



GREAT PANTHER MINING LIMITED

TECHNICAL REPORT ON THE 2019 MINERAL RESERVES AND MINERAL RESOURCES OF THE TUCANO GOLD MINE, AMAPÁ STATE, BRAZIL

Report for NI 43-101

Contributors:

Reno Pressacco, M.Sc. (A), P.Geo.

Jason J. Cox, P.Eng.

Goran Andric, P.Eng.

Fernando A. Cornejo, M.Eng., P.Eng.

Neil Hepworth, M.Sc., CEng MIMMM

Marcelo Antonio Batelochi, MAusIMM

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Technical Report on the 2019 Mineral Resources and Mineral Reserves of the Tucano Gold Mine, Amapá State, Brazil

Client Name & Address

Great Panther Mining Limited
1330-200 Granville St.
Vancouver, ON
V6C 1S4

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Lead Author

Reno Pressacco

(Signed)

Peer Reviewer

Chester Moore
Brenna Scholey

(Signed)
(Signed)

Project Manager Approval

Torben Jensen

(Signed)

Project Director Approval

Luke Evans

(Signed)

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Roscoe Postle Associates Inc.
now part of SLR Consulting Ltd
55 University Avenue, Suite 501
Toronto, ON M5J 2H7
Canada
Tel: +1 416 947 0907
Fax: +1 416 947 0395
mining@rpacan.com

TABLE OF CONTENTS

	PAGE
1 SUMMARY	1-1
Executive Summary	1-1
Economic Analysis	1-11
Technical Summary	1-12
2 INTRODUCTION	2-1
Sources of Information	2-1
List of Abbreviations	2-3
3 RELIANCE ON OTHER EXPERTS	3-1
4 PROPERTY DESCRIPTION AND LOCATION	4-1
Location	4-1
Mineral Tenure	4-1
Surface Rights	4-8
Royalties and Agreements	4-10
Environmental Liabilities	4-11
Permits and Other	4-11
5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY	5-1
Accessibility	5-1
Physiography	5-2
Climate	5-2
Infrastructure	5-3
6 HISTORY	6-1
Prior Ownership, Development, and Production History	6-1
Exploration	6-3
Previous Mineral Resource Estimates	6-13
7 GEOLOGICAL SETTING AND MINERALIZATION	7-1
Regional Geology	7-1
Property Geology	7-4
Local Geology and Mineralization	7-7
Mineralization Weathering Types	7-11
8 DEPOSIT TYPES	8-1
9 EXPLORATION	9-1
10 DRILLING	10-1
Drilling Summary	10-1
Drilling Methods	10-2
Surveys and Survey Coordinate System	10-15
Diamond Drill Core	10-15

Core Recovery	10-16
Drilling Orientation	10-16
Grade Control Drilling	10-16
Sampling.....	10-17
11 SAMPLE PREPARATION, ANALYSES, AND SECURITY	11-1
Sample Preparation	11-1
Sample Security	11-1
Sample Analysis	11-1
Sample Quality Assurance/Quality Control.....	11-2
Quality Assurance/Quality Control Data Analysis.....	11-2
12 DATA VERIFICATION	12-1
13 MINERAL PROCESSING AND METALLURGICAL TESTING	13-1
Summary	13-1
Historical Plant Performance	13-2
Test Work Review	13-10
Conclusions and Design Criteria	13-14
14 MINERAL RESOURCE ESTIMATE	14-1
Summary	14-1
Urucum Deposit.....	14-4
Tap AB Deposit	14-51
Urucum East and Duckhead Deposits.....	14-85
Tap C Deposit.....	14-99
Comparison to Previous Estimates.....	14-100
15 MINERAL RESERVE ESTIMATE	15-1
Summary	15-1
Open Pit Mineral Reserves.....	15-2
Underground Mineral Reserves.....	15-5
Comparison to Previous Estimates.....	15-8
16 MINING METHODS.....	16-1
Open Pit Mining	16-1
Pit Mining Quantities.....	16-26
Open Pit Production Schedule	16-27
Underground Mining Methods	16-34
17 RECOVERY METHODS	17-1
Summary	17-1
Crushing and Ore Stockpiling.....	17-3
Milling, Classification, and Pre-Leach Thickening	17-3
Hybrid CIL Circuit	17-3
Tailings	17-5
Elution.....	17-6
Carbon Regeneration	17-6
Electrowinning and Gold Recovery.....	17-6
18 PROJECT INFRASTRUCTURE	18-1

Context and Regional Infrastructure	18-1
Site Access and Logistics	18-2
Mining and Support Facilities	18-3
Contractor Facilities	18-4
Process Plant	18-5
Water	18-5
Power	18-7
Fire Protection	18-7
Communications	18-8
Security	18-8
Personnel and Personnel Logistics	18-8
Accommodation and Medical Care	18-9
Tailings Storage Facilities	18-10
19 MARKET STUDIES AND CONTRACTS	19-1
Markets	19-1
Contracts	19-2
20 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT	20-1
Project Permitting	20-1
Groundwater and Surface Water Monitoring	20-2
Fauna and Flora	20-5
Threatened and Special Status Species	20-7
Air Quality	20-7
Geotechnical	20-9
Hydrogeology and Hydrology	20-9
Cultural and Archaeological Resources	20-10
Regional Archaeological Context	20-10
Archaeological Studies	20-11
Social or Community Requirements	20-13
Mine Closure	20-15
21 CAPITAL AND OPERATING COSTS	21-1
Capital Costs	21-1
Open Pit Capital Cost	21-1
Underground Capital Cost	21-2
Operating Costs	21-4
22 ECONOMIC ANALYSIS	22-1
23 ADJACENT PROPERTIES	23-1
24 OTHER RELEVANT DATA AND INFORMATION	24-1
25 INTERPRETATION AND CONCLUSIONS	25-1
26 RECOMMENDATIONS	26-1
27 REFERENCES	27-1
28 DATE AND SIGNATURE PAGE	28-1

29 CERTIFICATE OF QUALIFIED PERSON	29-1
Reno Pressacco	29-1
Jason J. Cox	29-3
Goran Andric	29-4
Fernando A. Cornejo	29-6
Neil Hepworth	29-7
Marcelo Antonio Batelochi	29-8

LIST OF TABLES

	PAGE
Table 1-1 Mineral Resource Estimate as of September 30, 2019	1-2
Table 1-2 Mineral Reserve Estimate as of September 30, 2019	1-3
Table 4-1 Great Panther Mineral Tenure	4-4
Table 5-1 Monthly Rainfall From 2010 to 2019	5-2
Table 6-1 Summary of Gold Production	6-2
Table 6-2 Conductivity Test Results of a Sample of Pyrrhotite Rich Core from Urucum	6-9
Table 6-3 Number of Exploration Samples Collected by Sample Type and Company	6-10
Table 6-4 Summary of the Mineral Resources as of June 30, 2017	6-13
Table 6-5 Summary of the Mineral Reserves as of June 30, 2017	6-14
Table 7-1 Description of Mineralized Zones in Each Deposit	7-8
Table 10-1 Summary of Drilling by Year - Tap AB and Urucum Deposits	10-1
Table 11-1 Summary of QA/QC Sampling, 2019	11-4
Table 11-2 Total of Blind Reference Material Sent to SGS Chemex, 2019	11-7
Table 11-3 Total of Blind Reference Material Sent to Great Panther Onsite Laboratory, 2019	11-8
Table 13-1 SGS Geosol Samples	13-12
Table 13-2 SGS Geosol Bottle Roll Results	13-13
Table 13-3 Selected Design Criteria (Ausenco)	13-15
Table 14-1 Mineral Resource Estimate as of September 30, 2019	14-2
Table 14-2 Summary of the Urucum Drill Hole Database as of September 30, 2019	14-6
Table 14-3 Summary of the Mineralized Wireframes - Urucum Deposit	14-11
Table 14-4 Descriptive Statistics of Capped and Uncapped Raw Assays	14-14
Table 14-5 Descriptive Statistics of Capped and Uncapped Compositing Assays	14-16
Table 14-6 Descriptive Statistics of the Compositing Density Measurements By Rock Type - Urucum Deposit	14-18
Table 14-7 Summary of Correlogram Parameters - Urucum Central Lodes	14-25
Table 14-8 Summary of Block Model Origin and Extents - Urucum Deposit	14-26
Table 14-9 Summary of Block Model Attributes - Urucum Deposit	14-27
Table 14-10 Summary of Search Strategy and Interpolation Parameters - Urucum Deposit	14-28
Table 14-11 Summary of Initial Classification Criteria - Urucum Deposit	14-29
Table 14-12 Comparison of Composite Average Grades with Block Estimates - Urucum Deposit	14-35
Table 14-13 Summary of Mineral Resource Pit Shell Input Parameters - Urucum Deposit	14-41
Table 14-14 Sensitivity Analysis - Urucum Deposit	14-42

Table 14-15	Summary of the Open Pit Mineral Resources as of September 30, 2019 - Urucum Deposit.....	14-42
Table 14-16	Summary of the Mineral Resource Database – Urucum North Deposit.....	14-44
Table 14-17	Summary of the Underground Portion of the Mineral Resource Database – Urucum North Deposit.....	14-44
Table 14-18	Summary of Search Parameters – Urucum North Deposit.....	14-47
Table 14-19	Block Model PArAmeters - Urucum North Deposit	14-47
Table 14-20	Summary of the Underground Mineral Resource Estimate as of September 30, 2019 - Urucum North Deposit.....	14-49
Table 14-21	Summary of the Underground Mineral Resource Estimate as of September 30, 2019 - Urucum Central Deposit	14-50
Table 14-22	Summary of the Tap AB Drill Hole Database as of September 30, 2019...	14-53
Table 14-23	List of Mineralized Wireframes by Area - Tap AB Deposit	14-57
Table 14-24	Descriptive Statistics of Uncapped Raw Assays - Tap AB Deposit.....	14-59
Table 14-25	Descriptive Statistics of Capped Raw Assays - Tap AB Deposit	14-60
Table 14-26	Descriptive Statistics of Capped Composited Assays - Tap AB Deposit....	14-61
Table 14-27	Summary of Dry Bulk Densities by Lithology - Tap AB Deposit	14-63
Table 14-28	Summary of Variogram Parameters - Tap AB Deposit	14-72
Table 14-29	Summary of Block Model Origin and Extent - Tap AB Deposit	14-73
Table 14-30	Summary of Block Model Attributes - Tap AB Deposit.....	14-73
Table 14-31	Summary of Search Strategies - Tap AB Deposit	14-74
Table 14-32	Summary of Mineral Resource Pit Shell Input Parameters - Tap AB Deposit.....	14-82
Table 14-33	Sensitivity Analysis - Tap AB Deposit	14-82
Table 14-34	Summary of the Open Pit Mineral Resource Estimate as of September 30, 2019 - Tap AB Deposit	14-83
Table 14-35	Summary of the Underground Mineral Resource Estimate as of September 30, 2019 - Tap AB Deposit	14-84
Table 14-36	Summary of the Resource Database - Duckhead Deposit.....	14-86
Table 14-37	AMC Gold Cut-off Grades used for NEsted Grade Shells – Duckhead Deposit	14-87
Table 14-38	Summary of Search Parameters – Duckhead Deposit.....	14-89
Table 14-39	Block Model Parameters – Duckhead Deposit.....	14-89
Table 14-40	Summary of Mineral Resource Pit Shell Input Parameters – Duckhead Deposit	14-91
Table 14-41	Summary of the Open Pit and Underground Mineral Resource Estimates as of September 30, 2019 - Duckhead Deposit	14-92
Table 14-42	Summary of the Resource Database – Urucum East Deposit	14-93
Table 14-43	Mineralized Domains - Urucum East Deposit.....	14-94
Table 14-44	Summary of Search Parameters – Urucum East Deposit	14-96
Table 14-45	Block Model PArAmeters – Urucum East Deposit.....	14-96
Table 14-46	Summary of Mineral Resource Pit Shell Input Parameters – Urucum East Deposit	14-98
Table 14-47	Summary of the Open Pit and Underground Mineral Resource Estimate as of September 30, 2019 - Urucum East Deposit.....	14-99
Table 14-48	Comparison of Current and Previous Mineral Resource Estimates	14-100
Table 15-1	Summary of the Mineral Reserve Estimate as of September 30, 2019	15-1
Table 15-2	Dilution and Mineral Extraction Estimates	15-4
Table 15-3	Pit Marginal Cut-Off Grade Estimate	15-5
Table 15-4	Underground Cut-Off Grade Estimate	15-6
Table 15-5	MSO Parameters.....	15-7
Table 15-6	Comparison of Current and Previous Mineral Reserves Estimates	15-8

Table 16-1	Mine Production History	16-1
Table 16-2	Geotechnical Design Recommendations	16-3
Table 16-3	Pit Overall Slope Angle Estimate	16-9
Table 16-4	Net Block Value Input Parameters	16-10
Table 16-5	Pit Optimization Results	16-11
Table 16-6	Selected Pit Shell Quantities	16-13
Table 16-7	Pit Design Parameters	16-14
Table 16-8	Pit Mining Quantities	16-26
Table 16-9	Pit Stockpile Inventory as of September 30, 2019	16-28
Table 16-10	Open Pit Production Schedule	16-29
Table 16-11	Mining Fleet.....	16-31
Table 16-12	Operating Hours per Shift.....	16-32
Table 16-13	Equipment Productivity and Utilization factors	16-32
Table 16-14	Current Manpower.....	16-33
Table 16-15	Range Of Q' and RMR Values	16-36
Table 16-16	Slope Design Factors and Hydraulic Radius.....	16-36
Table 16-17	Underground Life of Mine Plan.....	16-47
Table 16-18	Underground Workforce	16-48
Table 16-19	Mining Department Employees - Excluding Underground Equipment Operators and Maintenance Personnel.....	16-49
Table 18-1	Summary of TSF Storage Capacity – Updated on December 11, 2019	18-11
Table 18-2	Geometric Characteristics of the East Extension NW TSF	18-24
Table 20-1	Main Licences and Status	20-1
Table 20-2	Closure Plan Total Cost	20-15
Table 21-1	Project Capital Cost.....	21-1
Table 21-2	Underground Capital Cost.....	21-2
Table 21-3	Operating Cost 2016 to 2019	21-5
Table 21-4	LOM Open Pit Operating Cost	21-6
Table 21-5	U&M Unit Mining Cost - Ore	21-8
Table 21-6	U&M Unit Mining Cost – Waste Rock.....	21-8
Table 21-7	U&M Ore Rehandle Cost.....	21-9
Table 21-8	LOM Underground Total Operating Costs by Major Area	21-9
Table 21-9	LOM Underground Total Operating Costs by Year	21-9
Table 21-10	LOM Average Underground Total Operating Costs	21-10
Table 21-11	Process Plant Operating Cost	21-10
Table 21-12	General and Administration Cost	21-11
Table 21-13	Head Office Administration Cost	21-12

LIST OF FIGURES

	PAGE
Figure 4-1	Location Map.....
Figure 4-2	Mineral Rights Holdings
Figure 4-3	Surface Rights Holdings.....
Figure 5-1	Monthly Rainfall from 2014 to 2019
Figure 5-2	Site Plan.....
Figure 6-1	Merged Airborne Magnetic Total Magnetic Image (AS)
Figure 6-2	Spectrem Electromagnetic Image
Figure 6-3	Photo of the Conductivity Test Sample

Figure 6-4	Tenement Status Map Showing the Coverage of Soil Sampling	6-11
Figure 6-5	Serra da Canga East Stream Sediment Anomaly	6-12
Figure 7-1	Regional Geology Map	7-3
Figure 7-2	Stratigraphic Column	7-5
Figure 7-3	Property Geology Map	7-6
Figure 7-4	Deposit Location Map	7-9
Figure 7-5	Foliation-Parallel Pyrrhotite Mineralization - Urucum Central Open Pit	7-12
Figure 7-6	Remobilized Pyrrhotite Veins - Urucum Central Open Pit	7-13
Figure 7-7	Pyrrhotite Veining in Drill Core	7-14
Figure 8-1	Reconstruction of the Guiana Craton and West Africa Shield	8-1
Figure 10-1	Drill Hole and Channel Sample Location Plan	10-4
Figure 10-2	Drill Hole and Channel Sample Location Plan - Tap AB Deposit	10-5
Figure 10-3	Example Cross Section 94,840N - Tap AB Deposit	10-6
Figure 10-4	Drill Hole and Channel Sample Location Plan - Urucum Deposit	10-7
Figure 10-5	Example Cross Section 98,620 N - Urucum Deposit	10-8
Figure 10-6	Mobilization of RAB Drill and its Compressor	10-10
Figure 10-7	View of a RAB Drill While Drilling	10-10
Figure 10-8	Sample Collection Procedure for a RAB Drill Hole	10-11
Figure 10-9	Sample Collection and Location of Drill Holes	10-12
Figure 10-10	Drilling Procedures for Auger Holes	10-13
Figure 10-11	Sample Collection Procedure for Auger Holes	10-13
Figure 10-12	Grade Control Drilling - Urucum North Deposit	10-14
Figure 11-1	2019 CRMs Submitted to the SGS Chemex laboratory	11-5
Figure 11-2	2019 CRMs Submitted to the Onsite Laboratory	11-5
Figure 11-3	2019 Blank Sample Results, Resource Definition Assaying (SGS Geosol) ..	11-6
Figure 11-4	2019 Blank Sample Results, Grade Control Assaying (Tucano Gold Mine Lab)	11-6
Figure 11-5	Sample Control Chart for CRM G911-1	11-9
Figure 11-6	Field Duplicate Charts (SGS Geosol vs ALS Chemex)	11-10
Figure 11-7	Pulp Duplicate Charts (Tucano Gold Mine Laboratory vs SGS Geosol)	11-12
Figure 13-1	% Sulphide Ore Processed (2016 to 2019)	13-3
Figure 13-2	% Sulphide Ore Processed (2016 to 2019)	13-4
Figure 13-3	% Plant Availability (2016 to 2019)	13-5
Figure 13-4	% Gold Recovery (2016 to 2019)	13-6
Figure 13-5	Gold Recovery in CIL Tank 1	13-7
Figure 13-6	Relationship Between g/t Au and % Gold Recovery	13-8
Figure 13-7	Size of Leach Feed (2016 to 2019)	13-9
Figure 13-8	Cyanide Consumption Rates (2016 to 2019)	13-10
Figure 14-1	Plan View of the As-Mined Surface for the Urucum Deposit as of September 30, 2019	14-5
Figure 14-2	Lithology and Mineralization, 149 Bench - Urucum Deposit	14-8
Figure 14-3	Pegmatite Intruding BIF - Tucano Gold Mine	14-9
Figure 14-4	Lithology and Weathering, Section 99,040N - Urucum Deposit	14-10
Figure 14-5	Upper Tail Histogram - Urucum South Deposit	14-12
Figure 14-6	Upper Tail Histogram - Urucum Central Deposit	14-13
Figure 14-7	Upper Tail Histogram - Urucum North Deposit	14-13
Figure 14-8	Histogram of Sample Lengths - Urucum Central Deposit	14-15
Figure 14-9	Distribution of Composited Density Measurements by Rock Type, Oxidized Zone - Urucum Deposit	14-19
Figure 14-10	Distribution of Composited Density Measurements by Rock Type, Fresh Rock - Urucum Deposit	14-19

Figure 14-11 Longitudinal Projection of the Gold Distribution, Lode 28 - Urucum North Deposit	14-21
Figure 14-12 Longitudinal Projection of the Gold Distribution, Lode 25 - Urucum North Deposit	14-22
Figure 14-13 Longitudinal Projection of the Gold Distribution, Lode 2 - Urucum Central Deposit	14-23
Figure 14-14 Longitudinal Projection of the Gold Distribution, Lode 20 - Urucum Central (South) Deposit.....	14-24
Figure 14-15 Sample Correlograms - Urucum Central Lodes	14-25
Figure 14-16 Comparison of Contoured vs. Estimated Gold Grades - Lode 28, Urucum North Deposit.....	14-31
Figure 14-17 Comparison of Contoured vs. Estimated Gold Grades - Lode 25, Urucum North Deposit.....	14-32
Figure 14-18 Comparison of Contoured vs. Estimated Gold Grades - Lode 20, Urucum Central Deposit.....	14-33
Figure 14-19 Comparison of Contoured vs. Estimated Gold Grades - Lode 2, Urucum Central Deposit.....	14-34
Figure 14-20 Swath Plots - Lode 28, Urucum North Deposit.....	14-37
Figure 14-21 Swath Plots - Lode 25, Urucum North Deposit.....	14-38
Figure 14-22 Swath Plots - Lode 20, Urucum Central Deposit.....	14-39
Figure 14-23 Swath Plots - Lode 2, Urucum Central Deposit.....	14-40
Figure 14-24 Plan View of the As-Mined Surface for the Tap AB Open Pit as of April 19, 2019.....	14-52
Figure 14-25 Lithology and Mineralization, 100 Bench - Tap AB Deposit	14-55
Figure 14-26 Lithology and Weathering, Section 94,240N - Tap AB Deposit	14-56
Figure 14-27 Upper Tail Histogram – AB 1 and Torres Areas.....	14-58
Figure 14-28 Upper Tail Histogram - AB 3 Area.....	14-59
Figure 14-29 Upper Tail Histogram of the Sample Lengths Within the Mineralized Wireframes - Tap AB Deposit.....	14-61
Figure 14-30 Histogram of the Dry Bulk Densities for the Un-weathered Banded Iron Formation - Tap AB Deposit.....	14-62
Figure 14-31 Longitudinal Projection of Lode S03 - Tap AB 3 Deposit	14-65
Figure 14-32 Longitudinal Projection of Lode S16 - Tap AB 3 Deposit	14-66
Figure 14-33 Longitudinal Projection of Lode S01 - Tap AB 1 Deposit	14-67
Figure 14-34 Longitudinal Projection of Lode S02 - Tap AB 1 Deposit	14-68
Figure 14-35 Sample Variograms, Wireframe S03 – Tap AB 3 Deposit.....	14-70
Figure 14-36 Sample Variograms, Wireframe S02 - Tap AB 1 Deposit	14-71
Figure 14-37 Comparison of Contoured vs. Estimated Gold Grades, Lode S03 - Tap AB Deposit	14-76
Figure 14-38 Comparison of Contoured vs. Estimated Gold Grades, Lode S16 - Tap AB Deposit	14-77
Figure 14-39 Comparison of Contoured vs. Estimated Gold Grades, Lode S01 - Tap AB Deposit	14-78
Figure 14-40 Comparison of Contoured vs. Estimated Gold Grades, Lode S02 - Tap AB Deposit	14-79
Figure 14-41 Swath Plot by Northing, Lode S03 - Tap AB Deposit.....	14-80
Figure 14-42 Swath Plot by Elevation, Lode S03 - Tap AB Deposit.....	14-81
Figure 16-1 Pit Wall in Urucum Pit	16-5
Figure 16-2 Geotechnical Sectors	16-8
Figure 16-3 Urucum North Ultimate Pit Design with A-A' Long Section	16-15
Figure 16-4 Urucum Central North Ultimate Pit Design with B-B' Long Section.....	16-16
Figure 16-5 Urucum Central South Ultimate Pit Design with C-C' Long Section.....	16-17

Figure 16-6	Urucum South Ultimate Pit Design with D-D' Long Section	16-18
Figure 16-7	Tap AB 1 Ultimate Pit Design with E-E' Long Section	16-19
Figure 16-8	Tap AB 3 Ultimate Pit Design with F-F' Long Section	16-20
Figure 16-9	Duckhead Ultimate Pit Design with G-G' Long Section	16-21
Figure 16-10	Urucum East Ultimate Pit Design with H-H' Long Section	16-22
Figure 16-11	Tap AB Waste Rock Dumps	16-24
Figure 16-12	Urucum Waste Rock Dumps	16-25
Figure 16-13	Total Material Mined by Rock Type	16-30
Figure 16-14	Plant Feed by Rock Type	16-30
Figure 16-15	Longitudinal Section - Urucum North Underground Mine	16-35
Figure 16-16	Modified Mathews Short-Term Stability Estimate	16-37
Figure 16-17	3D Schematic of Up-Hole Retreat Mining Method	16-40
Figure 16-18	Long Projection Indicating Up-Hole Retreat Mining Sequence	16-41
Figure 16-19	Long Projection Indication Primary Ventilation System	16-43
Figure 17-1	Tucano Simplified Process Flow Sheet	17-2
Figure 18-1	U&M Workshop Facilities	18-5
Figure 18-2	Tap D Embankments	18-13
Figure 18-3	Typical Wall Cross Section Schematic	18-14
Figure 18-4	WPP1 Embankments	18-15
Figure 18-5	Wall 11 Cross Section Schematic	18-16
Figure 18-6	NMP Embankments	18-18
Figure 18-7	Integrated WPP1 and NMP TSFs	18-20
Figure 18-8	Proposed TSF Expansion	18-22
Figure 18-9	Typical Cross Section of Walls 21 and 22	18-23
Figure 18-10	Typical Cross Section of Walls 23 and 24	18-25
Figure 18-11	East Dam – Extension NW	18-26
Figure 18-12	WPP1 and WPP2 TSF Layout	18-28
Figure 20-1	Location Map of Field Visit Monitoring Points	20-4
Figure 20-2	Ceramics Fragments Found in “Sitio 1” of Mutum Area	20-12
Figure 20-3	Location Map of Affected Communities	20-14

1 SUMMARY

EXECUTIVE SUMMARY

Roscoe Postle Associates Inc. (RPA), now part of SLR Consulting Ltd (SLR), was retained by Great Panther Mining Limited (Great Panther) to prepare a Technical Report on its Tucano Gold Mine (the Mine or Tucano), located in Amapá State, Brazil. Great Panther acquired the Tucano Gold Mine in March 2019 and holds a 100% interest in the Mine. The purpose of this Technical Report is to support the disclosure of the Mineral Resource and Mineral Reserve estimates for the Tucano Gold Mine as of September 30, 2019. This Technical Report conforms to National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101).

Great Panther is a Canadian gold mining, development, and exploration company which owns the Tucano Gold Mine located in Brazil and the Guanajuato Mine Complex and the Topia Mine located in Mexico. Great Panther also owns the Coricancha Project in Peru. The common shares of Great Panther are listed on both the Toronto Stock Exchange and the New York Stock Exchange and trade under the symbol GPR in Canada and GPL in the USA.

The Tucano Gold Mine is a well established open pit mining operation comprising four open pits, Urucum, Urucum East, Tap AB, and Duckhead. The mine production to date has been sourced from all deposits except Urucum East. As of December 31, 2019, the Mine has produced a total of approximately 1,300,000 ounces of gold since commencing operation in 2005. As well as the open pits, the Tucano Gold Mine includes an underground mine Project which sits below the Urucum North open pit.

This report presents the first Mineral Resource and Mineral Reserve estimates for the Mine under Great Panther's ownership. The effective date of the Mineral Resource and Mineral Reserve estimates is September 30, 2019.

All currency in this report is US dollars (US\$) unless otherwise noted.

The Mineral Resource estimate for the Tucano Gold Mine, as of September 30, 2019, is presented in Table 1-1. The Mineral Resource estimate conforms to Canadian Institute of

Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves (CIM (2014) definitions).

TABLE 1-1 MINERAL RESOURCE ESTIMATE AS OF SEPTEMBER 30, 2019
Great Panther Mining Limited – Tucano Gold Mine

Category	Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)
Measured			
Open Pit	1,775	1.76	100
Underground	-	-	-
Surface Stockpile	3,786	0.61	74
Total Measured	5,562	0.97	174
Indicated			
Open Pit	4,521	2.32	338
Underground	3,399	4.1	448
Surface Stockpile	-	0	-
Total Indicated	7,920	3.09	786
Measured & Indicated			
Open Pit	6,296	2.16	438
Underground	3,399	4.1	448
Surface Stockpile	3,786	0.61	74
Total Measured & Indicated	13,482	2.22	960
Inferred			
Open Pit	18	3.21	2
Underground	11,646	2.16	810
Surface Stockpile	-	0	-
Total Inferred	11,664	2.16	812

Notes:

1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated at various cut-off grades depending on mining method and mineralization style.
3. Mineral Resources are estimated using a long-term gold price of US\$1,500/oz Au, and a US\$/Brazilian real (R\$) exchange rate of 3.8.
4. A minimum mining width of 3 m was used for preparation of mineralization wireframes for the Urucum open pit and Taperebá AB (Tap AB) open pit and underground Mineral Resources.
5. Mineral Resources are inclusive of Mineral Reserves.
6. Mineral Resource statements are prepared using constraining surfaces and volumes for open pit and underground Mineral Resources, respectively.
7. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
8. Numbers may not add due to rounding.

The Mineral Reserve estimate for the Tucano Gold Mine as of September 30, 2019 is presented in Table 1-2.

TABLE 1-2 MINERAL RESERVE ESTIMATE AS OF SEPTEMBER 30, 2019
Great Panther Mining Limited – Tucano Gold Mine

Category	Tonnage (000 t)	Grade (g/t Au)	Contained Metal (000 oz Au)
Proven			
Open Pit	1,212	1.79	70
Underground	189	3.78	23
Surface Stockpiles	2,446	0.71	56
Probable			
Open Pit	3,297	2.20	233
Underground	1,976	4.17	265
Surface Stockpiles	-	-	-
Proven & Probable			
Open Pit	4,509	2.09	302
Underground	2,164	4.13	288
Surface Stockpiles	2,446	0.71	56
Total Proven & Probable	9,119	2.20	646

Notes:

1. CIM (2014) definitions were followed for Mineral Reserves.
2. Open pit Mineral Reserves are estimated within designed pits above marginal cut-off grades that vary from 0.51 g/t Au to 0.62 g/t Au for oxide ore and 0.65 g/t Au to 0.72 g/t Au for sulphide ore. The cut-off grades are derived based on a gold price of US\$1,250/oz Au and operating costs sourced from the current operations and mining contracts at an US\$/R\$ exchange rate of 3.8:1.
3. Mineral Reserves incorporate estimates of dilution and mineral losses.
4. Underground Mineral Reserves were estimated using an incremental cut-off grade of 2.4 g/t Au.
5. A minimum mining width of 20 m was used for open pit Mineral Reserves and 3 m was used for underground Mineral Reserves.
6. The Mineral Reserve estimate includes stockpile inventory.
7. Average metallurgical process recovery: 93%.
8. Bulk density is 2.19 t/m³.
9. Numbers may not add due to rounding.

RPA is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource and Mineral Reserve estimates.

CONCLUSIONS

Based on the site visit, discussions with Project personnel, and available information, RPA and Great Panther offer the following conclusions:

GEOLOGY AND MINERAL RESOURCES

- The gold mineralization at the Urucum and Tap AB deposits is observed to be related to elevated abundances of pyrrhotite that occurs in both stratiform and cross-cutting relationships with the host rocks. The primary host rock has been a banded iron formation (BIF), with other host rocks containing lesser quantities of gold.

- Digital interpretations of the distribution of the gold mineralization for the Urucum and Tap AB deposits were prepared by RPA using Seequent Limited's Leapfrog software package. The mineralization wireframes were created using a nominal cut-off grade of 0.5 g/t Au across a minimum width of three metres to align with the cut-off grade and minimum width criteria that are currently being employed by the Mine staff for establishing the ore/waste dig packets at the Urucum deposit.
- Review of the resulting contoured grade longitudinal sections for the selected lodes at the Urucum deposit suggests that, in general, the higher gold grades occur as small pockets up to a few tens of metres in size. In places, these higher grade pockets are contained within broader, lower grade zones which locally exhibit shallow northerly plunges. Flat-lying plunges, and steep southerly plunges are also suggested on a more local scale.
- The down-plunge limits of many of the higher grade mineralized shoots at Urucum do not appear to be defined by drilling in the wireframes examined.
- Examination of the grade distribution for wireframe S03 of the Tap AB deposit reveals that this wireframe has been systematically evaluated by diamond drilling at a spacing of approximately 50 m x 50 m to a depth of approximately 200 m below the current mining surface. The density of drill hole and sample information increases at shallow levels where information from grade control drilling programs is available. The drilling has identified several zones of elevated gold grades. In general, these higher grade zones appear to be oriented along a moderate to steep north plunge. The higher grade zones located immediately below the mining surface in the AB 1 portions of the zone occur as pods approximately 25 m to 50 m in size.
- The down-plunge limits of many of the higher grade mineralized shoots within the S03 wireframe of the Tap AB deposit do not appear to be defined by drilling in the wireframes examined.
- The 2019 Tucano Mineral Resource estimate resulted in a 51% reduction in Measured and Indicated gold ounces, relative to the previous (June 30, 2017) estimate, after accounting for a 62% reduction in ore tonnage and a 27% increase in gold grades.
 - The 2019 geological interpretation of the mineralized zones is the most significant factor explaining the reduction in resource tonnage. RPA and Great Panther interpreted mineralized zones as discrete lodes, which in turn were used to constrain the block grade estimates. The 2017 resource model used a geostatistical approach with limited manual interpretation.

MINING AND MINERAL RESERVES

- The 2019 Mineral Reserve estimate resulted in a 43% reduction in gold ounces compared to the previous (June 30, 2017) estimate as the 51% reduction in ore tonnes is partly offset by a 17% improvement in average gold grades.
 - The decrease is primarily due to the change in the underlying Mineral Resources, as well as an increase in cut-off grades to reflect current operating parameters.

Open Pit Mining

- The Mine is a mature open pit mining operation in a steady state of mining production. The operations are sufficiently established to provide the basis of much of the technical and economic inputs required for this study.

- Economic analysis confirms the economic viability of the open pit Mineral Reserves at the base gold price of US\$1.250/oz.
- Pit optimizations were carried out on Measured and Indicated Mineral Resources using a block net value (block value = block revenue – block total operating cost), including allowances for dilution and mining loss, and preliminary estimates for pit overall slope angles (OSA).
- Individual pit shell selection was made based on a gold price of US\$1,250/oz Au for Urucum Central South and Urucum Central North, US\$1,350/oz Au for Tap AB 1, Tap AB 3 and Duckhead, US\$1,450/oz Au for Urucum North and Urucum East, and US\$1,500/oz Au for Urucum South. These pit shells were used to guide the ultimate pit design.
- In order to determine if material within the open pit should be sent to the mill for processing or to the waste rock dump, a marginal cut-off grade has been calculated. The marginal cut-off grade, which is referred to as the “Open Pit Discard Cut-off” in the CIM Estimation of Mineral Resource and Mineral Reserves Best Practice Guidelines, differs from the breakeven cut-off-grade since mining costs are excluded from the calculation. The reason for excluding the mining costs is that material already defined to be within the limits of the open pit must be mined regardless if it is classified as ore or waste in order to access the bench below.
- The mine planning block model is based on the resource model regularized to the minimum practical size dig block (i.e., selective mining unit), that can be selectively excavated by mining equipment currently employed on site. Each block in the regularized model contains the quantities of diluted mineralized tonnes and grades including the tonnages of mining dilution and ore loss, where ore loss (%) = 100% - mining recovery (%). Mining dilution comprises internal dilution inherited during the model regularization and external (contact) dilution resulting from geological/geometric contacts with waste rock.
- Geotechnical and pit design parameters are based on data, information, and results from previous geotechnical studies and incorporate the pre-split drilling and controlled blasting. There is a risk that the failure to attain the design pit slopes could result in pit wall instability and the loss of ore at the pit bottom.
- The west wall of the Urucum Central South pit underwent slope displacement on October 6, 2019. Since then, the pit has been closed to mining while Great Panther works toward a remediation plan with the assistance of the independent consulting firm Knight Piésold & Co. This pit remains in Mineral Reserves, however, the pit design may be subject to revision once the results of the remediation plan are available.
- All pits have been designed with 4 m operating bench heights. To maximize ore selectivity and minimize dilution, it is expected that ore will be mined on 4 m benches.
- The catch-berms in fresh rock are stacked at 24 m intervals (Urucum) and 20 m intervals (other pits). It is believed that it may be possible in some higher elevation areas to mine fresh waste rock on 8 m or 12 m high benches, which is more cost effective and may facilitate higher pit sinking rates in terms of vertical metres per year. This is considered a future opportunity that has not been incorporated into the base case mine plan.
- The ultimate pit designs contain sufficient run-of-mine (ROM) quantities to support a 10,000 tonnes per day (tpd) processing rate through to late 2021. The open pit Mineral Reserves are included in eight pits, with two largest pits, Urucum and Tap AB

containing 95% of the total open pit Mineral Reserves. Oxide ore contributes 22% of the total open pit ore mined. The life-of-mine (LOM) average strip ratio is 6:1.

- Mine waste dumps are located adjacent to the pits, to minimize hauling requirements. Waste dumping platforms are laid out to facilitate dump re-sloping at mine closure.
- The LOM production schedule has been prepared quarterly based on the mining activities commencing in Q4 2019. The pit production is founded on mining the ultimate pit bench-by-bench without phases or subdivisions. The LOM pit mining rate averages approximately 66,000 tpd and includes both mineralization and waste material.
- The plant feed comprises the ROM ore from the pit and from the stockpiles. The pit ROM production is projected to be a direct feed to the crusher, complemented with the ROM from the stockpiles re-handled on as needed basis.
- Contractor mining is carried out by U&M Mineração e Construção S.A. (U&M), one of the largest mining contractors in Brazil, using conventional open pit methods, consisting of the following activities:
 - Drilling performed by conventional production drills.
 - Blasting using emulsion explosives and a downhole delay initiation system.
 - Loading and hauling operations performed with hydraulic shovel, front-end loader, and rigid frame and articulated haulage trucks.
- The owner's personnel monitor the mining contractor and provide engineering support including survey and grade control. Operations run 24 hours per day, seven days a week, on an eight-hour shift rotation.
- The open pit is scheduled to operate 365 days per year, 24 hours per day. The U&M work schedule utilizes four crews working eight-hour shifts.
- Equipment productivity and utilization factors and equipment operating hour estimates are based on seasonal conditions (dry, transitional, or wet season during the calendar year), rock type, and various mining conditions including different bench mining width and ramp width.
- The mine manpower at the end of September 2019 is estimated at approximately 1,493 employees. This includes owner's and contractor's workforce. The ongoing pit operations will require this level of manpower for most of the next two years.
- Open pit operating costs are estimated to average R\$13.35/t mined (\$3.51/t moved at a R\$/US\$ exchange rate 3.8:1) and includes owner and contract mining operating costs. The cost is estimated based on material quantities and unit costs supplied from existing operations comprised of actual 2019 operating costs, projected operating costs, and the current mining contracted rates. The pit operating cost estimate was developed based on cost for drilling, blasting, loading, and hauling and includes labour costs and costs for consumables (diesel, explosive, parts, etc.).

Underground Mining

- Underground Mineral Reserves are based on a 2016 Pre-Feasibility Study (PFS) carried out by AMC Consultants Pty Ltd. (AMC). RPA reviewed the AMC PFS, and made the following adjustments:
 - Updated the cost estimates to reflect current inputs and a stand-alone underground mining scenario.

- Updated cut-off grades.
- Filtered out stopes that no longer met updated cut-off grades.
- Rebalanced the production schedule.
- Modern trackless mobile equipment is proposed for the development and stoping operations.
- The mine will be accessed by a single portal located at the northern end of Urucum North and twin declines (north and south) based on an orebody strike length of >800 m.
- Level intervals will be 20 m (based on 15 m production blastholes and the narrow width of some lodes) with crosscuts between the decline and the mineralization, every 20 vertical metres (vm).
- Declines have been designed to allow equipment access to each production level. On each level a crosscut will be developed from the decline to the ore lode/lodes. Decline and crosscut development have been designed at 5.0 m wide x 5.0 m high, sufficient to accommodate 30 t to 40 t trucks.
- Ore drives have been designed to be 5.0 m high x 4.0 m wide to accommodate production drills and 10 t load-haul-dump (LHD) units. Trucks will not enter the ore drives.
- All waste will be tipped directly into stopes or trucked to surface.
- Approximately 2.1 million tonnes (Mt) of ore at an average grade of 4.1 g/t Au will be mined and processed over the 6.5 mine life.
- All ore production and mine development is proposed to be done by contractors; this includes all waste rock filling.
- Ventilation will be provided via a pull-type (exhausting) system with primary fans located on surface at the top of each of two primary exhaust raises.
- With the infrastructure airflow and leakage and balancing allowances, the total airflow determination based on the diesel fleet size is 350 m³/s.
- Evaluation of the planned production rate and scheduling indicates that the deposit supports 450,000 tonnes per annum (tpa) to 500,000 tpa. Production rates vary from year to year depending on the number of production fronts becoming available in different areas of the mine.
 - There are opportunities for further optimization of the production rate in future studies, particularly if additional areas are considered for underground mining (e.g., Urucum Central).
- Major scheduling assumptions driving these production rates include: decline and crosscut advance of 140 m/month, ore drive advance of 60 m/month, production rate from stoping of 10,000 t/month for both Uphole retreat and Benching stopes, backfilling rate of 12,000 m³ per month, per stope, for Benching stopes. All scheduling assumptions are based on industry benchmarked data.
- Scheduling has been based on maintaining a nearly constant number of primary mobile equipment in both the North and South declines.
- Workforce size at full production is estimated to be 240 employees, based on three eight-hour shifts.

- The underground mine would use some of the existing infrastructure built for the open pit operations such as the explosives magazines and warehouse.
- Mining costs are estimated to be \$50.00/t of ore milled and total operating costs, inclusive of processing and G&A, are estimated to be \$75.80/t of ore milled.
- An economic assessment of the Underground Mineral Reserves confirms that they are economically viable at the base gold price of \$1,250/oz.

MINERAL PROCESSING

- A new grinding configuration (semi-autogenous grinding + ball mill) has allowed Tucano to increase the percentage of sulphide ore in the overall plant blend without substantially affecting their target throughput. This was done while maintaining the % passing at 75 µm to 85 µm.
- The plant was originally designed to run at 3.4 million tonnes per annum (Mtpa) considering 90% Sulphide in the blend. The plant blend from May to September 2019 was close to 95% sulphide ore and 5% oxide material and the average annual plant throughput was 3.1 Mtpa, however, this annual figure was affected by lower plant availabilities (i.e., 89%) due to other issues experienced in the plant such as mill grade breakages, power issues and also, issues with the old primary crusher.
- The increasing percentage of sulphide ore has not adversely affected plant gold recoveries. On the contrary, the new oxygen plant commissioned in April 2019 has contributed to higher metal recoveries, which resulted in an average gold recovery of 93% from May to December 2019.

INFRASTRUCTURE

- The Mine is currently operating and has all of the required infrastructure to carry on operations. Additional surface infrastructure will be required to support the underground operation.
- The remaining tailings storage facility (TSF) capacity is 1,879 Mm³, which is sufficient for eight months, from December 2019 to June 2020.
- The Mine plans to extend the tailings storage capacity by commissioning three new TSFs, East Dam, East-NW Extension, and West Pond Phase 2 (WPP2), which together will provide approximately 32 Mm³ of tailings storage.

ENVIRONMENT, PERMITTING, AND SOCIAL ASPECTS

- The Tucano Gold Mine is in possession of all licences required for the operation of the mine, mill, processing plant, and TSFs in compliance with Brazilian regulations. There is currently one licence that is in the process of being renewed and is expected by the third quarter of 2020. While in the process of renewal the current licence remains valid.
- Continuous monitoring programs are carried out at the Project, which confirm that there are no material concerns pertaining to non-compliance.
- The Mine implements stakeholder engagement and social investment programs focused in three main areas: socio-economic development, public health and safety, and education. The social performance practices at the Project are effective and

enable the Mine to maintain a good level of social acceptance. No significant issues with the local communities have been identified since production re-started in 2012.

RECOMMENDATIONS

Based on the site visit and subsequent review of the available documentation, the following recommendations are offered:

GEOLOGY AND MINERAL RESOURCES

- Evaluate the potential for adjacent lithologies to the BIF and carbonate units for their potential of hosting significant quantities of gold mineralization.
- Carry out a program of assay-to-extinction to more fully understand the nature of the gold distribution of the mineralized samples.
- Determine the genetic and temporal relationships between the gold mineralization and the pegmatite units.
- Prepare a separate series of underground wireframe interpretations for the Urucum deposit using cut-off grade and minimum width criteria that are reflective of the envisioned operational scenario for an underground mining operation.
- Review the capping value applied to the short term grade control block model in consideration of all available drill hole and sample information, as well as all information collected from the plant reconciliation studies.
- Carry out additional drill testing to define and outline the extents of the higher grade mineralized shoots found at the Urucum deposit.
- Continue contouring exercises for the remainder of the mineralized wireframes present at the Urucum deposit as aids in conducting future variogram analyses as well as aids for developing exploration targets. These contouring exercises should examine not only the distribution of the gold grades alone, but also examine the grade times thickness product.
- For future updates to the Urucum long term Mineral Resource block models, use common origins with the short term grade control block models.
- Prepare future long term block models for the Urucum deposit using more stringent search strategies that are designed to improve the accuracy of the estimated grades at the local level.
- Carry out future updates to the Urucum long term Mineral Resource block models using a sub-blocked block model framework so that the volumes and grades of the mineralized wireframed can be easily modelled with a high degree of accuracy.
- Ensure that the estimation parameters and workflows are harmonized between the long term Mineral Resource block model and the short term grade control block model for the Urucum deposit.
- Prepare a separate series of underground wireframe interpretations for the Tap AB deposit using cut-off grade and minimum width criteria that are reflective of the envisioned operational scenario for an underground mining operation.

- Determine the location of the oxidized to fresh rock transition at the Tap AB deposit to a higher degree of accuracy, particularly in the area of the AB 1 deposit.
- Carry out additional drill testing to define and outline the extents of the higher grade mineralized shoots found at the Tap AB deposit.
- Evaluate the down-dip projections of the BIF and carbonate units for the Tap C sector for their potential of hosting significant quantities of gold mineralization.

MINING AND MINERAL RESERVES

Open Pit Mining

- Geotechnical monitoring of open pit stability is imperative to follow best practices for both production and safety reasons. Standard open pit slope monitoring using a prism network should be established and developed continuously as open pit mining progresses.
- Review pit design for Urucum Central South once the results of the geotechnical remediation plan are available.
- Mining dilution should be controlled as it is a critical modifying factor when estimating Mineral Reserves, since there is an added cost associated with the processing of the waste dilution material.
- A full reconciliation of actual plant feed and gold production versus mine plan prediction should be carried out on an ongoing basis in order to more accurately determine the mining dilution and ore loss parameters.
- Additional resources in the mine proximity may extend the open pit mine life. While such resources have not yet been identified, RPA is aware that brownfield exploration is underway to see if such opportunities may exist for the near term.

Underground Mining

- Complete further drilling and investigation work aimed at upgrading Inferred Mineral Resources and increasing the geotechnical and hydrogeological understanding of the deposit at depth, in order to consolidate the design basis for the underground project.
- Advance the Underground Project to the FS stage. Opportunity exists to stage the Project such that the second ramp is delayed until production from the first ramp proves successful and mining costs are better understood.
- Develop and operate the underground mine with contractors; this resolves any issues regarding supply of an experienced underground work force and allows for a reduction in upfront capital expenditure for mobile equipment.
- Consider using truck haulage for all material movement in the underground mine.
- Carry out further geotechnical analysis to facilitate design and the efficient recovery of pillars. Detailed geotechnical modelling is recommended during the FS stage. This will also assist with understanding of the potential dilution, particularly in the narrower veins.
- Complete further metallurgical test work particularly on the primary sulphide material that will be extracted from underground. There is a risk that unexpected changes to metallurgical performance and gold recovery may occur.

- Complete further environmental work during the FS stage to ensure that the underground operations do not present any issues in terms of environmental compliance. Any compliance issues could inadvertently delay the project or add additional unplanned costs to the project.
- Opportunities exist to reduce capital costs for the underground project through locally constructed surface change rooms and offices rather than rental and may be an inexpensive alternative. The use of less expensive Scania P420 trucks for underground haulage once the decline roadway (floor) has been prepared and graded is also an opportunity. These options should be evaluated during the FS.

MINERAL PROCESSING

- Tucano will start a program to improve the understanding of the ore hardness distribution in some of the major deposits. With special consideration to ores potentially extracted from a future underground mine.
- The plant currently has dated equipment in need of replacement such as the Primary Crusher.
- Further investigation and test work is required to optimize the current cyanide consumption rates, which averaged 1.4 kg/t ore from May to September 2019, which is much higher than the average consumption rates reported in past metallurgical test work.
- Further testing to optimize oxygen consumption is also required.
- Improving process control tools, especially for the grinding and CIL unit operations, may result in performance gains.
- Mineralogical characterization should be undertaken to better understand the influence of other contaminants in plant performance and cyanide consumption.

ENVIRONMENT

- Environmental aspects in the Amazon region is a global theme, and many efforts have been carried out to preserve this world heritage. Therefore, Great Panther should continue following high environmental standards and updating its best practices procedures in accordance with the regulations in force for the area of the Tucano Gold Mine.

ECONOMIC ANALYSIS

This section is not required as Great Panther is a producing issuer, and the Property is currently in production and there is no material expansion of current production. RPA has verified the economic viability of the Mineral Reserves through cash flow analysis at the base gold price of US\$1,250/oz.

TECHNICAL SUMMARY

PROPERTY DESCRIPTION AND LOCATION

The Mine is located in Amapá State, Brazil, at latitude 0.85°N and longitude 52.90°W. The Mine is approximately 200 km from Macapá, the state capital, and is accessible by the Brazilian federal highway BR-210, or by chartered aircraft. The access comprises:

- Sealed road for approximately 100 km, from the city of Macapá to Porto Grande.
- Unsealed road from Porto Grande to Pedra Branca do Amapari, approximately 75 km.
- Unsealed road from Pedra Branca do Amapari to the site, approximately 17 km.

LAND TENURE

The property comprises 49 mineral rights concessions and leases totalling 261,621 ha. The surface rights for five of the mineral rights concessions have also been secured by agreement. These surface rights agreements are sufficient to cover the existing mining operations at the Mine.

In addition to the Mining Concession (851.676/1992) and Exploitation Application (850.865/1987), Great Panther holds approximately 251,000 ha of contiguous exploration tenements. This ground area spans a strike length of approximately 100 km of Paleoproterozoic greenstone terrain and is 100% Great Panther owned.

HISTORY

Anglo American Plc discovered a mineralized shear zone in 1994, undertook extensive exploration between 1995 and 2002, and through AngloGold, completed an FS of the oxide Mineral Resources in October 2002.

In May 2003, the Project was acquired by EBX Gold Ltd (EBX). EBX carried out a FS for the oxide mineral resources and a Pre-Feasibility Study (PFS) for mining the sulphide mineralization.

In January 2004, the Project was acquired by Wheaton River Minerals Ltd (Wheaton River) (which later merged with Goldcorp Inc (Goldcorp) in 2005). Mine construction began in July 2004, with the first gold poured in late 2005. The Project was later operated by Mineração Pedra Branca do Amapari (MPBA), a company created in 2003 by EBX, as a heap leach

operation until January 2, 2009, when it was placed on care and maintenance due to the inability to treat transition material (not fully oxidized) in the deeper portions of the pits.

Goldcorp sold the Project to Peak Gold Limited (Peak Gold) in April 2007. Peak Gold later merged with New Gold Inc (New Gold).

The operation did not reach the predicted gold production due to issues related to the clayey nature of the saprolite mineralization. In response, metallurgical test work was conducted during 2007 to investigate the potential improvements of installing a wash-plant to remove fines and clays to improve heap percolation. Given that the results from the test work were inconclusive, and considering the relative amount of oxide resource available, the plans for an integrated wash-plant and oxide and sulphide milling circuit were put aside in favour of a milling and carbon-in-leach (CIL) circuit to treat predominantly sulphide, and remnant oxide material.

Until the closure of the Project in 2009, mining operations extracted 8.8 (Mt) of ore from four areas, Tap AB (pits 1, 2, and 3), Tap C, Tap D, and Urucum. Total gold production from the heap leach operations was approximately 316,000 ounces of gold.

In 2010, Beadell Resources Ltd (Beadell, through Beadell Brasil, a wholly owned subsidiary, acquired the Project and commenced construction of a CIL plant to augment the existing process infrastructure. Mining and stockpiling of ore commenced in 2011 and the CIL plant was commissioned in November 2012. Beadell upgraded the plant from 2018 to 2019 including a ball mill, pre-leach thickener, leach tank, and oxygen plant.

Great Panther acquired the Project in March 2019 and holds a 100% interest.

GEOLOGY AND MINERALIZATION

The South American Precambrian Shield comprises approximately 50% of the bedrock in Brazil and consists of major Proterozoic deformation zones surrounding cratonic nuclei of Archean age. The three principal cratons are the Guyana Craton in the north, the Amazon (or Guapore) craton immediately south of the Amazon River, and the São Francisco Craton situated between the Amazon Craton and the coast. The cratons are mostly a granite gneiss complex including some highly metamorphosed supracrustal belts, of which greenstone belts represent a small portion. Remoteness and lack of outcrops due to deep weathering prevent detailed stratigraphic and structural mapping across most of the greenstone belts. However,

stratigraphic and structural elements typical for greenstone belts worldwide are well recognized in most South American examples.

The mineralization at Tucano occurs in a series of deposits over a seven-kilometre strike length associated with a north-south trending shear zone occurring coincident with a north-south line of topographic ridges. From south to north, these deposits have been named Tap A, B, C, and Urucum. Tap D is a separate structure in the west. Higher grades are associated with the more intensely hydrothermally altered rocks.

Deep weathering is present in most of the deposits with high grade mineralization extending to the surface through a layer of colluvium several metres thick. Gold mineralization can be found in the fresh rock at depth, in the saprolite zone created by in-situ weathering of the underlying rocks, and in colluvial deposits which overlie the saprolite mineralization as a blanket, spreading out over the hill slopes.

Sulphide zones follow shear plane foliation, often crosscutting the BIF and other host meta-sediments and as bedding parallel lenses dipping either east or west along the limbs of the folded BIF units. Outside the shears and faulted zones, host rocks are poor in sulphide and gold. The accumulation of auriferous massive and/or disseminated sulphides in zones of fractures and folds, and forming plunging mineralized shoots, often crossing lithological contacts, suggests an epigenetic event.

EXPLORATION STATUS

Exploration work on the property by previous operators includes geological mapping, rock and soil sampling, ground and airborne geophysical surveys, petrophysics, and diamond drilling with detailed core logging. The focus of the exploration programs has been towards identifying and delineating mineralized gold zones for subsequent production activities. Additional exploration activities have been carried out elsewhere on the property to evaluate selected exploration targets for their potential of hosting new gold mineralized zones.

MINERAL RESOURCES

The Mineral Resources for the Tucano Gold Mine (Table 1-1) include contributions from four deposits as well as material contained within various stockpiles present throughout the Tucano Gold Mine property. The Mineral Resources from these four deposits are composed of

mineralized material that is envisioned to be extracted by both open pit and underground mining methods. Gold mineralization is contained within oxidized lithologies as well as their fresh, un-weathered equivalents.

Updated grade-block models were prepared for the open pit component of the Urucum deposit, as well as the open pit and the underground component of the Tap AB deposit using drill hole, sample information, and topography that was current as of September 30, 2019. The underground component of the Mineral Resource estimate for the Urucum North deposit was prepared from a grade-block model that used the drill hole and sample information that was current as of November 2, 2015. Drilling completed since the 2015 was reviewed and in RPA's opinion does not materially impact the Mineral Resource estimate.

MINERAL RESERVES

The Mineral Reserve estimate for the Tucano Project conforms to the CIM (2014) definitions as incorporated by reference into NI 43-101. To convert Mineral Resources to Mineral Reserves, RPA applied modifying factors of dilution and mineral extraction to only the Measured and Indicated categories of the Mineral Resource. Inferred Mineral Resources are not included in the Mineral Reserves. The Mine consists of both open pit and underground Mineral Resources for which Mineral Reserves have been independently estimated.

The Mineral Reserve statement for the Mine is presented in Table 1-2. The open pit estimate is based on the newly developed 2019 resource block models as described in Section 14. This Mineral Reserve estimate includes open pit mining in Urucum, Tap AB, Urucum East, and Duckhead and underground mining in the Urucum deposit.

MINING METHOD

OPEN PIT MINING

The Mine is a well established open pit mining operation comprising four open pits, Urucum, Urucum East, Tap AB, and Duckhead.

Mine production within the presently developed LOM pits is the responsibility of a mining contractor, U&M, and utilizes conventional earthmoving equipment with drill and blast, load and haul operations. The mined ore is blasted in four metre benches with backhoe excavators

loading ore and waste into off-highway dump trucks. Mined ore is either temporarily stockpiled or fed directly to the crusher.

UNDERGROUND MINING

The underground mine project is located below the Urucum North open pit. Access would be via a portal located at the north end of the Urucum North pit. The mine layout is based on the following criteria:

- Twin declines accessing the north and south parts of the orebody.
- Portal situated on the north side of the Urucum North open pit.
- North and south exhaust ventilation raises.
- 20 m sublevel interval.
- Stopes accessed by a footwall drive and crosscuts on every sublevel.
- Decline development initiates in Year 1.
- Mine plan targets Measured, Indicated, and Inferred Mineral Resources down to 500 mRL (750 metres below sea level (mbs)).

Geotechnical data from an infill drill program below the Urucum North Pit indicates that the ground conditions at the Urucum North are suitable for open stoping mining methods. Furthermore, stopes measuring 50 m in length and 20 m in height will be feasible. It will be possible to mine multiple benches simultaneously in the same ore block. As the ore loads are steeply dipping and relatively narrow, they are suitable for a longitudinal version of longhole open stoping.

Up-hole retreat will be used in the upper levels of the northern part of the mine. This method permits ore production to commence early in the LOM schedule because mining proceeds in a top-down sequence. Moreover, it can achieve high rates of production as backfill is not required in the mining cycle. A disadvantage of the method, however, is that it requires leaving rib pillars for supporting the sidewalls, which results in an 86% ore recovery.

Conventional Avoca will be used for mining the remainder of the orebody. It permits high ore recovery as it does not require leaving pillars along strike. A pastefill plant will not be needed as the method uses rockfill for backfilling. The Tucano site has an abundance of stockpiled waste from open pit mining available as a source of rockfill.

Sill pillars will be left between ore blocks to permit simultaneous production in multiple mining fronts. These pillars will be partially recovered (estimated at 65% recovery) towards the end of the mine life using Up-hole retreat. As additional information about the resource is acquired, it should be possible to reposition some of the sill pillars in low-grade zones.

The mine design uses a 20 m sublevel interval. This sublevel interval favours accurate drilling of longholes, which will help minimize dilution. The ore drives will be 5 m high; consequently, the typical height of an Up-hole Retreat stope or Avoca bench will be 15 m. A minimum mining width of 2.0 m has been assumed. With skin dilution of 0.5 m from each of the footwall and hanging wall, the actual minimum stope width will be 3.0 m.

The design of the declines allows the mobile equipment to access each of the production levels. Footwall drives and crosscuts on the sublevels provide access to the stopes. The cross-sectional dimensions of the declines and crosscuts will be 5.0 m high x 5.0 m wide, which is adequate for accommodating Volvo AD35 articulated trucks. The ore drives will have a cross-section of 5.0 m high x 4.0 m wide, which is enough for 10-tonne-capacity LHDs as well as the proposed production drill. The trucks will not enter the ore drives.

The following assumptions, based on industry benchmarks, were used to determine the production and development rates and schedules:

- Decline and crosscut advance of 140 m/month.
- Ore drive advance of 60 m/month.
- Production rate from stoping of 10,000 t/month for both Up-Hole retreat and Conventional Avoca.
- Backfilling rate of 12,000 m³ per month per stope for Conventional Avoca.

The schedule is based on operating three development jumbos and two LHDs for both the north and south declines. The annual ore production tonnages vary depending on the number of production fronts that are available in any given year.

MINERAL PROCESSING

The existing Tucano gold processing plant was designed by Ausenco. After approximately four years of operation, an expansion was planned as part of the original Definitive Feasibility Study (DFS) to install a 3 MW ball mill. This new secondary grinding mill, alongside the 7 MW

single stage SAG mill, was installed in order to maintain 3.4 Mtpa throughput capacity treating 90% of the much harder sulphide ore type.

The plant flowsheet was modified in 2018 to deal with the harder sulphide ore type and the key features of these flowsheet changes are as follows:

- An additional 6 MW ball mill to increase original Ausenco design capacity to 3.6 Mtpa and potentially obtain a finer product size of 80% < 75 µm at a higher proportion of sulphide ore to increase cyanide leach gold recovery and kinetics. Completed in September 2018.
- A pre-leach thickener to allow both effective operation of the hydrocyclones which in turn provides higher leach feed pulp % solids. The change in philosophy from the originally proposed tailings thickener to a pre-leach thickener is explained further below. Completed in September 2018.
- Additional leach residence time by adding one additional pre-leach tank to allow for the higher proposed plant capacity. Completed November 2018
- In November 2018, an oxygen plant was added to the CIL as proposed by Ausenco. An additional Liquid Oxygen plant was added in April 2019

At a plant throughput of 450 tonnes per hour and a slurry density of 45% solids, a total volume of 17,200 m³ is required to provide a leach residence time of 24 hours. The existing CIL provides 15,400 m³; therefore, one additional leach tank, 15 m x 15 m is required. The new tank will be located ahead of the existing CIL tanks and used for pre-leaching. This allows a major proportion of gold to go into solution before the resultant pregnant solution comes into contact with the carbon, this speeds up adsorption kinetics.

As outlined above, the commissioning of the new oxygen plant was completed in April 2019, which resulted in a consistent increase of gold recoveries to an average of 93% from May to September 2019.

PROJECT INFRASTRUCTURE

Infrastructure at the Mine site includes a central administration building and medical facility, offices (mining, geology, survey, mining engineering, supply, environment, and safety), core shed, nursery, light and heavy equipment workshops, warehouse storage facilities, tire shop, refuelling and washing bays, fire-fighting systems, and explosive magazines. The Project also encompasses a CIL gold plant with administration buildings, workshop, a power generation and distribution facility, security office, sample preparation and assay laboratory, storage area, and a reagent preparation facility. Mine contractors have separate facilities.

The Mine is connected to the national electrical grid by a 69 kilovolt (kV), 20 megavolt-ampere (MVA) power line via Companhia de Eletricidade do Amapá (CEA), the local supply authority. Power is also provided by an independent 11 MW continuous rated Aggreko diesel-powered generation system. Water is provided from recycled process water and water storage dams.

The Mine currently employs a total of 1,493 persons, of whom 381 are Great Panther employees and 1,112 are contractors. Approximately 99% are Brazilian nationals with the majority of the workforce from local towns in proximity to the mine. Accommodations for staff members are provided by a camp located two kilometres from the plant which is capable of housing 142 persons.

The plant contains the mechanical treatment (crusher, mill, and thickener) and chemical process (CIL, detox, oxygen plant, elution) areas. The other major infrastructure buildings include the reagents storage warehouse, reagents preparation plant, chemical laboratory and process laboratory, tailings dam and power distribution system. The main administration area includes maintenance (electrical and mechanical) workshops, mine administration facilities, technical services offices, stores warehouse, core yard, mess facility, and medical centre.

MARKET STUDIES

Approximately 70% of the doré is shipped to Asahi, Canada and 30% to Metalor, Switzerland. The current refining contract with Asahi is valid until the end of December 2020. The refining contract with Metalor is managed through Samsung C&T U.K and is valid until the end of December 2021.

Brinks is the designated company to transport the doré from Tucano to the refining facilities. The title change for each shipment occurs typically at the Brampton, Ontario refinery with Asahi, and Sao Paulo airport for Samsung (Metalor). Based on actual contract agreements, the breakdown of costs is set out below:

- Refinery charge \$0.53/oz Au (\$0.50/oz doré).
- Transport, handling, and insurance \$22.00/oz Au.
- Total \$ 22.50/oz Au.

The costs above are subject to some variation depending on the amount of ounces per shipment, however, they are representative of the average cost.

The refining process and sampling is supervised by an independent service provider, which includes the analysis of samples from the service provider's certified laboratory, to ensure quality standards and accuracy of information are met and maintained consistently.

Penalties are applied in the refining contract for any impurities, but these are rare occurrences and the penalties are not excessive. The main impact comes from the delay in final payments due to higher sample analysis turnaround time, as a result of a higher number of samples required from the special melt shop.

ENVIRONMENTAL, PERMITTING, AND SOCIAL CONSIDERATIONS

All licences required by various government agencies covering the operation of the Tucano Gold Mine, mill, and processing plant have been obtained or applications for renewals have been filed.

The complete environmental studies, permitting, and social or community impact was carried out by SRK Consultants, in 2011, for the Operating Licence issued by the State Secretariat of Environment, Amapá (SEMA) to operate a SAG mill/CIL processing plant.

The Mine has been active engaging with the local communities to create and to maintain mutually beneficial relationships by understanding and optimizing the positive influence the Mine can have on local development. The Mine's community relations personnel implemented wide stakeholder engagement and social investment programs that focused on three main areas: socio-economic development, public health and safety, and education.

Groundwater and surface water monitoring is performed through field checking of daily monitoring activities and collection of samples for chemical analysis at Great Panther's facilities. There are also monthly, quarterly, and half-yearly sample collections as required by environmental agencies, which are required to be sent to a certified external laboratory.

The Mine, as part of the requirements of its Operation Licence, annually contributes capital to the Social and Environmental Compensation Funds of the local municipalities of Pedra Branca and Serra do Navio. A council formed by representatives of the communities, City Hall, City Council, and the company reviews and analyzes the programs that will be executed under these agreements in their respective communities.

CAPITAL AND OPERATING COST ESTIMATES

This is a producing mining operation. As such, the mine capital cost for the LOM totals \$59.8 million. The open pit capital is \$9.5 million, and the underground capital is \$50.3 million.

The open pit capital cost includes tailings dam expansion, new primary crusher, contractor shop improvements, power line, plant improvements, environmental improvements, closure cost, fire safety system, and others.

The Urucum North underground mine capital cost includes surface and underground infrastructure. Surface infrastructure includes portal preparation, surface exhaust fans, change rooms, offices, surface workshop, water supply, fuel storage, surveying and engineering equipment, first fills, raiseboring, and contingency. Underground infrastructure includes ladderways, electrical equipment, power supply and distribution, mine dewatering and water supply, compressed air, refuge chambers, fire detection and suppression equipment, leaky feeder communications system, mine rescue equipment, auxiliary ventilation fans and regulators, and underground workshops. In addition, capital lateral development is included which totals \$20 million over the LOM.

2 INTRODUCTION

Roscoe Postle Associates Inc. (RPA), now part of SLR Consulting Ltd (SLR), was retained by Great Panther Mining Limited (Great Panther) to prepare a Technical Report on its Tucano Gold Mine (the Mine or Tucano), located in Amapá State, Brazil. Great Panther acquired the Mine in March 2019 and holds a 100% interest in Tucano. The purpose of this Technical Report is to support disclosure of the Mineral Resource and Mineral Reserve estimates for the Tucano as of September 30, 2019. This Technical Report conforms to National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101).

Great Panther is a Canadian gold mining, development, and exploration company which owns Tucano, located in Brazil, and the Guanajuato Mine Complex and the Topia Mine located in Mexico. Great Panther also owns the Coricancha Project in Peru. The common shares of Great Panther are listed on both the Toronto Stock Exchange and the New York Stock Exchange and trade under the symbol GPR in Canada and GPL in the USA.

The Mine is a well established open pit mining operation comprising four open pits, Urucum, Urucum East, Tap AB, and Duckhead. Mine production to date has been sourced from all deposits except Urucum East. As of December 31, 2019, the Mine has produced a total of approximately 1,300,000 ounces of gold since commencing operation in 2005. As well as the open pits, Tucano includes an underground mine project (the Project) which is located below the Urucum North open pit.

The effective date of the Mineral Resource and Mineral Reserve estimates is September 30, 2019.

All currency in this report is US dollars (US\$) unless otherwise noted.

SOURCES OF INFORMATION

The Technical Report was prepared by RPA and Great Panther Qualified Persons (QPs). RPA site visits were carried out by Mr. Reno Pressacco, M.Sc.(A), P.Geo, Principal Geologist, from September 15 to 21, 2019. Mr. Goran Andric, P.Eng., Principal Mining Engineer, carried out a site visit from October 20 to 26, 2019.

Discussions were held with the following Great Panther personnel:

- Mr. Neil Hepworth P.Eng. Chief Operating Officer, Great Panther
- Mr. Robert Archer P.Geo., Director and Board member, Great Panther
- Mr. Fernando Cornejo, M.Eng., P.Eng., Vice President, Projects and Technical Services, Great Panther
- Mr. Marcelo Antonio Batelochi, MAusIMM, Director of Geology, Tucano Gold Mine
- Mr. Felipe Fernandes, Manager Technical Services, Tucano Gold Mine
- Mr. Carlos Pires, Geologist, Tucano Gold Mine

Mr. Pressacco is responsible for Sections 3 to 12, and 14. Mr. Jason J. Cox, P.Eng., Technical Director – Canada Mining Advisory, and Mr. Andric share responsibility for Sections 15, 16, 21, and 22, with Mr. Cox taking responsibility for the underground portions and Mr. Andric taking responsibility for the open pit mining portions. Mr. Cornejo is responsible for Sections 13 and 17. Mr. Hepworth is responsible for Sections 18 and 19. Mr. Batelochi is responsible for Sections 20, 23, and 24. All authors share responsibility for Sections 1, 2, 25, 26, and 27 of the Technical Report.

The documentation reviewed, and other sources of information, are listed at the end of this report in Section 27 References.

LIST OF ABBREVIATIONS

Units of measurement used in this report conform to the metric system. All currency in this report is US dollars (US\$) unless otherwise noted.

μ	micron	kVA	kilovolt-amperes
μg	microgram	kW	kilowatt
a	annum	kWh	kilowatt-hour
A	ampere	L	litre
bbl	barrels	lb	pound
Btu	British thermal units	L/s	litres per second
°C	degree Celsius	m	metre
C\$	Canadian dollars	M	mega (million); molar
cal	calorie	m ²	square metre
cfm	cubic feet per minute	m ³	cubic metre
cm	centimetre	MASL	metres above sea level
cm ²	square centimetre	m ³ /h	cubic metres per hour
d	day	mi	mile
dia	diameter	min	minute
dmt	dry metric tonne	μm	micrometre
dwt	dead-weight ton	mm	millimetre
°F	degree Fahrenheit	mph	miles per hour
ft	foot	MVA	megavolt-amperes
ft ²	square foot	MW	megawatt
ft ³	cubic foot	MWh	megawatt-hour
ft/s	foot per second	oz	Troy ounce (31.1035g)
g	gram	oz/st, opt	ounce per short ton
G	giga (billion)	ppb	part per billion
Gal	Imperial gallon	ppm	part per million
g/L	gram per litre	psia	pound per square inch absolute
Gpm	Imperial gallons per minute	psig	pound per square inch gauge
g/t	gram per tonne	RL	relative elevation
gr/ft ³	grain per cubic foot	s	second
gr/m ³	grain per cubic metre	st	short ton
ha	hectare	stpa	short ton per year
hp	horsepower	stpd	short ton per day
hr	hour	t	metric tonne
Hz	hertz	tpa	metric tonne per year
in.	inch	tpd	metric tonne per day
in ²	square inch	US\$	United States dollar
J	joule	USg	United States gallon
k	kilo (thousand)	USgpm	US gallon per minute
kcal	kilocalorie	V	volt
kg	kilogram	W	watt
km	kilometre	wmt	wet metric tonne
km ²	square kilometre	wt%	weight percent
km/h	kilometre per hour	yd ³	cubic yard
kPa	kilopascal	yr	year

3 RELIANCE ON OTHER EXPERTS

This Technical Report has been prepared by RPA for Great Panther. The information, conclusions, opinions, and estimates contained herein are based on:

- Information available to RPA at the time of preparation of this Technical Report.
- Assumptions, conditions, and qualifications as set forth in this Technical Report.

For the purpose of this Technical Report, RPA has relied on ownership information provided by Great Panther and this information is relied on in Section 4 and the Summary of this Technical Report. RPA has not researched property title or mineral rights for Tucano and expresses no opinion as to the ownership status of the property.

RPA has relied on Great Panther for guidance on applicable taxes, royalties, and other government levies or interests, applicable to revenue or income from Tucano.

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

4 PROPERTY DESCRIPTION AND LOCATION

LOCATION

Tucano is located in Amapá State, Brazil, at latitude 0.85°N and longitude 52.90°W, approximately 200 km from Macapá, the state capital, and is accessible via the Brazilian federal highway BR-210, or chartered aircraft (Figure 4-1).

MINERAL TENURE

Tucano is comprised of 49 mineral rights concessions and leases totalling 261,621 ha (Figure 4-2). The surface rights for five of the mineral rights concessions have also been secured by agreement. These surface rights agreements are sufficient to cover the existing mining operations at Tucano (Figure 4-3). A summary of the expiry dates of the various mineral rights tenure, in addition to a listing of the payments required to maintain the mineral rights in good standing is provided in Table 4-1.

In addition to the Mining Concession (851.676/1992) and Exploitation Application (850.865/1987), Great Panther holds approximately 251,000 ha of contiguous exploration tenements. This ground area spans a strike length of approximately 100 km of Paleoproterozoic greenstone terrain and is 100% Great Panther owned.

These contiguous tenements include four tenements currently held by Zamin Ferrous (Zamin). Within the four Zamin leases, the rights to any iron ore have been retained by Zamin, however, Great Panther has secured an agreement for the rights to any gold mineralized zones. In 2017, Beadell Brasil Ltda (Beadell Brasil), a previous owner of the Tucano property, also reached an agreement with joint venture partner Mineração Vale dos Reis Ltda (MVR) to increase its holdings in two exploration concessions (858.010/2010 and 850.858/1987) from 70% to 100%. These rights have been assigned to Great Panther.



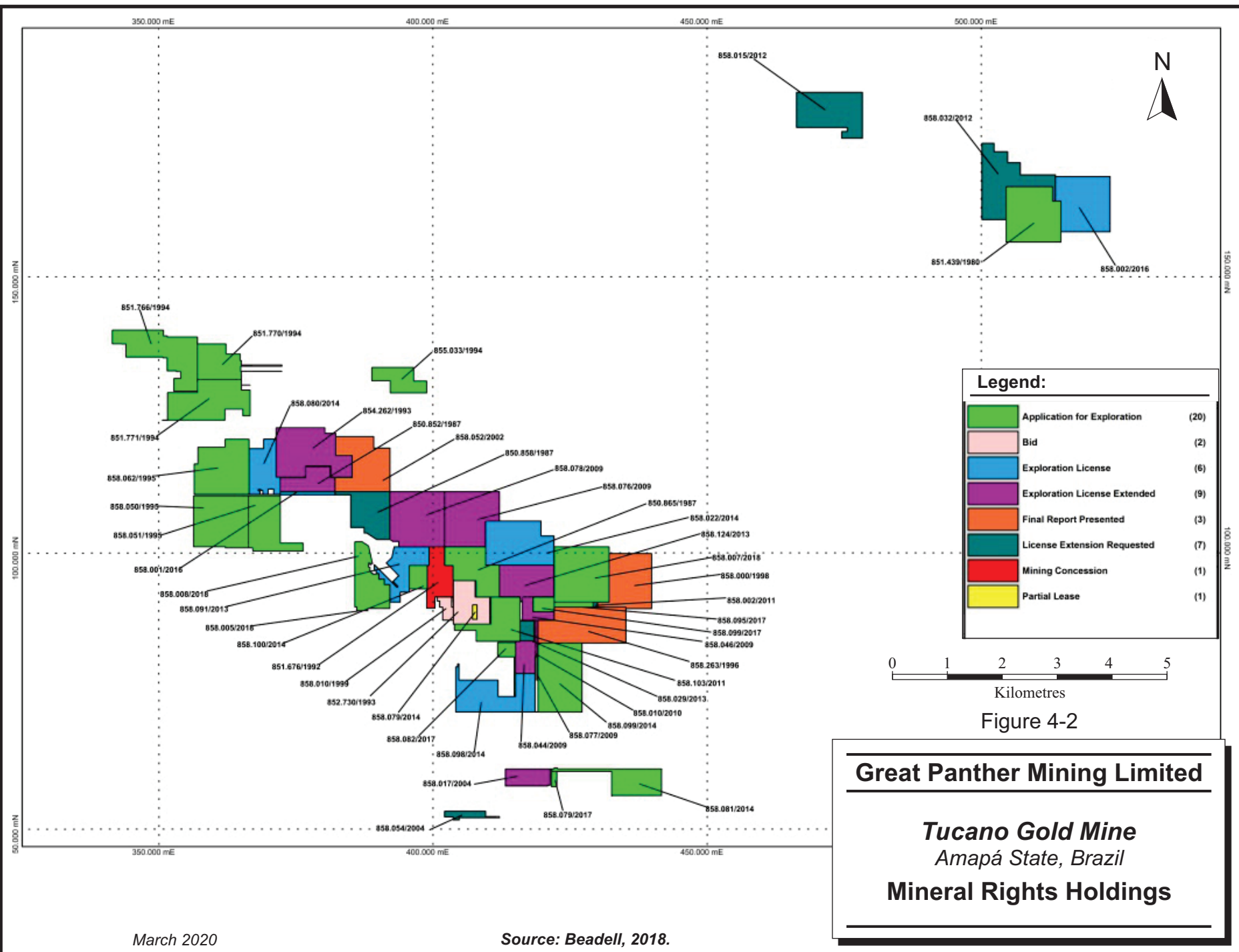


TABLE 4-1 GREAT PANTHER MINERAL TENURE
Great Panther Mining Limited – Tucano Gold Mine

Process	Titleholder (Great Panther Subsidiary)	Status	Area (Ha)	Project	Phase	Due Jan 20	Due Jan 21	Expiration Date	Substance	District
858.078/2009	Mneração Serra Da Canga Ltda	In Progress	9,823	Tucano	Exploration License Extended Exploration License			17/04/2020	Gold	Serra Do Navio E Pedra Branca Do Amapari
858.124/2013	Tucano Resources Mineracao Ltda	In Progress	5,813	Tucano	Exploration License Extended Exploration License	R\$29,823.05		13/08/2020	Gold	Pedra Branca Do Amapari E Porto Grande
858.010/2010	Mineração Vale Dos Reis Ltda	In Progress	290	Tucano	Exploration License Extended Exploration License	R\$1,487.39		29/08/2020	Gold	Pedra Branca Do Amapari E Porto Grande
858.076/2009	Mneração Serra Da Canga Ltda	In Progress	8,807	Tucano	Exploration License Extended Exploration License	R\$45,180.06		16/01/2021	Gold	Serra Do Navio
858.022/2014	Tucano Resources Mineracao Ltda	In Progress	9,348	Tucano	Exploration License	R\$47,957.60			Gold	Porto Grande
858.018/2018	Tucano Resources Mineracao Ltda	In Progress	2,527	Tucano	Exploration License	R\$8,643.23		6/6/2021	Gold	Porto Grande
858.019/2018	Tucano Resources Mineracao Ltda	In Progress	3,736	Tucano	Exploration License	R\$12,776.13	\$12,776.13	30/07/2021	Gold	Pedra Branca Do Amapari E Porto Grande
858.020/2018	Tucano Resources Mineracao Ltda	In Progress	3,452	Tucano	Exploration License	R\$11,806.76	\$11,806.76	30/07/2021	Gold	Serra Do Navio E Pedra Branca Do Amapari
858.029/2013	Tucano Resources Mineracao Ltda	In Progress	919	Tucano	Exploration License Extended Exploration License	R\$4,714.68		5/9/2021	Iron/Gold	Pedra Branca Do Amapari E Porto Grande
858.007/2018	Tucano Resources Mineracao Ltda	In Progress	9,992	Tucano	Exploration License	R\$34,174.14	\$34,174.14	13/09/2021	Gold	Ferreira Gomes E Porto Grande
858.008/2018	Tucano Resources Mineracao Ltda	In Progress	5,148	Tucano	Exploration License	R\$17,605.34	\$17,605.34	13/09/2021	Gold	Serra Do Navio/Pedra Branca Do Amarapari
858.082/2017	Tucano Resources Mineracao Ltda	In Progress	1,038	Tartarugalzinho	Exploration License	R\$3,551.05	R\$3,551.05	13/09/2021	Gold	Pedra Branca Do Amapari
858.095/2017	Tucano Resources Mineracao Ltda	In Progress	644	Tucano	Exploration License	R\$2,201.66	R\$2,201.66	13/09/2021	Gold	Porto Grande
858.077/2009	Mina Tucano Ltda	In Progress	124	Tucano	Exploration License Extended Exploration License	R\$635.71	R\$635.71	4/6/2022	Gold	Pedra Branca Do Amapari E Porto Grande

Process	Titleholder (Great Panther Subsidiary)	Status	Area (Ha)	Project	Phase	Due Jan 20	Due Jan 21	Expiration Date	Substance	District
858.100/2014	Mina Tucano Ltda	In Progress	1,377	Tucano	Application For Exploration			N/A	G	Serra Do Navio E Pedra Bca Amapari
858.103/2011	Mina Tucano Ltda	Pending Appeal	5,530	Tucano	Application For Exploration			N/A	Iron	Pedra Branca Do Amapari
858.099/2014	Tucano Resources Mineracao Ltda	Pending Appeal	10,000	Tucano	Application For Exploration			N/A	G	Pedra Branca Do Amapari E Porto Grande
858.081/2014	Tucano Resources Mineracao Ltda	Pending Appeal	4,875	Tucano	Application For Exploration			N/A	G	Porto Grande
855.033/1994	Marina Norte Empreendimentos De Mineração S.A.	In Progress	3,262	Tucano	Application For Exploration			N/A	G	Ferreira Gomes
851.766/1994	Mineração Dorica Ltda	Assignment Submitted/Pending Appeal	8,983	Tucano	Application For Exploration			N/A	G	Serra Do Navio
851.770/1994	Mineração Dorica Ltda		4,747	Tucano	Application For Exploration			N/A	G	Serra Do Navio
851.771/1994	Mineração Dorica Ltda	Pending Appeal	8,750	Tucano	Application For Exploration			N/A	G	Serra Do Navio E Pedra Bca Amapari
858.062/1995	Mineração Tanagra Ltda	In Progress	8,982	Tucano	Application For Exploration			N/A	G	Macapá
858.079/2017	Tucano Resources Mineracao Ltda	In Progress	269	Tartarugalzinho	Application For Exploration			N/A	G	Porto Grande
858.099/2017	Tucano Resources Mineracao Ltda	In Progress	997	Tucano	Application For Exploration			N/A	G	Porto Grande
858.050/1995	Mineração Tanagra Ltda	Total Assignment Submitted/Ff	9,300	Tucano	Application For Exploration			N/A	G	Macapá
858.051/1995	Mineração Tanagra Ltda	Total Assignment Submitted/Ff	6,371	Tucano	Application For Exploration			N/A	G	Macapá
852.730/1993	Mina Tucano Ltda	Pending Appeal	5,530	Duckhead	Bid			N/A	No	Pedra Branca Do Amapari
858.010/1999	Mina Tucano Ltda	Pending Appeal	8,634	Tucano	Bid			N/A	No	Pedra Branca Do Amapari
850.865/1987	Mina Tucano Ltda	In Progress	6,112	Tucano	Exploitation Application			N/A	Iron/G	Pedra Branca Do Amapari E Porto Grande
858.000/1998	Mina Tucano Ltda	Positive Final Report Submitted	7,884	Tucano	Final Report Presented			N/A	Gold And Aluminium	Ferreira Gomes E Porto Grande
858.263/1996	Mina Tucano Ltda	Positive Final Report Submitted	9,691	Tucano	Final Report Presented			N/A	G	Porto Grande

Process	Titleholder (Great Panther Subsidiary)	Status	Area (Ha)	Project	Phase	Due Jan 20	Due Jan 21	Expiration Date	Substance	District
858.052/2002	Mneração Serra Da Canga Ltda	Pending Appeal	8,065	Tucano	Final Report Presented			N/A	G	Serra Do Navio E Ferreira Gomes
852.336/1994	Mina Tucano Ltda	Parcial Report Submitted/Pending Appeal	919	Tucano	License Extension Requested			N/A	G	Pedra Branca Do Amapari E Porto Grande
858.062/2004	Mina Tucano Ltda	Parcial Report Submitted/Pending Appeal	5,771	Tucano	License Extension Requested			N/A	Gold	Pedra Branca Do Amapari
858.065/2005	Mina Tucano Ltda	Parcial Report Submitted/Pending Appeal	9,323	Tucano	License Extension Requested			N/A	G	Porto Grande
858.264/1996	Mina Tucano Ltda	Parcial Report Submitted/Pending Appeal	10,000	Tucano	License Extension Requested			N/A	G	Pedra Branca Do Amapari E Porto Grande
858.054/2004	Mina Tucano Ltda	Parcial Report Submitted	971	Tucano	License Extension Requested			N/A	Gold	Pedra Branca Do Amapari
858.015/2012	Tucano Resources Mineracao Ltda	Parcial Report Submitted	8,280	Tartarugalzinho	License Extension Requested			N/A	G	Tartarugalzinho
858.032/2012	Tucano Resources Mineracao Ltda	In Progress	8,476	Tartarugalzinho	License Extension Requested			N/A	G	Tartarugalzinho
850.858/1987	Mineração Vale Dos Reis Ltda	Parcial Report Submitted/Pending Appeal	5,644	Tucano	License Extension Requested			N/A	Titan	Serra Do Navio E Pedra Bca Amapari
858.002/2011	Mneração Serra Da Canga Ltda	Parcial Report Submitted/Pending Appeal	77	Tucano	License Extension Requested			N/A	I	Porto Grande
851.676/1992	Mina Tucano Ltda	In Progress	3,971	Tucano	Mining Concession			N/A	Gold	Pedra Branca Do Amapari
858.079/2014	Mina Tucano Ltda	Arrendamento Parcial	150	Duckhead	Partial Lease			N/A	Gold	Pedra Branca Do Amapari
858.091/2013	Mina Tucano Ltda	Parcial Report Submitted	4,469	Tucano	License Extension Requested			N/A	G	Serra Do Navio E Pedra Bca Amapari

Process	Titleholder (Great Panther Subsidiary)	Status	Area (Ha)	Project	Phase	Due Jan 20	Due Jan 21	Expiration Date	Substance	District
858.098/2014	Tucano Resources Mineracao Ltda	Parcial Report Submitted	8,006	Tucano	License Extension Requested			N/A	G	Pedra Branca Do Amapari E Porto Grande
858.080/2014	Mina Tucano Ltda	Parcial Report Submitted	4,593	Tucano	License Extension Requested			N/A	G	Serra Do Navio E Pedra Bca Amapari
858.002/2016	Tucano Resources Mineracao Ltda	Parcial Report Submitted	9,408	Tartarugalzinho	License Extension Requested			N/A	G	Tartarugalzinho
858.001/2016	Mneração Serra Da Canga Ltda	Parcial Report Submitted	543	Tucano	License Extension Requested			N/A	G	Serra Do Navio E Pedra Bca Amapari

SURFACE RIGHTS

All surface rights of Amapá State belonged to the Brazilian federal government until 1988. During the Second World War, on September 13, 1943, Federal Decree-Law No. 5.812 was enacted by President Getúlio Vargas due to strategic and regional economic development factors.

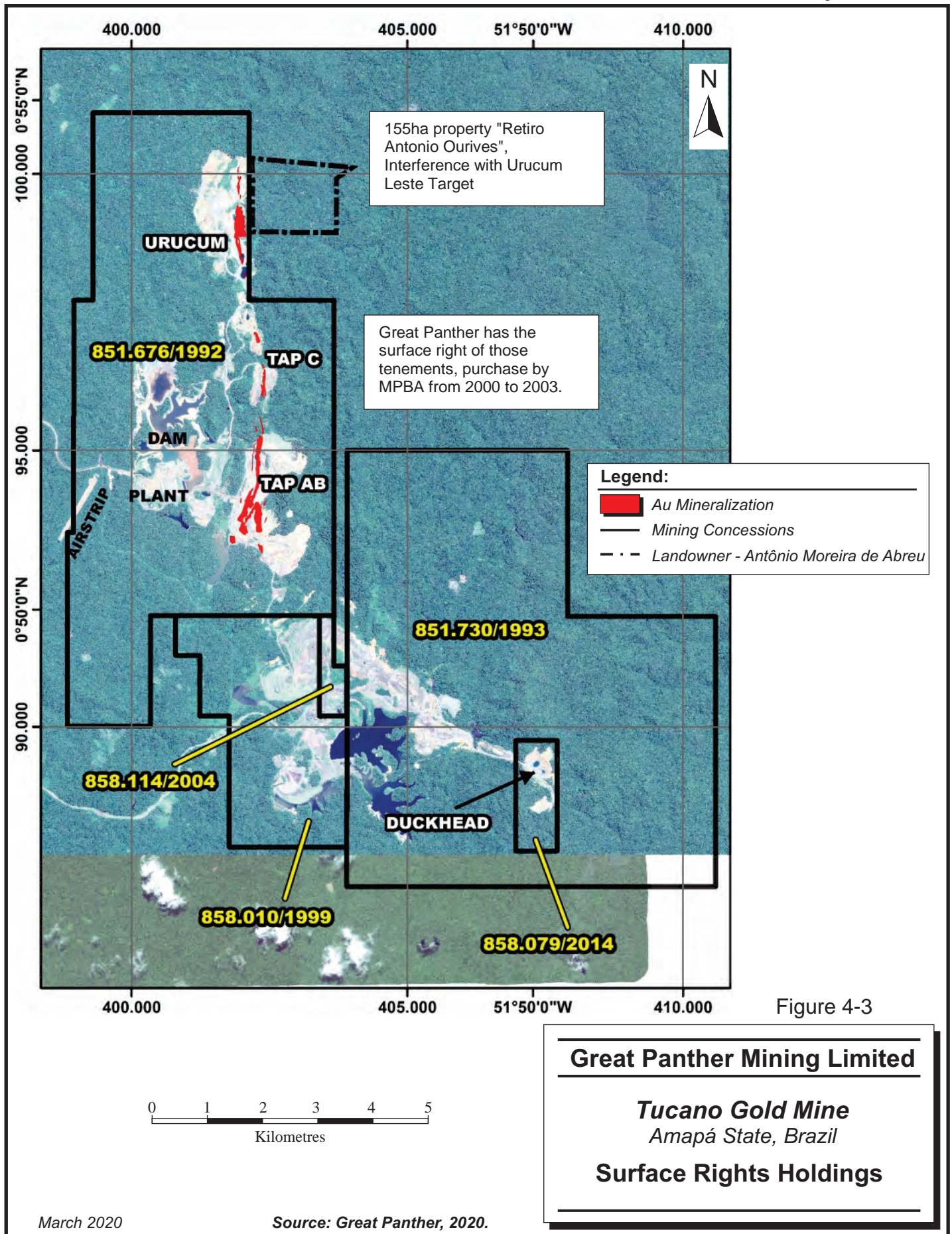
With the promulgation of the current Brazilian Constitution on October 5, 1988, Amapá was elevated to the category of State, where it granted, by INCRA (National Institute of Colonization and Agrarian Reform), to squatters, the survey occupation titles called “Títulos Precários”.

Between 2000 and 2003, during the Feasibility Study (FS) phase of gold and iron ore mining, Mineração Pedra Branca do Amapari (MPBA), the owner of all tenements at that time, entered into an indemnity judicial agreement with thirty-two squatters/surface owners, for use and occupation of the surface for mining purposes. These agreements covered the entire area covered by the Brazilian Mineral Agency (ANM) Processes 851.676 / 1992 (current Tucano property) and 851.730/1993, 858.010/1999, 858.079/2014 and 858.114/2004 (current Zamin mine), as shown on Figure 4-2.

Specifically, the request of possession (Imissão de Posse) for the surface rights of Tucano (tenement 851.676/1992), including the mine area, stockpiles and waste dumps, tailing dams, processing plant, offices and facilities, was submitted to ANM on May 4, 2005 and the servitude (Concedida Servidão) was granted on October 2, 2006, exempt from onus and royalties to the third parties.

There is only one property with interference with the Urucum East target area. It is the 155 ha “Retiro Antonio Ourives” property (Figure 4-3), which Great Panther has agreements via contracts to carry out the 2020 exploration drilling programme. The negotiations for the definitive acquisition of the property are conditioned to the results of Mineral Resources that will be made in 2020.

Regarding the other tenements, which are the subject of regional exploration, Great Panther has a procedure for negotiating lease and right of way contracts with the squatters, with remuneration and reimbursement objectives arising from possible interventions in the field inherent to the mineral research.



ROYALTIES AND AGREEMENTS

Tucano is subject to both federal and state royalties and other royalty agreements in relation to mineral product sales. In summary these are:

- the Compensation for Exploitation of Mineral Resources (CFEM).
- the Control, Monitoring, and Supervision of Research Activities, Mining, Exploration and Exploitation of Mineral Resources Fee (TFRM).
- the Social and Community Development Funds.
- a Commodities Royalty.

The CFEM is a federal royalty and is calculated over the amount of gross revenue obtained in the sale of mineral products. In respect to gold sales, Great Panther is liable to pay a royalty of 1.5% on gross revenue from production at Tucano. These royalties have been paid for 2019.

The TFRM is a royalty levied by Amapá State. The TFRM is currently calculated based on the grams of gold produced multiplied by the state index rate of Brazilian real (R\$) 2.25 which is then multiplied by a factor of 0.4. Great Panther has recently finalized negotiations with Amapá State to reduce the factor applied to 0.1 for 2018 and 2019, and 0.25 for 2020 and beyond. The reduced factors have not yet been enacted into law. These royalties have been paid for 2019.

The Social and Community Development funds have resulted from various agreements with Amapá State and the municipalities of Pedra Branca do Amapari and Serra do Navio which are located near Tucano.

Under the terms of the agreements, Great Panther will pay a maximum 1% royalty over the gross proceeds from gold sales from Tucano to support the socio-economic and community development of the municipalities of Pedra Branca do Amapari and Serra do Navio. The royalties due from 2019 will be paid in Q3 2020.

The Commodities Royalty is payable to the previous holders of 13 tenements acquired by Great Panther. The Commodities Royalty is levied at 0.75% of commodity sales revenue arising from those 13 tenements less taxes, transport and insurance expenses, and royalties payable. These royalties have been paid in 2019.

ENVIRONMENTAL LIABILITIES

Tucano is an active mining operation centred in dense tropical rain forest located in Amapá State, Brazil, consisting of open pit operations, crushing, milling, and carbon-in-leach (CIL) processing that has a direct impact on the environment and the ecosystem of the region. The predominant impacts are on biological resources, air quality, noise and vibration, archaeology, hydrogeology, and hydrology (ground and surface water), and community stakeholders.

PERMITS AND OTHER

All permits are in place for Tucano. The environmental and archaeological permits (discussed further in Section 20), have confirmed that all relevant monitoring and reporting to is being undertaken within the relevant legal framework and that Tucano is fully compliant in the areas of:

- Characterization of flora and fauna.
- Documentation and retrieval of archaeological artifacts.
- Fauna monitoring programs.
- Vegetation clearing and rehabilitation processes.
- Dust, emissions, and noise control.
- Control of drainage and erosion.
- Monitoring of surface and ground water.
- Classification and management of industrial solid and liquid wastes.
- Environmental emergency plans
- Details of funding for community development programs.
- Positive impact on the state economy through employment.
- Development of educational programs for the community.
- Support in maintaining local community infrastructure and services.

RPA is not aware of any environmental liabilities on the property. Great Panther has all required permits to conduct the work on the property. RPA is not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform the work program on the property.

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

ACCESSIBILITY

The mine site is located approximately 200 km from Macapá. This road access comprises:

- A sealed road for approximately 100 km, from the port town of Macapá to Porto Grande.
- An unsealed road from Porto Grande to Pedra Branca do Amapari, approximately 75 km.
- Unsealed road from Pedra Branca do Amapari to the site, approximately 17 km.

Travel from Macapá to Tucano takes approximately four hours by car during the dry season and up to six hours during the wet season, depending on the condition of the unsealed roads. The unsealed roads are passable all year around and no blockages are experienced except during road maintenance. The transport of personnel, bulk materials, fuel, and other supplies passes over various bridges on route to Tucano. These are mostly of wood construction and limited to a 45 t total load (carrier plus load). Most of the bridges have been upgraded recently, allowing for a reliable means of transport to the site.

Tucano is also serviced by a 1,100 m airstrip located approximately 800 m from the main gate. Charter flights from Macapá to Tucano take approximately 50 minutes.

The nearest accessible communities to Tucano are the towns of Pedra Branca do Amapari (10,000 inhabitants) and Serra do Navio (3,000 inhabitants) which are 15 km from Tucano and approximately 175 km and 200 km from Macapá, respectively.

Macapá has a population of approximately 500,000 inhabitants and lies along the equator on the north side of the Amazon River. The majority of the workforce are transported by bus from Serra do Navio, Pedra Branca, and other small surrounding communities. Professional staff commute from either Macapá or other cities in Brazil on a fly-in-fly-out (FIFO) basis.

PHYSIOGRAPHY

Tucano is situated in the low hills to the north of the Amapari River valley in an area within tropical forest characterized by dense vegetation and trees above 50 m in height. The original heap leach pad and plant site were cut from the top of existing hills. The ground drops away quickly to the east of the process plant, first into the valley of Taperebá Creek and then into the valley of the William Creek. The Taperebá AB (Tap AB) pit complex is located on the left bank of William Creek while the Urucum pit is located on the right bank of William Creek, both are bounded on the east by some slightly higher hills. The process plant is located at an altitude of approximately 143 metres above sea level (MASL) while the adjacent William Creek valley is approximately 90 MASL. The hills behind Tucano rise to a height of approximately 320 MASL.

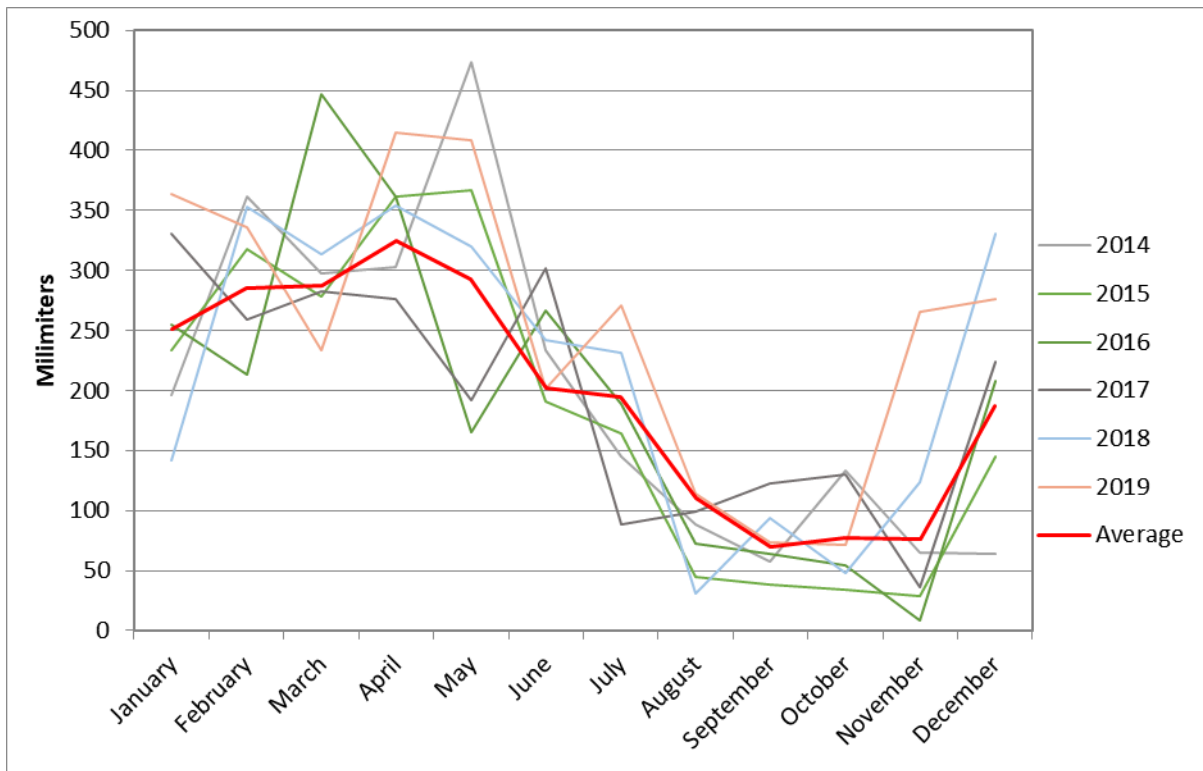
CLIMATE

Tucano is located in an area considered to have an equatorial climate, typified by year round high humidity and rainfall. The wet season occurs from January to June and is associated with frequent torrential rain events of long duration. Less rainfall is received during the remaining months, however, rainfall events are still frequent. Measurements of site rainfall over the last 10 years (2010 to 2019) show an average annual rainfall of 2,360 mm. Table 5-1 shows the monthly rainfall measurements for the 2010 to 2019 period. Figure 5-1 shows the monthly rainfall measurements for the 2014 to 2019 period. According to the Brazilian Water Agency (ANA), average monthly evaporation rates range from 800 mm (February to April) and 1,900 mm (August to October), with an annual evaporation of 1,424 mm.

TABLE 5-1 MONTHLY RAINFALL FROM 2010 TO 2019
Great Panther Mining Limited – Tucano Gold Mine

Year	Jan (mm)	Feb (mm)	Mar (mm)	Apr (mm)	May (mm)	Jun (mm)	Jul (mm)	Aug (mm)	Sep (mm)	Oct (mm)	Nov (mm)	Dec (mm)	Total (mm)
2010	304	225	262	334	268	160	196	184	57	33	91	186	2,300
2011	249	244	306	320	317	160	238	147	43	95	69	71	2,257
2012	222	281	257	240	182	166	171	109	41	104	52	218	2,043
2013	218	268	196	284	236	103	248	209	104	72	24	151	2,115
2014	196	361	297	303	474	233	145	88	58	133	65	64	2,417
2015	233	318	278	362	367	191	164	45	38	34	29	145	2,204
2016	255	213	447	362	165	267	189	73	64	54	9	208	2,306
2017	331	259	283	276	192	302	88	99	123	130	36	224	2,343
2018	142	353	313	354	320	242	231	31	94	48	124	331	2,583
2019	364	336	234	415	408	201	271	115	74	71	265	276	3,029
Average	251	286	287	325	293	203	194	110	70	77	76	187	2,360

FIGURE 5-1 MONTHLY RAINFALL FROM 2014 TO 2019



INFRASTRUCTURE

Infrastructure at Tucano includes a central administration building and medical facility, offices (mining, geology, survey, mining engineering, supply, environment, and safety), core shed, nursery, light and heavy equipment workshops, warehouse storage facilities, tire shop, refuelling and washing bays, fire-fighting systems, and explosive magazines (Figure 5-2). Tucano also encompasses a CIL gold plant with administration buildings, workshop, a power generation and distribution facility, security office, sample preparation and assay laboratory, storage area, and a reagent preparation facility. Mine subcontractors have separate facilities.

Site communication comprises private branch exchange (PBX) telephone systems and internet links.

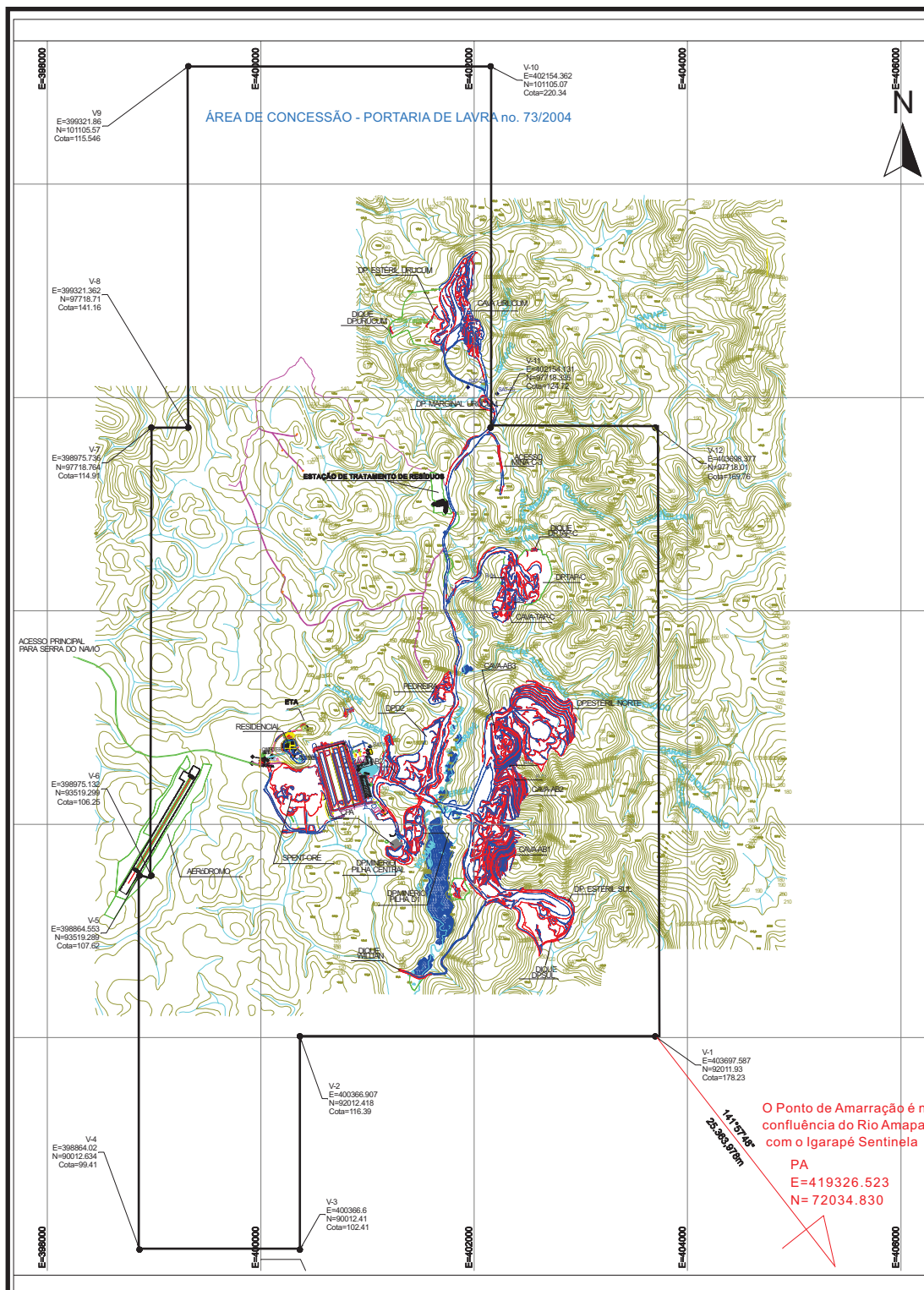


Figure 5-2

Great Panther Mining Limited

Tucano Gold Mine
Amapá State, Brazil

Site Plan

All installations are fenced and monitored by armed guards and cameras. The entrance to Tucano is located at the main site access road. A 122 person accommodation camp is located near the access road to Tucano. This camp is well equipped and includes a gymnasium, games room, laundry, and restaurant area.

A doctor works at Tucano Monday to Thursday, while nurses are stationed on the site permanently. An established system is in place for emergency removal of personnel if required.

WATER

Water for Tucano is provided from water storage dams and recycled process water. Potable water is processed onsite through a potable water treatment plant, where it undergoes filtration and chlorination. The water is transferred from the potable water treatment plant into two potable water tanks.

Process water consists of recycled and other waste streams used in the process, including return water from the tailings storage facility (TSF).

POWER

Tucano is connected to the national electrical grid by a 69 kilovolt-amperes (kVA), 20 megavolt-ampere (MVA) power line via the state-owned Companhia de Eletricidade do Amapá (CEA - the local supply authority). The line capacity is currently 10 megawatt (MW) but is forecasted to increase to 12 MW by mid 2020. An independent 12 MW continuous rated Aggreko diesel-powered generation system is also present at Tucano.

WORKFORCE

Tucano currently employs a total of 1,493 persons, comprising 381 employees and 1,112 contractors, with all staff Brazilian nationals. Most of the workforce live in towns in close proximity to the mine site. Managers and professional staff either commute from Macapá, the state capital, or from other cities in Brazil on a FIFO basis.

Shift workers work a rotating eight hour shift over a 24-hour period with a roster in days of 6 on 1 off, 6 on 2 off, or 6 on 3 off basis. Managers and professional staff either work a roster in

days of 19 on, 9 off, or 5 on, 2 off. Expats work on a FIFO basis of six weeks on, three weeks off.

COMMERCIAL RESOURCES AND SERVICES

Contracted services and the procurement of goods is managed by the site supply department. Also cleaning services are managed by the administrative department. Transport services are located in Pedra Branca do Amapari (buses) and light vehicles in Goiás state. Catering services are sourced from Pedra Branca do Amapari. Larger construction projects, such as the process plant and tails dam expansion, are contracted using companies based in Minas Gerais and Amapá. Great Panther has long term contracts with other companies in Belo Horizonte, which is the hub for many mining industry services in Brazil, and another cities located in Rio de Janeiro, São Paulo, etc. The supply of materials is either directly out of Macapá or shipped in from other cities via the port of Belem to the port of Santana located 10 km from Macapá.

6 HISTORY

PRIOR OWNERSHIP, DEVELOPMENT, AND PRODUCTION HISTORY

Anglo American Plc discovered a mineralized shear zone in 1994, undertook extensive exploration between 1995 and 2002, and through AngloGold, completed an FS of the oxide Mineral Resources in October 2002.

In May 2003, Tucano was acquired by EBX Gold Ltd (EBX). EBX carried out a FS for the oxide mineral resources and a Pre-Feasibility Study (PFS) for mining the sulphide mineralization.

In January 2004, Tucano was acquired by Wheaton River Minerals Ltd (Wheaton River) (which later merged with Goldcorp Inc (Goldcorp) in 2005). Mine construction began in July 2004, with the first gold poured in late 2005. Tucano was later operated by MPBA, a company created in 2003 by EBX, as a heap leach operation until January 2, 2009, when it was placed on care and maintenance due to the inability to treat transition material (not fully oxidized) in the deeper portions of the pits.

Goldcorp sold Tucano to Peak Gold Limited (Peak Gold) in April 2007. Peak Gold later merged with New Gold Inc (New Gold).

The operation did not reach the predicted gold production due to issues related to the clayey nature of the saprolite mineralization. In response, metallurgical test work was conducted during 2007 to investigate the potential improvements of installing a wash plant to remove fines and clays to improve heap percolation. Given that the results from the test work were inconclusive, and considering the relative amount of oxide resource available, the plans for an integrated wash plant and oxide and sulphide milling circuit were put aside in favour of a milling and CIL circuit to treat predominantly sulphide, and remnant oxide, material.

Until the closure of Tucano in 2009, mining operations extracted 8.8 million tonnes (Mt) of ore from four areas, Tap AB (pits 1, 2, and 3), Tap C, Tap D, and Urucum. Total gold production from the heap leach operations was approximately 316,000 ounces of gold.

In 2010, Beadell Resources Ltd (Beadell), through Beadell Brasil, a wholly owned subsidiary, acquired Tucano and commenced construction of a CIL plant to augment the existing process infrastructure. Mining and stockpiling of ore commenced in 2011 and the CIL plant was commissioned in November 2012. Beadell upgraded the plant from 2018 to 2019 including a ball mill, pre-leach thickener, leach tank, and oxygen plant.

On September 23, 2018, Great Panther announced that it had entered into an Implementation Deed with Beadell to acquire all of the issued ordinary shares of Beadell by means the Scheme under the Australian Corporations Act 2001. On February 11, 2019, the Scheme was approved by the Great Panther's shareholders (96% in favour) and on February 12, 2019, the Scheme was also approved by 97% of the number of votes cast, and 75% of the number of Beadell shareholders present and voting, at the meeting of Beadell shareholders. On March 5, 2019, the acquisition of Beadell was completed and now Great Panther holds a 100% interest in Tucano via Beadell Resources Australia, which is now a wholly owned subsidiary of Great Panther.

A summary of the production history of Tucano from 2005 to 2019 is presented in Table 6-1.

TABLE 6-1 SUMMARY OF GOLD PRODUCTION
Great Panther Mining Limited – Tucano Gold Mine

Year	Company	Processing Method	Au (oz)
2005	Wheaton River / Goldcorp	Heap leach	24,715
2006	Goldcorp	Heap leach	84,212
2007	Goldcorp -> Peak Gold / New Gold	Heap leach	96,426
2008	New Gold	Heap leach	86,993
2009	New Gold	Heap leach	16,240
2010	New Gold-> Beadell	Heap leach	8,118
2011	Beadell	SAG/CIL FS	-
2012	Beadell	SAG/CIL Start up plant	1,108
2013	Beadell	SAG/CIL	175,990
2014	Beadell	SAG/CIL	156,582
2015	Beadell	SAG/CIL	123,027
2016	Beadell	SAG/CIL	145,870
2017	Beadell	SAG/CIL	129,764
2018	Beadell	Ball Mill/Thicker/SAG/CIL/ O ₂ Plant (Oxair – Gas)	123,296
2019	Beadell/Great Panther	Ball Mill/Thicker/SAG/CIL/ O ₂ Plant (Praxair – Liquid)	123,867
Total			1,296,208

EXPLORATION

Exploration work at Tucano by previous operators includes geological mapping, rock and soil sampling, ground and airborne geophysical surveys, petrophysics, and diamond drilling (DD) with detailed core logging. The focus of the exploration programs has been towards identifying and delineating mineralized gold zones for subsequent production activities. Additional exploration activities have been carried out elsewhere at Tucano to evaluate selected exploration targets for their potential of hosting new gold mineralized zones. Most of the results of the exploration activities have been compiled into a digital database.

AIRBORNE MAGNETICS, RADIOMETRICS, AND DEM

Tucano has been covered by an airborne magnetic, radiometric, and Digital Elevation Model (DEM) survey conducted for previous operator, AngloGold in 1998. The survey was flown by LASA Engenharia e Prospecções S.A covered a total area of 10,377 km² on 250 m spaced lines at an elevation of 100 m. Two areas; AP1 (Eastern Area) and AP2 (Western Area) were flown. In 2001, Spectrem Air Ltd (Spectrem) conducted an airborne geophysics program for AngloGold involving magnetic, electromagnetic, radiometric, and DEM on 200 m spaced lines.

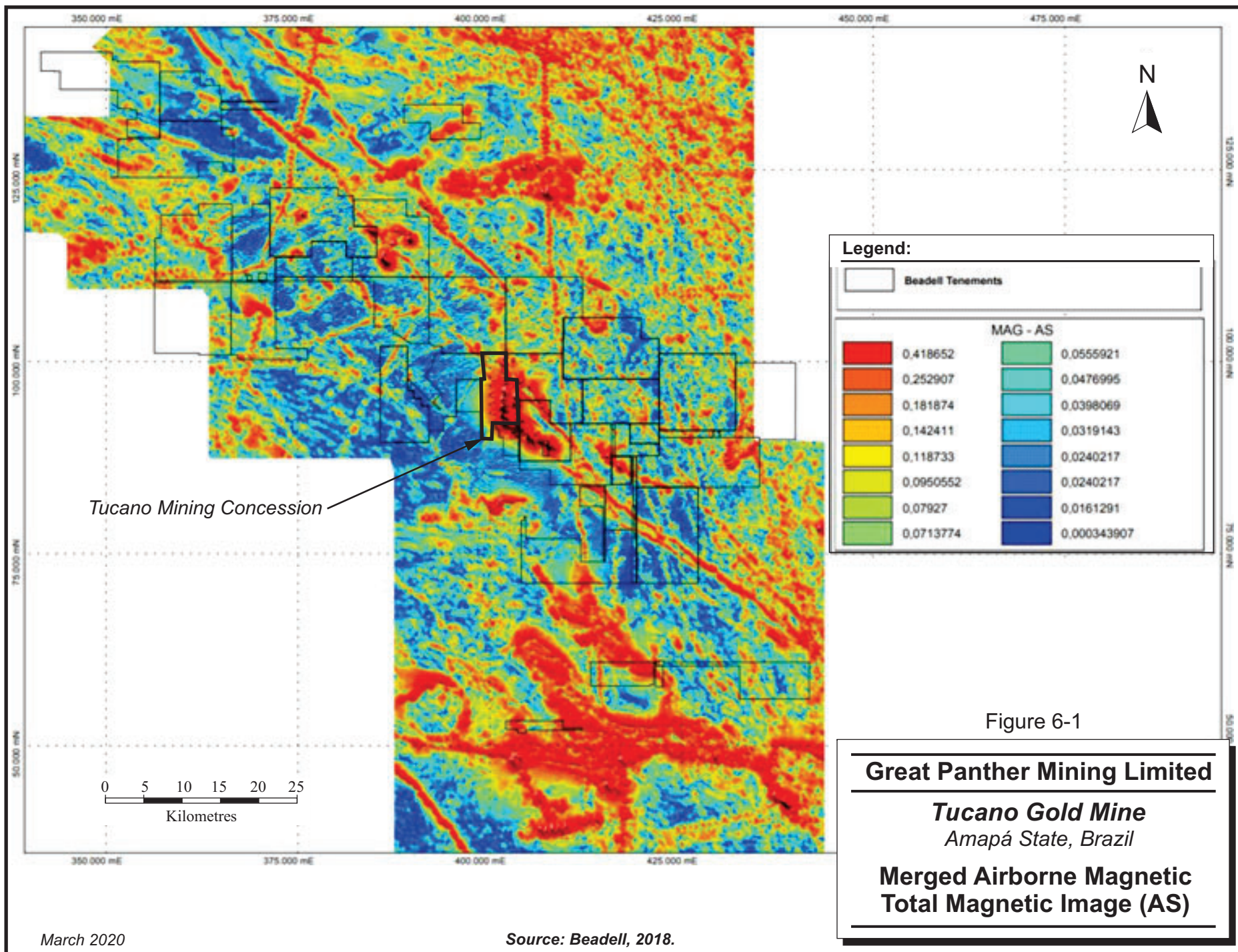
In 2004, CPRM - Serviços Geológico do Brasil (Geological Survey of Brazil) flew a government funded airborne magnetic, radiometric, and DEM survey covering the Araguari River Project area in Amapá State. The survey covered 10,872 km² at an elevation of 110 m and a line spacing of 500 m. The 2004 program was conducted on the basis that geological characteristics indicated potential for gold, base metals (copper and others), and chromium.

During 2015, Beadell contracted Southern Geoscience Consultants (SCS) in Australia to merge and re-process both airborne and ground geophysical datasets. For the airborne magnetic datasets, the AP1 survey was excluded as it was superseded by the higher resolution Spectrem survey. The processing of the airborne magnetic datasets involved re-projection to a common SAD69 22N datum, re-gridding, merging, and filtering. The merged total magnetic intensity (TMI) filters used included:

- Reduction to Pole (RTP).
- First Vertical Derivative (1VD).
- Analytical Signal (AS) of the TMI.
- Analytical Signal of the Vertical Integral (ASVI) of the TMI.

A total magnetic image (AS) from the SCS merged data along with the Tucano outline is shown in Figure 6-1. Banded iron formations (BIFs) and late cross cutting diorite dykes are shown as magnetic highs in red.

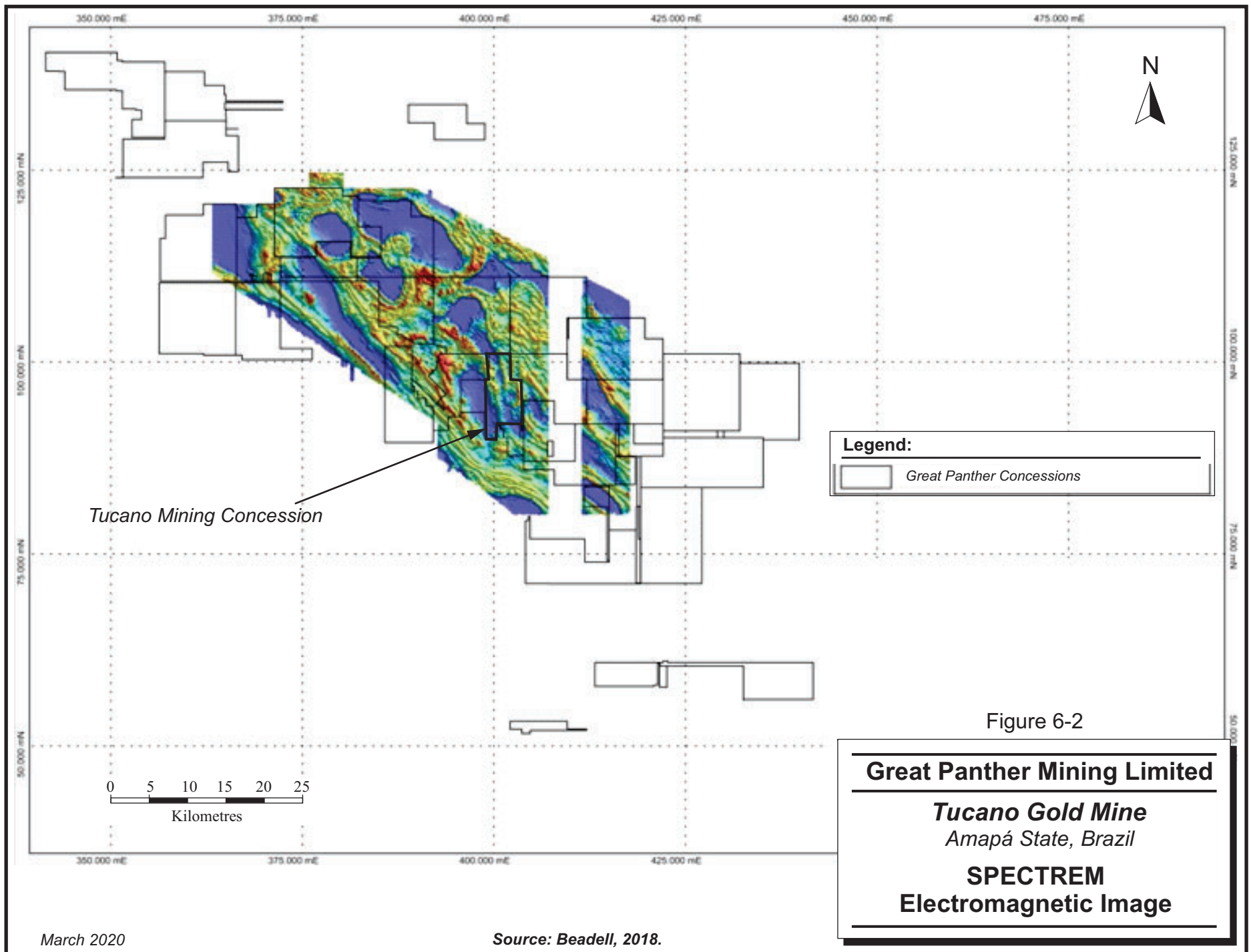
In 2015, SCS also merged all four datasets for the following radiometric elements; K, U, Th, and TC (total count) using a grid cell of 100 m for the Araguari dataset and a grid cell of 50 m for the others. K and U were not used from the Spectrem dataset due to an issue with the processing of these channels. Prior to merging, the data was scaled and levelled using a histogram approach.



AIRBORNE ELECTROMAGNETIC SURVEY

In January 2001, Spectrem flew an airborne electromagnetic (AEM) survey over the Amapá area for previous operator, AngloGold. A total of 4,601 acceptable line kilometres of data were collected on 200 m spaced lines before the bird (sensor) was lost and thus an estimated 750 line kilometres were never captured. In addition to AEM, aeromagnetic, radiometric, and DEM data were also collected. A large number of good quality bedrock conductors were identified in the largely resistive environment. Most of these conductors seem to be due to carbonaceous units although many of those could also be ascribed to sulphide-rich horizons. A number of conductors, identified as BIFs with associated sulphides, are of interest as gold exploration targets. High conductivity-thickness product AEM anomalies with a magnetic association are probably indicative of pyrrhotite rich sulphide conductors.

The Spectrem data did not require levelling or filtering by SCS in 2015 as it was deemed to be of good quality. The data was re-gridded to 40 m to improve image detail (Figure 6-2).



GROUND GEOPHYSICS

In 2004, MPBA contracted Equipe AFC Geofísica Ltda to carry out ground geophysical surveys using the following methods, magnetometer, very low frequency (VLF), and induced polarization (IP) time domain over the Tap AB, Tap D, Urucum, Vila do Meio, and Urucum East projects. The first stage of the geophysical survey included four lines ranging from 300 m to 800 m in length as a baseline against known mineralization at Urucum, Tap D, and Tap AB, which were already defined by drilling.

At Vila do Meio and Urucum East, only IP and magnetometer surveys were completed along eight lines for a total length of 6,100 line metres, and 8,350 line metres, respectively. At the first stage, spacing of the magnetometer readings was 10 m and IP dipole-dipole was arranged on a 25 m spacing on short lines up to 400 m in length with a combination of dipole and gradient array on the longer lines up to 800 m in length. At Urucum East and Vila do Meio, magnetometer reading spacing was at 25 m and IP dipole was at 50 m with some lines employing a combination of dipole and gradient array. Mineralization from all lines in Stage 1 orientation surveys was detected with IP. The magnetometer was excellent in defining the BIF. Conductors in areas without drill information were identified and flagged for follow-up work.

In 2015, SCS processed the ground magnetic data for Vila do Meio for Beadell with the aim to provide information in the Spectrem data gap area, however, the resolution of the image was considered poor. It was recommended to close the reading spacing to 10 m to improve resolution. A review of the ground IP dataset was not undertaken by SCS.

PETROPHYSICS

In 2016, Beadell contracted Western Geoscience Pty Ltd to undertake physical property test work on selected drill cores for Tucano. Results confirmed that pyrrhotite mineralization was of insufficient concentration to be conductive. IP surveys have been proposed to test targets in the Tucano trend for possible sulphide conductors at depth. Table 6-2 shows the test results of a sample of pyrrhotite rich ore from Urucum along with a photo of the core (Figure 6-3).

TABLE 6-2 CONDUCTIVITY TEST RESULTS OF A SAMPLE OF PYRRHOTITE RICH CORE FROM URUCUM
Great Panther Mining Limited – Tucano Gold Mine

Id	No. reading	Grade (ppm Au)	CondS/m	MSus10-3
1	1		1,305.00	2.61
1	2		1,545.00	2.83
1	3		832.00	2.85
1	4		815.00	2.06
1	5		517.00	2.43
1	6		855.00	2.45
Average		48.1	978.17	2.54

FIGURE 6-3 PHOTO OF THE CONDUCTIVITY TEST SAMPLE

Description Core : Tucano-Urucum.Banded mssv.-semi-mssv. Pyrrh.



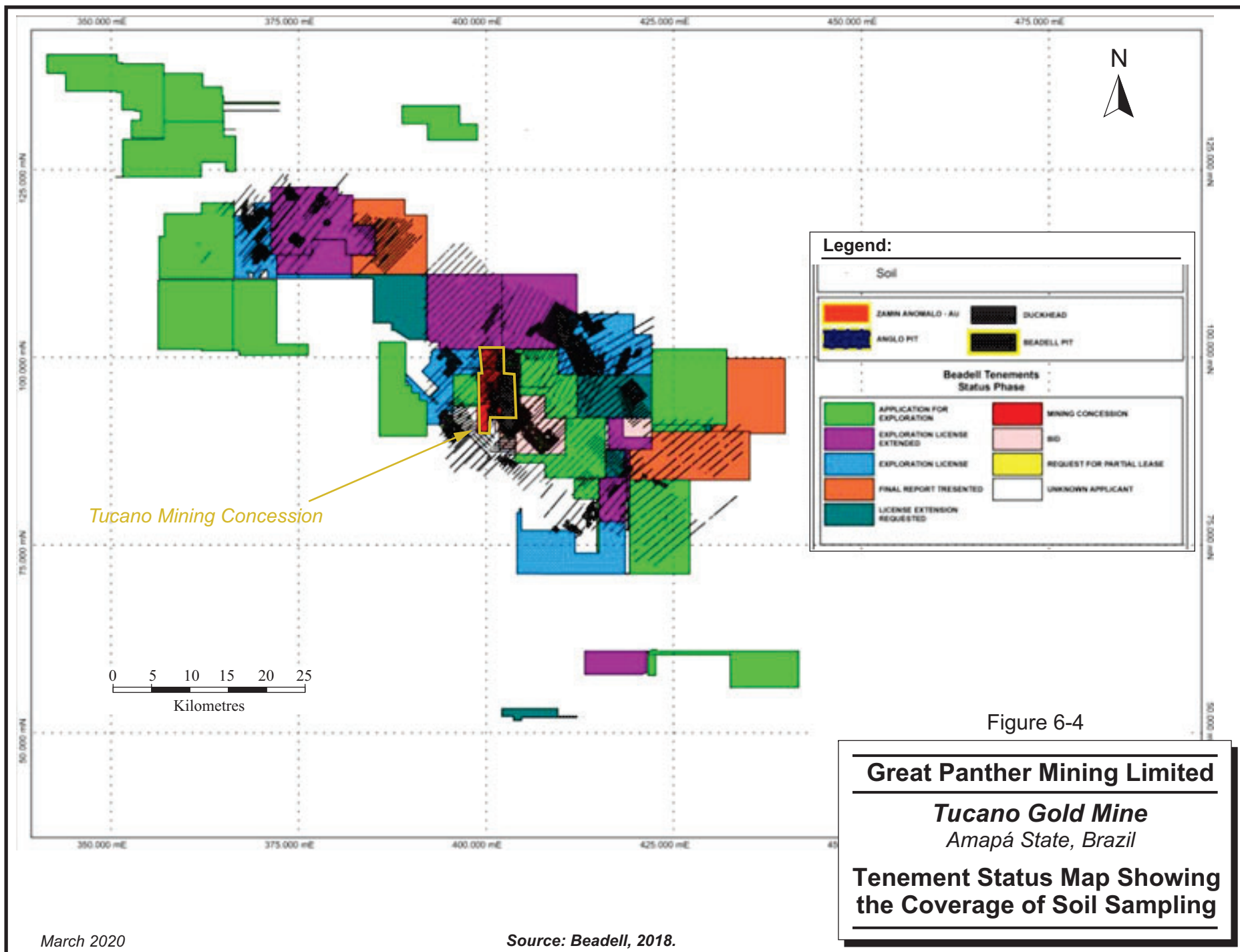
GEOCHEMISTRY

AngloGold conducted extensive soil sampling across Tucano. Results indicated the presence of elevated gold values in the soils over many areas. Some of the elevated gold values required baseline levelling due to several methods of analysis and various detection limits being used during the surveys. Beadell assessed this data along with an interpretation of the geophysics and geological mapping as part of its exploration target generation and ranking review. Figure 6-4 shows the coverage of existing soil sampling and tenement status. It is evident that for many tenements, the first pass soil sampling remains to be completed. Beadell undertook soil sampling in its exploration tenements using 400 m spaced lines and 40 m sample intervals with infill sampling closing to 200 m spaced lines. Soil samples of approximately one kilogram were collected from the B soil horizon using a post hole digger to a depth of 30 cm to 50 cm. Table 6-3 presents a breakdown of sampling work undertaken, by operator.

TABLE 6-3 NUMBER OF EXPLORATION SAMPLES COLLECTED BY SAMPLE TYPE AND COMPANY
Great Panther Mining Limited – Tucano Gold Mine

Company	Sample type	Number of Samples
Anglo Gold	Soil	78,134
Anglo Gold	Stream sediment	1,349
Anglo Gold	Rock chip	3,674
Beadell	Soil	3,907
Beadell	Stream sediment	263
Beadell	Rock chip	1,073

Beadell carried out an extensive program of stream sediment sampling in 2017 using a method of fine fraction (200 mesh) bulk leach extractable gold analysis. Samples were collected at approximately 700 m spaced centres, typically one sample per tributary stream. The sampling involved the collection of one composite of 35 sample points along a 100 m stretch of the stream collection point. This method proved effective in identifying a large anomaly in the Serra da Canga East area and is now the subject of a follow-up exploration program. . Figure 6-5 shows the extent of the Serra da Canga stream sediment anomaly.



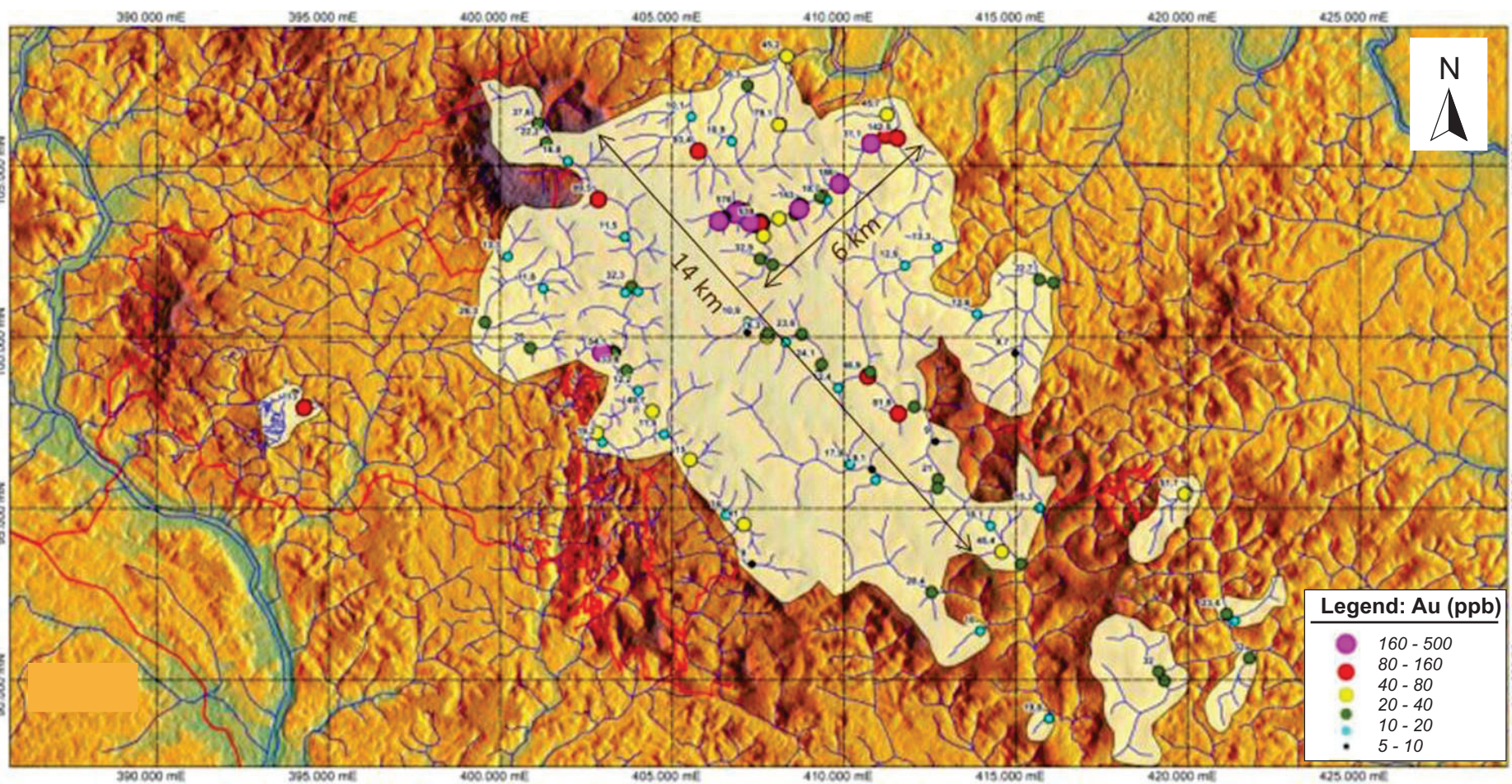


Figure 6-5

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Serra da Canga East
Stream Sediment Anomaly**

GEOLOGICAL MAPPING

The tenement package has been extensively mapped by MPBA and work continued under the direction of Beadell's regional exploration team. Outcrops are generally scarce, however, the composition of the soil and colluvium cover indicated underlying geology, which in conjunction with geophysics, aided in geological interpretation. Mapping typically occurred in conjunction with soil sampling along defined sampling lines.

PREVIOUS MINERAL RESOURCE ESTIMATES

A detailed description of the Mineral Resource and Mineral Reserve estimates for Tucano, as of June 30, 2017, is presented in Wolfe et. al. (2018). A summary of the Mineral Resource estimates for Tucano, as of June 30, 2017, is presented in Table 6-4. A summary of the Mineral Reserve estimates for Tucano, as of June 30, 2017, is presented in Table 6-5.

These Mineral Resource and Mineral Reserve estimates are superseded by the current estimates presented in Sections 14 and 15 of this Technical Report.

TABLE 6-4 SUMMARY OF THE MINERAL RESOURCES AS OF JUNE 30, 2017
Great Panther Mining Limited – Tucano Gold Mine

Classification	Tonnes (000 t)	Grade (g/t Au)	Contained Metal (000 oz Au)
Measured	18,448	1.41	835
Indicated	22,293	1.96	1,405
Sub-total, M & I	40,742	1.71	2,240
Inferred	16,351	2.19	1,150

Notes:

1. The June 2017 Tap AB underground Resource includes 173 kt at 4.68 g/t Au of Inferred Oxide within the Inferred Primary Category.
2. CIM Definition Standards (2014) were used for reporting the Mineral Resources.
3. Mr. B. Wolfe, MAIG is the Qualified Person under NI 43-101 and takes responsibility for the Mineral Resource estimate for the Tap AB Open Pit and Urucum Open Pit Resource. Mr. M. Batelochi, MAusIMM (CP) is the Qualified Person under NI 43-101 and takes responsibility for all remaining resources.
4. Tap AB and Urucum open pit Mineral Resources are constrained by an optimized pit shell at a gold price of US\$1,500/oz Au and using Measured, Indicated, and Inferred categories. The cut-off grade (COG) applied to the open pit resources is 0.5 g/t Au. The COG applied to ore stockpiles is 0.5 g/t with the exception of Marginal ore which has a COG of 0.3 g/t Au.
5. The underground COG is 1.2 g/t Au.
6. Drilling results are up to the 30 June 2017 for the Tap AB Open Pit resource. For all other deposits, drilling results up to the 31 December 2016, excluding the Urucum North Underground resource which has drilling results up to September 2015.
7. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
8. Mineral Resources are inclusive of their derived Mineral Reserves.
9. Numbers may not compute exactly due to rounding.

TABLE 6-5 SUMMARY OF THE MINERAL RESERVES AS OF JUNE 30, 2017
Great Panther Mining Limited – Tucano Gold Mine

Area	Proved Reserve			Probable Reserve			Total Mineral Reserve		
	Tonnes (000 t)	Grade (g/t Au)	Contained Metal (000 oz Au)	Tonnes (000 t)	Grade (g/t Au)	Contained Metal (000 oz Au)	Tonnes (000 t)	Grade (g/t Au)	Contained Metal (000 oz Au)
Oxide Open Pit	3,120	1.92	193	2,545	1.66	136	5,666	1.80	329
Primary Open Pit	5,949	1.74	333	6,836	1.77	390	12,785	1.76	723
Oxide and Primary Open Pit	9,069	1.80	525	9,381	1.74	526	18,450	1.77	1,051
Stockpiles	3,642	0.66	77	-	-	-	3,642	0.66	777
Open Pit and Stockpiles	12,711	1.47	603	9,381	1.74	526	22,092	1.59	1,128
Underground Primary	-	-	-	2,378	3.64	278	2,378	3.64	278
Total	12,711	1.47	603	11,759	2.12	804	24,470	1.79	1,406

Notes:

1. Mineral Reserves are reported within open pit designs based on pit optimized shells using the following optimization COGs; Tap AB Oxide: 0.66 g/t Au, Tap AB Primary: 0.82 g/t, Urucum Oxide 0.74 g/t Au, Urucum Primary 0.94 g/t Au, Tap C Oxide 0.66 g/t Au, Tap C Primary 0.86 g/t Au, Urucum East Oxide 0.74 g/t Au, and Urucum East Primary 0.94 g/t Au. The COG is based on total costs per unit (inclusive of processing, general and administration (G&A), technical services and haulage, exclusive of mining costs) and averages \$12.8/t for oxide and \$16.8/t for primary. Metallurgical recoveries are 95% for oxide and 93% for sulphides. The gold price used for the open pit optimizations was US\$1,150/oz Au for Tap AB and US\$1,100/oz Au for Tap C and Urucum. The gold price used to calculate the COGs for the reserves reported within the optimized pit designs was US\$1,200/oz Au. An exchange rate of US\$/R\$ of 1:3.2 for Tap AB and 1:3.4 for Urucum was used. Open Pit Mining Recoveries of 100% for oxide and primary were used at Urucum, 90% for oxide and primary at Tap C, and Tap AB and 90% oxide, 100% primary at Urucum East. Dilution used for all pits was 15% for oxide and 20% for primary.
2. 2018 Underground Mineral Reserves are stated as of 30 June 2017 and based on a COG of 1.6 g/t Au. The COG is based on an incremental mining and processing cost of \$50/t, metallurgical recovery of 90%, a gold price of US\$1,120/oz Au and an exchange rate of US\$/R\$ of 1:3.8.
3. A 0.5 m dilution skin was assumed for the HW and FW side of the underground production stopes making the total dilution 1.0 m in width. Ore losses were assumed to be 8% for the Benching method, 14% for the Uphole retreat method, and ore losses for the recovery of the sill pillars were assumed to be 35%.
4. Numbers may not compute exactly due to rounding.

7 GEOLOGICAL SETTING AND MINERALIZATION

REGIONAL GEOLOGY

The South American Precambrian Shield comprises some 50% of the bedrock in Brazil and consists of major Proterozoic deformation zones surrounding cratonic nuclei of Archean age. The three principal cratons are the Guyana Craton in the north, the Amazon (or Guapore) craton immediately south of the Amazon River, and the São Francisco Craton situated between the Amazon Craton and the coast. The cratons are mostly a granite gneiss complex including some highly metamorphosed supracrustal belts, of which greenstone belts represent a small portion. Remoteness and lack of outcrops due to deep weathering prevent detailed stratigraphic and structural mapping across most of the greenstone belts. However, stratigraphic and structural elements typical for greenstone belts worldwide are well recognized in most South American examples.

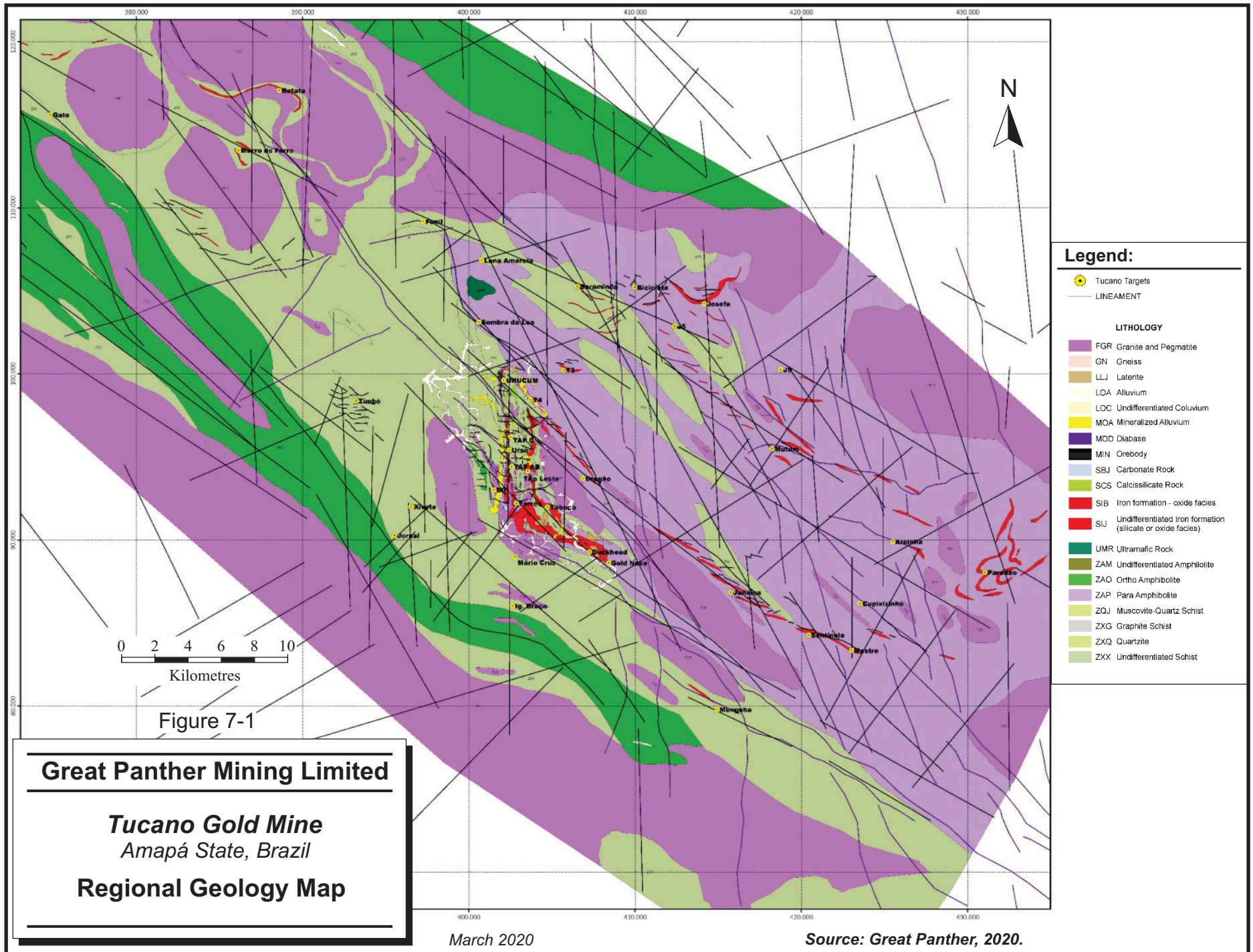
The consistent north-easterly trend of inferred extensions within granite-greenstone belts across north-eastern South America suggest they have formed during a single major event. The Tucano mineral deposits are located within the Guyana Craton, described by several authors as the Maroni – Itacaiunas mobile belt. This belt runs from Pará and Amapá States of northern Brazil through the Guyanas and into Venezuela.

The Maroni-Itacaunas Province at in Central-South Amapá State region is characterized by an association of greenstone belt (the Vila Nova Greenstone sequence) that is composed of clastic metasedimentary rocks interspersed with metabasalts and meta-andesites, containing subordinate layers of iron and manganese formations, calc-silicate schists, and marbles. These units were affected by an orogenic metamorphism under low to medium degree conditions, between the upper green schist and middle amphibolites facies, under intermediate pressure.

Structural surveys suggest that the complexes were affected by the same processes of deformation and metamorphism, which resulted in a regional foliation S1-2 oriented according to the N70-85°W direction. This foliation is affected by a later deformation phase, which

generated F3 folds of regional scale and with open to closed forms and with axis according to the direction NW-SE.

Figure 7-1 below shows the Regional Geology of Tucano Gold Mine.



PROPERTY GEOLOGY

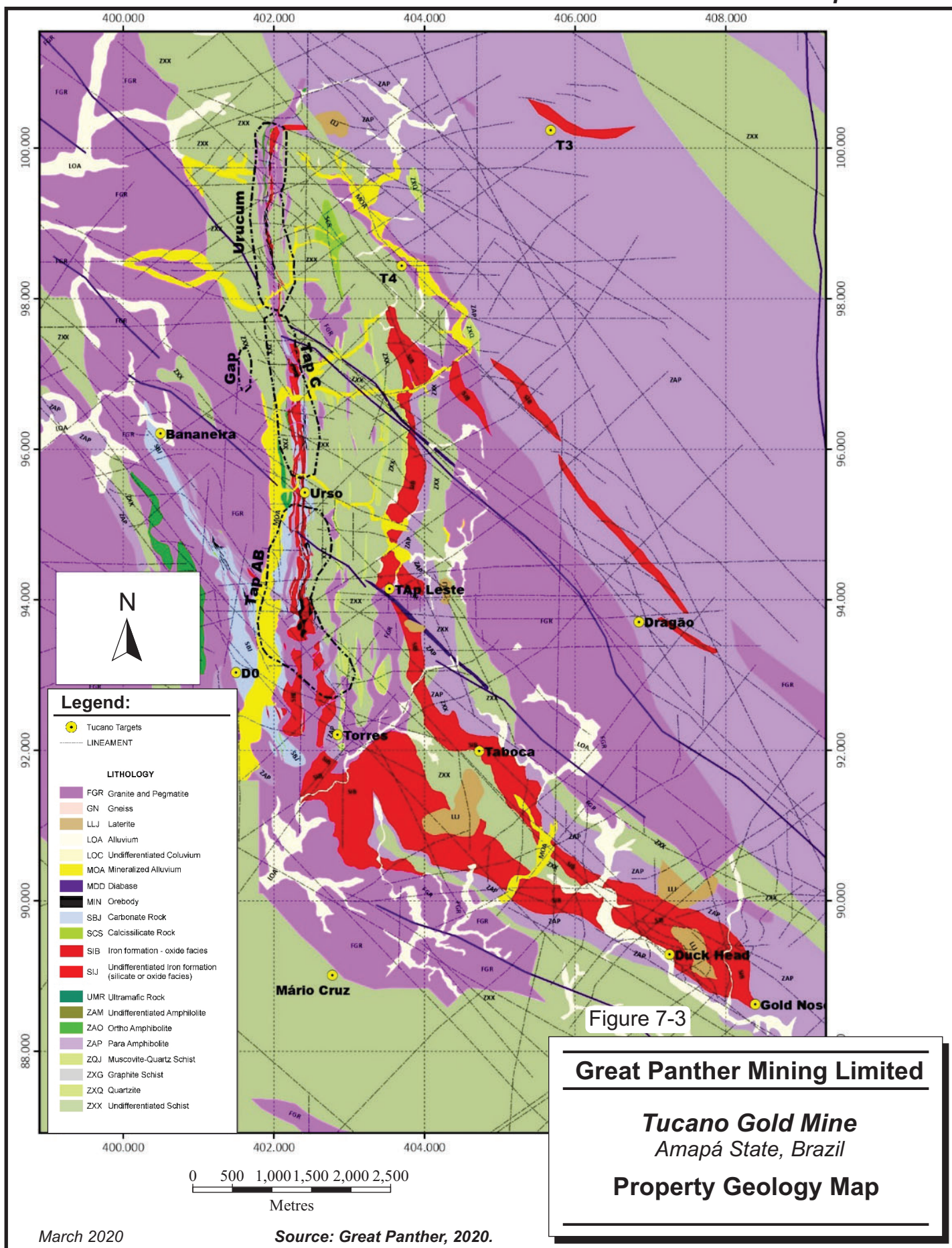
The western part of the Tucano property (about 25% of the area) is underlain by basement gneiss. The balance of the property area is underlain by ortho-amphibolite and meta-sedimentary rocks of the Vila Nova Group (1.75 to 1.9 billion years old), composed essentially of gneisses, granites, amphibolites, banded iron formations (BIF), massive iron formations, schists, and quartzites. These units are intruded by granitic pegmatites, diabase dykes, and gabbro bodies. The metasediments are similar to what has been named the Serra do Navio Formation in the nearby area that was mined by Indústria e Comércio de Minerios S/A for manganese. The metasediments hosting the gold mineralization within the Tucano property lie along the west limb of a north striking syncline (Figure 7-2).

On the north end of the syncline, the strike is north-south, with dips approximately 65 degrees to the west. To the south, the dip becomes vertical to dipping slightly northeast, with the strike trending north-northwest. The gold mineralization is associated with iron and carbonate-rich units of the chemical sedimentary sequence known as the William Formation. Gold mineralization is predominantly associated with the BIF facies, but carbonate and calc silicate rocks also host economic mineralization. Sub-economic mineralization may be hosted by any of the lithological units shown in the stratigraphic column (Figure 7-2) except for the late intrusions.

Laterite and lateritic colluvium are common throughout the area and tend to be thicker over topographic highs, with thick laterites developed in proximity to BIF. Colluvium is characterized by deeply weathered rock that no longer displays any trace of original structure and commonly has angular fragments that indicate limited transport. The colluvium hosts secondary mineralization. A north-south trending shear zone appears to control gold mineralization by carrying gold-bearing hydrothermal fluids or remobilizing existing mineralization; this can be justified by the presence of mineralization found in BIF that was not deformed by shearing. Mineralization is both conformable and not conformable with meta-sedimentary contacts in the William Formation (Figure 7-3).

FIGURE 7-2 STRATIGRAPHIC COLUMN

Alluvium / laterites					
	Intrusives	Basic	Db	Gabbro / diabase	Dykes of diabase and gabbro
		Acid	Gran. / Peg	Pegmatites	
Vila Nova Group	Clasto-pelitic Sedimentary Unit	Quartz Domain	QMX	Muscovite quartzites	Muscovite-quartz schist, muscovite quartzite, locally with fuchsite and / or sillimanite
		Pelitic Domain	QBX	Quartz-mica schists	Quartz-biotite-muscovite schist with garnets, interspaced with lenses of calc-silicates, iron formation and muscovite
	Clasto-chemical Sedimentary Unit	Transitional Unit	RANF	Quartz-grünerite cummingtonite schist w/ garnets, chlorite and biotite	Quartz-amphibole schists and amphibole schists with lenses of silicate facies iron formation and calc-silicates
	Chemical Sedimentary Unit (William Fm.)	Ferruginous Domain	FFER	Iron formation, silicate facies	Garnet-hornblende-grünerite-diopside; magnetite-grünerite-hornblende schists
			BIF-O	Iron formation oxide facies	(Grünerite)-quartz-magnetite / hematite, sometimes with garnets and diopside
			BIF-OS	Iron formation oxide-silicate facies	(Hornblende)-diopside-grünerite-quartz with magnetite; (diopside)-hornblende-garnet, quartz-magnetite-grünerite schist
		Calc-magnesian Domain	CALC	Schists with diopside porphyroblasts	Actinolite-tremolite-diopsides, hornblende-diopsides, amphibole-diopsides, with epidote, biotite and garnets
			RCB	Marble and carbonate schists	Calcic marble, serpentine marble with tremolite, forsterite, fayalite, hastingsite, chlorite and magnetite; actinolite-tremolite-carbonate schists
	Volcanic Unit		MTB or ANF	Metabasics ortho-amphibolites	Plagioclase amphibolite's, biotite-amphibole schists, plagioclase-cummingtonite-hornblende schists



LOCAL GEOLOGY AND MINERALIZATION

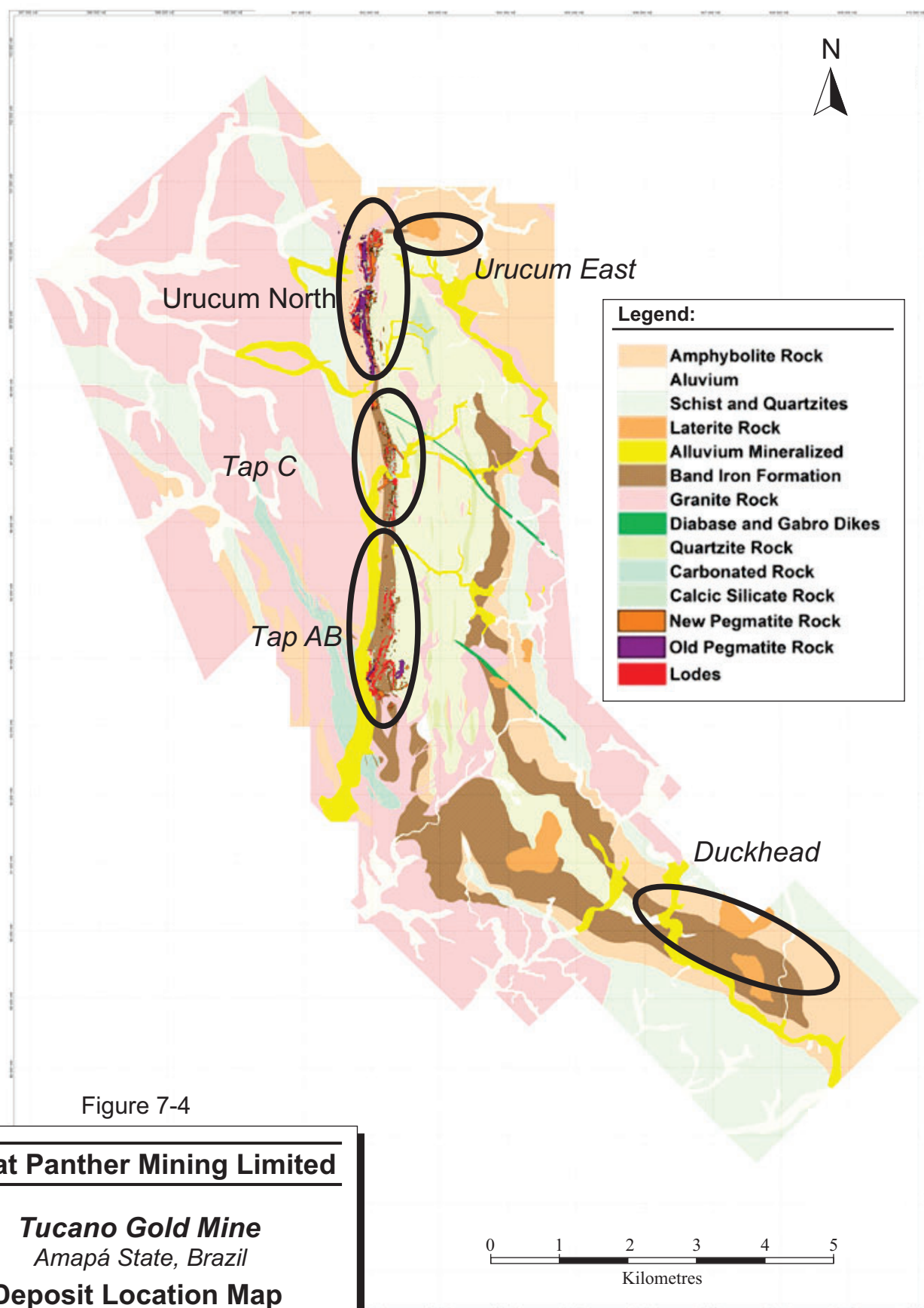
The mineralization at Tucano occurs in a series of deposits over a seven kilometre strike length associated with a north-south trending shear zone occurring coincident with a north-south line of topographic ridges. From south to north, these deposits have been named Tap A, B, C, and Urucum. Tap D is a separate structure in the west. The locations of the deposits are shown in Figure 7-4. Higher grades are associated with the more intensely hydrothermally altered rocks.

Continuous, high grade, steeply to shallowly plunging ore lodes are developed along mineralized shear zone hosts. The geometry and plunge of the ore shoots are interpreted to be controlled by gently plunging F2 fold hinges and more steeply dipping fault intersections.

The texture and mineralogy along the shear zone indicate a high-temperature hydrothermal system. The interaction of favourable rock type, structure, heat, and mineralized solutions has resulted in the deposition of gold bearing, non-refractory sulphides concentrated near or on major lithological contacts. This mineralized zone exhibits intense hydrothermal alteration, particularly silicification and sulfidation, bearing auriferous pyrrhotite, and pyrite. Alteration is most intense in the proximity of reactive meta-sediments such as BIF, followed by amphibolite, carbonate, schist, and to a lesser extent, calc-silicate rocks. Table 7-1 shows a description of length, width, depth, and continuity for each deposit.

TABLE 7-1 DESCRIPTION OF MINERALIZED ZONES IN EACH DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine

Deposit	Pit / Area	Total Horizontal Length of Mineralization (m)	Average Width (m)	Depth Defined by Drilling (m)	Continuity of Mineralization Down Plunge (m)
Tap AB	Tap AB 1	580	9.0	300	450
	Tap AB 2	600	5.5	350	440
	Tap AB 3	420	5.5	460	480
Tap C	Tap C1	800	6.0	150	150
	Tap 3C	450	7.0	300	150
	Tap C3N	350	5.5	90	150
	Gap	170	11.0	130	100
Urucum	Urucum North	1,000	4.0	780	550
	Urucum South	1,300	10.0	360	750
Urucum East	Urucum East	230	7.0	75	180
Duckhead	Main Lode	80	12.0	210	220
	HW Lode	90	15.0	165	180



March 2020

Source: Beadell, 2018.

TAP AB AND URUCUM

The Tap AB and Urucum deposits are emplaced within a north-south trending, multiply deformed volcano-sedimentary sequence of rocks that is bounded to the west by the Amapari Granite. The deformation history has resulted in steeply dipping N-S shear zones and the gold mineralization is associated with alteration and sulphide mineralization of various lithologies within the deformed sequence. Mineralization occurs over at least seven kilometres of strike length and has been interpreted to extend to more than 700 m below the surface. A suite of late post-gold pegmatites has been emplaced throughout the sequence in various orientations and is largely barren of gold.

Mineralization also occurs in colluvium overlying the sequence and is spatially related to the bedrock mineralization and is interpreted to be derived thereof. Typically for many deposits of its type, the mineralization often presents as being somewhat discontinuous and irregularly distributed on the scale of approximately 50 m to 100 m.

Gold mineralization at Urucum is predominantly strata bound to specific sheared lithological units within the BIF and is characterized by strong disseminated and shear fabric pyrrhotite sulphide. The strong association between gold and pyrrhotite results in a highly visual ore in fresh rock that is easily discernible from non-mineralized BIF and other rock.

URUCUM EAST

The Urucum East deposit is located east of the Urucum Mine in the northern fold hinge of the Tucano Gold Mine stratigraphy. The deposit consists of a single, east-west striking and flat (-30°) north dipping sulphide lode which has an average thickness of seven metres and a strike length of 230 m. Mineralization at Urucum East is hosted in a wedge of carbonate and altered BIF located inside a swarm of parallel, east-west striking and -30° north dipping pegmatite dykes/sills which have intruded the host schist unit. The deposit is covered by a blanket of poorly mineralized colluvium up to 10 m thick and weathered to a depth of approximately 50 m below the surface.

DUCKHEAD

The Duckhead deposit is located south east of the Tap AB deposit. Mineralization at Duckhead is controlled by the recently interpreted intersection of steep east-west striking shear zones with a BIF lithological contact to form steeply west plunging high grade shoots. The texture and

mineralogy along the shear zone indicate high-temperature hydrothermal alteration, particularly silicification and sulfidation, bearing auriferous pyrite.

MINERALIZATION WEATHERING TYPES

Deep weathering is present in most of the deposits with high grade mineralization extending to the surface through a layer of colluvium several metres thick. Gold mineralization can be found in the fresh rock at depth, in the saprolite zone created by in-situ weathering of the underlying rocks, and in colluvial deposits which overlie the saprolite mineralization as a blanket, spreading out over the hill slopes. The saprolite and the colluvial mineralization are collectively grouped together as “oxide mineralization”.

Sulphide zones follow shear plane foliation, often crosscutting the BIF and other host meta-sediments and as bedding parallel lenses dipping either east or west along the limbs of the folded BIF units. Outside the shears and faulted zones, host rocks are poor in sulphide and gold. The accumulation of auriferous massive and/or disseminated sulphides in zones of fractures and folds, and forming plunging mineralized shoots, often crossing lithological contacts, suggests an epigenetic event.

PRIMARY OR SULPHIDE MINERALIZATION

Sulphide mineralization within fresh rock is only found in drill core and does not outcrop at Tucano. Pyrrhotite and pyrite are the most abundant sulphides. Chalcopyrite, arsenopyrite, sphalerite, and galena occur in trace amounts (less than 1%). At Urucum, the mineralization occurs with intense silicification and pyrrhotite is the dominant sulphide (Figures 7-5, 7-6, and 7-7). At Tap AB the gold is associated with masses containing 5% to 10% pyrite, and pyrrhotite only occurs in trace amounts.

The individual sulphide masses are several metres thick and can be elongated on strike along north-northwest or north-south orientations. The sulphides extend in depth along a plunge dipping from 10° to 40° at about N10°W. The dip ranges from almost vertical at Urucum, to 30°W at the south of the Tap AB deposit. Studies show that the gold occurs as free gold and not tied into the crystal lattice of the sulphide minerals. Mineralization is not confined to any particular lithology, nor is it concordant with lithological contacts.

**FIGURE 7-5 FOLIATION-PARALLEL PYRRHOTITE MINERALIZATION -
URUCUM CENTRAL OPEN PIT**



Source: Cooley (2019)

FIGURE 7-6 REMOBILIZED PYRRHOTITE VEINS - URUCUM CENTRAL OPEN PIT



Source: Cooley (2019)

FIGURE 7-7 PYRRHOTITE VEINING IN DRILL CORE



Source: RPA

SAPROLITE MINERALIZATION

Intense tropical weathering reaching down 30 m to 300 m has caused the formation of saprolite, that is, an in-situ oxidation of the sulphide mineralization and host rocks. The saprolite consists mainly of iron oxides and hydroxides, clay, and silica. Gold mineralized zones within saprolite follow the strike, dip, and plunge of the sulphide mineralization. Semi-decomposed remnants of the sulphide mineralization become more frequent with depth.

Weathering has left much of the saprolite material amenable to free digging, however, some of the saprolite has required blasting prior to excavation. The mineralization in these more competent zones may range from entirely oxidized to partially or even fresh sulphides.

COLLUVIAL MINERALIZATION

The colluvial deposits occur along north-south trending ridges cut by William Creek. The creek is at about 115 m elevation and the ridges reach 300 m. The top and slopes of the ridges are covered by alluvial and colluvial sediments. It is difficult to separate alluvial and colluvial sediments in the field and therefore they are collectively named colluvium.

All mineralized gold zones in fresh rock are covered by mineralized colluvium, which varies in character according to the subsurface lithology. The grade of mineralization in colluvium tends to reflect the grade of underlying ore shoots, with patches of low grade or barren colluvium usually reflecting low grade or barren underlying saprolite zones. However, zones of mineralization in colluvium tend to be wider than in underlying saprolite due to mechanical transport and development of some secondary mineralization due to variations in surface soil chemistry.

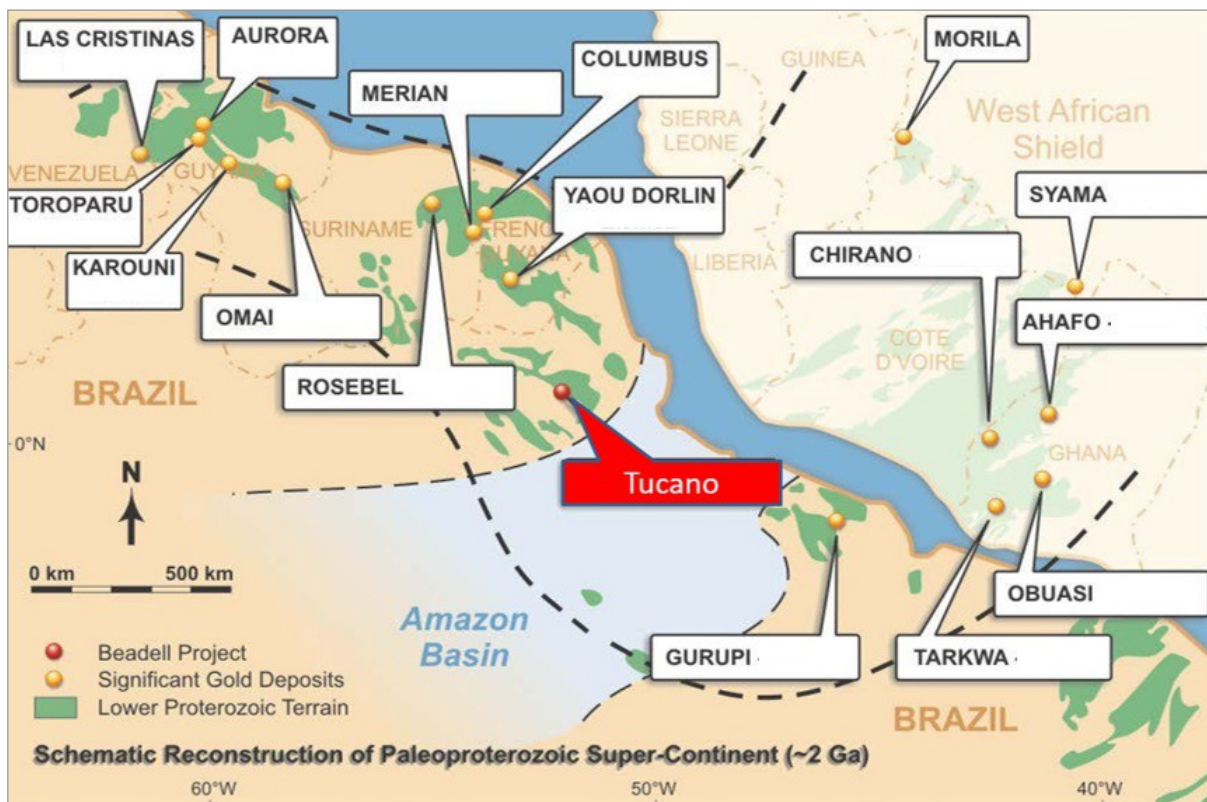
Deep weathering and intense fixation of iron in the upper portions of the soil often create a laterite horizon. The top of the colluvium is usually a layer rarely more than one metre thick composed of silty, clayey, and sandy materials, poor in fragments of limonite. Immediately below there is a variable layer up to 10 m thick containing lateritic fragments rich in iron oxide dispersed in a ferruginous clay-sand matrix which becomes rich in manganese at the base.

The colluvium deposits are heterogeneous, reflecting the varied subsurface lithologies. Occasionally there are semi-decomposed, angular fragments of these lithologies within the colluvium.

8 DEPOSIT TYPES

The Tucano gold deposits are hosted in shear zones within a number of different Paleoproterozoic, metasedimentary host rocks. This mineralization style is considered to represent an orogenic, structurally controlled gold mineralizing system. The strong association of gold mineralization within, and proximal to, a major BIF unit makes the setting of the Tucano deposit unique in the district, however, iron formation hosted gold deposits are well documented throughout Precambrian cratons worldwide. The age and structural controls at Tucano exhibit similarities to Birimian Orogenic Gold District deposits in West Africa. Figure 8-1 shows a reconstruction of the Guiana Craton with the West Africa Shield showing the location of the major gold deposits in the area. Deep and highly variable thickness of weathering is a feature shared by Tucano with other gold deposits in the Guiana Craton.

FIGURE 8-1 RECONSTRUCTION OF THE GUIANA CRATON AND WEST AFRICA SHIELD



Source: Great Panther

9 EXPLORATION

Great Panther acquired the Tucano in March 2019. All prior exploration conducted by other companies and government agencies prior to Great Panther's involvement is summarized in Section 6.

Since acquiring the property, Great Panther has not completed any material exploration work on the Tucano property, other than drilling.

Summaries of the exploration results obtained by Great Panther during 2019 can be found in news releases issued by Great Panther in 2019 and 2020 (Great Panther 2019 and Great Panther 2020).

10 DRILLING

DRILLING SUMMARY

Auger, rotary air blast (RAB), reverse circulation (RC), and DD methods have been employed at Tucano. A summary of the drilling history for the Tap AB and Urucum deposits is presented in Table 10-1. Drill hole locations, and example cross sections are presented in Figures 10-1 to Figure 10-5, inclusive.

TABLE 10-1 SUMMARY OF DRILLING BY YEAR - TAP AB AND URUCUM DEPOSITS

Great Panther Mining Limited – Tucano Gold Mine

Year	Diamond Drilling		Reverse Circulation Drilling	
	No. Holes	Total Length	No. Holes	Total Length
Tap AB Deposit				
Pre-1995	16	876	2,369	65,373
1995	0	0	20	1,839
1996	43	4,792	103	7,981
1997	43	11,989	78	6,366
1998	57	7,692	38	3,246
1999	17	1,331	1	90
2000	55	3,595	139	1,548
2001-2003	0	0	0	0
2004	41	4,081	58	4,942
2005	78	9,831	0	0
2006	9	802	1	38
2007	85	6,958	3	94
2008	83	13,611	0	0
2009	2	562	0	0
2010	119	13,848	69	3,762
2011	67	13,373	657	15,307
2012	5	2,819	1,123	20,949
2013	0	0	23	1,948
2014	5	927	920	24,497
2015	0	0	351	14,590
2016	5	1,577	1,346	87,140
2017	19	5,557	850	50,361
2018	2	975	332	24,113
2019	12	2,408	0	0
Tap AB Total	763	107,604	8,481	334,184
Urucum Deposit				
Pre-1995	5	582	1,539	60,981

Year	Diamond Drilling		Reverse Circulation Drilling	
	No. Holes	Total Length	No. Holes	Total Length
1995	0	0	63	5,787
1996	39	6,175	10	606
1997	24	7,341	11	672
1998	29	13,125	5	222
1999	0	0	0	0
2000	1	61	1	18
2001-2003	0	0	0	0
2004	12	1,997	10	688
2005	13	1,868	0	0
2006	61	11,668	4	304
2007	55	8,688	0	0
2008	82	14,674	0	0
2009	1	308	0	0
2010	13	2,279	33	2,298
2011	15	6,269	199	6,779
2012	8	4,243	2	56
2013	0	0	0	0
2014	3	1,416	948	21,695
2015	25	9,772	675	25,176
2016	9	3,773	308	18,694
2017	0	0	4	328
2018	0	0	377	21,326
2019	10	1,955	388	18,232
Urucum Total	405	96,194	4,577	183,862

DRILLING METHODS

The QP is of the opinion that the auger and RAB drilling methods are efficient regional exploration techniques for identifying the surface expression of Tucano's style of mineralization, which is characterized by narrow lodes ranging from 3 m to 10 m thickness located in a region of dense forest without outcrops. The auger technique was a crucial component of the discovery of the Urucum Mine. Drill holes in both techniques are up to 20 m in length and above the water table. If the water table is intercepted, the drill hole is terminated.

In 2019, Great Panther began using auger and RAB drilling to cover strategic tenements outside of the Tucano area as part of the Regional Exploration program. While the results of this exploration program have not been finalized, they are not expected to have a material impact on the Mineral Resource or Mineral Reserve estimates.

Where possible, RAB drilling is given priority due to its greater productivity (50 m/day to 80 m/day) relative to auger drilling (15 m/day to 20 m/day). In certain instances, however, there are areas where access is difficult or a high health and safety risk is posed if RAB drilling is used, in these instances auger drilling is conducted.

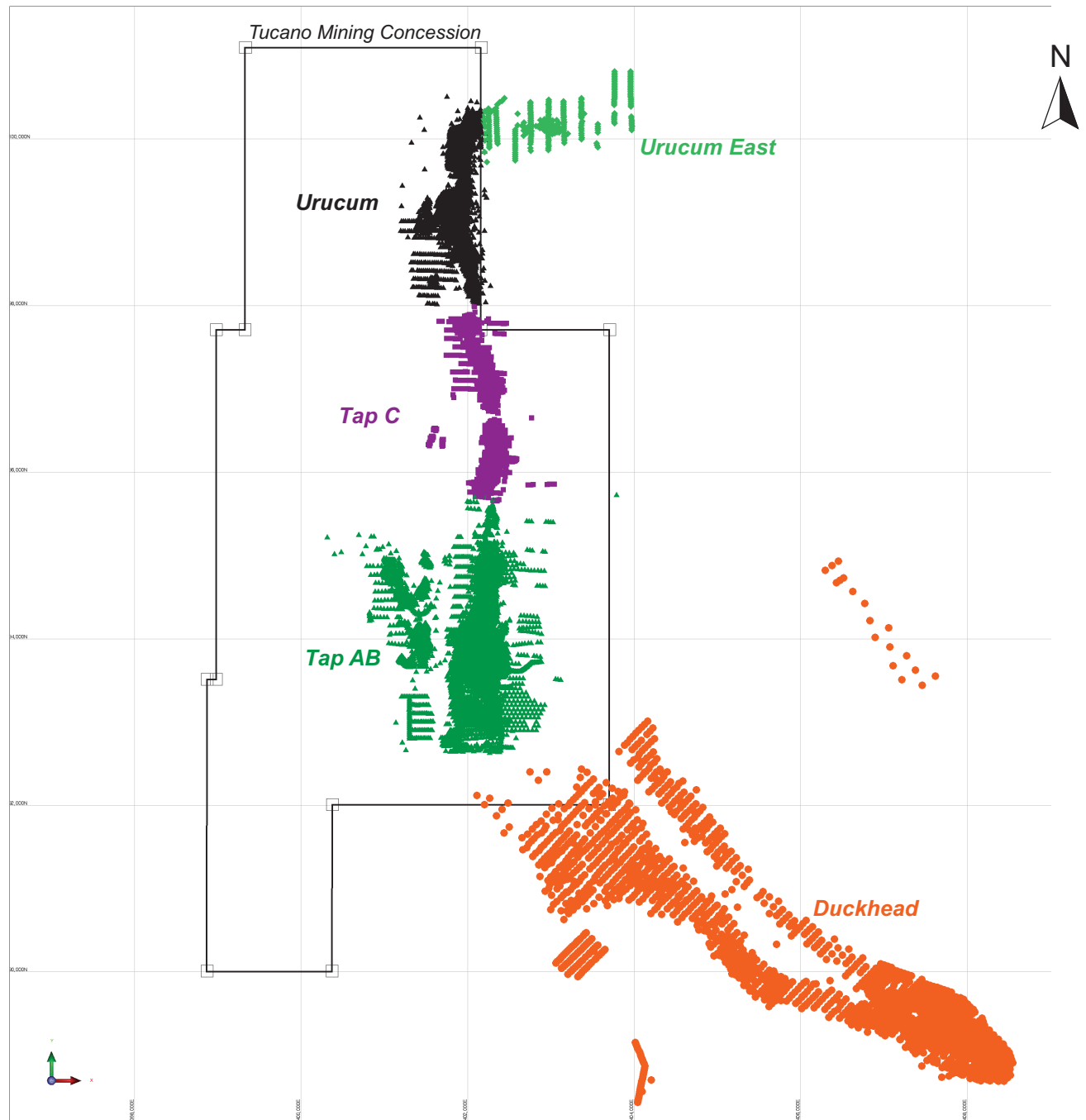


Figure 10-1

Great Panther Mining Limited

Tucano Gold Mine
Amapá State, Brazil

**Drill Hole and Channel
Sample Location Plan**

March 2020

Source: RPA, 2020.

Longitudinal View (Looking West)

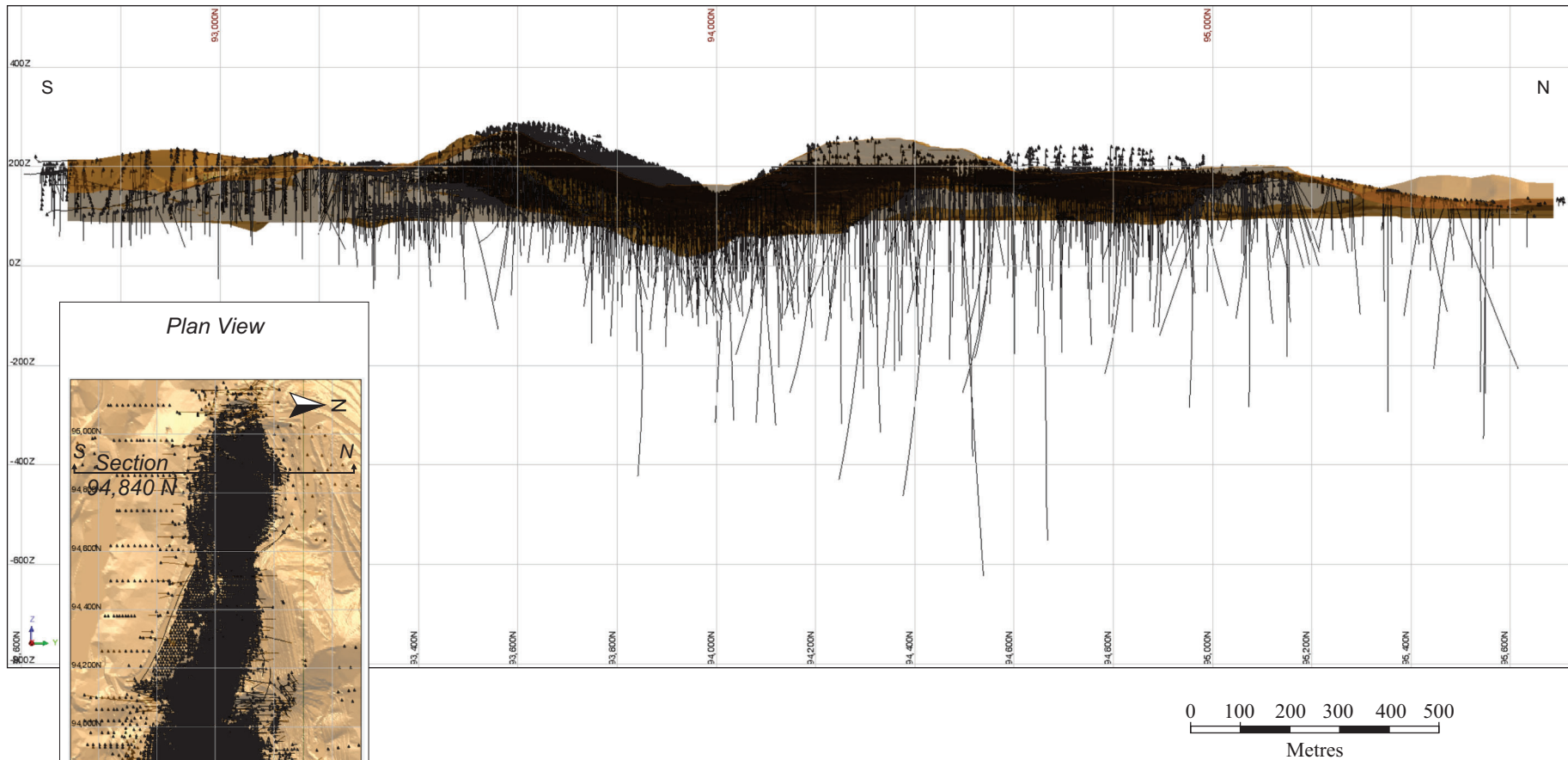


Figure 10-2

Great Panther Mining Limited

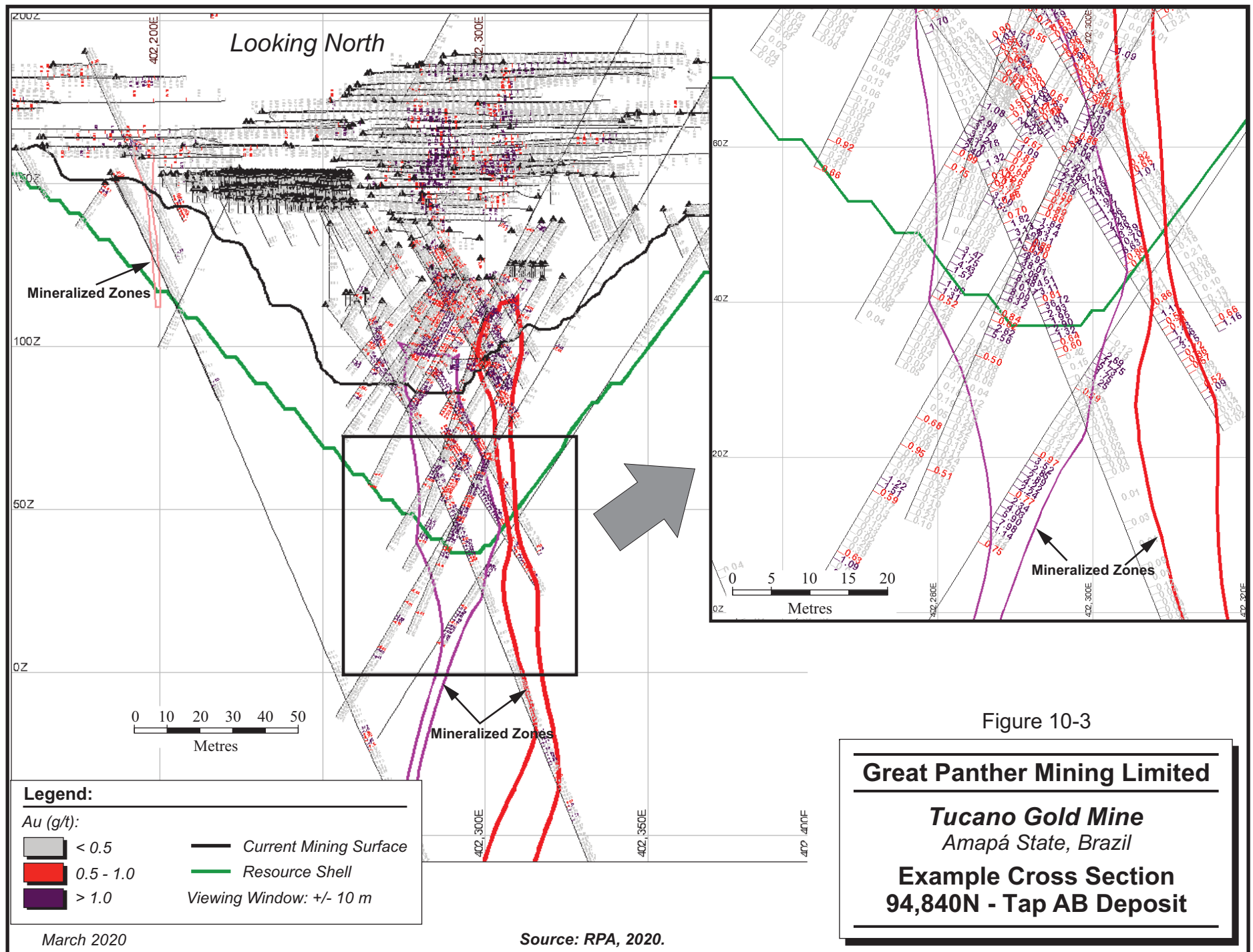
Tucano Gold Mine

Amapá State, Brazil

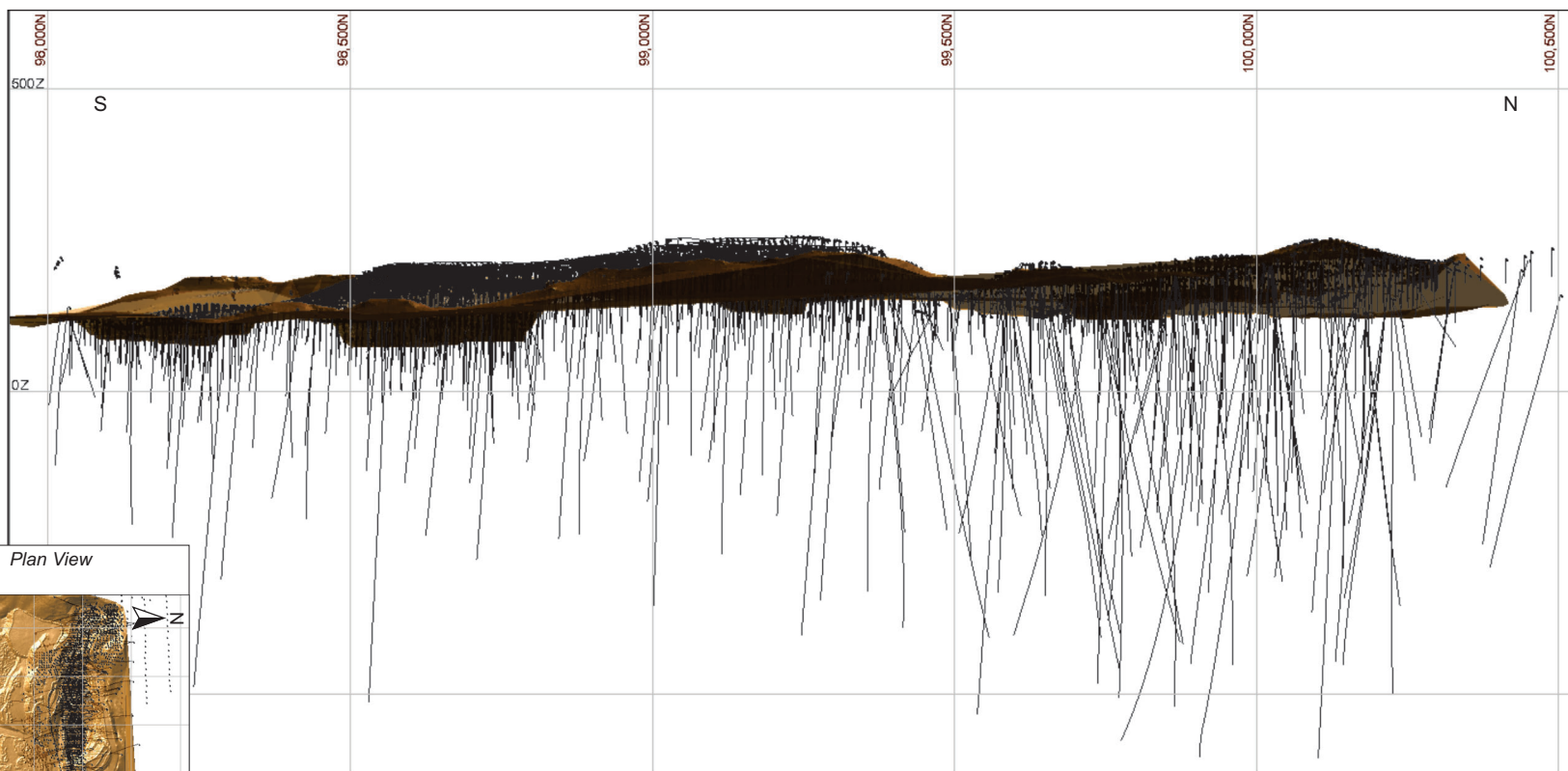
**Drill Hole and Channel Sample Location
Plan - Tap AB Deposit**

March 2020

Source: RPA, 2020.

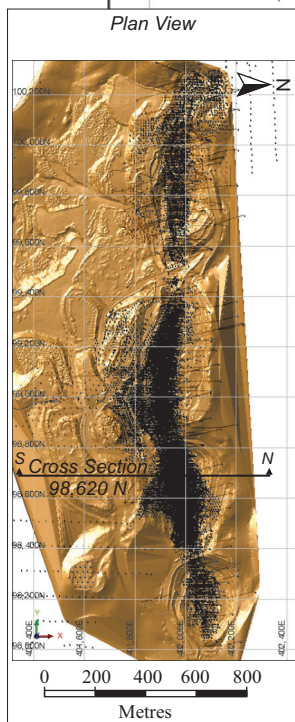


Longitudinal View (Looking West)



0 100 200 300 400 500
Metres

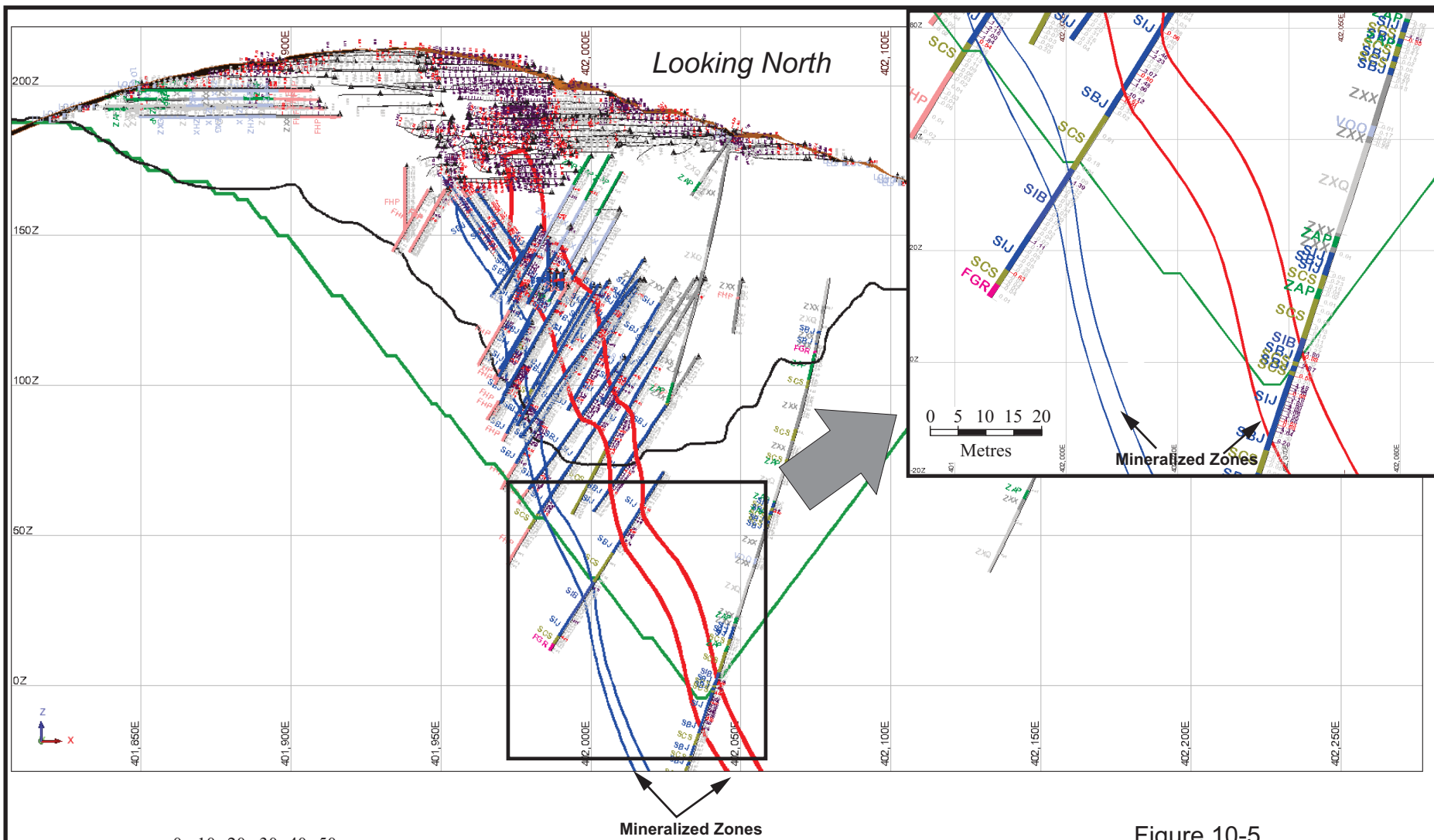
Figure 10-4



March 2020

Source: RPA, 2020.

Great Panther Mining Limited
Tucano Gold Mine
Amapá State, Brazil
Drill Hole and Channel Sample
Location Plan - Urucum Deposit

**Legend:**

Au (g/t):

< 0.5

0.5 - 1.0

> 1.0

— Current Mining Surface

— Resource Shell

Viewing Window: +/- 10 m

March 2020

Source: RPA, 2020.

Figure 10-5

Great Panther Mining Limited***Tucano Gold Mine****Amapá State, Brazil***Example Cross Section 98,620N
- Urucum Deposit**

ROTARY AIR BLAST (RAB)

Tucano's RAB drill rig is a model PWH-5000, that is a pneumatic reciprocating piston-driven "hammer" to energetically drive a heavy drill bit into the rock. The drill bit is hollow, solid steel and has approximately 38 mm thick tungsten rods protruding from the steel matrix as buttons. The tungsten buttons are the cutting face of the bit. The cut materials are blown up outside of the rods and collected at surface. The use of an air compressor, Ingersoll Rand Model XAS 420 (269 hp), which pushes 25.48 m³/min / 900 PCM / 100 psi down the hole, lifts the material to surface.

The drill operation was carried out by a team of three workers, one responsible for rig operation and two assistants responsible for collecting the one metre samples and assist with the operation.

The drill holes were completed on exploration lines spaced 100 m apart, with a drill hole every 40 m, and detailed on potential targets to lines spaced 20 m apart with a drill hole every 10 m. This is deemed to be the optimum drill spacing to intercept mineralized bodies with 3 m to 10 m of thickness.

The RAB operational procedure begins with the positioning of the rig at the selected point (Figure 10-6), without any pad, orienting the rig vertically (Figure 10-7). Once drilling is commenced, samples are collected manually at one metre intervals (Figure 10-8), packed in plastic bags, identified, and sent to the laboratory. The hole is identified by a low relief stamp in tin foil plate nailed to a wooden stake (Figure 10-9). Every metre, the ground and the collectors are cleaned. RAB historically produces lower quality samples than RC because the cuttings are blown up the outside of the rods and can be contaminated from contact with other rocks.

FIGURE 10-6 MOBILIZATION OF RAB DRILL AND ITS COMPRESSOR



FIGURE 10-7 VIEW OF A RAB DRILL WHILE DRILLING



FIGURE 10-8 SAMPLE COLLECTION PROCEDURE FOR A RAB DRILL HOLE



FIGURE 10-9 SAMPLE COLLECTION AND LOCATION OF DRILL HOLES



AUGER DRILLING

Auger drilling is conducted with a helical screw that is driven into the ground with rotation and the earth is lifted up the borehole by the blade of the screw.

At Tucano, auger drilling is carried out by a team of five employees, working in rotation, with three employees operating the drilling and two in support work. Drill holes follow the exploration lines through the forest.

The procedure includes removal of all obstacles within a two metre radius, drilling (Figure 10-10) and collecting samples at every 30 cm advance (Figure 10-11) until they compose a one metre sample. As with RAB drilling, this one metre sample is packed in plastic bags, identified, and sent to the laboratory. The hole is identified by a low relief stamp in tin foil plate nailed to a wooden stake.

FIGURE 10-10 DRILLING PROCEDURES FOR AUGER HOLES



FIGURE 10-11 SAMPLE COLLECTION PROCEDURE FOR AUGER HOLES



REVERSE CIRCULATION

Up until 2017, the RC drilling carried out by Beadell used a track mounted Schramm T60 with a track mounted auxiliary booster operated by McKay Sondagens (a Brazilian company established by Australian owned McKay Drilling). The rig had a mounted cyclone and cone

splitter which were both accessible for cleaning during drilling operations. The rig previously drilled to depths of 400 m and was the main tool used for in-pit grade control as well as resource extension and definition work.

In 2019, Great Panther contracted RC drilling from Geosedna Perfurações Especiais SA, who used two types of drill rigs: an RC Explorac 50 and a Prominas A15 (made in Brazil). Both drill rigs have a mounted cyclone and cone splitter which are accessible for cleaning during drilling operations. The drill rigs have completed holes up to 150 m in length, primarily for short term grade control purposes and for near mine exploration of oxide ore bodies (Figure 10-12).

FIGURE 10-12 GRADE CONTROL DRILLING - URUCUM NORTH DEPOSIT



DIAMOND DRILLING

DD utilizes two skid mounted rigs: the Brazilian Maquesonda Mach 1200 and the Longyear LF-70 diamond rigs operated by Brazilian drilling contractor Geosol. The rigs have previously

drilled up to 550 m on site and are mainly employed to test deeper underground resource targets.

SURVEYS AND SURVEY COORDINATE SYSTEM

Drill hole collar locations of grade control RAB holes and exploration core holes are surveyed using a Total Station Leica 407 in the SAD69 22N coordinate system. The collar azimuth and initial dip of the diamond drill rods are measured using the same survey equipment. Downhole surveys for the RC drilling are undertaken using a Reflex Gyro tool. Downhole survey deviation measurements are collected in diamond holes by Great Panther utilizing a Reflex Ez- North Seeking Gyro, however, prior to 2017, Beadell used a Reflex Maxibore II unit. These surveys are generally undertaken every 100 m as the hole progresses to monitor drilling deviation. Maxibore survey data is collected at three metre intervals after the drill holes are completed. Geology staff check and validate the survey data before entering the information into the main drill hole database.

DIAMOND DRILL CORE

DD utilizes both HQ2 and NQ2 diameter core. Normally holes are started utilizing HQ2 size in oxide material and are reduced to NQ2 size once fresh rock is encountered. Drill core is orientated with a Reflex ACT III orientation tool in fresh rock. Core orientations and depths are verified by site geologists and core yard personnel for accuracy before the core is photographed, and geologically and geotechnically logged.

Geological logging is completed manually and then re-typed into the Acquire database, which digitizes the lithology, structure, mineralization, alteration, weathering, and material resistance/hardness. Core is routinely measured for bulk density, with the bulk density of the oxide measured immediately after drilling to determine the wet bulk density prior to drying, and the subsequent dry bulk density. The method of density measurement used was the Jolly Method (also known as the Archimedes method). The procedure uses the weight of an intact 15 cm length of whole core that is measured in air and again in water. The density is calculated by the formula specific gravity (SG) = weight in air / (weight in air - weight in water). As oxide and transitional rock normally contains moisture, the sample is wrapped in plastic film and weighed while the core is still wet / moist, soon after being received from the drill rig. This enables a wet density to be calculated. The core is then oven dried, and the procedure repeated to attain

the dry density. Once the bulk density core has been tested and photographs taken, it is cut in half for assay. The remaining core is stored in purpose built, undercover racks at the site core yard.

CORE RECOVERY

Core recovery is measured along with rock quality designation (RQD) in core run intervals. Average recoveries of core from all Tucano deposits is 94%. Both core recovery and RQD are recorded together in the drill hole database.

DRILLING ORIENTATION

Due to the general north-south strike of the Tucano system, exploration, delineation, and grade control drill holes are typically orientated to either azimuth 90° or 270°, depending on the dip of the lodes and/or availability of accessible drilling sites. Dips of - 50° to -90° can be achieved by the T60 Schramm RC rig whereas dips of -55° to -90° are possible with the diamond rigs. Most holes are orientated with dips of around -60°.

GRADE CONTROL DRILLING

In-reserve pit drilling has been carried out on an initial spacing of 20 m to 40 m within the plane of the mineralized structure. Deeper underground intercepts have been completed on a long section spacing of 40 m to 80 m.

At Urucum, grade control drilling is carried out on a nominal 10 mN x 12 mE spacing with infill to 10 mN x 6 mE in zones of lode mineralization. Grade control samples are systematically collected using RC drill rigs and the information is used to prepare the final dig layouts for ore/waste control. Additional grade control samples are collected on a periodic by means of channel sampling, slope channel sampling, and sampling of blast hole cuttings.

SAMPLING

Grade control samples of between 1.5 kg to 6.0 kg in weight are collected at one metre intervals from an adjustable cone splitter attached to the base of the cyclone. These cuttings are used for both lithology logging and assaying.

Diamond core is predominantly sampled at one metre intervals, with some sample lengths being adjusted to accommodate local-scale geological or mineralization features. The sample lengths range from a minimum of 0.6 m to a maximum of 1.4 m. Diamond core is used for structural, geotechnical, and density measurements as well as lithology logging and assaying. Density measurements are completed for both oxide and fresh whole core with the oxide densities calculated before and after drying to determine wet bulk density, dry bulk density, and moisture content. The method of density measurement used was the Jolly Method.

The bulk densities of the core samples were also determined by earlier operators using the volume method. While the bulk density information obtained using this method is stored in the drill hole database, this method is no longer used to determine the bulk densities of oxidized and primary materials.

11 SAMPLE PREPARATION, ANALYSES, AND SECURITY

SAMPLE PREPARATION

Sample preparation is completed at the Tucano sample preparation facility.

Core samples are dried at 105°C, crushed to -8 mm then to -2 mm and split to 0.9 kg to 1.0 kg before being pulverized to 1 mm. The 1 mm pulverized sample is quarter cut to 200 g to 400 g before being pulverized to 95% passing 105 microns (μm). The final pulp is quartered again to achieve a sample of 100 g to 200 g.

RC samples are dried at 140°C, crushed to -2 mm (if aggregated) and riffle split to 1.0 kg. The 1.0 kg sample is then pulverized to 1 mm and quarter cut to between 200 g and 400 g. This sample is then pulverized to 95% passing 105 μm and quarter cut to a 100 g to 200 g.

SAMPLE SECURITY

Samples analysed by the Great Panther onsite laboratory are securely sealed and stored onsite. Samples to be analysed by external laboratories are securely sealed and stored onsite until delivery to Macapá via the company contracted driver, who then delivers the samples directly to a airlines cargo dispatch facility for delivery to SGS Geosol Laboratorios Ltda (SGS Geosol) in Belo Horizonte, Brazil. Sample submission forms are sent with the samples, and upon receiving the samples the laboratory emails a confirmation notice indicating that the samples have been received, in addition to a job number for tracking purpose.

SAMPLE ANALYSIS

Sample analysis is completed by both the Great Panther onsite laboratory for samples from the grade control program and an external laboratory, SGS Geosol, for samples from the resource definition program. SGS Geosol has been accredited by ABS Quality Evaluations Inc and complies with the requirements for ISO 9001:2015, ISO 14001:2015 and ISO/IEC 17025:2005.

Sample analysis is undertaken at both laboratories using a 30 g charge, with the gold concentration being determined by means of a fire assay with an atomic absorption spectroscopy (AAS) finish. The lower detection limit for the Great Panther site laboratory is 0.01 g/t Au and the lower detection limit for both the SGS Geosol and the ALS Chemex Laboratories (ALS Chemex) is 0.005 g/t Au.

Samples from the resource definition program that exhibit elevated sulphide concentrations or other geological features of interest, are sent to the SGS Geosol external laboratory and the Great Panther onsite laboratory so as to obtain the assay results more quickly. When received, the results from the external laboratory then supersede the results of the site laboratory in the drill hole database and are used as an additional means to monitor site laboratory performance.

SAMPLE QUALITY ASSURANCE/QUALITY CONTROL

Samples are sent to SGS Geosol in Belo Horizonte for analysis. Certified standards are inserted every 20th sample to assess the accuracy and methodology of the laboratory. Field duplicates are inserted every 20th sample of diamond core only to assess the repeatability and variability of the gold mineralization. The field duplicate sample used is the remaining half of the core from the same sample interval. No field duplicates are produced for the RC drilling, which represents the majority for drilling completed. A blank standard is inserted at the start of every batch of approximately 150 samples. In addition, SGS Geosol, also carries out their own internal standards and laboratory duplicates for each lot. Results of the quality assurance/quality control (QA/QC) sampling are assessed on a batch by batch basis and the QP is of the opinion that they are acceptable.

QUALITY ASSURANCE/QUALITY CONTROL DATA ANALYSIS

Data analysis for the Beadell QA/QC results was undertaken by Maxwell Geoservices (Maxwell) of Fremantle, WA on available QA/QC data for gold assays from Beadell's various drilling programs. The results of that analysis are presented in Wolfe, et. al. (2018). A summary of the 2019 QA/QC results to September 30, 2019 (the drill hole cut-off date for preparation of the Mineral Resource estimates) is summarized below.

In early 2016 the grade control data, which was stored in the Minesight Torque database, was integrated to the Maxwell Geoservices Datashed (Datashed) database management system.

The Minesight Torque grade control database did not store the quality control or standards data for grade control and only some of the early batches were fully loaded to Datashed. The Datashed database is therefore incomplete for quality control for the period prior to the beginning of 2016.

The QP notes, however, that previous reports by Maxwell focusing on data prior to 2015 have been reviewed with only minor issues identified.

The results generated from the following QA/QC materials currently being used at Tucano have been reviewed:

- Standards: Standards assays provide a measure of relative analytical precision. Sample batches which fall outside specified tolerance ranges are flagged and investigated.
- Blank samples: Blank samples are inserted into the sample stream for both resource definition drilling, grade control drilling, and sampling programs at a frequency of approximately 2%
- Laboratory Repeats (i.e. represents a second 50 g pulp sample taken from the first 200 g pulp).
- Field Duplicates (i.e. represents a second 3 kg sample split taken from the original RC field sample interval. This sample is taken at the same time as the original sample).

Prior to Great Panther's acquisition of Tucano in 2019, a total of eight datasets were available (four deposit areas) for two separate laboratories, with gold assaying completed by both the onsite laboratory and SGS Geosol. A total of six datasets were identified as relevant to this Technical Report. A large number of standards are available for review and a total of 47 have been deleted from the dataset due to low usage (<10 occurrences each). Those datasets were organized and migrated to the Acquire database in the beginning of 2019.

The QA/QC program completed by Great Panther for samples analysed in 2019 included samples collected from the resource definition drilling program and the grade control program comprised the following:

- 43 batches analyzed for drilling completed as part of the resource definition drilling program were sent to SGS Geosol.
- 517 batches analyzed for grade control drilling were assayed by the Great Panther onsite laboratory.
- Three batches of samples that were sent to SGS Geosol were also sent to ALS Chemex for umpire assaying as part of the resource definition drilling program (SGS Geosol x ALS Chemex).

- 16 batches of samples assayed for grade control drilling by the Great Panther onsite laboratory were also sent to ALS Chemex for umpire assaying (Great Panther onsite laboratory x SGS Geosol).

A summary of the QA/QC samples used in 2019 is provided in Table 11-1.

TABLE 11-1 SUMMARY OF QA/QC SAMPLING, 2019
Great Panther Mining Limited – Tucano Gold Mine

Item	Resource Definition Drilling		Grade Control Program	
	Number	Frequency	Number	Frequency
Standards	86	4%	676	3%
Blanks	43	2%	517	2%
Field Duplicates	44	2%	N/A	N/A
Assay Samples	1,787		21,574	

For resource definition, diamond drill holes were completed, and all samples sent to SGS Geosol with an Inter-Laboratory cross check at ALS Chemex. For grade control channel sampling, slope channel, RBA drill holes, and RC drill holes, all analyses were performed at the Great Panther onsite laboratory with an Inter-Lab cross check at ALS Chemex. All sample preparation was performed in the Tucano Preparation Lab that is handled by the Tucano Geology Team. The Tucano Geology Team typically had two separate preparation lines, one for resource definition and another for grade control.

Failure control consists of checking all received certificates from the laboratories and comparing the real value with the reference grade. If the real value is outside of the thresholds, the database manager investigates the total batch, contacts the responsible laboratory and makes an action plan to re-assay the batch. Figures 11-1 and 11-2 demonstrate that the failure rate is less than 5% in each batch.

FIGURE 11-1 2019 CRMS SUBMITTED TO THE SGS CHEMEX LABORATORY

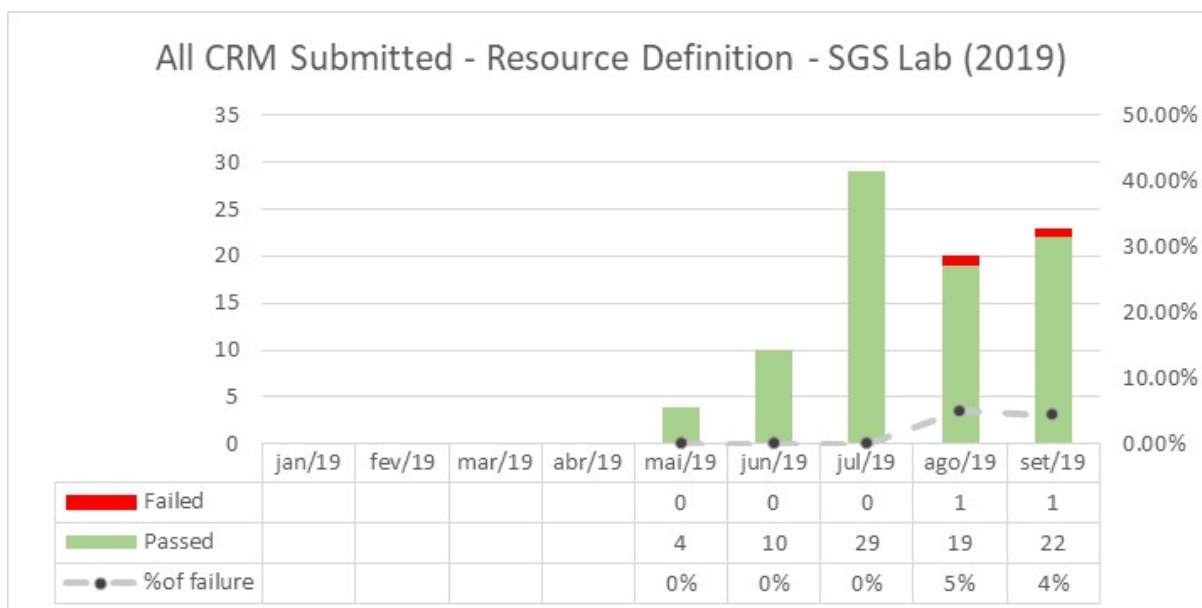
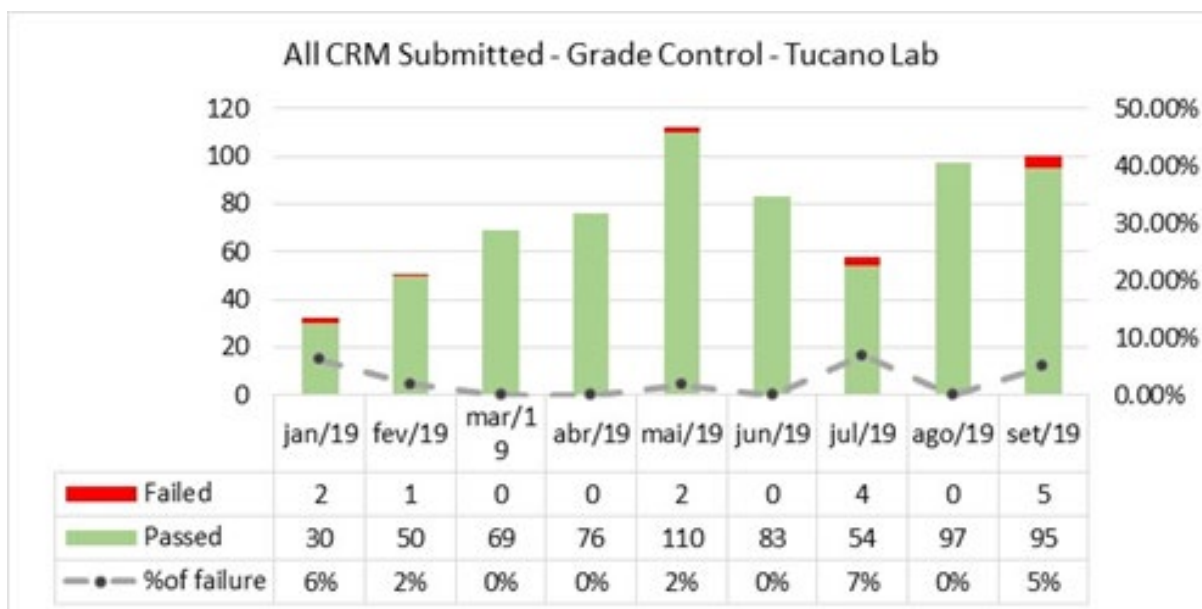


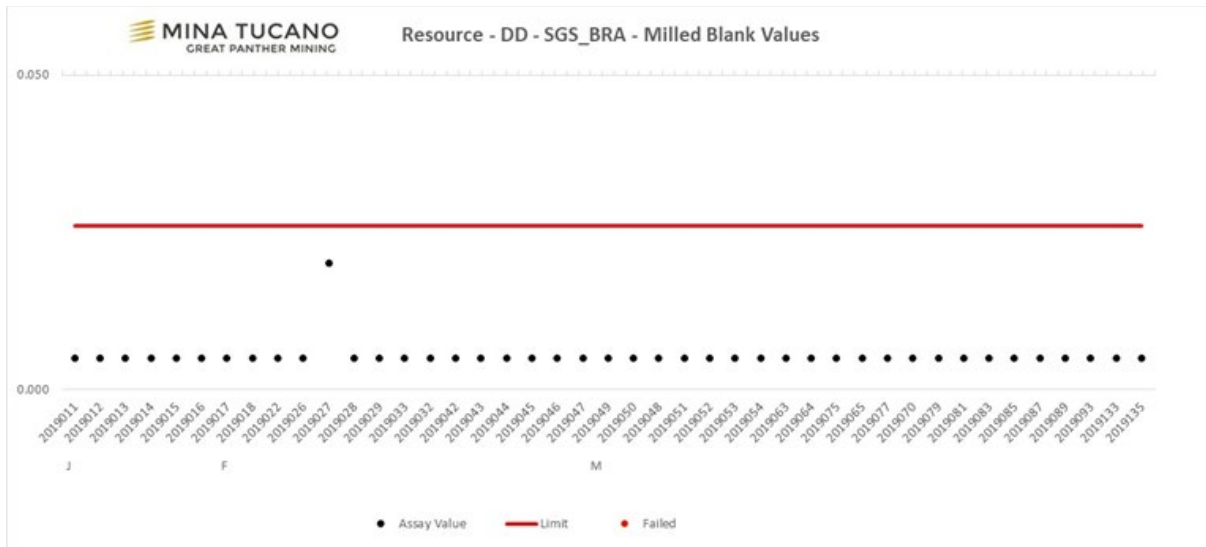
FIGURE 11-2 2019 CRMS SUBMITTED TO THE ONSITE LABORATORY



BLANK SAMPLES

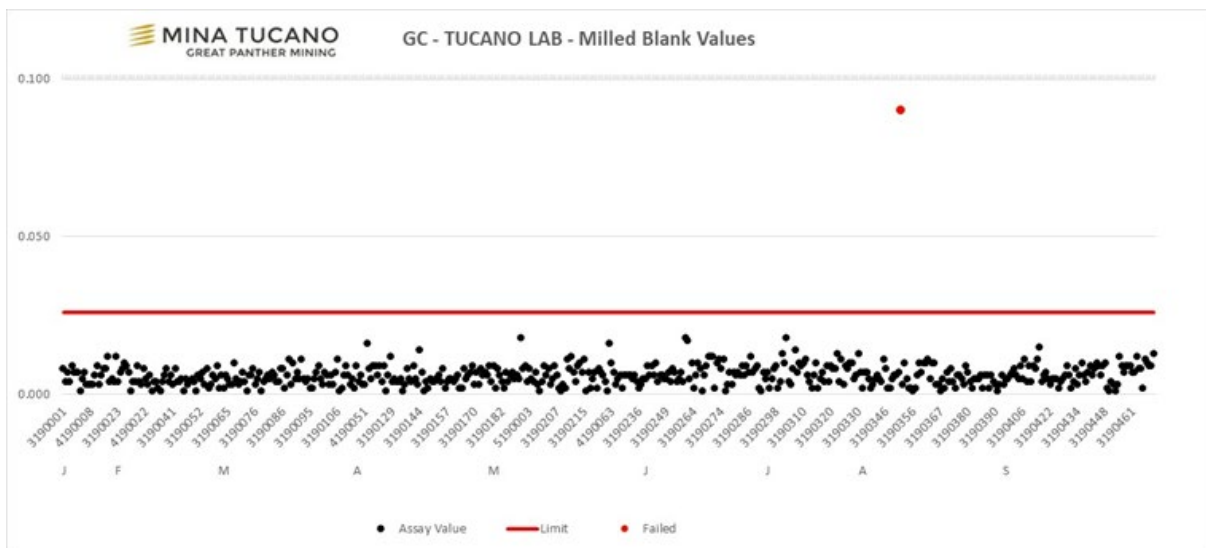
Every batch contains blank samples (white quartz rock) in first position to verify the crusher cleaning between batches. The lower detection limits (LDL) are defined using 5% of a cut-off grade. Historically the cut-off grade was 0.52 g/t Au, so an LDL of 0.026 g/t Au was used for blank assays. Figures 11-3 and 11-4 show the resource definition blank control at SGS Chemex and the grade control blank control at the Great Panther onsite laboratory.

FIGURE 11-3 2019 BLANK SAMPLE RESULTS, RESOURCE DEFINITION ASSAYING (SGS GEOSOL)



Note: red line = 0.026 g/t Au

FIGURE 11-4 2019 BLANK SAMPLE RESULTS, GRADE CONTROL ASSAYING (TUCANO GOLD MINE LAB)



Note: red line = 0.026 g/t Au

CERTIFIED REFERENCE MATERIALS

Tucano has used thirteen Geostats Pty industry certified reference materials (CRM) covering a range of gold grades from 0.37 g/t Au to 9.80 g/t Au, in sachets, inserted in batches sent to SGS Chemex and the Great Panther onsite laboratory. Table 11-2 shows the CRM material inserted in batches sent to SGS Chemex (average frequency 4.4%) and Table 11-3 shows the

CRM material inserted in batches sent to the Great Panther onsite laboratory (average frequency of 3.0%).

**TABLE 11-2 TOTAL OF BLIND REFERENCE MATERIAL SENT TO SGS
CHEMEX, 2019**

Great Panther Mining Limited – Tucano Gold Mine

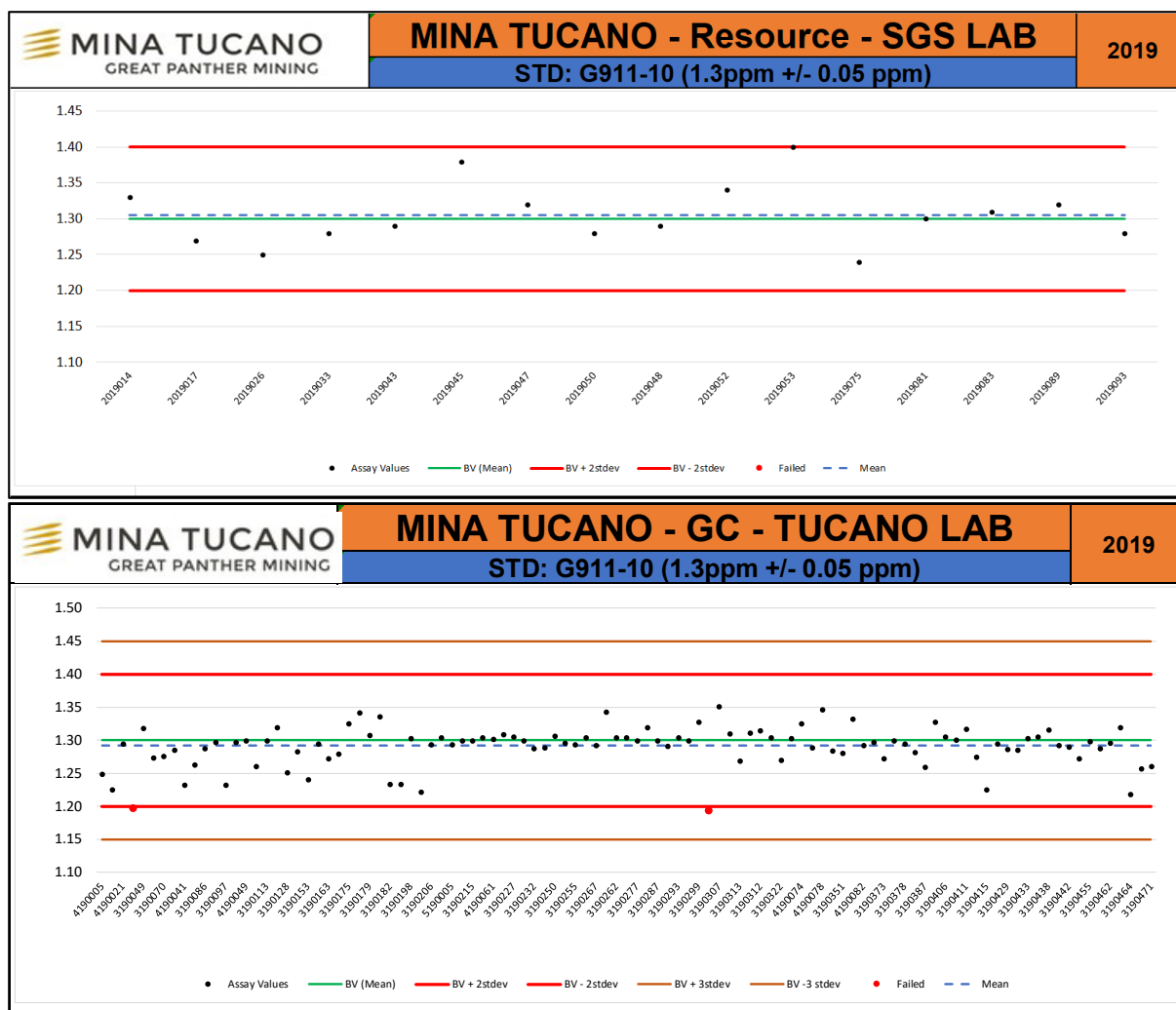
Standard	Best Value (g/t Au)	Average (g/t Au)	Total Submitted	Number of Failures	Failed %	Bias %
G314-10	0.380	0.370	2	0	0.000	-2.703
G912-8	0.530	0.535	2	0	0.000	0.935
G913-1	0.820	0.823	4	0	0.000	0.304
G910-2	0.900	0.901	7	0	0.000	0.158
G914-3	1.240	1.285	2	0	0.000	3.502
G911-10	1.300	1.305	16	0	0.000	0.383
G315-3	1.970	2.022	11	1	9.091	2.563
G916-10	2.810	2.869	13	1	7.692	2.064
G912-6	4.080	4.183	6	0	0.000	2.470
G913-9	4.910	4.984	10	0	0.000	1.485
G913-10	7.090	7.236	5	0	0.000	2.018
G306-3	8.660	8.908	4	0	0.000	2.779
G914-7	9.810	9.783	4	0	0.000	-0.281
			86	2	2%	

**TABLE 11-3 TOTAL OF BLIND REFERENCE MATERIAL SENT TO GREAT
PANTHER ONSITE LABORATORY, 2019
Great Panther Mining Limited – Tucano Gold Mine**

Standard	Best Value (g/t Au)	Average (g/t Au)	Total Submitted	Number of Failures	Failed %	Bias %	Comments
G314-10	0.380	0.385	13	0	0.000	1.220	Little Information
G912-8	0.530	0.523	15	1	6.667	-1.326	Little Information One Failure.
G913-1	0.820	0.820	68	2	2.941	-0.027	Slight negative Bias. Two Failures.
G910-2	0.900	0.908	76	0	0.000	0.849	Positive Bias.
G914-3	1.240	1.279	30	2	6.667	3.064	Positive Bias. Two Failure.
G911-10	1.300	1.290	103	2	1.942	-0.807	Negative Bias. Two Failure.
G315-3	1.970	1.946	92	3	3.261	-1.250	Negative Bias. Three Failure
G916-10	2.810	2.828	103	3	2.913	0.652	Slight Positive Bias.
G912-6	4.080	4.018	29	0	0.000	-1.548	Little information.
G913-9	4.910	4.895	90	0	0.000	-0.309	Slightly negative Bias.
G913-10	7.090	6.932	51	1	1.961	-2.276	Negative Bias. 1 Failure.
G306-3	8.660	8.736	3	0	0.000	0.866	Little Information
G914-7	9.810	9.691	3	0	0.000	-1.228	Little Information
Total			676	14	2%		

The individual performance of all CRMs used to monitor the accuracy of assays indicates 2% failed samples and no significant bias due to the random distribution of the CRM. As examples, Figure 11-5 shows an example control chart of standard: G911-1 (1.30 g/t Au: +/- 0.05 ppm).

FIGURE 11-5 SAMPLE CONTROL CHART FOR CRM G911-1

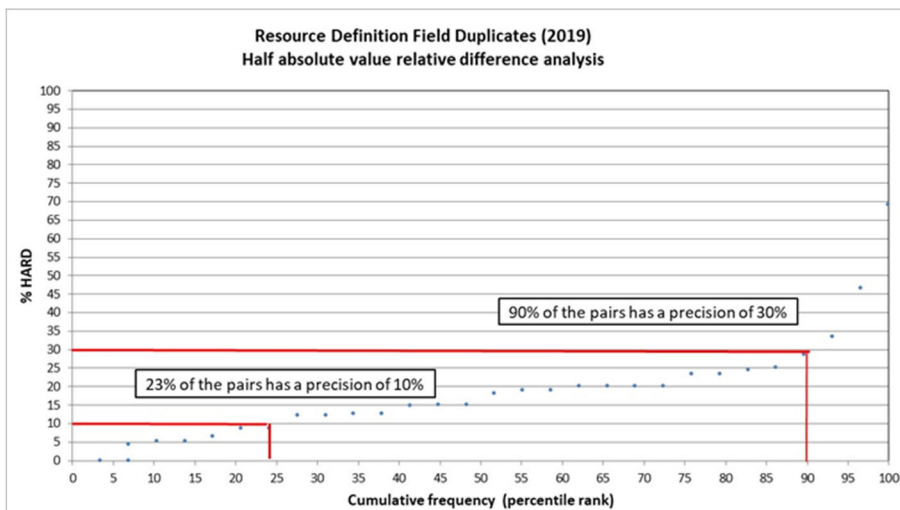
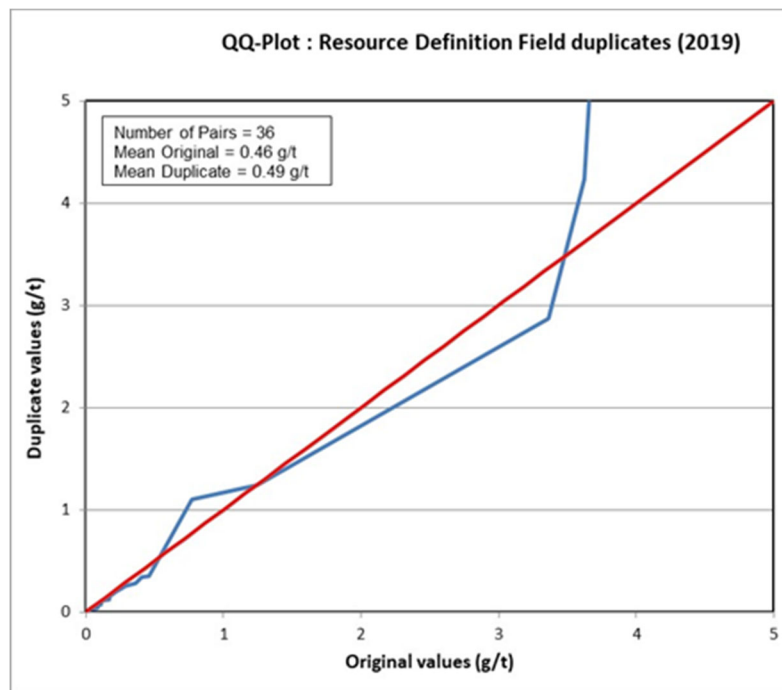
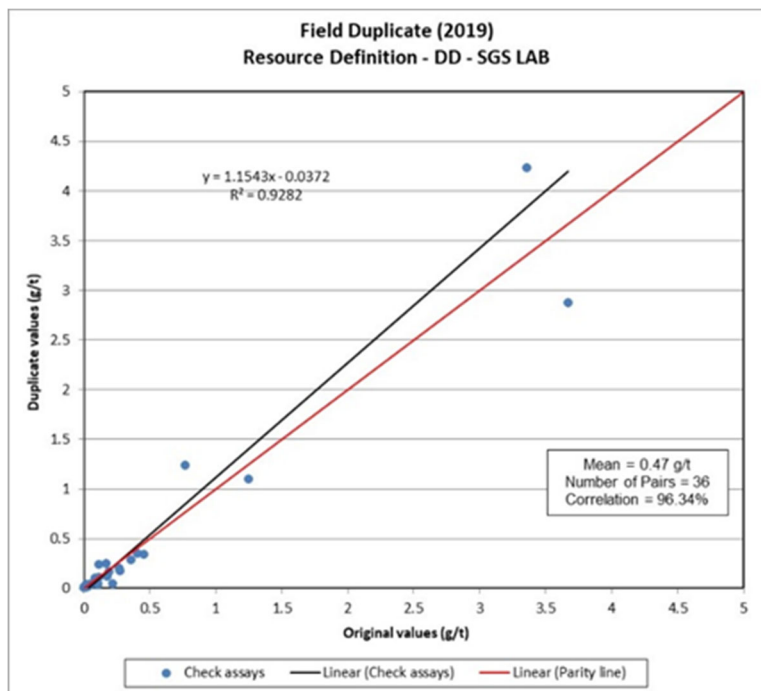


DUPLICATE SAMPLES

Tucano field duplicates are samples of diamond drill core cut in half that have been analyzed in the same laboratory (for resource definition, at SGS Geosol). Lab duplicates are pulp duplicates prepared in one laboratory, that have been sent to another laboratory (Inter-Lab) for check purposes. Resource definition used SGS Geosol as the primary laboratory and an Inter-Lab check was performed by ALS Chemex. Grade control used the Tucano laboratory as the primary laboratory and the Inter-Lab check was performed by SGS Geosol.

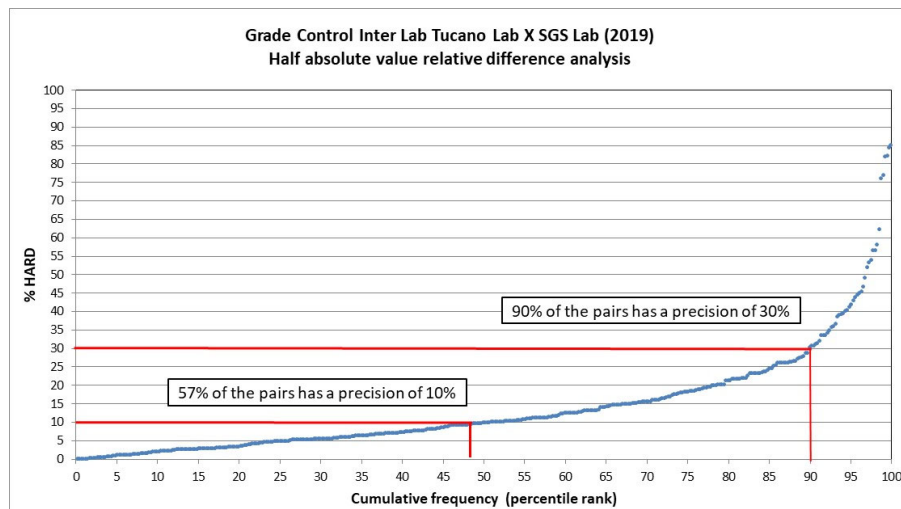
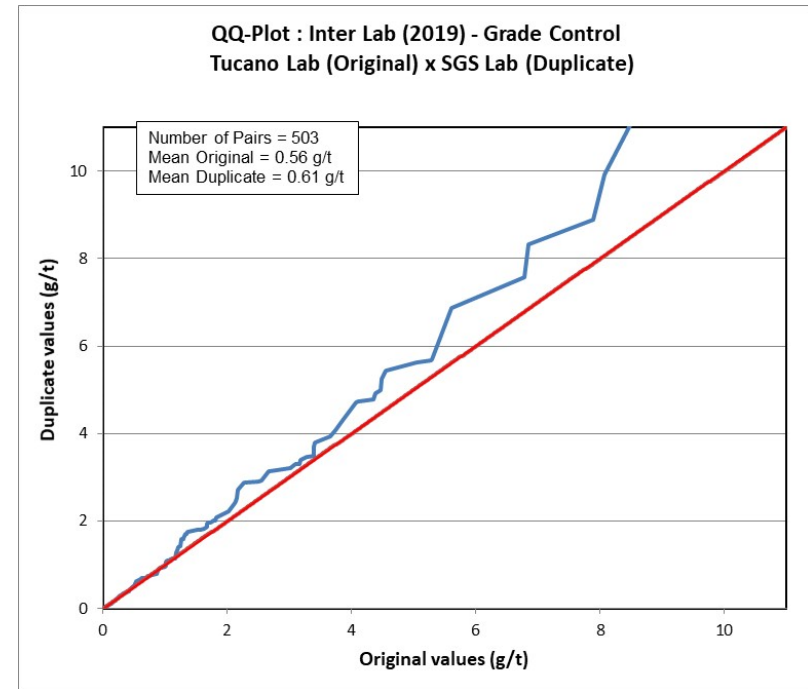
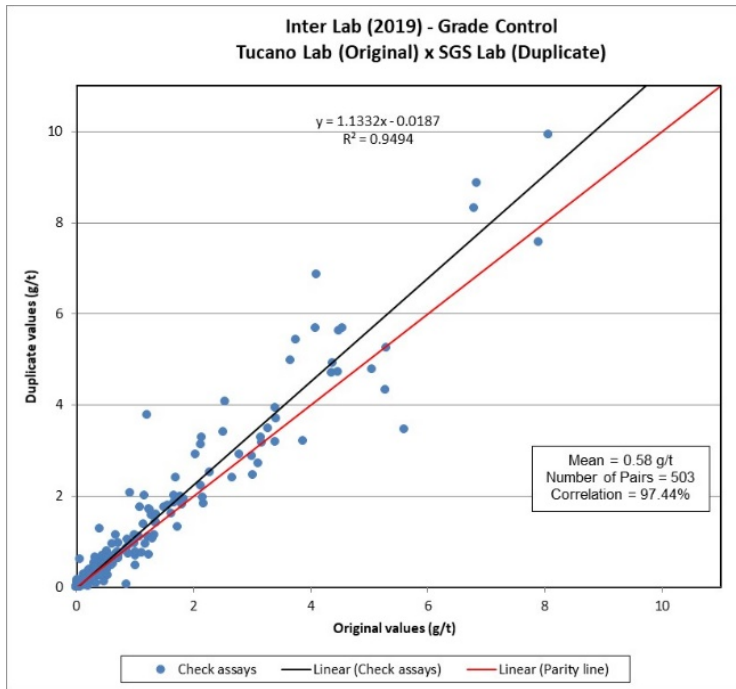
The field duplicates from DD sent to SGS Geosol (Figure 11-6) show good precision, the linear parity line is close mainly in the low grades and 90% of the pairs have a precision of less than 30%. In the QP's opinion while this is not excellent it is satisfactory. One outlier, from within a fracture zone, was identified (original 3.05 g/t Au and duplicate 0.16 g/t Au) and was removed.

FIGURE 11-6 FIELD DUPLICATE CHARTS (SGS GEOSOL VS ALS CHEMEX)



The Inter-Lab (Onsite x SGS Chemex) pulp duplicates (crushed material) from RC drilling – grade control (Figure 11-7), do not show good precision as the SGS Geosol results are systematically greater than the Great Panther onsite laboratory. While it seems that there is an underestimation of grades at the Great Panther onsite laboratory, according to the Great Panther onsite laboratory, the grades had good precision when compared with the production samples. The QP is of the opinion that the Tucano Geology Team has been reporting the bias and controlling this systematic difference. Between the Great Panther onsite laboratory x SGS Geosol reports, 90% of the pairs have a precision of less than 34%.

FIGURE 11-7 PULP DUPLICATE CHARTS (TUCANO GOLD MINE LABORATORY VS SGS GEOSOL)



DISCUSSION AND RECOMMENDATIONS

In the QP's opinion, the sample preparation, analysis, and security procedures at Tucano are adequate for use in the estimation of Mineral Resources.

In the QP's opinion, the QA/QC program, as designed and implemented by Great Panther, is adequate and the assay results within the database are suitable for use in a Mineral Resource estimate.

The QP recommends that a program of assay to extinction be carried out to more fully understand the nature of the gold distribution of the mineralized samples.

12 DATA VERIFICATION

Personal inspections were carried out by RPA personnel during site visits conducted by Mr. Reno Pressacco, M.Sc.(A), P. Geo. and Mr. Goran Andric, P. Eng.

During his site visit, Mr. Pressacco visited the core shack where examples of the drill core and RC samples were reviewed, several examples of mineralization from both the Tap AB and Urucum deposits were inspected, the logging and sampling procedures were reviewed, and the density measurement facilities were inspected. Visits were made to several of the operating pits in the Urucum deposit where the nature of the mineralization was observed, the grade control and sampling procedures reviewed, and the operational capabilities of the loading units were observed. A visit was also made to several diamond drills operating in the area as part of the resource definition drilling program, where the drilling procedures were reviewed and discussed.

Mr. Pressacco also visited the plant stockpile area, as well as conducting a brief tour of the processing plant to inspect the sampling points used to determine the tonnages and grades processed. A visit was made to the site sample preparation facility as well as the site assay lab.

During his site visit, Mr. Andric had an opportunity to inspect the Tucano site, talk to mine personnel, and collect relevant information regarding a revised Mineral Reserve model, electronic drawings of pit designs and as-built surveys, mine productivity and cost reference data, and the mine planning procedures including the mine call factors used for conversion of in situ ore tonnage into run-of-mine (ROM) tonnage delivered to the mill.

In addition to personal inspections of Tucano, RPA carried out a program of validating the assay tables in the drill hole databases by means of spot checking a selection of drill holes that intersected gold mineralization for both the Tap AB and Urucum deposits. RPA proceeded to carry out its drill hole database validation exercise by comparing the information contained within the assay tables of the digital databases against the assays presented in the original laboratory certificates. Comparisons of the lithological information contained within the drill logs against the information contained within the digital databases were also carried out.

Additional checks included a comparison of the drill hole collar locations with the digital models of the topographic surfaces and excavation models as well as a visual inspection of the downhole survey information.

The QP's are of the opinion that the Tap AB and Urucum drill hole and chip sample data are adequate for the purposes of Mineral Resource and Mineral Reserve estimation.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

SUMMARY

The existing Tucano gold processing plant was designed by Ausenco Limited (Ausenco). After approximately four years of operation, an expansion was planned, also by Ausenco, as part of the original Definitive Feasibility Study (DFS) to install a 3.0 MW ball mill.

This new secondary grinding mill, alongside the 7.0 MW single stage semi-autogenous grinding (SAG) mill, was installed in order to maintain 3.4 million tonnes per annum (Mtpa) throughput capacity treating 90% of the much harder sulphide ore type.

A tailings thickener was also envisaged in order to recycle cyanide rich solutions prior to detoxification. The plant flowsheet was modified in 2018 to deal with the harder sulphide ore type and the key features of these flowsheet changes are as follows:

- An additional 6.0 MW ball mill to increase original Ausenco design capacity to 3.6 Mtpa and potentially obtain a finer product size of 80% < 75 μm at a higher proportion of sulphide ore to increase cyanide leach gold recovery and kinetics. Completed in September 2018.
- A pre-leach thickener to allow both effective operation of the hydrocyclones which in turn provides higher leach feed pulp % solids. The change in philosophy from the originally proposed tailings thickener to a pre-leach thickener is explained further below. Completed in September 2018.
- Additional leach residence time by adding one additional pre-leach tank to allow for the higher proposed plant capacity. Completed November 2018.
- In November 2018, an oxygen plant was added to the CIL as proposed by Ausenco. An additional Liquid Oxygen plant was added in April 2019.

The mill sizing calculations were conducted by Ray Walton Consulting Inc. (RWC) and determined that a 4.0 MW mill should be adequate to grind the tonnages in the proposed mine plant to 80% passing (P_{80}) 75 μm . However, a larger 6.0 MW ball mill was installed for the following reasons:

- The selection of the smaller 4.0 MW ball mill assumes that the SAG mill and ball mills can operate continuously at 6.5 MW and close to 4.0 MW, respectively. This is difficult in practice. Selection of the larger 6.0 MW ball mill allowed optimization with some drift of the respective SAG mill and ball mill power draws. It is likely that the actual optimum

power draws for the SAG mill and ball mill will be closer to approximately 4.0 MW and 6.0 MW, respectively.

- A 6.0 MW ball mill is a better suited to work alongside the 6.5 MW SAG mill. It is very unusual in SAG/ball mill grinding installations that the ball mill has a smaller motor than the SAG mill.
- Future operations may decide to remove some of the current processing bottlenecks which limit production to 450 tonnes per hour (tph) (i.e., 3.6 Mtpa at 92% plant availability)
- There is also some doubt as to the exact specific energy of all the sulphides. Selection of a 6.0 MW mill will ensure the treatment rate is maintained if harder sulphide ore is mined.
- Selection of a 6.0 MW mill allows some standardization of mill components with the existing Outotec SAG mill.

The hydrocyclones were not operating effectively, which was adversely affecting grind size and gold recovery. The installation of the pre-leach thickener is an absolute necessity to decouple the operation of the grinding circuit and hydrocyclones from the downstream pre-leach and CIL circuit. The resultant higher % solids in the leach circuit feed will increase residence times and decrease cyanide consumptions. As a consequence, the original tailings thickener proposed by Ausenco was replaced by this pre-leach thickener.

At a plant throughput of 450 tph and a slurry density of 45% solids, a total volume of 17,200 m³ is required to provide a leach residence time of 24 hours. The existing CIL provides 15,400 m³; therefore, one additional leach tank, 15 m x 15 m in size is required. The new tank will be located ahead of the existing CIL tanks and used for pre-leaching. This allows a major proportion of gold to go into solution before the resultant pregnant solution comes into contact with the carbon, which will speed up adsorption kinetics.

The aforementioned changes were executed and commissioned by November 2018.

HISTORICAL PLANT PERFORMANCE

PLANT THROUGHPUT

Figure 13-1 shows the 2016 to 2019 plant throughput and availability trends and Figure 13-2 shows the amount of sulphide ore in the overall ROM blend fed to the plant. The average plant throughput from 2016 to 2018 was 3.6 Mt containing an average of 17% sulphide ore in the blend.

Tucano commissioned a new oxygen plant in April 2019 which allowed the processing of higher amounts of sulphide ore in the blend, which averaged 95.3% of sulphide ore from May to December 2019. The increased amount of sulphide ore did not affect metallurgical recoveries, but the hardness of the sulphide ore negatively impacted the primary crusher.

FIGURE 13-1 % SULPHIDE ORE PROCESSED (2016 TO 2019)

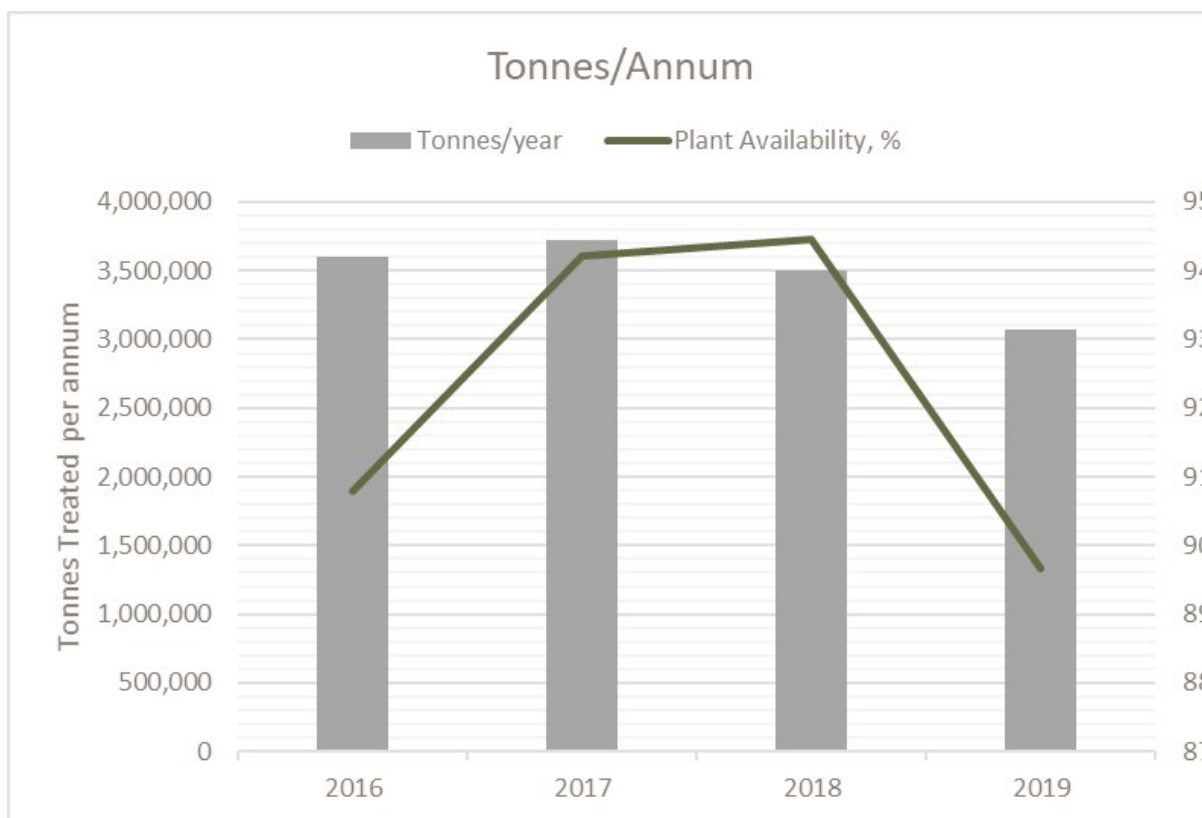
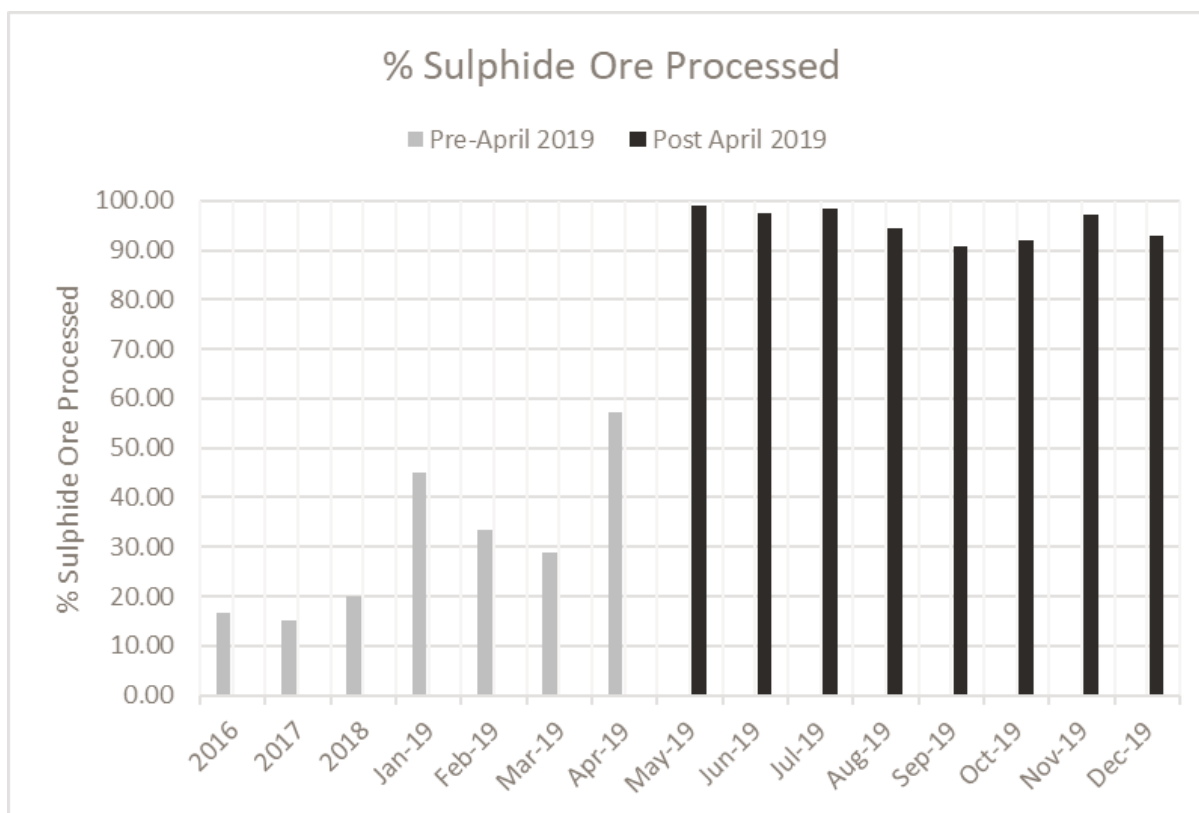


FIGURE 13-2 % SULPHIDE ORE PROCESSED (2016 TO 2019)

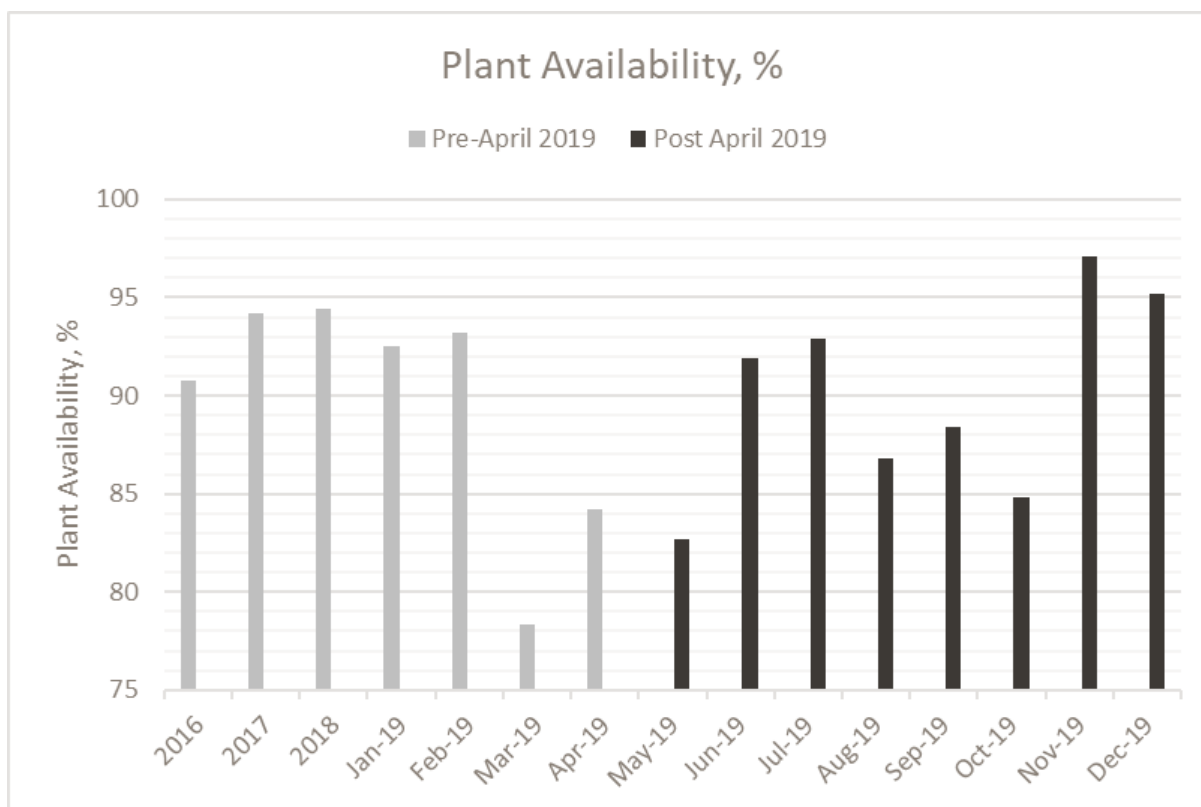


Plant availability in 2019 was adversely affected by issues with the power line, issues in the plant due to excessive crushing liner wear, and crusher issues due to its dated nature and high frequency of SAG mill liner breakages

The plant personnel worked extensively with Metso, Hardox, Fornac, and other liner suppliers to redefine liner design and also to test different materials to extend the life of the liners. These issues were rectified in Q4 2019. The plant availability during the period from November 2019 to December 2019 was extremely good (> 95%), however, the average for 2019 was low at 88.9%. For reference, the 2017 and 2018 plant availability were 94% (Figure 13-3).

Tucano has also started detailed engineering work to replace the primary crusher with a new Metso C-150 crusher, which is scheduled for replacement in June 2020.

FIGURE 13-3 % PLANT AVAILABILITY (2016 TO 2019)



PLANT METALLURGICAL RECOVERY AND OXYGEN

Historical plant performance focussed on pre- and post-April 2019 when the dissolved oxygen (DO) in the pulp in leach tank one was increased to more than 15 parts per million (ppm) DO, as originally recommended by Ausenco for sulphide ore types. Figure 13-4 demonstrates how the % sulphide ore being processed increased significantly after April 2019.

FIGURE 13-4 % GOLD RECOVERY (2016 TO 2019)

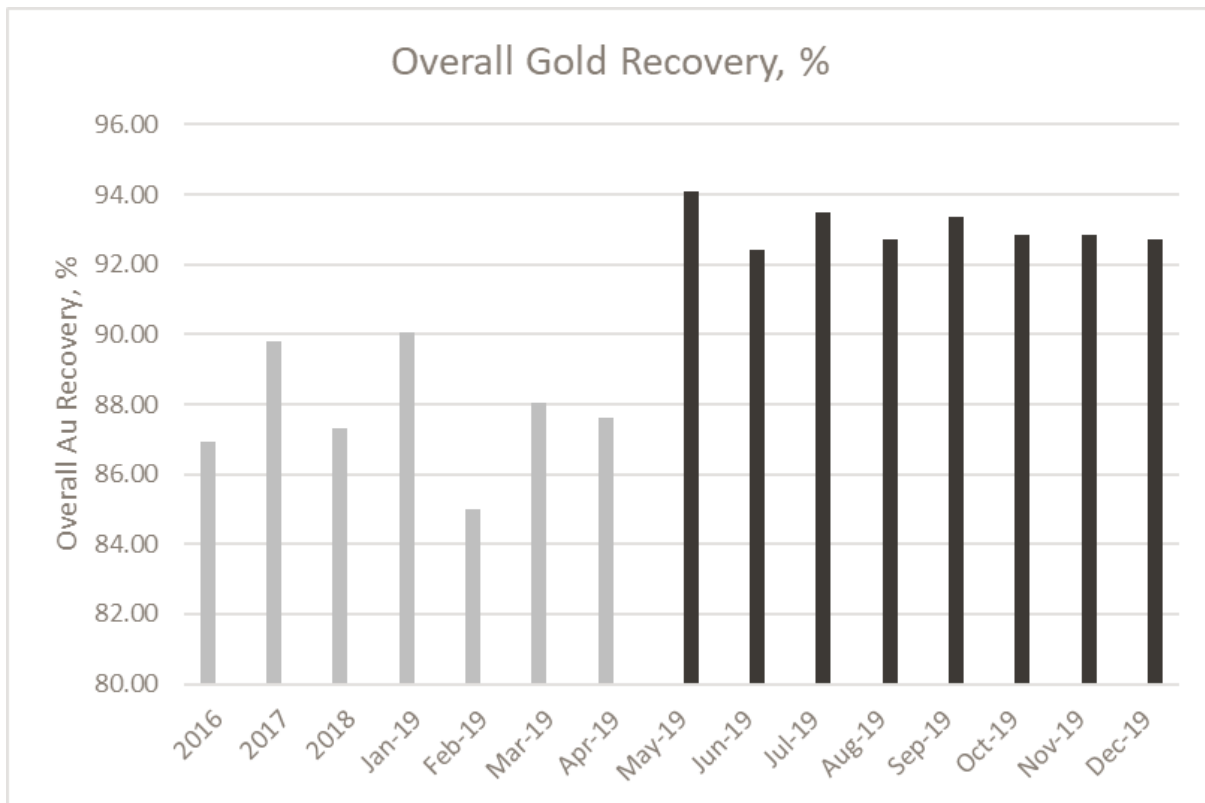


Figure 13-5 shows the increase in the percentage of total gold recovery achieved in CIL Tank 1 alone. This clearly demonstrates that gold recovery kinetics have been significantly increased by the increased DO levels. Approximately, 85% of the gold is in solution in CIL Tank 1 already, which will vastly improve carbon adsorption kinetics and reduce soluble losses and reliance on downstream tanks for further gold dissolution.

FIGURE 13-5 GOLD RECOVERY IN CIL TANK 1

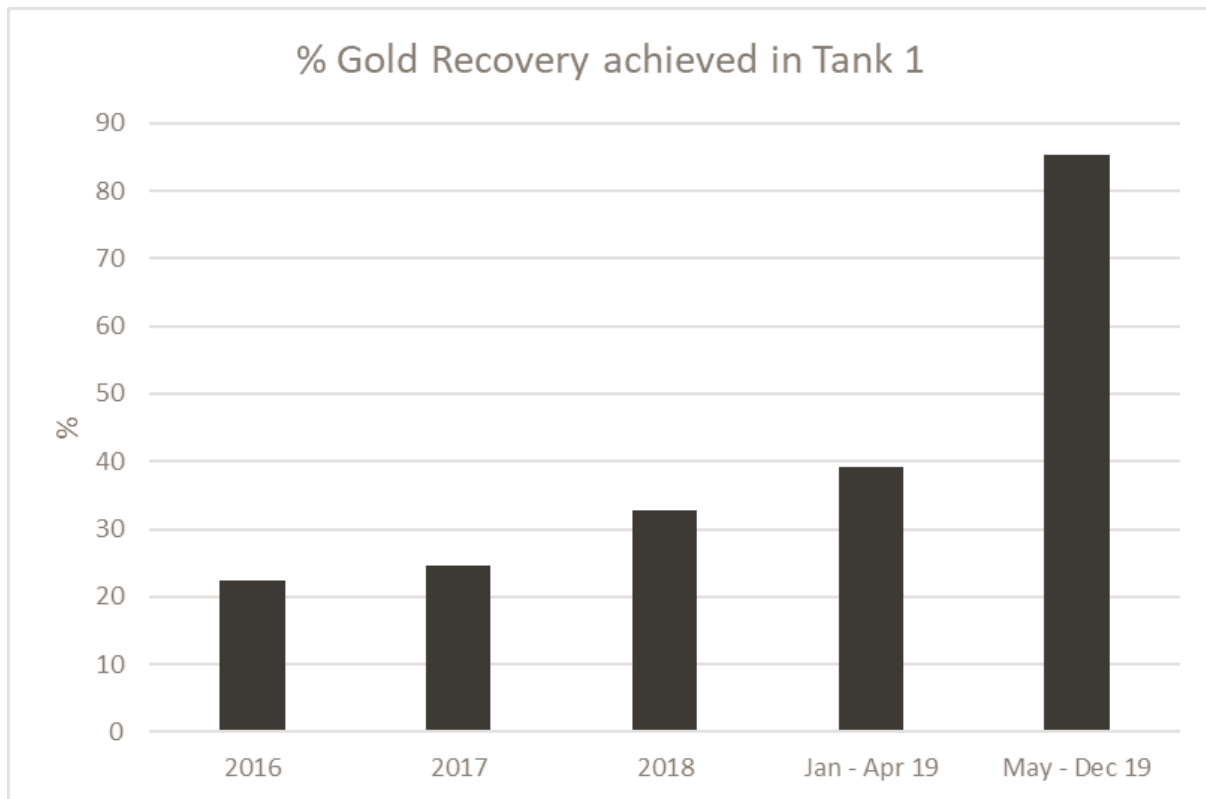


Figure 13-6 shows how the gold recovery has increased in relation to grade in the plant feed. The gold recovery is now approximately 5% higher than pre-April 2019 and is more consistent since there is less random scatter.

FIGURE 13-6 RELATIONSHIP BETWEEN G/T AU AND % GOLD RECOVERY

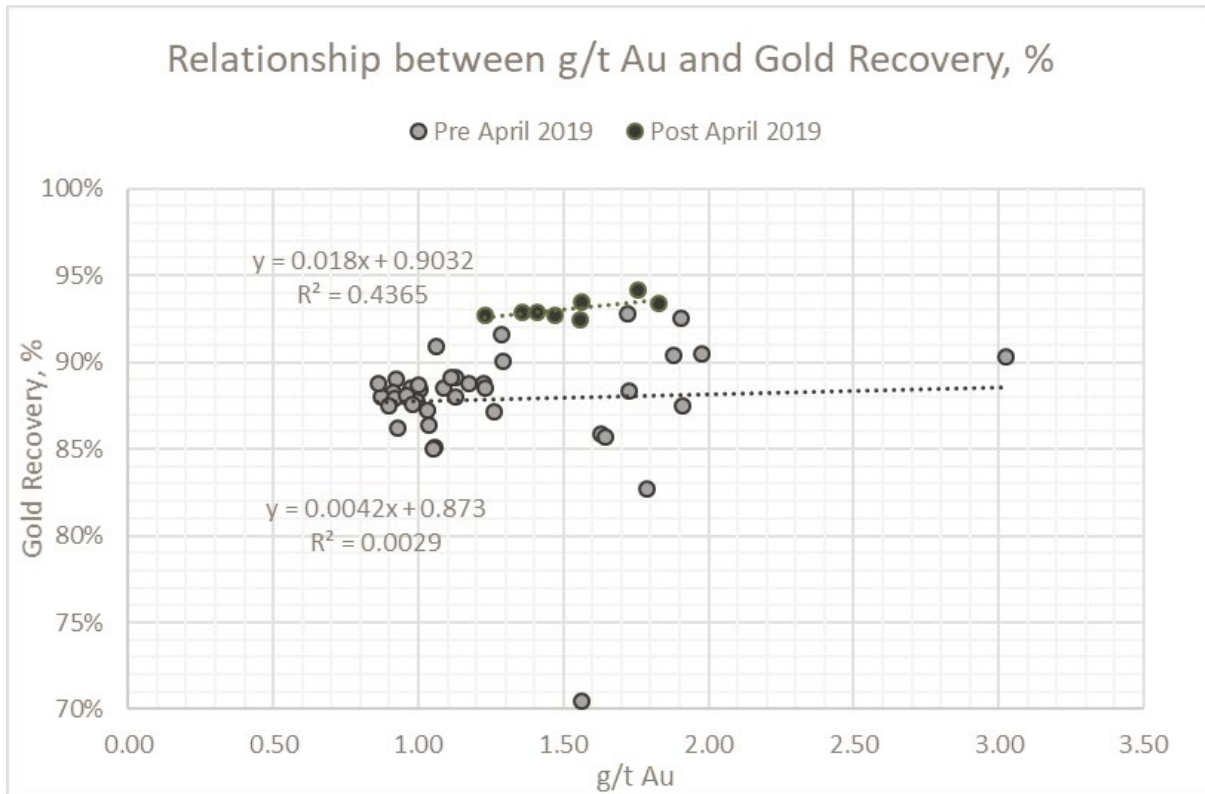
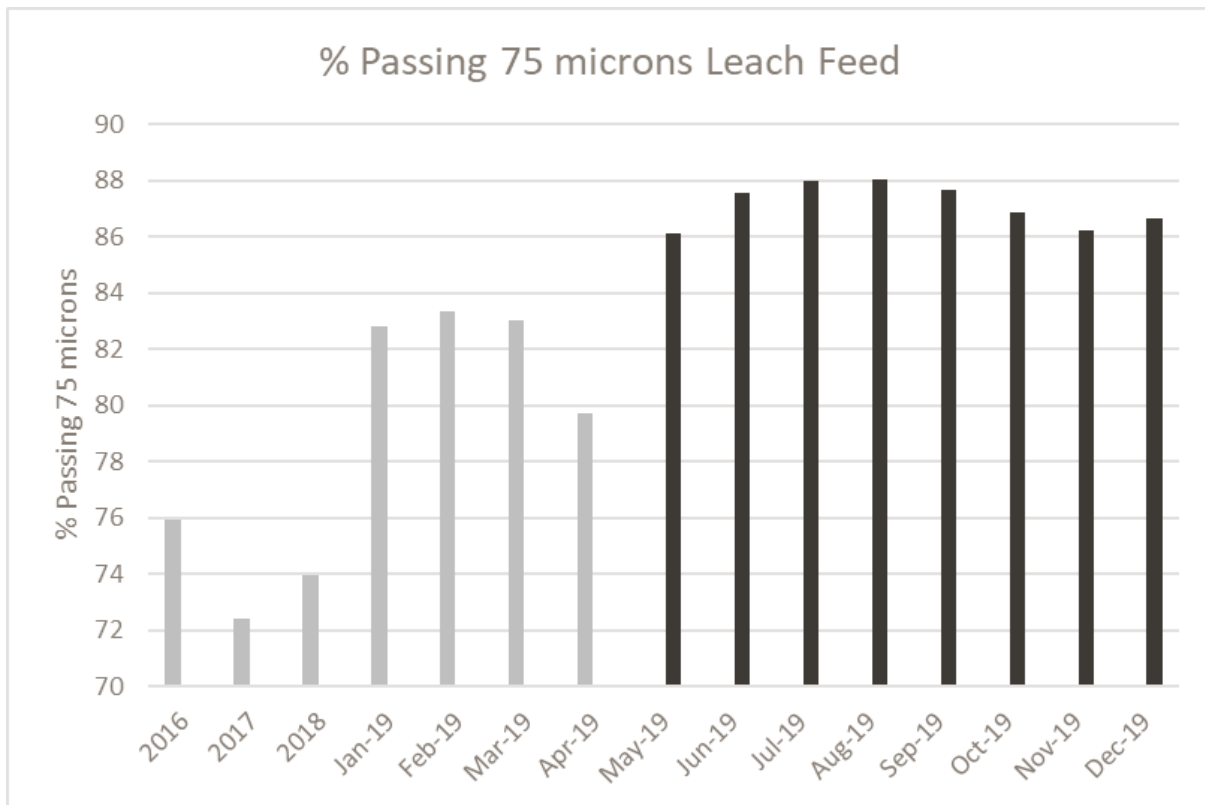


Figure 13-7 below shows the improvement in the percentage of particles that are less than 75 µm in the leach feed and the finer particle size will be amenable to gold leaching.

FIGURE 13-7 SIZE OF LEACH FEED (2016 TO 2019)



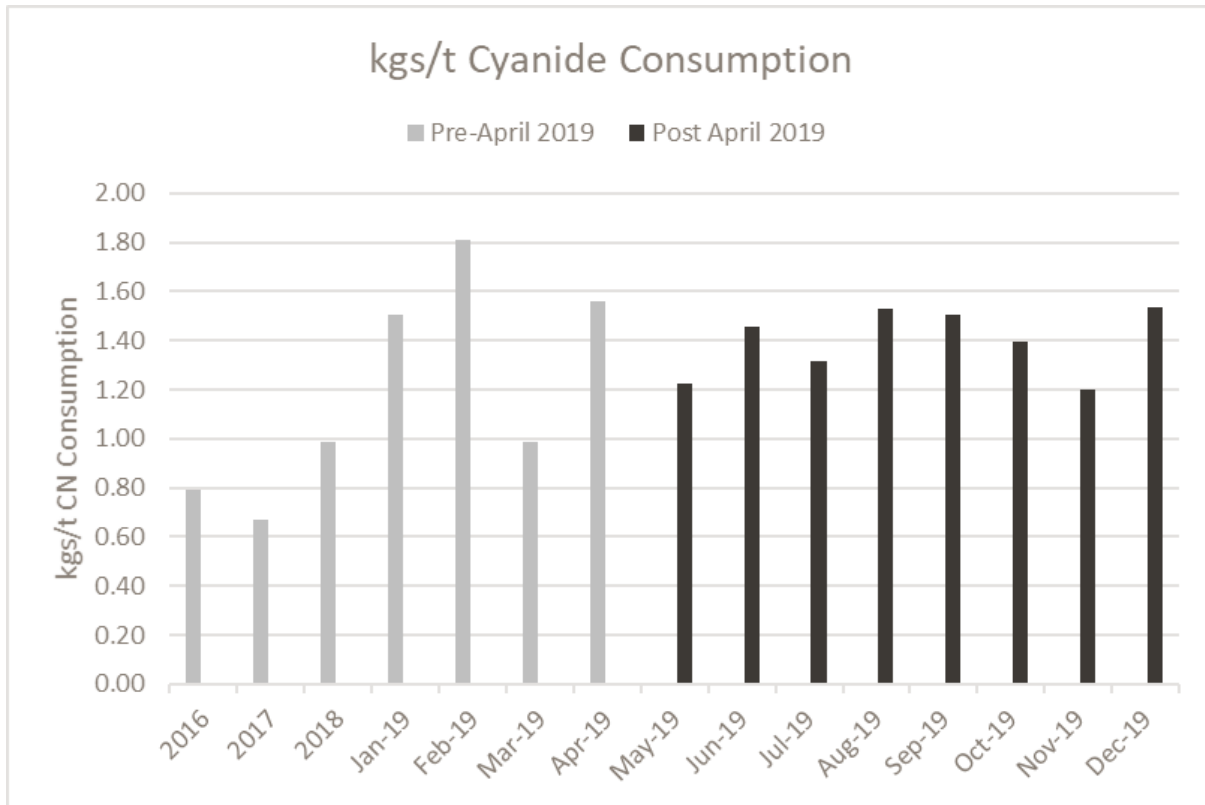
CYANIDE CONSUMPTION

Figure 13-8 shows the 2016 to 2019 cyanide consumption trends. The actual cyanide consumption rates are an order of magnitude higher than those achieved during the Ausenco DFS study.

The main reason for the higher cyanide consumption is the presence of pyrrhotite and other iron bearing minerals which solubilize on contact with water. Fe^{2+} ions consume cyanide and it is therefore important that Fe^{2+} ions are oxidized to Fe^{3+} ions, since Fe^{3+} ions do not consume cyanide. The addition of higher levels of oxygen has significantly increased gold recovery, however, cyanide consumption rates have remained high.

Further research and development work are currently being planned to ascertain the optimum plant set up to manage oxygen and cyanide consumption.

FIGURE 13-8 CYANIDE CONSUMPTION RATES (2016 TO 2019)



TEST WORK REVIEW

As described in the 2017 AMC Technical Report, three separate metallurgical test work programs have been carried out:

- Amapari work program by New Gold (original heap leach).
- Ausenco FS program by Ausenco and Ammtec Limited (Ammtec) (original mill).
- Beadell FS program by Beadell and their consultants, RWC for the mill expansion and MPH Minerals Consultancy Ltd (MPH) for the Metallurgical Accounting and original Ausenco metallurgical test work review and interpretation of project test work needs.
- The Amapari program by New Gold was focused on a heap leach operation and is not relevant to the grind and cyanidation process later adopted by Beadell.

The bulk of the test work to support the design of the original mill was carried out by Ausenco and Ammtec. This was later supplemented by an operations review and other test work at SGS Geosol to support the design of the expansion, and supervised by Beadell. The latter two programs are summarized below.

AUSENCO FS METALLURGICAL PROGRAM

A detailed metallurgical test work program was conducted to support the initial FS for Tucano. The program was supervised by Ausenco and was carried out by Ammtec in Perth, Western Australia, during the second half of 2010. It included test work to establish:

- The comminution characteristics of four main ore type composite samples of Tap AB oxide, Tap AB sulphide, Urucum oxide, and Urucum sulphide, and 15 variability samples.
- The optimum grind size and cyanidation conditions for the four main ore type composite samples.
- The gravity recovery response of the four main ore type composite samples.
- The leach performance of 29 variability samples, including five Tap C oxide, two Tap C, sulphide, and two Tap D oxide ores.
- The leach performance of eight samples of spent ore (heap leach tailings) and two samples of stockpiled low grade ore.
- Engineering data that included testing of oxygen uptake, carbon kinetics, slurry viscosity, and lime demand.
- The performance of air/SO₂ process and hydrogen peroxide (H₂O₂) for cyanide destruction.
- The mineralogy of the four main ore type composites.

In addition, Ammtec prepared samples for dispatch to:

- Coffey International Limited to establish physical characteristics of plant tailings.
- ALS Environmental to establish geochemical characteristics of plant tailings.
- FLSmidth Pty Ltd for thickening test work.

BEADELL FS METALLURGICAL PROGRAM

In mid 2016 Beadell, together with their consultants and RWC, reviewed the operation of the plant with specific emphasis on the low gold recovery and coarser grind that was being experienced at the time. MPH provided specific guidance on metallurgical accounting and reviewed metallurgical test work needs. RWC reviewed the plant operating data and compared the data with the original mill design. It was concluded that certain critical areas required attention, and this was defined under the expansion project as follows:

- Additional grinding power to be provided by an additional ball mill.
- A pre-leach thickener to allow both effective operation of the cyclones and adequate retention time in CIL.
- Additional leach residence time.
- Oxygen addition to CIL.

- Lead nitrate addition to CIL.

TESTWORK PROCESS DEVELOPMENT LTD.

In mid 2016, samples were submitted by Beadell to Testwork Process Development Ltd. for bottle roll testing as follows: Urucum sulphide, Urucum Oxide, Tap AB 2 oxide, Tap AB 3 sulphide, Tap AB 2 transition, and spent ore.

Leaching curves of gold recovery versus time were produced, with and without oxygen addition. The source of the samples was not recorded. Generally, the results were highly variable and, not as expected, therefore, an additional test program at SGS Geosol was planned.

This work was planned and initiated by Beadell.

SGS GEOSOL

In January 2017, a more definitive metallurgical test program was initiated by Beadell. Ten composites were prepared, nine sulphide composites and one oxide composite, and were submitted to SGS Geosol for bottle roll testing as listed in Table 13-1.

TABLE 13-1 SGS GEOSOL SAMPLES
Great Panther Mining Limited – Tucano Gold Mine

Metallurgical Test Composite	Lode Description	Mine	Pit
BDRMET1	AB 1 Flat Sulphide	Tap AB	Tap AB 1
BDRMET2	AB 1 Trough Oxide	Tap AB	Tap AB 1
BDRMET3	AB 2 Sulphide	Tap AB	Tap AB 2
BDRMET4	AB 3 Sulphide	Tap AB	Tap AB 3
BDRMET5	URS Sulphide	Urucum	Urucum South (URS)
BDRMET6	URCS Sulphide	Urucum	Urucum Central South (URCS)
BDRMET7	URCN SIB Sulphide	Urucum	Urucum Central North (URCN)
BDRMET8	URCN SCS Sulphide	Urucum	Urucum Central North (URCN)
BDRMET9	URN Sulphide	Urucum	Urucum North (URN)
BDRMET10	URN UG Sulphide	Urucum	Urucum North Underground (URN UG)

A summary of the selected drill hole intervals used to select the samples and sections showing the drill hole locations, within the proposed open pit, was provided. The metallurgical results are summarized in Table 13-2.

TABLE 13-2 SGS GEOSOL BOTTLE ROLL RESULTS
Great Panther Mining Limited – Tucano Gold Mine

Metallurgical Test Composite	Grade (g/t Au)	53 µm	75 µm	106 µm
BDRMET1	2.17	98.3	94.9	96.7
BDRMET2	2.41	96.6	96.1	97.6
BDRMET3	2.91	94.6	94.2	91.6
BDRMET4	2.81	97.3	95.7	97.6
BDRMET5	3.44	91.5	91.3	90.3
BDRMET6	2.48	90.4	93.0	91.0
BDRMET7	2.19	96.1	93.6	91.1
BDRMET8	7.14	97.6	95.7	91.9
BDRMET9	1.52	91.2	88.9	88.5
BDRMET10	5.71	96.5	95.7	93.2
Average	3.28	95.0	93.9	93.0

Leaching curves of gold recovery versus time were produced at various grind sizes. The data was analysed by Beadell and their consultants and it was concluded that a residence time of 24 hours and a grind size of P₈₀ 75 µm was optimum. Although it can be seen that recoveries were higher at P₈₀ 53 µm than at P₈₀ 75 µm, the calculations carried out to determine the optimum grind size, demonstrated that the net operating revenues at both grind sizes were similar. According to plant experience, recoveries fall significantly with grinds coarser than P₈₀ 106 µm.

OXYGEN TEST WORK SUMMARY

The original test work conducted by ALS Ammtec in Perth involved testing all ore types at two DO levels, 6 ppm using air and 25 ppm using oxygen sparging. The aim was to identify the effect of oxygen on the leach kinetics and cyanide consumption rates. The conclusions from this test work were that all oxide ore type testing would employ 6 ppm (i.e., natural air aspiration), while the sulphide ore types required much higher oxygen demands and much higher ppm DO.

The Ausenco design provided for just air (no oxygen) injection in the first four years of mine life, while the oxide ore types were being treated, but Ausenco recommended greater than 15ppm DO when treating sulphide ore types.

CONCLUSIONS AND DESIGN CRITERIA

The conclusions and design criteria from the two test work programs, i.e., the Ausenco and Ammtec FS and the Beadell FS, are described separately as follows.

AUSENCO AND AMMTEC FS PROGRAM

Conclusions drawn from the Ausenco and Ammtec FS test work program are given below.

- The oxide and sulphide ores have very dissimilar physical and comminution characteristics.
- The oxide ore has very low competency and low-to-average hardness, whereas the sulphide ores are competent to very competent and average to above average hardness. Co-processing of these ores is best suited to a SAG mill. A single-stage SAG mill is recommended for the first few years, when a high-oxide low-sulphide blend is planned. A ball mill is to be added around Year 4 when the sulphide content of the blend is expected to rise.
- Gravity test work in the laboratory showed a high recovery (35% to 56%) of gold by centrifugal gravity concentration and intensive cyanidation of gravity concentrate. However, the overall gold recovery, including leaching of gravity tails, showed no recovery improvement in recovery over a whole ore leach. Therefore, the gravity circuit was not included in the processing plant design in order to reduce capital costs.
- The Tucano ores are free-milling and are not preg-robbing. They are amenable to gold extraction by conventional CIP cyanidation. As a group, the oxide ores respond in a similar manner to each other, giving very high recoveries (typically greater than 95%) at a grind size of P_{80} 75 μm , with moderate reagent consumptions of 0.55 kg/t NaCN and 5.5 kg/t lime (60% CaO). Despite the ores showing no preg-robbing characteristics, CIL was selected because it was the lowest capital cost. The original elution circuit inherited by Beadell from New Gold's heap leach operation was retained again to minimise capital costs.
- The sulphide ores also have high recoveries, but typically 3% lower than oxide ores, at a grind size of P_{80} 75 μm , and moderate reagent consumptions of 0.49 kg/t NaCN and 0.57 kg/t lime (60% CaO).
- The spent ore samples stockpiled from the previous heap leach operation had a recovery of 87% at a grind size of P_{80} 75 μm , the low grade ore stockpiled during the previous heap leach operation exhibited a recovery of 93.5% at a grind size of P_{80} 75 μm .
- Oxygen addition increases the leaching kinetics, primarily for the sulphide ores. The use of oxygen is recommended for the high sulphide ore blends planned for the fourth year of operation.

- Lead nitrate ($\text{Pb}(\text{NO}_3)_2$) addition (at 100 g/t) appears to increase the kinetics of gold leaching for Tap AB oxide material, such that extractions previously achieved at 48 hours are achieved at between 12 hours and 24 hours.
- The planned Tucano ore blends both have thickener specific settling rates of 1.2 t/m². The high sulphide blend requires 5 g/t to 7.5 g/t of flocculant and should achieve thickener underflow solids concentration of 60% to 62% solids. By comparison, the high oxide blend would require twice as much flocculant and would be expected to achieve a thickener underflow solids concentration of 50% to 52% solids.
- The air/SO₂ cyanide destruction process can be used to reduce cyanide in CIL tailings slurry to less than 3 ppm CN_{WAD} and less than 25 ppm CN_{TOTAL}.

The process design criteria recommended from this test work program by Ausenco are summarized in Table 13-3.

TABLE 13-3 SELECTED DESIGN CRITERIA (AUSENCO)
Great Panther Mining Limited – Tucano Gold Mine

Parameter	Unit	Oxide	Sulphide
Comminution			
Bond Rod Mill Work Index	kWh/t	7.9	20.0
Bond Ball Mill Work Index	kWh/t	11.3	16.8
Bond Abrasion Index	kWh/t	0.03	0.43
JK Parameter A x b		192	34.9
Ore Specific Gravity (SG)		3.57	3.27
Grind Size, P ₈₀	µm	75	75
CIL			
CIL Residence Time	h	24	24
Residual CN _{FREE} Level	mg/L	100	100
Tails Thickening			
Specific Settling Rate	t/m ² h	1.2	1.2
Underflow Density	% w/w	50-52	60-62
Cyanide Destruction			
Operating pH		8.5-9.0	8.5-9.0
Suggested Residence Time	h	1	1
CIL Residual CN _{WAD} Level	mg/L	110	110
Tailings CN _{WAD}	mg/L	<50	<50
Tailings CN _{WAD} (Target)	mg/L	<10	<10
Solution Discharge CN _{TOTAL} Limit	mg/L	<0.2	<0.2

BEADELL FS PROGRAM

The relevant studies and evaluations carried out by Beadell and their consultants are summarized in detail in the Beadell FS. An alternative expansion strategy to the original

Ausenco FS was recommended to maintain adequate throughput and recovery and this strategy was carried out under the Beadell FS as follows:

- The nominal throughput would be 3.6 Mtpa, 10,000 tonnes per day (tpd), or 450 tph of predominantly sulphide ore, at a grind size of P_{80} 75 μm .
- The new equipment would comprise a 6 MW ball mill, a 28 m diameter pre-leach thickener, and an additional leach tank, located ahead of the existing CIL.
- An oxygen plant would also be included.

The design, sizing, and location of each new item of equipment are described below.

BALL MILL

The SRK Report, included in the Beadell FS, contains a description of the plant trials, mill sizing, and power requirement calculations. The conclusion was that to achieve the optimum grind size of P_{80} 75 μm , 7.1 kWh/t for oxide and 24.6 kWh/t for sulphide, would be required. The mill sizing calculations by RWC and SRK have determined that a 4.0 MW mill should be adequate to grind the tonnages in the proposed plant to P_{80} 75 μm , however, a larger 6.0 MW ball mill is recommended, the reasons for which were outlined earlier.

PRE-LEACH THICKENER

In the current operation, the cyclones are operating inefficiently due to the high viscosity of the feed slurry. Operating experience shows that the actual grind size currently being achieved is between P_{80} 110 μm and P_{80} 150 μm . The high viscosity of the feed slurry resulted from a need to maintain a high percentage of solids in the cyclone overflow, which fed the leach circuit directly and this was required to maintain adequate residence times in the CIL process. Therefore, it was recommended by Beadell and their consultants to install a pre-leach thickener and a 28 m diameter thickener was selected.

Thickening tests were conducted by Outotec during the Beadell FS. This thickener will provide two functions:

- Allow the cyclones to be operated at a lower percentage of solids and thus, classify more effectively at the optimum grind size of 75 μm .
- Provide a slurry at a higher percentage of solids to the new leach tank and CIL process, and hence maintain adequate residence times.

ADDITIONAL LEACH TANK

At a throughput of 450 tph and a slurry density of 45% solids, a total volume of 17,200 m^3 is required to provide a leach residence time of 24 hours. The existing CIL process has a total

volume of 15,400 m³, therefore, one additional tank, 15 m x 15 m in size, is required. The additional leach tank will be located ahead of the existing CIL tanks.

REAGENTS

The benefits of lead nitrate addition are shorter leach time and reduced cyanide consumption, particularly on the oxide ores, as highlighted by MPH Metallurgical Testwork Review. Additions fall in the range of 100 g/t to 250 g/t as lead nitrate. A design figure of 150 g/t has been selected and a lead nitrate mixing, and dosing plant has already been installed.

RWC estimated oxygen consumption using benchmarks from other operations and feedback from discussions with companies specializing in oxygenation. These oxygen consumption figures were checked against the previous experience of personnel at Tucano. These benchmarks were also compared against typical specific aeration rates that were adjusted for the improved mass transfer efficiency experienced with oxygen. A final check was made against an oxygen uptake rate measured using DO meters on slurries during a previous test work program. A plant capacity of 7.5 tpd of oxygen was recommended, i.e., approximately 0.75 kg of oxygen per tonne of slurry.

14 MINERAL RESOURCE ESTIMATE

SUMMARY

The Mineral Resources for Tucano include contributions from four deposits as well as material contained within various stockpiles present throughout the Tucano property. The Mineral Resources from these four deposits are composed of mineralized material that is envisioned to be extracted by both open pit and underground mining methods. Gold mineralization is contained within oxidized lithologies as well as their fresh, un-weathered equivalents.

Updated grade-block models were prepared for the open pit component of the Urucum deposit, as well as the open pit and the underground component of the Tap AB deposit using drill hole, sample information, and topography that was current as of September 30, 2019. The underground component of the Mineral Resource estimate for the Urucum North deposit was prepared from a grade-block model that used the drill hole and sample information that was current as of November 2, 2015. Drilling completed since the previous Technical Report (AMC, 2017) was reviewed and in RPA's opinion does not materially impact the Mineral Resource estimate.

The Mineral Resource estimate for the Tucano as of September 30, 2019 is presented in Table 14-1.

TABLE 14-1 MINERAL RESOURCE ESTIMATE AS OF SEPTEMBER 30, 2019
Great Panther Mining Limited – Tucano Gold Mine

	Cut-off Grade (g/t Au)	Measured			Indicated			Total Measured & Indicated			Inferred		
		Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)	Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)	Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)	Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)
OXIDE OPEN PIT													
Urucum	0.40	109	1.11	4	27	1.54	1	136	1.20	5	0	0.00	0
Urucum East	0.40	0	0.00	0	143	2.09	10	143	2.09	10	0	0.00	0
Tap AB	0.40	0	0.00	0	1,099	2.27	80	1,099	2.27	80	0	0.00	0
Duckhead	0.40	0	0.00	0	64	4.35	9	64	4.35	9	6	1.71	0
Total Oxide Open Pit	0.40	109	1.11	4	1,333	2.34	100	1,442	2.24	104	6	1.71	0
FRESH OPEN PIT													
Urucum	0.55	1,667	1.80	96	2,561	2.30	190	4,228	2.10	286	7	3.94	1
Urucum East	0.55	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0
Tap AB	0.55	0	0.00	0	508	2.45	40	508	2.45	40	0	0.00	0
Duckhead	0.55	0	0.00	0	118	2.06	8	118	2.06	8	5	4.14	1
Total Fresh Open Pit	0.55	1,667	1.80	96	3,188	2.32	238	4,855	2.14	334	12	4.03	2
OPEN PIT OXIDE AND FRESH													
Urucum		1,775	1.76	100	2,589	2.30	191	4,364	2.08	291	7	3.94	1
Urucum East		0	0.00	0	143	2.09	10	143	2.09	10	0	0.00	0
Tap AB		0	0.00	0	1,607	2.33	120	1,607	2.33	120	0	0.00	0
Duckhead		0	0.00	0	183	2.87	17	183	2.87	17	12	2.79	1
Total Oxide & Primary Open Pit		1,775	1.76	100	4,521	2.32	338	6,296	2.16	438	18	3.21	2
STOCKPILE													
Open pit stockpile	0.50	1,887	0.71	43	0	0.00	0	1,887	0.71	43	0	0.00	0
Spent ore stockpile	0.50	37	0.70	1	0	0.00	0	37	0.70	1	0	0.00	0
Rom expansion stockpile	0.50	522	0.70	12	0	0.00	0	522	0.70	12	0	0.00	0
Marginal ore stockpiles	0.30	1,340	0.42	18	0	0.00	0	1,340	0.42	18	0	0.00	0
Total Stockpiles		3,786	0.61	74	0	0.00	0	3,786	0.61	74	0	0.00	0
Total Tucano Open Pit & Stockpiles		5,562	0.97	174	4,521	2.32	338	10,083	1.58	512	18	3.21	2

	Cut-off Grade (g/t Au)	Measured			Indicated			Total Measured & Indicated			Inferred		
		Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)	Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)	Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)	Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)
OXIDE UNDERGROUND													
Urucum - North	2.10	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0
Urucum - Central	2.10	0	0.00	0	0	0.00	0	0	0.00	0	0	0.00	0
Urucum East	2.10	0	0.00	0	0	0.00	0	0	0.00	0	12	2.72	1
Tap AB	2.10	0	0.00	0	174	4.94	28	174	4.94	28	1,436	2.33	108
Duckhead	2.10	0	0.00	0	0	0.00	0	0	0.00	0	33	4.20	5
Total Oxide Underground	2.10	0	0.00	0	174	4.94	28	174	4.94	28	1,481	2.38	113
FRESH UNDERGROUND													
Urucum - North	1.60	0	0.00	0	3,042	4.04	395	3,042	4.04	395	4,664	2.12	318
Urucum - Central	1.60	0	0.00	0	0	0.00	0	0	0.00	0	852	2.61	71
Urucum East	1.60	0	0.00	0	0	0.00	0	0	0.00	0	88	2.03	6
Tap AB	1.60	0	0.00	0	184	4.33	26	184	4.33	26	4,331	2.06	287
Duckhead	1.60	0	0.00	0	0	0.00	0	0	0.00	0	230	2.05	15
Total Oxide Underground	1.60	0	0.00	0	3,225	4.06	421	3,225	4.06	421	10,165	2.13	697
UNDERGROUND OXIDE AND FRESH													
Urucum - North		0	0.00	0	3,042	4.04	395	3,042	4.04	395	4,664	2.12	318
Urucum - Central		0	0.00	0	0	0.00	0	0	0.00	0	852	2.61	71
Urucum East		0	0.00	0	0	0.00	0	0	0.00	0	100	2.11	7
Tap AB		0	0.00	0	357	4.63	53	357	4.63	53	5,767	2.13	395
Duckhead		0	0.00	0	0	0.00	0	0	0.00	0	263	2.32	20
Total Oxide & Primary Underground		0	0.00	0	3,399	4.10	448	3,399	4.10	448	11,646	2.16	810
Grand Total Tucano		5,562	0.97	174	7,920	3.09	786	13,482	2.22	960	11,664	2.16	812

Notes:

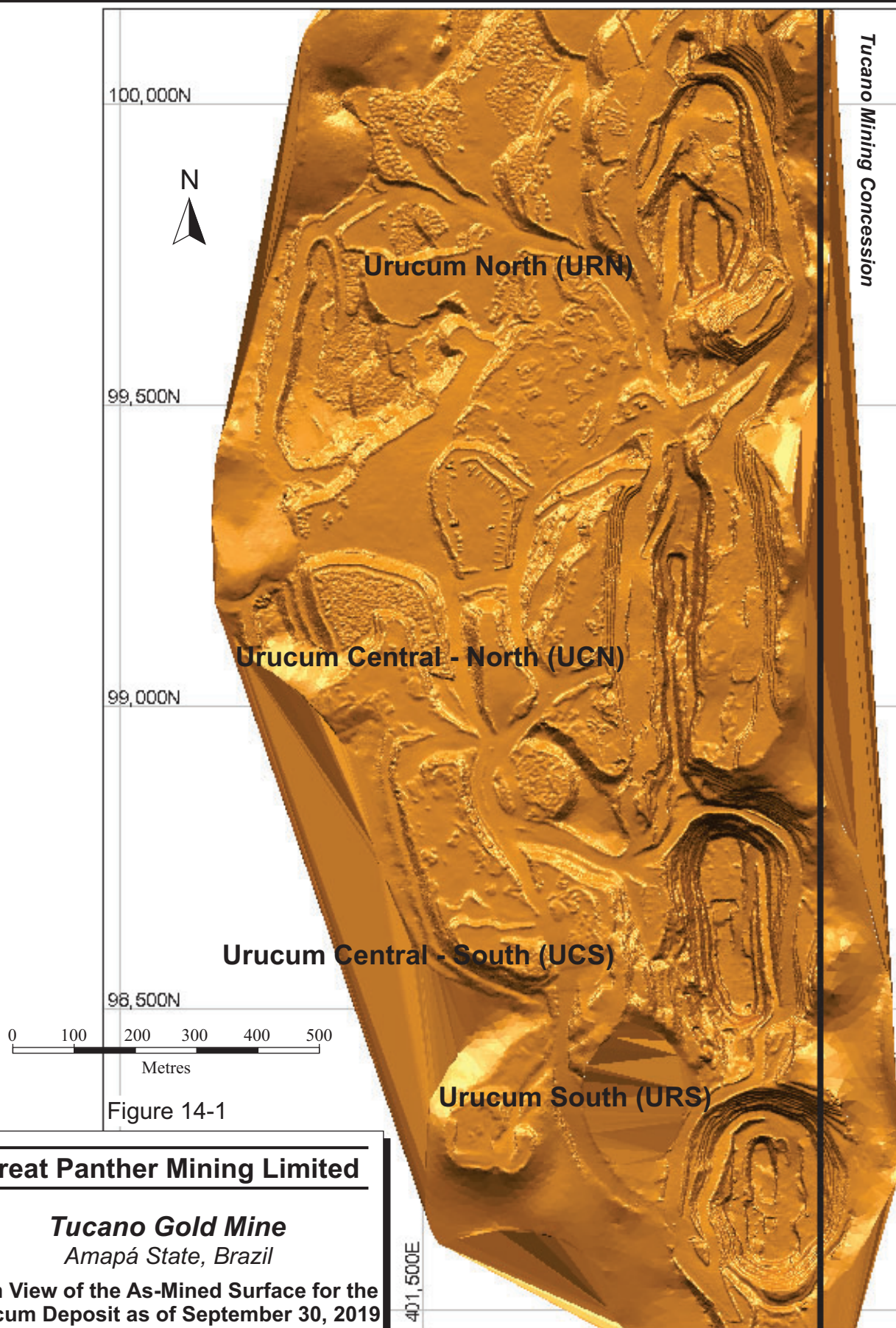
1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated at various cut-off grades depending on mining method and mineralization style.
3. Mineral Resources are estimated using a long-term gold price of US\$1,500/oz Au and a US\$/Brazilian real (R\$) exchange rate of 1:3.8.
4. A minimum mining width of 3 m was used for preparation of mineralization wireframes for the Urucum open pit and Tap AB open pit and underground Mineral Resources.
5. Mineral Resources are inclusive of Mineral Reserves.
6. Mineral Resource statements are prepared using constraining surfaces and volumes for open pit and underground Mineral Resources, respectively.
7. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
8. Numbers may not add due to rounding.

URUCUM DEPOSIT

OPEN PIT

TOPOGRAPHY AND EXCAVATION MODELS

Great Panther prepares digital models of the open pit mining excavations on a regular basis as mining progresses using information collected from drone surveys as well as conventional total station surveying equipment. The information collected from these period surveys are integrated together from the various mining areas at the Urucum deposit into one integrated model of the as-mined topographic surface. A digital copy of the as-mined topographic surface was provided to RPA for the Urucum deposit that was current as of September 30, 2019 (Figure 14-1).



March 2020

Source: RPA, 2020.

MINERAL RESOURCE DATABASE

The presence and distribution of the gold mineralization found at the Urucum deposit is defined by means of diamond drill holes, auger holes, and RC drill holes completed during deposit delineation drilling programs, and RC drill holes, chip/channel samples, RAB hole samples and blast hole samples taken as part of the grade control sampling program. All information is entered into a master acQuire geological database management system which stores all drill hole and sample information for the Mine.

Subsets from this master database were extracted by the Mine staff and used for preparation of the Urucum Mineral Resource estimate. All the drill holes contained within the Urucum subset of the database were used to prepare the estimate. All the drill hole data were modified for use by the Datamine Studio mine modelling software package. Additional fields to store such information as the composited assay values and wireframe flags were created as required during preparation of the Mineral Resource estimate.

The cut-off date for the drill hole database is September 30, 2019. The location of the drill holes which were used to prepare the 2019 Mineral Resource estimate were shown in Section 10 of this Technical Report. The drilling has outlined gold mineralization along a strike length of approximately 2,300 m and from surface to depths of up to 600 m from surface at the Urucum North deposit. A summary of the database is provided in Table 14-2.

**TABLE 14-2 SUMMARY OF THE URUCUM DRILL HOLE DATABASE
AS OF SEPTEMBER 30, 2019
Great Panther Mining Limited – Tucano Gold Mine**

Hole Type	Number of Holes	Total Length (m)
Auger (AG)	1,670	8,442
Chip/Channel (CH)	3,530	77,537
Diamond Drilling (DD)	405	96,196
Rotary Air Blast (RB)	2,995	25,415
Reverse Circulation (RC)	4,577	183,861
Trench Samples (TR)	151	4,351
Total	13,328	395,802

LITHOLOGY MODEL

Digital models of the main host rock types encountered at the Urucum deposit were prepared by the Mine staff using a series of vertical, east-west cross sections that were equally spaced

at 10 m intervals. The Hexagon Minesight software package was used to create the interpretations of the lithological and weathering units.

The main rock types include BIF, a carbonate unit, quartz-sericite schist, and pegmatite (Figure 14-2). The BIF unit has been the host to the majority of the gold mineralization to date, although minor quantities of gold are also hosted by the carbonate unit. Excluding the pegmatite units, all rock units strike in a general north-south direction and have sub-vertical or steep easterly dips. Visual inspection of the pegmatite units by RPA during its visit to the Tucano site suggests that these units have not been subjected to the same degree of regional metamorphism and deformation, and so may represent a post-mineralization intrusion event (Figure 14-3).

RPA recommends that the adjacent lithologies to the BIF and carbonate units be evaluated for their potential of hosting significant quantities of gold mineralization.

RPA recommends that the genetic and temporal relationships between the gold mineralization and the pegmatite units be determined.

A digital model of the nominal top of the fresh rock has been prepared using available information obtained from drill holes and mining activities. The depth of weathering in the area of the Urucum deposit varies at the detailed scale but is generally in the order of 50 m (Figure 14-4). This weathering unit is topped off by the presence of a colluvium layer that represents weathered material that has been re-worked or transported by secondary processes such as erosion or mass flow events. The depth of this colluvium layer varies at the detailed scale but is generally in the order of 10 m in depth.

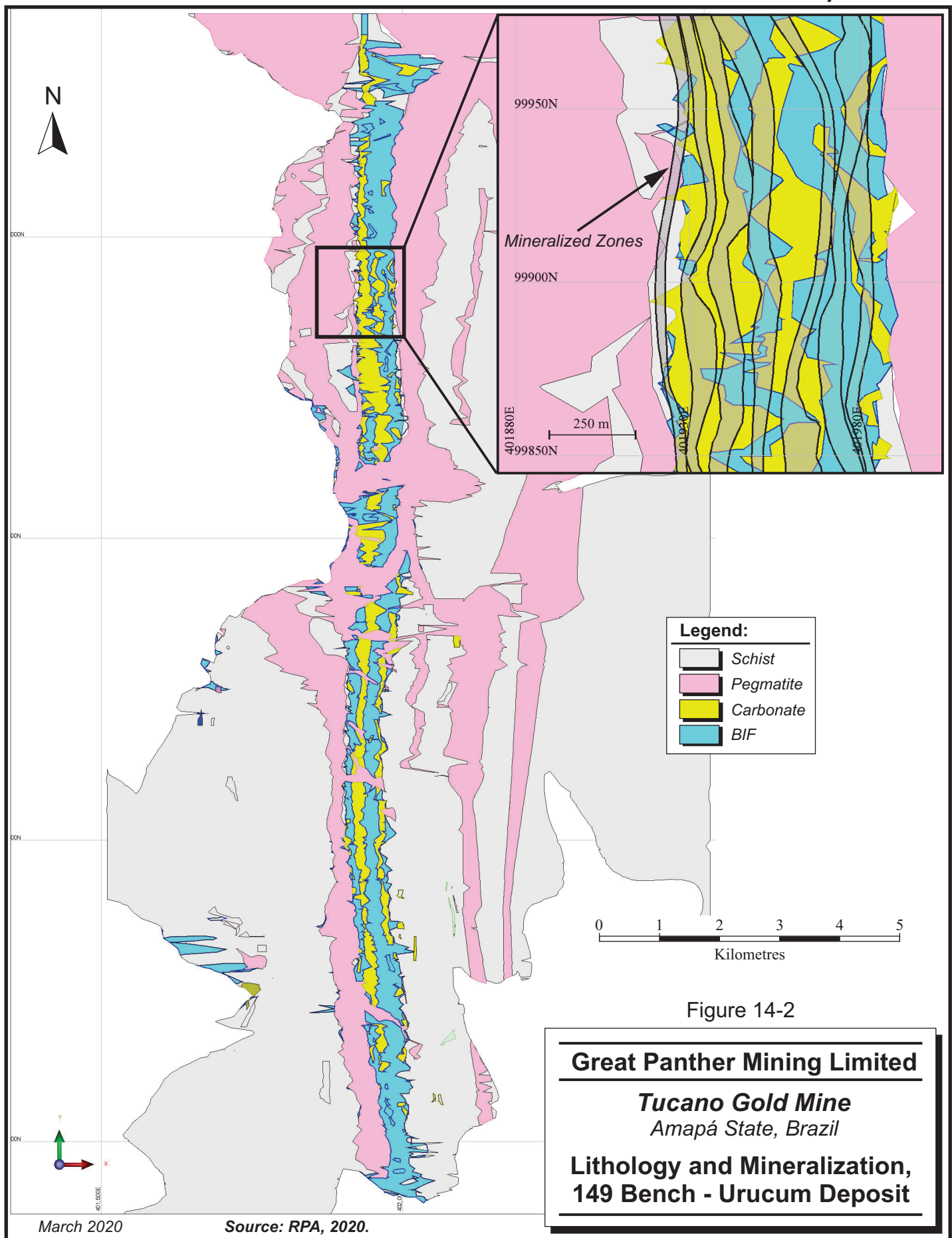




Figure 14-3

Great Panther Mining Limited

Tucano Gold Mine

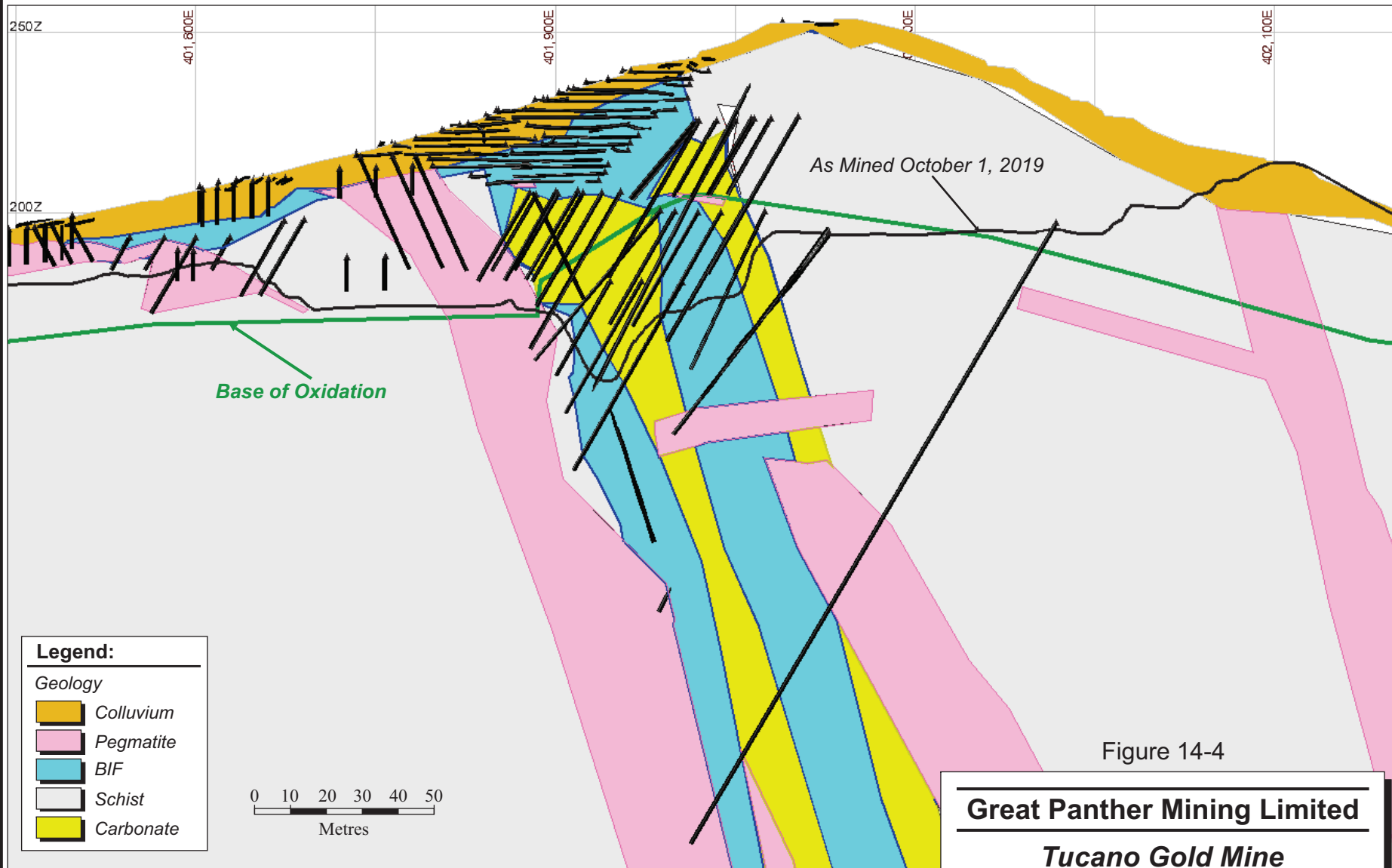
Amapá State, Brazil

**Pegmatite Intruding BIF
- Tucano Gold Mine**

March 2020

Source: RPA, 2020.

Looking North



14-10

MINERALIZATION MODELS

Gold mineralization at the Urucum deposit is sub-divided into four segments referred to as the Urucum South (URS), Urucum Central South (UCS), Urucum Central North (UCN), and Urucum North (URN) deposits. Digital interpretations of the distribution of the gold mineralization for these four segments were prepared by RPA using the Leapfrog software package. In general, the interpretations were created by examining drill hole and channel sample information in cross sectional views. The mineralization wireframes (referred to as Lodes by Mine staff) were based on a series of interpretations created by Mine staff in earlier years but updated to incorporate additional exploration and grade control drill hole and channel sample information. The updated mineralization wireframes were created using a nominal cut-off grade of 0.5 g/t Au across a minimum width of three metres to align with the cut-off grade and minimum width criteria that are currently being employed by the Mine staff for establishing the ore/waste dig packets. It is important to note that the cut-off grade of 0.5 g/t Au represents a pit-discard cut-off grade, which considers processing and general and administration (G&A) costs only. In all, a total of 32 mineralized wireframes were created for the four mineralized segments (Table 14-3). Examples of the interpretations were presented in Section 10. In total, gold mineralization has been modelled along a strike length of approximately 2,300 m and to a depth of approximately 600 m from surface.

RPA recommends that a second series of wireframe interpretations be prepared for the Urucum deposit using cut-off grade and minimum width criteria that are reflective of the envisioned operational scenario for an underground mining operation.

**TABLE 14-3 SUMMARY OF THE MINERALIZED WIREFRAMES -
URUCUM DEPOSIT**

Great Panther Mining Limited – Tucano Gold Mine

Zone	Number of Lodes
Urucum South (URS)	10
Urucum Central (North and South)	15
Urucum North (UCN)	7

EXPLORATORY DATA ANALYSIS AND GRADE CAPPING

Analyses of the gold grade distributions were conducted for those sample assays contained within the mineralized wireframes for each of the three zones. These analyses included preparation of descriptive statistics along with examination of the grade distribution by means of upper tail histogram plots, decile analyses, and Parrish plots. The purpose of this exercise

was to identify whether any outlier gold values are present whose influence on the Mineral Resource estimate must be restrained.

Review of the results of these analyses suggests that an appropriate capping value is approximately 12 g/t Au for the Urucum South mineralization, approximately 20 g/t Au for the Urucum Central mineralization, and approximately 15 g/t Au for the Urucum North mineralization. In comparison, the capping value applied to the raw assays for creation of the short term grade control block models is 26 g/t Au for all three zones. A summary of the descriptive statistics for the capped and uncapped raw assays, along with a brief review of the impact of alternate capping values, is presented in Table 14-4.

FIGURE 14-5 UPPER TAIL HISTOGRAM - URUCUM SOUTH DEPOSIT

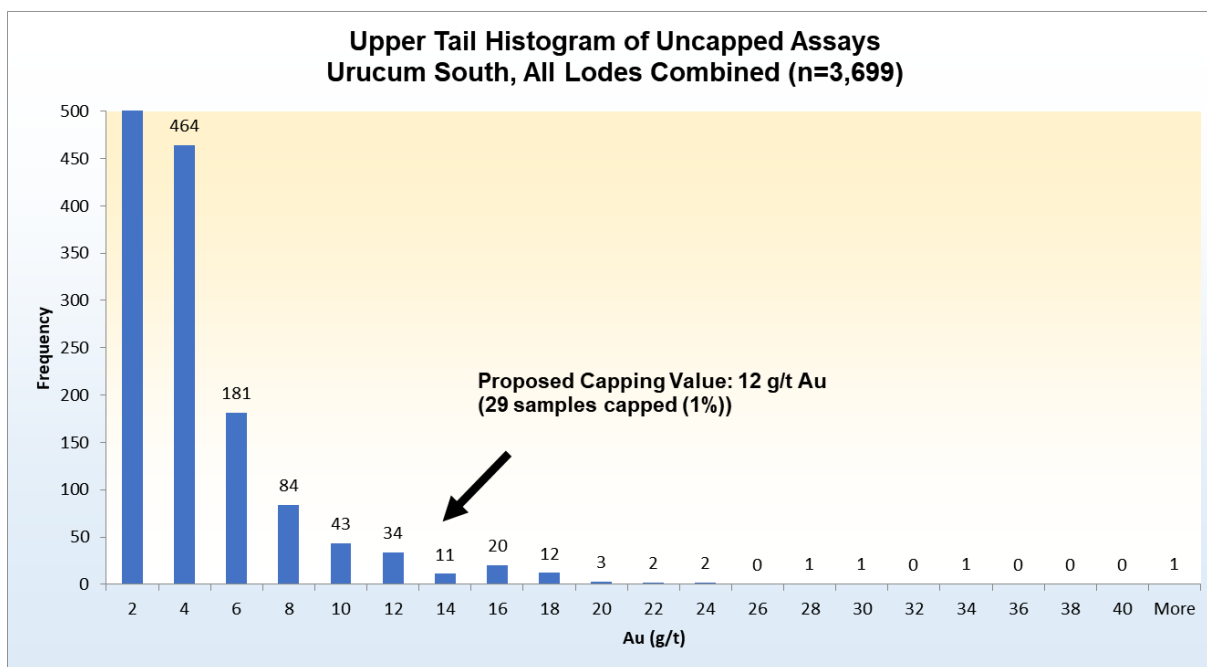


FIGURE 14-6 UPPER TAIL HISTOGRAM - URUCUM CENTRAL DEPOSIT

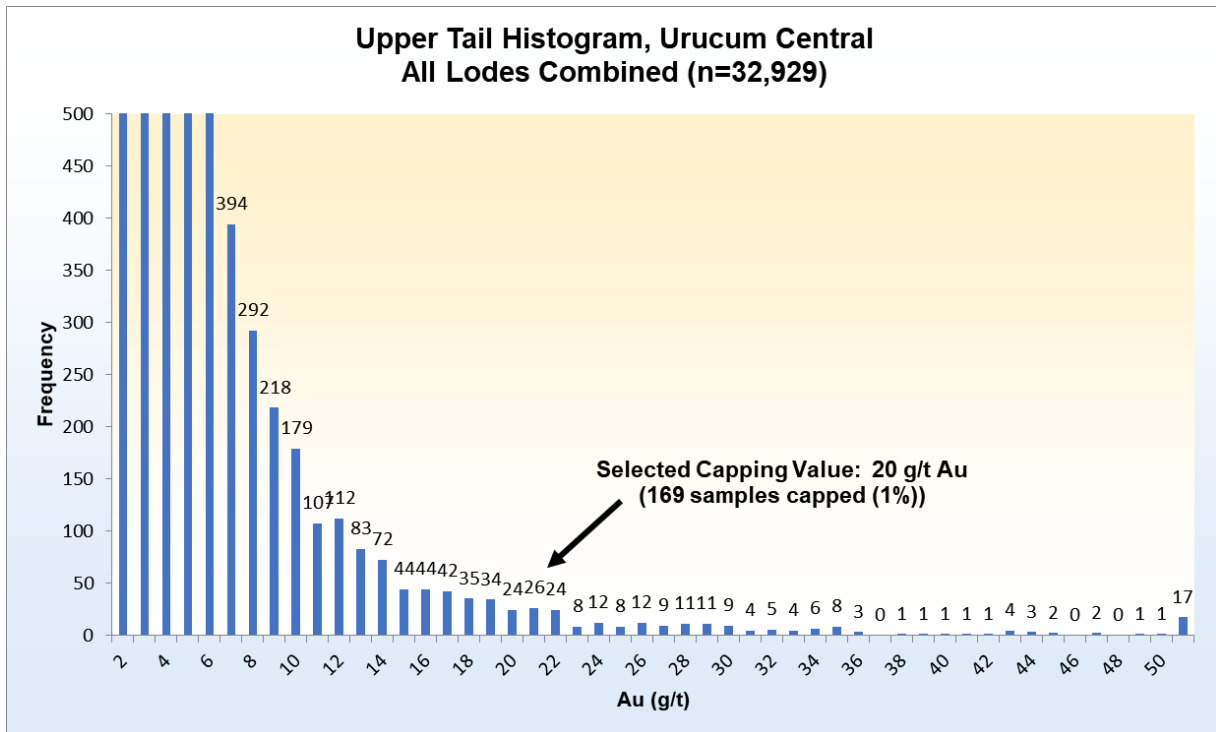
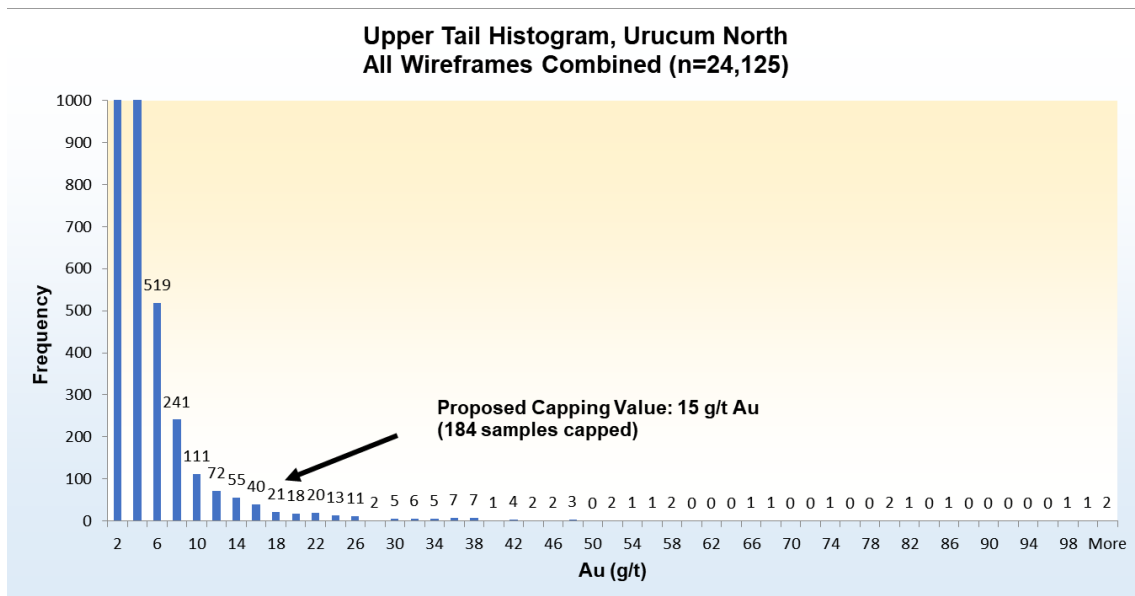


FIGURE 14-7 UPPER TAIL HISTOGRAM - URUCUM NORTH DEPOSIT



**TABLE 14-4 DESCRIPTIVE STATISTICS OF CAPPED AND UNCAPPED
RAW ASSAYS**
Great Panther Mining Limited – Tucano Gold Mine

Urucum South			
Item	No Cap	Cap 12 (g/t Au)	Cap 10 (g/t Au)
Length-Weighted Mean	1.68	1.61	1.57
Median	0.77	0.77	0.77
Mode	0.01	0.01	10.00
Standard Deviation	2.79	2.32	2.15
CoV - LW	1.66	1.44	1.37
Sample Variance	7.77	5.36	4.63
Minimum	0.00	0.00	0.00
Maximum	47.58	12.00	10.00
Count	3,699	3,699	3,699
Urucum Central			
Item	No Cap	Cap 20 (g/t Au)	Cap 15 (g/t Au)
Length-Weighted Mean	1.65	1.58	1.54
Median	0.63	0.63	0.63
Mode	0.01	20.00	15.00
Standard Deviation	3.56	2.78	2.53
CoV-LW	2.16	1.75	1.64
Sample Variance	12.66	7.70	6.40
Minimum	0.00	0.00	0.00
Maximum	146.32	20.00	15.00
Count	32,929	32,955	32,955
Urucum North			
Item	No Cap	Cap 15 (g/t Au)	Cap 10 (g/t Au)
Mean	1.12	1.02	0.97
LW Mean	1.11	1.02	0.97
Median	0.43	0.43	0.43
Mode	0.02	0.02	0.02
Standard Deviation	3.22	1.93	1.63
CoV-Arithmetic	2.88	1.90	1.69
CoV-LW	2.89	1.90	1.68
Sample Variance	10.34	3.72	2.67
Minimum	0.00	0.00	0.00
Maximum	121.07	15.00	10.00
Count	24,125	24,209	24,209

RPA recommends that the capping value applied to the short term grade control block model be reviewed in consideration of all available drill hole and sample information, as well as all information collected from the plant reconciliation studies.

COMPOSITING

The selection of an appropriate composite length began with examination of the descriptive statistics of the sample lengths of the raw assays and preparation of histograms of the sample lengths. Consideration was also given to the size of the blocks that would be used in the block model.

The majority of the sample lengths in the various mineralized wireframes were found to be one metre in length, with a small percentage of the samples having larger sample lengths (Figure 14-8). Consequently, on the basis of the available information, RPA believes that a composite length of one metre is reasonable.

The capped raw assays were composited individually for each of the 32 mineralized wireframes using either the best-fit function or the equal length function of the Datamine Studio 3 software package. The descriptive statistics of the composite samples for each of the 32 mineralized wireframes are provided in Table 14-5.

FIGURE 14-8 HISTOGRAM OF SAMPLE LENGTHS - URUCUM CENTRAL DEPOSIT

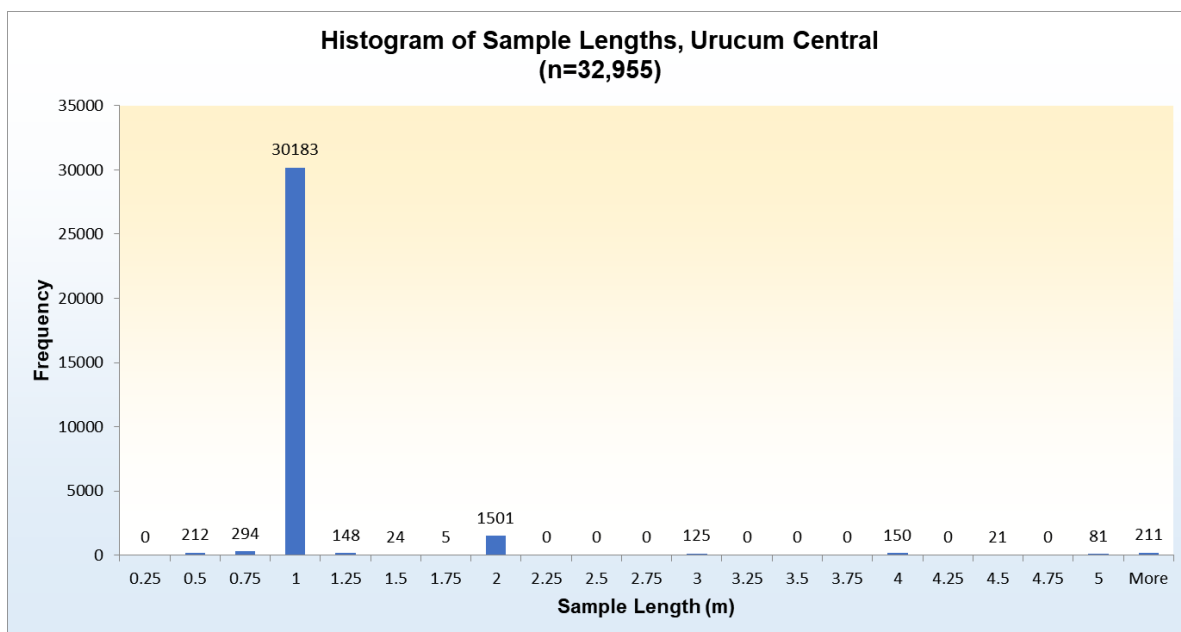


TABLE 14-5 DESCRIPTIVE STATISTICS OF CAPPED AND UNCAPPED COMPOSITED ASSAYS
 Great Panther Mining Limited – Tucano Gold Mine

Urucum North																
Item	Lode 22		Lode 23		Lode 24		Lode 25		Lode 27		Lode 28		Lode 29			
	No Cap	Capped	No Cap	Capped	No Cap	Capped	Cap	Capped	Cap	Capped	Cap	Capped	No Cap	Capped		
LW Mean	1.58	1.45	1.1	1.04	0.84	0.82	0.97	0.92	0.89	0.84	1.6	1.37	0.8	0.66		
Median	0.59	0.59	0.53	0.53	0.48	0.48	0.46	0.46	0.4	0.4	0.56	0.56	0.1	0.1		
Mode	0.02	15	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		
Standard Deviation	3.75	2.53	2.65	1.67	1.64	1.34	2.43	1.62	2.21	1.48	4.71	2.5	3.57	1.77		
CoV-Weighted	2.37	1.74	2.42	1.61	1.97	1.64	2.51	1.77	2.49	1.76	2.94	1.82	4.47	2.7		
Sample Variance	14.08	6.38	7.03	2.8	2.7	1.79	5.89	2.63	4.9	2.2	22.22	6.23	12.75	3.13		
Minimum	0		0	0	0	0	0	0	0	0	0	0	0	0		
Maximum	111.7	15	80.1	15	41.83	15	97.36	15	57.72	15	99.15	15	78.89	15		
Count	3,897	3,897	3,449	3,449	3,112	3,112	4,598	4,598	2,815	2,815	4,033	4,033	1,356	1,356		
Capping Value:		15		15		15		15		15		15		15		
Urucum Central																
Item	Lode 1		Lode 2		Lode 3		Lode 6		Lode 7		Lode 8		Lode 11		Lode 12	
	No Cap	Capped	No Cap	Capped	No Cap	Cappe	Cap	Cap	Cap	Cap	Cap	Capped	No Cap	Capped	No Cap	Capped
LW Mean	1.39	1.36	1.84	1.71	0.73	0.72	1.69	1.64	1.88	1.77	0.6	0.6	2.93	2.93	0.76	0.76
Median	0.61	0.61	0.66	0.66	0.28	0.28	0.78	0.78	0.59	0.59	0.27	0.27	0.96	0.96	0.48	0.48
Mode	0.14	0.14	0.01	20	0.25	0.25	0.02	0.02	0.16	20	0.5	0.5	#N/A	#N/A	0.07	0.07
Standard Deviation	2.77	2.33	4.38	3.06	2.06	2.02	3.25	2.85	4.17	3.57	0.94	0.94	3.62	3.62	1.2	1.2
CoV-Weighted	1.99	1.72	2.38	1.79	2.83	2.8	1.92	1.74	2.22	2.02	1.58	1.58	1.23	1.23	1.58	1.58
Sample Variance	7.66	5.42	19.17	9.38	4.23	4.1	10.54	8.11	17.43	12.75	0.89	0.89	13.12	13.12	1.45	1.45
Minimum	0		0	0			0	0	0.01	0.01	0.01	0.01	0.06	0.06	0.01	0.01
Maximum	81.3	20	146.32	20	20.44	20	31.92	20	28.91	20	4.95	4.95	13.18	13.18	18.28	18.28
Count	9,909	9,909	11,234	11,234	126	126	1,102	1,102	489	489	102	102	32	32	712	712
Capping Value:		20		20		20		20		20		20		20		20
Urucum Central																
Item	Lode 13		Lode 14		Lode 15		Lode 18		Lode 19		Lode 20		Lode 21			
	No Cap	Capped	No Cap	Capped	No Cap	Capped	No Cap	Capped	No Cap	Capped	Cap	Capped	No Cap	Capped		
LW Mean	0.59	0.59	0.53	0.53	1.1	1.1	1.04	1.04	1.19	1.03	1.97	1.94	0.48	0.48		
Median	0.5	0.5	0.16	0.16	0.81	0.81	0.48	0.48	0.58	0.58	0.82	0.82	0.28	0.28		
Mode	0.67	0.67	0.03	0.03	2.59	2.59	0.08	0.08	0.17	0.17	0.01	20	0.09	0.09		
Standard Deviation	0.59	0.59	0.84	0.84	1.03	1.03	1.76	1.76	3.57	1.94	3.22	2.94	0.7	0.7		

Urucum Central														
	Lode 13		Lode 14		Lode 15		Lode 18		Lode 19		Lode 20		Lode 21	
Item	No Cap	Capped	No Cap	Capped	No Cap	Capped	No Cap	Capped	No Cap	Capped	No Cap	Capped	No Cap	Capped
CoV-Weighted	1	1	1.58	1.58	0.94	0.94	1.7	1.7	3.01	1.88	1.64	1.52	1.45	1.45
Sample Variance	0.34	0.34	0.7	0.7	1.06	1.06	3.11	3.11	12.72	3.77	10.4	8.64	0.49	0.49
Minimum	0.02	0.02	0.01	0.01	0.02	0.02	0	0	0	0	0	0	0	0
Maximum	2.04	2.04	4.41	4.41	3.92	3.92	15.64	15.64	40.79	20	62.19	20	8.24	8.24
Count	18	18	72	72	39	39	442	442	137	137	9,932	9,932	620	620
Capping Value:		20		20		20		20		20		20		20
Urucum South														
	Lode 31		Lode 32		Lode 33		Lode 34		Lode 36					
Item	No Cap	Capped	No Cap	Capped	No Cap	Capped	Cap	Capp	No Cap	Capped				
LW Mean	2.67	2.55	1.47	1.2	1.12	1.12	1.31	1.29	1.07	1.07				
Median	1.43	1.43	0.56	0.56	0.6	0.6	0.78	0.78	0.85	0.85				
Mode	0.01	12	0.01	0.01	0.01	0.01	0.7	0.7	1.09	1.09				
Standard Deviation	3.39	2.92	3.93	1.97	1.51	1.51	1.82	1.69	0.9	0.9				
CoV-Weighted	1.27	1.15	2.68	1.64	1.35	1.35	1.39	1.31	0.84	0.84				
Sample Variance	11.	8.55	15.42	3.88	2.29	2.29	3.3	2.85	0.81	0.81				
Minimum	0	0	0.01	0.01	0	0	0.01	0.01	0.04	0.04				
Maximum	26.43	12	47.58	12	11.45	11.45	16.25	12	6.67	6.67				
Count	1,398	1,398	334	334	692	692	241	241	133	133				
Capping Value:		12		12		12		12		12				
Urucum South														
	Lode 37		Lode 39		Lode 40		Lode 41		Lode 42					
Item	No Cap	Capped	No Cap	Capped	No Cap	Capped	Cap	Capped	Cap	Capped				
LW Mean	0.9	0.9	1.67	1.58	0.73	0.73	1.14	1.14	1.13	1.12				
Median	0.65	0.65	0.76	0.76	0.55	0.55	0.91	0.91	0.59	0.59				
Mode	#N/A	#N/A	0.01	0.01	0.02	0.02	0.94	0.94	0.03	0.03				
Standard Deviation	0.8	0.8	2.88	2.46	0.83	0.83	1.24	1.24	1.81	1.67				
CoV-Weighted	0.89	0.89	1.73	1.56	1.14	1.14	1.09	1.09	1.59	1.5				
Sample Variance	0.64	0.64	8.32	6.07	0.69	0.69	1.54	1.54	3.27	2.79				
Minimum	0.1	0.1	0.01	0.01	0.01	0.01	0.1	0.1	0	0				
Maximum	3.14	3.14	16.97	12	8.08	8.08	5.56	5.56	19.09	12				
Count	17	17	114	114	428	428	21	21	429	429				
Capping Value:		12		12		12		12		12				

BULK DENSITY

A large number of density measurements (39,991 measurements in total) are available for the various lithological and weathering units present at the Urucum deposit. A summary of the various measurement methods is provided in Section 10. For the purposes of this Mineral Resource estimate, each of these density measurements was assigned to one of the principal lithological units using the wireframe interpretations described above. Similarly, each of the density measurements were assigned to either oxidized or fresh rock as defined by the interpreted oxidized surface. All samples were then composited into equal one metre lengths and were used to interpolate the dry bulk density values into the block model for each respective lithological unit using the Inverse Distance (Power 2) (ID²) interpolation algorithm.

The summary descriptive statistics of the composited density measurements grouped by the interpreted lithology wireframes are presented in Table 14-6 and are graphically illustrated in Figures 14-9 and 14-10. Comparison of the density values for the oxidized and fresh rock show that, as expected, the degree of variation in the density values for each of the fresh rock lithologies reside within much narrower ranges as compared to their oxidized equivalents.

**TABLE 14-6 DESCRIPTIVE STATISTICS OF THE COMPOSITED
DENSITY MEASUREMENTS BY ROCK TYPE - URUCUM DEPOSIT**
Great Panther Mining Limited – Tucano Gold Mine

Item	BIF (2000)	Carbonate (3000)	East Schist (4000)	Pegmatite (5000)	West Schist (6000)
Primary					
Mean	3.30	3.12	2.80	2.75	* included
Median	3.32	3.10	2.76	2.66	with
Mode	3.33	3.00	2.67	2.94	East
Standard Deviation	0.25	0.24	0.19	0.24	Schist
Sample Variance	0.06	0.06	0.03	0.06	composites
Minimum	2.32	1.12	2.04	1.78	
Maximum	4.88	4.66	4.12	4.35	
Count	12,011	12,754	10,105	3,971	
Oxide					
Mean	2.41	2.17	2.05	2.53	* included
Median	2.40	2.07	1.89	2.58	with
Mode	1.75	1.67	2.00	2.64	East
Standard Deviation	0.67	0.67	0.44	0.44	Schist
Sample Variance	0.45	0.45	0.19	0.19	composites
Minimum	1.06	0.82	1.33	1.40	
Maximum	3.61	3.44	3.17	4.16	
Count	173	148	161	64	

FIGURE 14-9 DISTRIBUTION OF COMPOSITED DENSITY MEASUREMENTS BY ROCK TYPE, OXIDIZED ZONE - URUCUM DEPOSIT

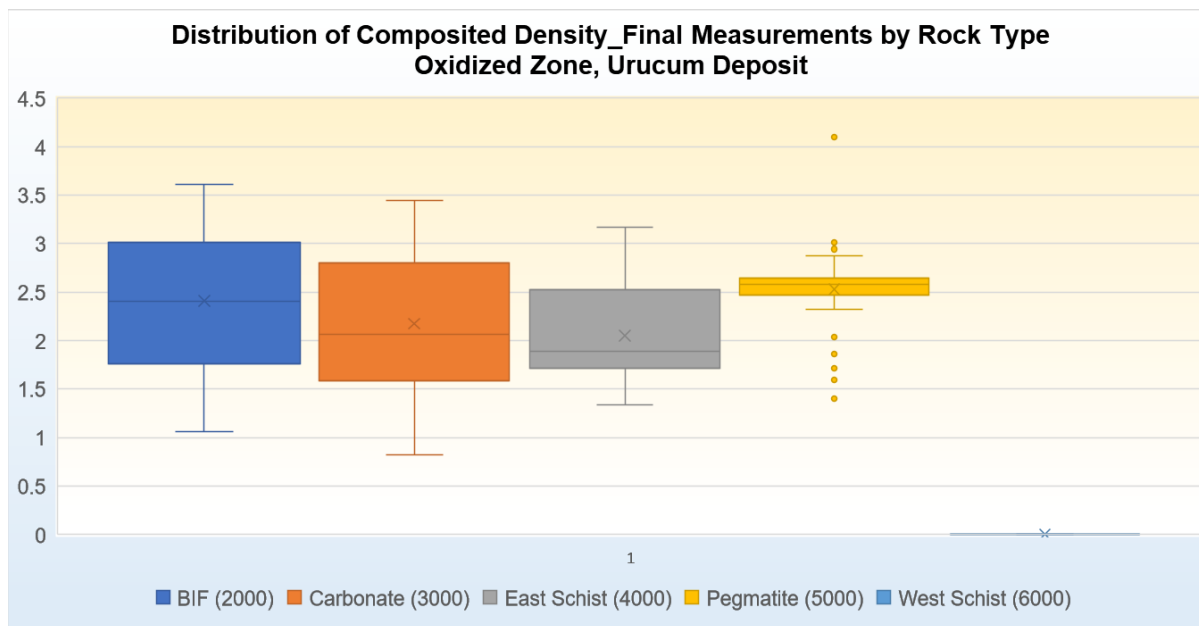
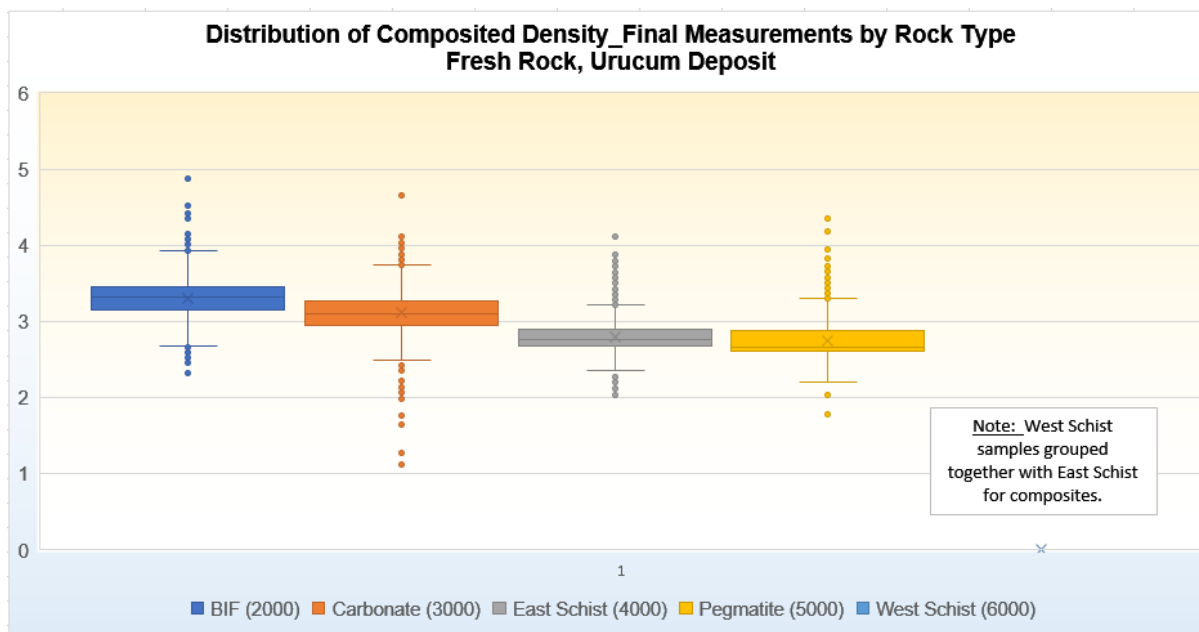


FIGURE 14-10 DISTRIBUTION OF COMPOSITED DENSITY MEASUREMENTS BY ROCK TYPE, FRESH ROCK - URUCUM DEPOSIT



TREND ANALYSIS**Grade Contouring:**

As an aid in carrying out variography studies to understand the continuity of the gold grades in the various mineralized wireframes, RPA prepared a series of traditional longitudinal projections for a selection of the mineralized wireframes present at the Urucum deposit. For this exercise, a data file was prepared that contained the average (uncapped) gold grade across the entire width of the mineralized wireframe model for each drill hole (and channel sample) that pierced the wireframe model. The resulting average grades of the collection of pierce points for any given wireframe model were then contoured using the contouring function of the GEOVIA Surpac (v. 2019, r1) software modelling package. The results of this contouring exercise are presented in Figures 14-11 through 14-14, inclusive.

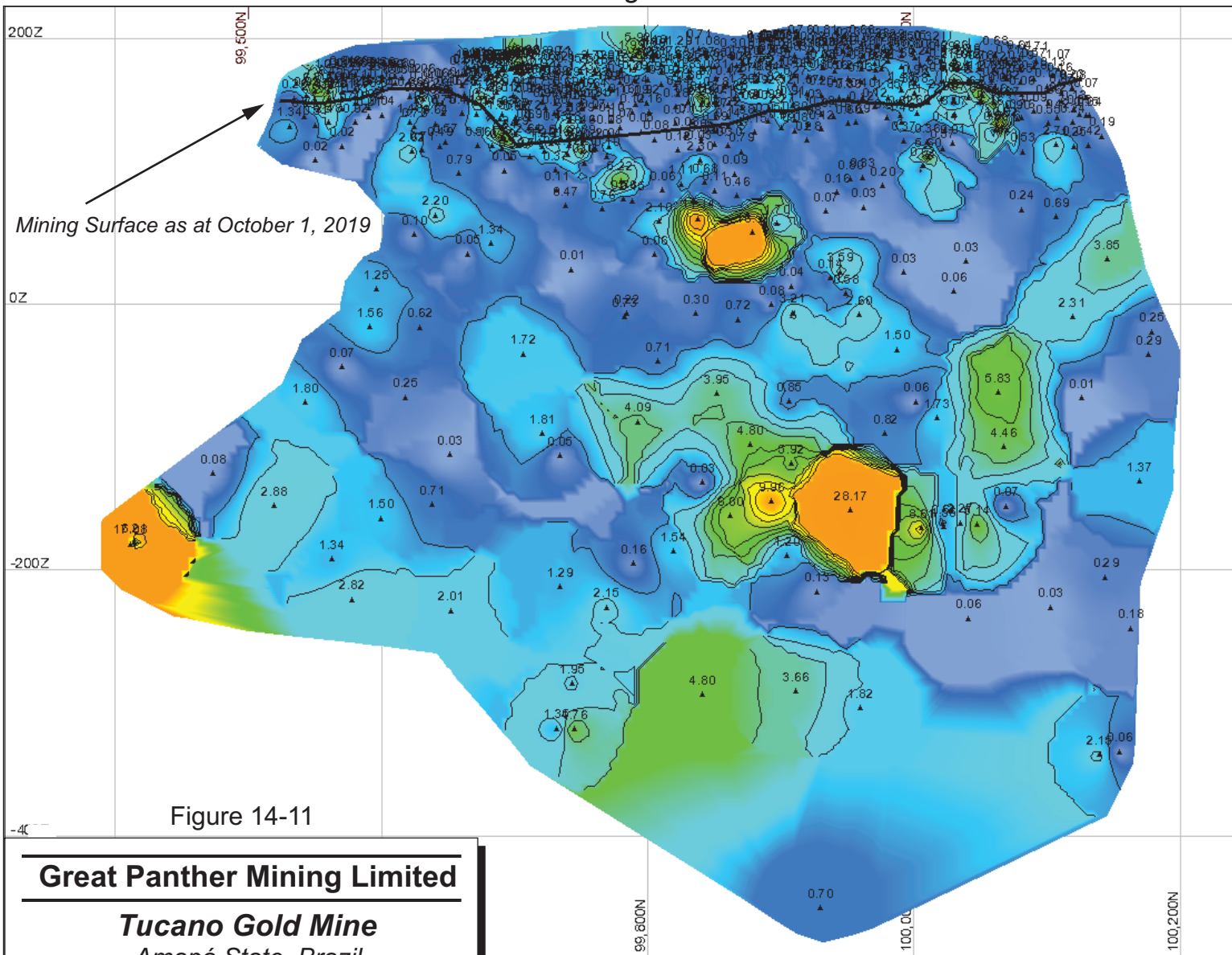
Review of the resulting contoured grade longitudinal sections for the selected lodes at the Urucum deposit suggests that, in general, the higher gold grades are situated as small pockets that are perhaps a few tens of metres in size. In places, these higher grade pockets are contained within broader, lower grade zones which exhibit shallow northerly plunges in places. Flat-lying plunges, and steep southerly plunges are also suggested on a more local scale.

A detailed review of the contoured gold grades for Lode 20 show the presence of sustained higher gold grades along a strike length of approximately 100 m to 150 m below the current mining surface. This observation is made on the basis of drill hole information at a spacing of approximately 50 m. Review of the detailed-scale grade distribution from the closely spaced grade control holes suggests the presence of moderately north dipping plunges for these higher grades.

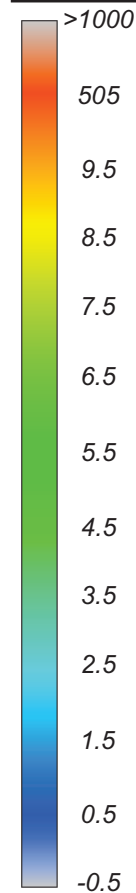
The down-plunge limits of many of the higher grade mineralized shoots at Urucum do not appear to be defined by drilling in the wireframes examined. Additional drill testing is warranted.

RPA recommends that contouring exercises be continued for the remainder of the mineralized wireframes present at the Urucum deposit as aids in conducting future variogram analyses as well as aids for developing exploration targets. These contouring exercises should examine not only the distribution of the gold grades alone, but also examine the grade times thickness product.

Looking West



Legend: (Au g/t)



▲ Drill Hole - Core

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Longitudinal Projection of
the Gold Distribution, Lode 28
- Urucum North Deposit**

March 2020

Source: RPA, 2020.

Looking West

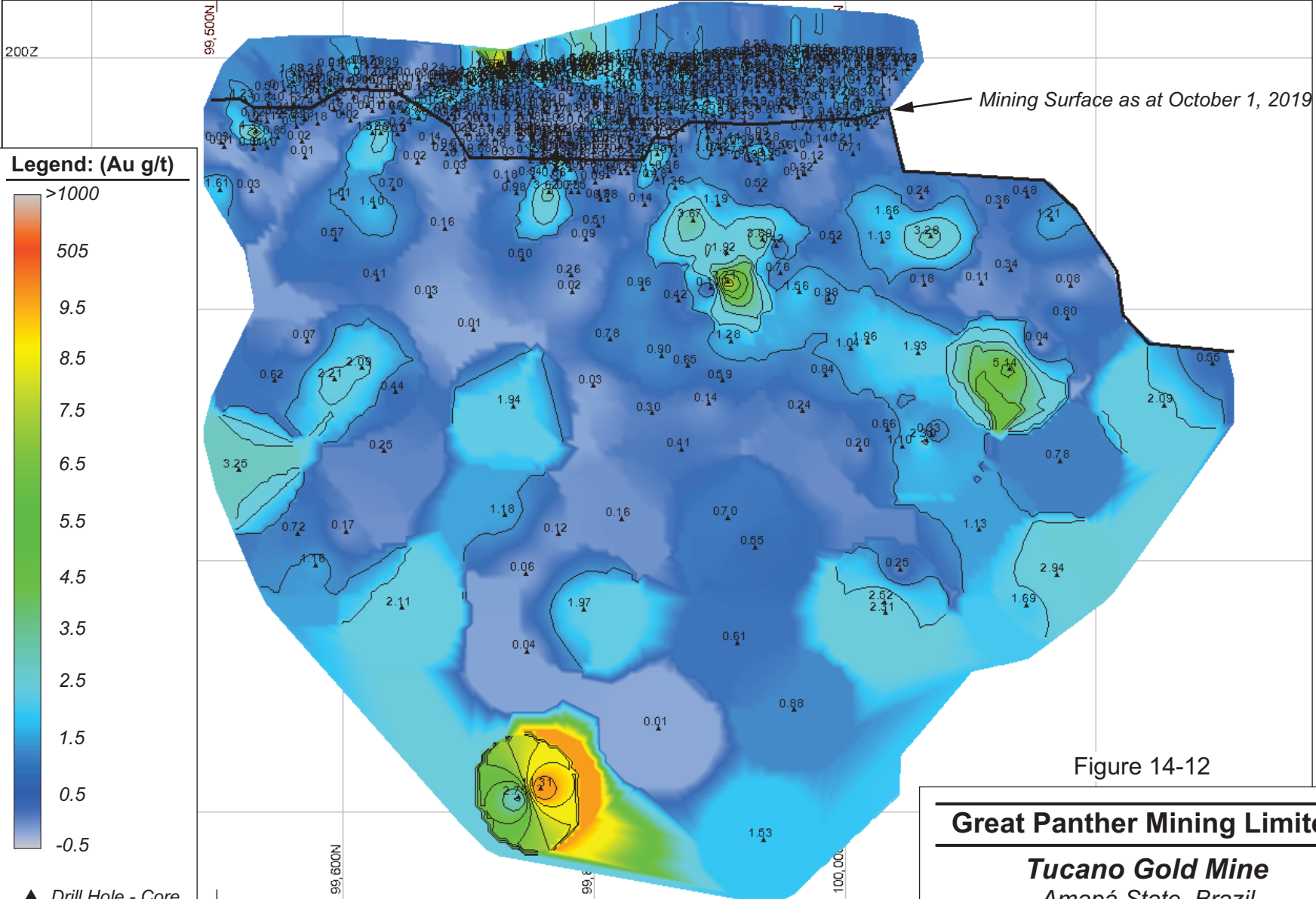


Figure 14-12

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Longitudinal Projection of
the Gold Distribution, Lode 25
- Urucum North Deposit**

March 2020

Source: RPA, 2020.

Looking West

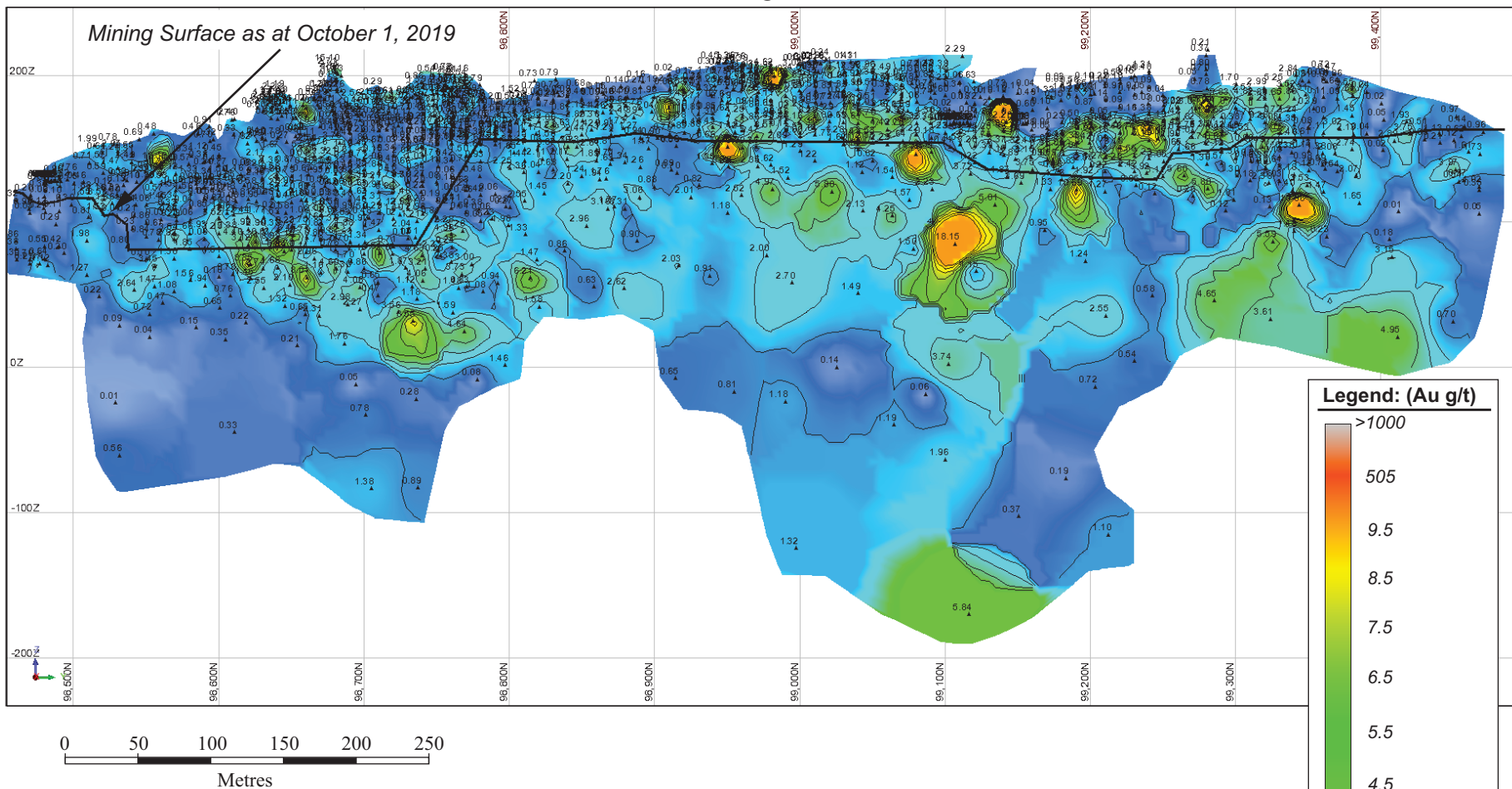


Figure 14-13

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

Longitudinal Projection of
the Gold Distribution, Lode 2
- Urucum Central Deposit

March 2020

Source: RPA, 2020.



Longitudinal Projection of the Gold Distribution, Lode 20 - Urucum Central (South) Deposit

Source: RPA, 2020.

Variography:

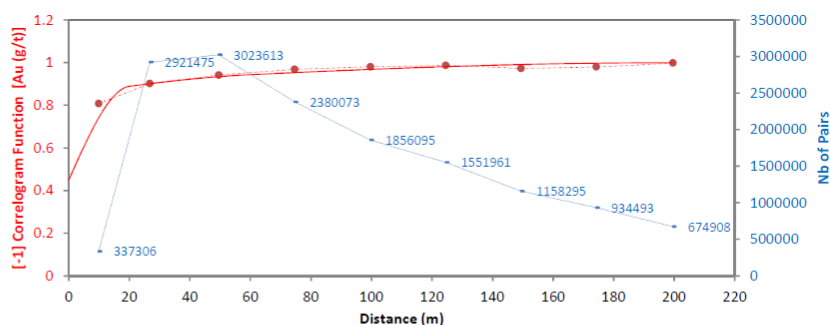
Variography studies were carried out by the Mine staff wherein the spatial continuity of the capped, composited gold grades was examined on a grouped basis for the samples contained within the mineralized wireframes for the Urucum South, Urucum Central, and Urucum North lodes. Sample correlograms are presented in Figures 14-15. A summary of the correlogram parameters derived for the Urucum lodes is presented in Table 14-7.

FIGURE 14-15 SAMPLE CORRELOGRAMS - URUCUM CENTRAL LODS

Major Vector:

Total
Tolerance on Distance = 0.5
Lag Value = 25.0m
Nb of Lags = 10
Vector Direction:
- N10W/15

Angular Tolerance = 30
Slicing Width = 12.5
Slicing Height = 12.5



Intermediate Vector (Orthogonal of Major)

Total
Tolerance on Distance = 0.5
Lag Value = 25 m
Nb of Lags = 10
Vector Direction:
- N80E/70

Angular Tolerance = 30
Slicing Width = 12.5
Slicing Height = 12.5

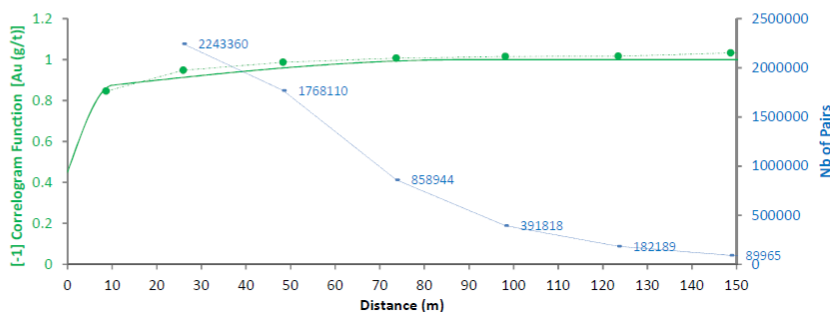


TABLE 14-7 SUMMARY OF CORRELOGRAM PARAMETERS - URUCUM CENTRAL LODS

Great Panther Mining Limited – Tucano Gold Mine

Item	S1	S2	S3
Urucum South (Nugget (C0) = 0.35)			
Type	Spherical	Spherical	Spherical
Sill	0.30	0.15	0.25
Range (m), Major (N5W/15)	10	50	350
Range (m), Intermediate (N85E/70)	10	90	90
Range (m), Minor (S85W/20)	14	14	14

Item	S1	S2	S3
Urucum Central (Nugget (C0) = 0.45)			
Type	Spherical	Spherical	Spherical
Sill	0.40	0.05	0.10
Range (m), Major (N10W/15)	20	60	200
Range (m), Intermediate (N80E/70)	10	90	90
Range (m), Minor (S80W/20)	7	24	24
Urucum North (Nugget (C0) = 0.65)			
Type	Spherical	Spherical	Spherical
Sill	0.20	0.10	0.05
Range (m), Major (N10W/15)	10	40	200
Range (m), Intermediate (N80E/70)	20	30	90
Range (m), Minor (S80W/20)	8	15	15

BLOCK MODEL CONSTRUCTION

An upright, non-rotated block model was created by Mine staff using the Datamine Studio 3 software packages with the long axis of the blocks being oriented along the strike of the mineralized wireframe models (i.e., to the north). The selected block sizes were five metres in the north-south direction (along strike) by three metres in the east-west direction (across strike), and four metres in height. The block sizes were selected so as to match with the block sizes used for the short term grade control program and daily production planning.

The block model used a whole-block approach for coding the wireframes found at the Urucum South and Urucum Central zones, but then used a partial-percentage approach for the mineralized wireframes found at the Urucum North zone. A number of attributes were also created to store such information as gold grades, distances to and the number of informing samples, domain codes, resource classification codes, and the like. The block model origins, dimensions, and attributes are provided in Table 14-8, and a list of the attributes used is provided in Table 14-9.

**TABLE 14-8 SUMMARY OF BLOCK MODEL ORIGIN AND EXTENTS
- URUCUM DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Type	Y (North)	X (East)	Z (Elev.)
Minimum Coordinates	97,800	401,500	-700
Maximum Coordinates	100,370	402,400	260
User Block Size	5	3	4
Rotation	0.000	0.000	0.000

**TABLE 14-9 SUMMARY OF BLOCK MODEL ATTRIBUTES -
URUCUM DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Attribute Name	Type	Decimals	Background Value	Description
aulp	Real	0	-1e+30	Final gold grade
box	Real	0	1	Code for deposit ID
class	Real	0	0	Mineral Resource classification
code	Real	0	0	Lode ID
densi	Real	0	-1e+30	Interpolated density
lito	Real	0	0	Lithology code
ore	Real	0	1	Wireframe flag
ore%	Real	0	0	Partial percentage for wireframe flag
oxi	Real	0	0	Oxidation state

RPA recommends that future updates to the Urucum long term Mineral Resource block models use common origins with the short term grade control block models.

SEARCH STRATEGY AND GRADE INTERPOLATION PARAMETERS

The search strategies used to estimate the gold grades into the block model are summarized in Table 14-10. The orientation and anisotropy ratios for the search strategies were slightly modified from those suggested from the variography study. Gold grades were estimated for each mineralized wireframe individually using the Nearest Neighbour (NN), Ordinary Kriging (OK), (ID²), and Inverse Distance (Power 3) (ID³) interpolation algorithms using the Datamine Studio 3 software package.

A multiple-pass estimation strategy was applied using “hard” domain boundaries for both selection of composite samples for grade estimation as well as “hard” block model boundaries to control which blocks receive estimated gold grades. Only data contained within the respective mineralized wireframes were used to estimate the gold grades, and only those blocks within the respective mineralized wireframes were allowed to receive grade estimates. Only the capped, composited grades were used to estimate the grades.

The gold grades estimated using the OK interpolation algorithm were selected for preparation of the Mineral Resource estimate. The gold grades estimated by OK for any blocks lying within the pegmatite unit were reduced to zero. These were then transferred to the Au_LP attribute which was then used for reporting of the Mineral Resources.

**TABLE 14-10 SUMMARY OF SEARCH STRATEGY AND
INTERPOLATION PARAMETERS - URUCUM DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Item	Urucum South	Urucum Central	Urucum North
Boundary conditions- data	Hard	Hard	Hard
Boundary conditions- blocks	Hard	Hard	Hard
Search ellipse orientation	Azimuth 355°, dip 70°E, Plunge 15°N	Azimuth 350°, dip 70°E, Plunge 15°N	Azimuth 350°, dip 70°E, Plunge 15°N
Estimation Pass1	Search Radius 50x40x8; Maximum 4 samples per hole; Minimum 9 samples (Means Minimum 3 drill holes); Maximum 32 Samples; Four Sectors (Quadrant)	Search Radius 30x40x6; Maximum 4 samples per hole; Minimum 9 samples (Means Minimum 3 drill holes); Maximum 32 Samples; Four Sectors (Quadrant)	Search Radius 50x40x8; Maximum 4 samples per hole; Minimum 9 samples (Means Minimum 3 drill holes); Maximum 32 Samples; Four Sectors (Quadrant)
Estimation Pass2	Search Radius 90x80x12; Maximum 4 samples per hole; Minimum 5 samples (Means Minimum 2 drill holes); Maximum 32 Samples; Four Sectors (Quadrant)	Search Radius 60x60x12; Maximum 4 samples per hole; Minimum 5 samples (Means Minimum 2 drill holes); Maximum 32 Samples; Four Sectors (Quadrant)	Search Radius 90x80x12; Maximum 4 samples per hole; Minimum 5 samples (Means Minimum 2 drill holes); Maximum 32 Samples; Four Sectors (Quadrant)
Estimation Pass3	Populate remaining blocks - Search Radius 1500x1500x100	Populate remaining blocks - Search Radius 1500x1500x100	Populate remaining blocks - Search Radius 1500x1500x100

For mine planning purposes, gold grades were also estimated for those volumes for which drill hole and sample information were available and that resided beyond the limits of the mineralized wireframes. The grades for these areas were estimated using composites of the capped gold grades, an isotropic search ellipse, and using the ID³ interpolation algorithm. For clarity, these gold grades were estimated for mine planning purposes only and were not considered in any estimates of the Mineral Resources.

CLASSIFICATION CRITERIA

Definitions for resource categories used in this Technical Report are consistent with those defined by CIM (2014) and adopted by NI 43-101. The estimated blocks within the mineralized wireframes were assigned an initial classification according to the criteria presented in Table 14-11. These initial classifications were then modified via a post-processing function which

used a moving average radius of 15 m x 25 m x 1,000 m to arrive at a final, smoothed classification.

**TABLE 14-11 SUMMARY OF INITIAL CLASSIFICATION CRITERIA -
URUCUM DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Item	Measured	Indicated	Inferred
Urucum South			
Pass No., and	1	2	3
Slope of Regression	0.9	None	None
Urucum Central			
Pass No., and	1	2	3
Slope of Regression	0.9	0.1	None
Urucum North			
Pass No., and	1	2	3
Minimum number of neighbours	13	None	None

BLOCK MODEL VALIDATION

Validation of the results of the long term Mineral Resource block model included visual comparisons, evaluation of the accuracy of the block model coding and global accuracy of the estimated grades, evaluation of the local accuracy by preparation of swath plots, and reconciliation with the short term grade control block model.

Visual Comparisons:

Visual comparisons between the contoured and estimated gold grades were conducted for selected mineralized wireframes of the various lodes at the Urucum deposit (Figures 14-16 to 14-19, inclusive). It can be seen that, while a general agreement is present between the distribution of the estimated gold grades and the contoured drill hole grades for those portions within the Mineral Resource pit surface, differences are present at the local scale. These differences will contribute to increased variances when reconciliation studies are performed between the long term Mineral Resource model and the short term grade control model. RPA believes that the choice of input parameters for the search strategies are contributing to the “smoothing” effect observed in the estimated gold grades. Additional drill hole information will be of great assistance in reducing the variances between the long term Mineral Resource model and the short term grade control model.

RPA recommends that future long term block models for the Urucum deposit be prepared using more stringent search strategies that are designed to improve the accuracy of the estimated grades at the local level.

Global Estimate:

The accuracy of the global estimate of the gold grades was examined by comparison of the average gold grades for each mineralized wireframe with the corresponding capped composite grades (Table 14-12). A cross check of the volumes of each of the mineralized wireframes with those coded in the block model was also completed.

Examination of the differences between the wireframe volumes and the block model codes shows that the block volumes are in reasonable agreement with the mineralized wireframes. Higher variances are observed for the Urucum North zone, which are believed to be due to the selected method of partial percentage and the accompanying workflow for coding of the block model.

RPA recommends that future updates to the Urucum long term Mineral Resource block models be carried out using a sub-blocked block model framework so that the volumes and grades of the mineralized wireframed can be easily modelled with a high degree of accuracy.

Examination of the differences in grade shows that while significant variances are present on an individual wireframe basis, overall the estimated grades are in good agreement with the informing samples. RPA believes that the “smoothing” effect discussed above is a contributing factor to the observed variances.

Looking West

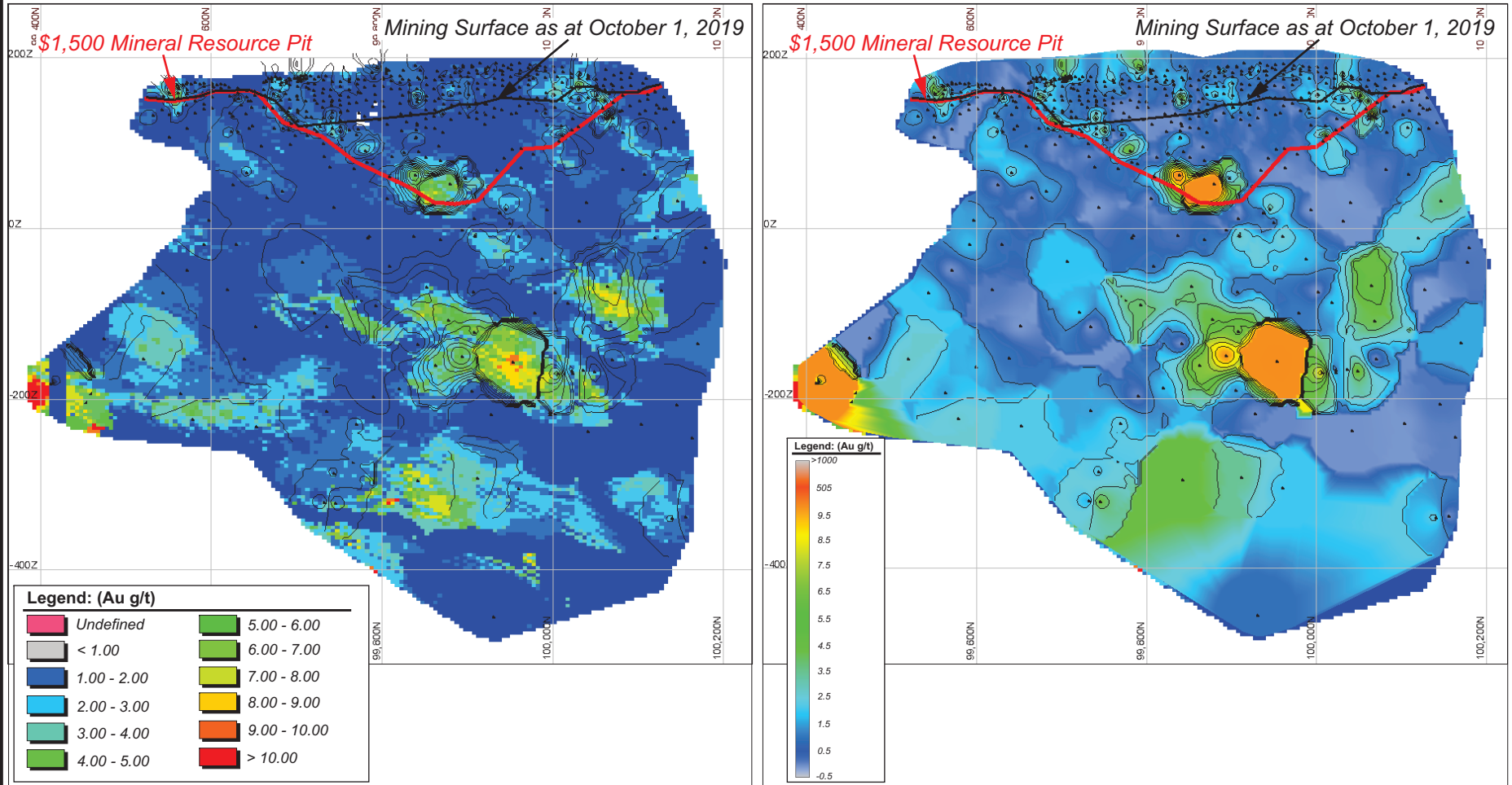


Figure 14-16

Great Panther Mining Limited

*Tucano Gold Mine**Amapá State, Brazil*

Comparison of Contoured vs
Estimated Gold Grades - Lode 28,
Urucum North Deposit

Legend:

▲ Drill Hole - Core

0 100 200 300 400
Metres

March 2020

Source: RPA, 2020.

Looking West

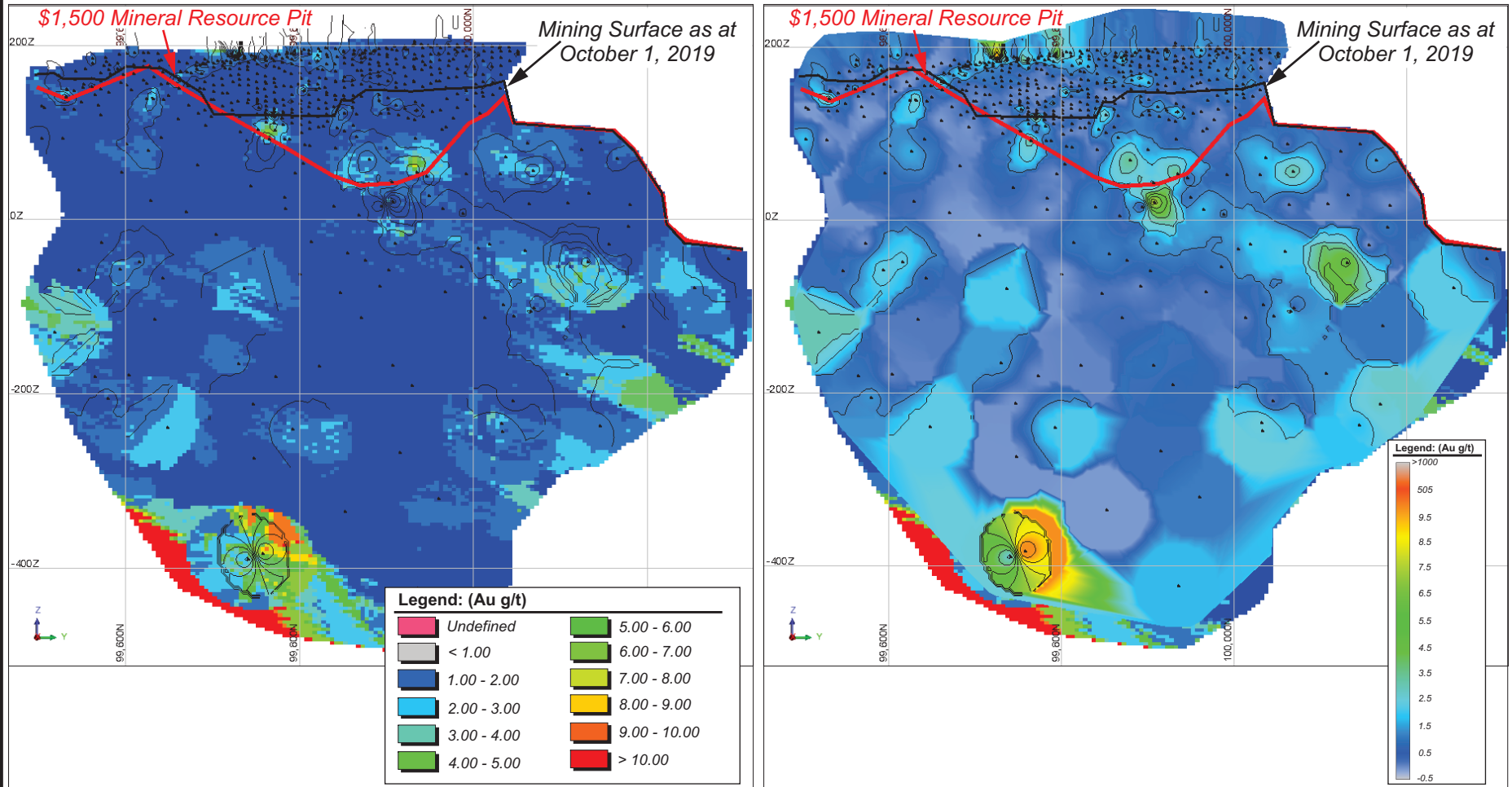
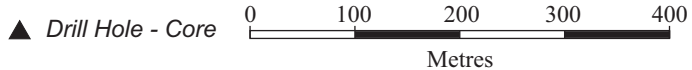


Figure 14-17

Legend:**Great Panther Mining Limited*****Tucano Gold Mine****Amapá State, Brazil*

**Comparison of Contoured vs
Estimated Gold Grades - Lode 25,
Urucum North Deposit**

March 2020

Source: RPA, 2020.



Looking West

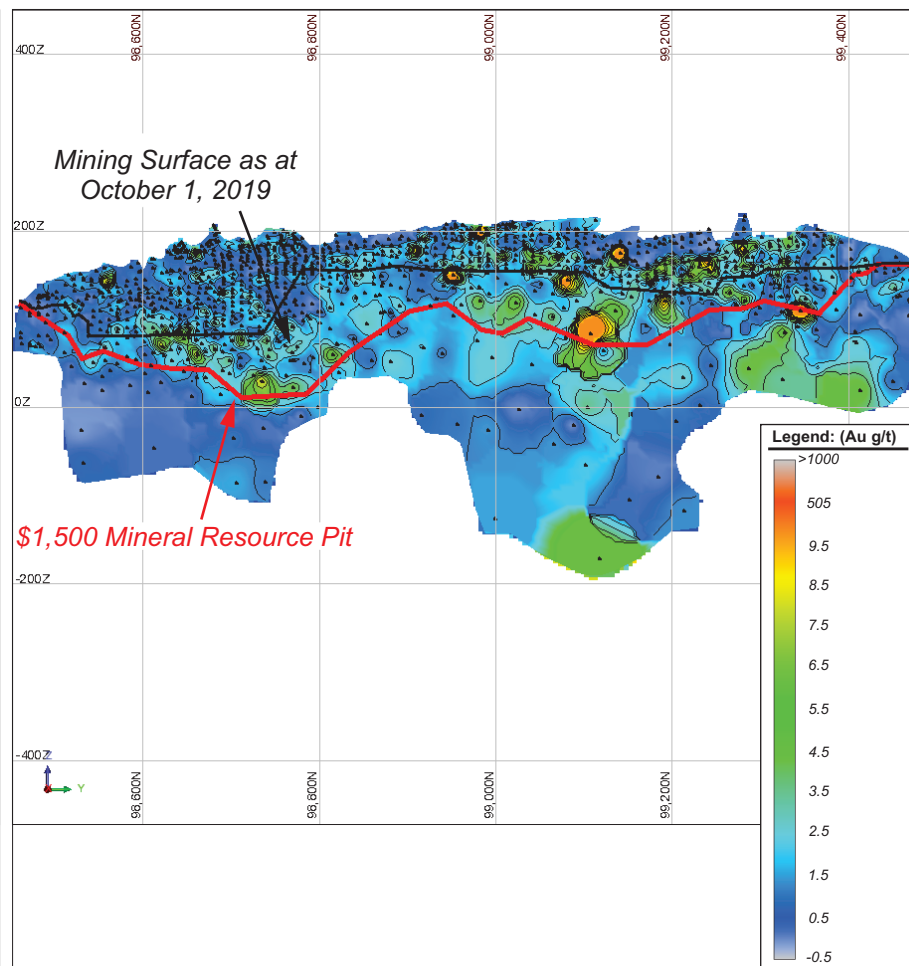
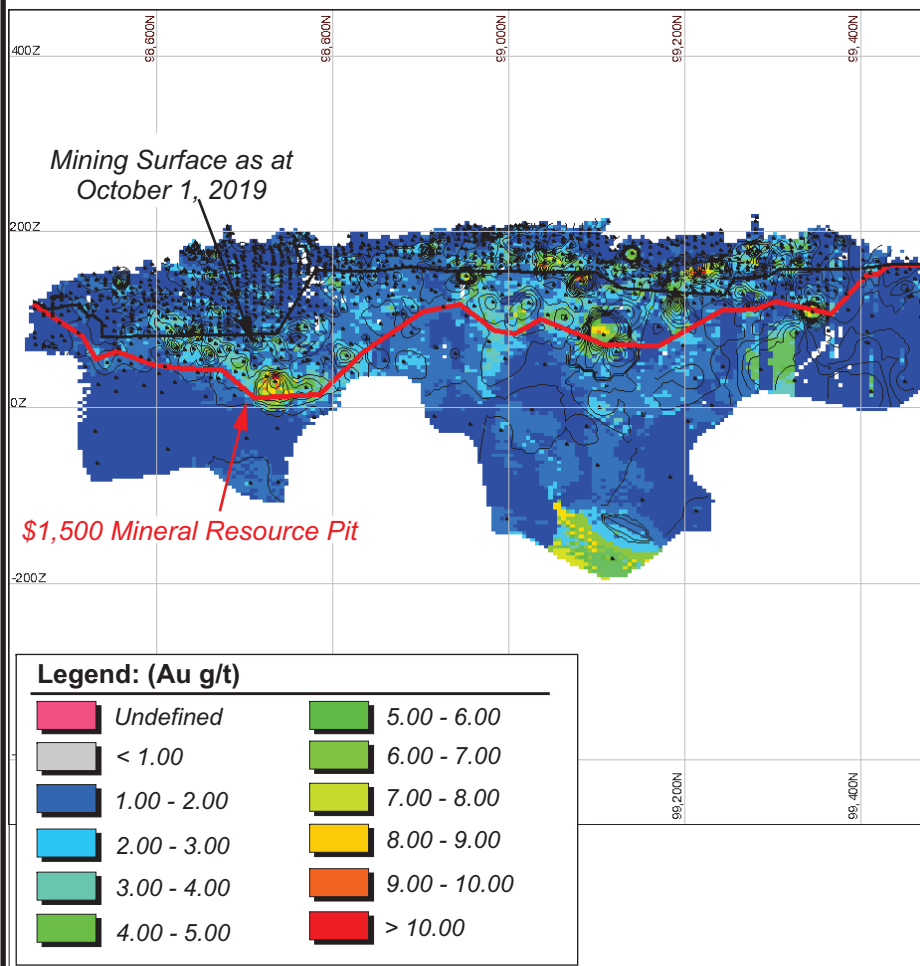
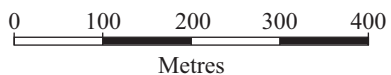


Figure 14-19

Legend:

▲ Drill Hole - Core



Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

Comparison of Contoured vs
Estimated Gold Grades - Lode 2,
Urucum Central Deposit

**TABLE 14-12 COMPARISON OF COMPOSITE AVERAGE GRADES
WITH BLOCK ESTIMATES - URUCUM DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Lode ID	Block Model Report			Wireframes			Composites		
	Volume (m³)	Tonnes	Grade (g/t Au)	Volume	Difference (BM-Wf)	% difference	Average Grade (g/t Au)	Difference (BM-Comp)	% Difference
Urucum Central (Whole Blocks)									
1	1,277,880	3,918,371	1.20	1,282,643	- 4,763	0%	1.36	-0.19	-12%
2	1,485,840	4,608,614	1.52	1,496,733	- 10,893	-1%	1.7	-0.19	-11%
3	6,480	16,334	0.66	6,649	- 169	-3%	0.72	-0.06	-9%
6	71,460	174,163	1.09	74,416	- 2,956	-4%	1.64	-0.56	-34%
7	54,420	161,462	1.53	55,174	- 754	-1%	1.77	-0.24	-14%
8	9,060	27,174	0.71	9,887	- 827	-8%	0.6	0.11	19%
11	10,800	33,727	2.96	11,210	- 410	-4%	2.93	0.03	1%
12	42,720	119,782	0.58	43,550	- 830	-2%	0.76	-0.18	-23%
13	38,340	123,192	0.56	39,560	- 1,220	-3%	0.59	-0.04	-6%
14	4,980	16,130	0.43	5,479	- 499	-9%	0.53	-0.10	-19%
15	3,300	11,332	1.16	3,262	38	1%	1.1	0.06	6%
18	21,240	67,413	0.94	21,980	- 740	-3%	1.04	-0.10	-10%
19	4,800	13,393	0.92	4,921	- 121	-2%	1.03	-0.11	-10%
20	809,640	2,520,053	2.19	817,221	- 7,581	-1%	1.94	0.25	13%
21	42,960	120,973	0.40	43,182	- 222	-1%	0.48	-0.08	-16%
Urucum North (Partial Percentage)									
22	1,721,439	5,434,661	1.15	1,895,220	- 173,781	-9%	1.45	-0.30	-21%
23	929,747	2,927,112	0.90	1,016,440	- 86,693	-9%	1.04	-0.14	-13%
24	935,843	2,817,236	0.67	1,130,870	- 195,027	-17%	0.82	-0.16	-19%
25	2,415,520	7,576,337	1.38	2,539,389	- 123,869	-5%	0.92	0.46	50%
27	863,407	2,610,695	0.73	874,652	- 11,245	-1%	0.84	-0.11	-13%
28	2,153,458	6,707,663	1.57	2,241,193	- 87,735	-4%	1.37	0.20	15%
29	1,372,348	4,078,599	0.69	1,378,925	- 6,577	0%	0.66	0.03	4%
Urucum South (Whole Blocks)									
31	377,700	1,201,680	1.36	380,119	- 2,419	-1%	2.55	-1.20	-47%
32	115,920	369,916	1.07	114,466	1,454	1%	1.2	-0.14	-11%
33	91,140	238,337	0.68	92,126	- 986	-1%	1.12	-0.44	-39%
34	53,520	173,936	0.95	54,321	- 801	-1%	1.29	-0.34	-26%
36	22,020	47,923	1.06	19,896	2,124	11%	1.07	-0.01	-1%
37	4,440	9,023	0.91	4,451	- 11	0%	0.9	0.01	1%
39	27,060	87,994	1.40	27,034	26	0%	1.58	-0.18	-12%
40	34,920	79,381	0.63	34,396	524	2%	0.73	-0.10	-14%
41	6,000	19,130	0.88	5,812	188	3%	1.1	-0.22	-20%
42	82,320	255,747	0.70	81,472	848	1%	1.12	-0.42	-38%
Total	15,090,722	46,567,480	1.23	15,806,649	- 715,927	-5%	1.24	-0.01	-1%

Swath Plots:

Swath plots in section and plan (i.e., bench) views were prepared for selected lodes in which the average capped, composited assays were compared with the average of the estimated block grades (Figures 14-20 to 14-23, inclusive). Examination of these plots suggests that good agreement is present between the estimated grades and the informing samples for those portions of the block model containing a high density of drilling and sampling information. Higher variances are observed in areas where the density of sample information is reduced. A degree of smoothing is also observed.

Reconciliation to Short Term Grade Control Block Model:

Attempts were made to compare the results of the long term Mineral Resource model with the data contained within the short term grade control model for the Urucum deposit. Unfortunately, these efforts were not successful in generating meaningful reports due to variances in the workflows and estimation parameters used to prepare the two different block models.

RPA recommends that efforts be undertaken to ensure that the estimation parameters and workflows be harmonized between the long term Mineral Resource block model and the short term grade control block model for the Urucum deposit.

Conclusion:

On the basis of its review and validation activities, RPA is of the opinion that the long term Mineral Resource block model for the Urucum deposit is sufficiently acceptable for use in preparing Mineral Resource estimates.

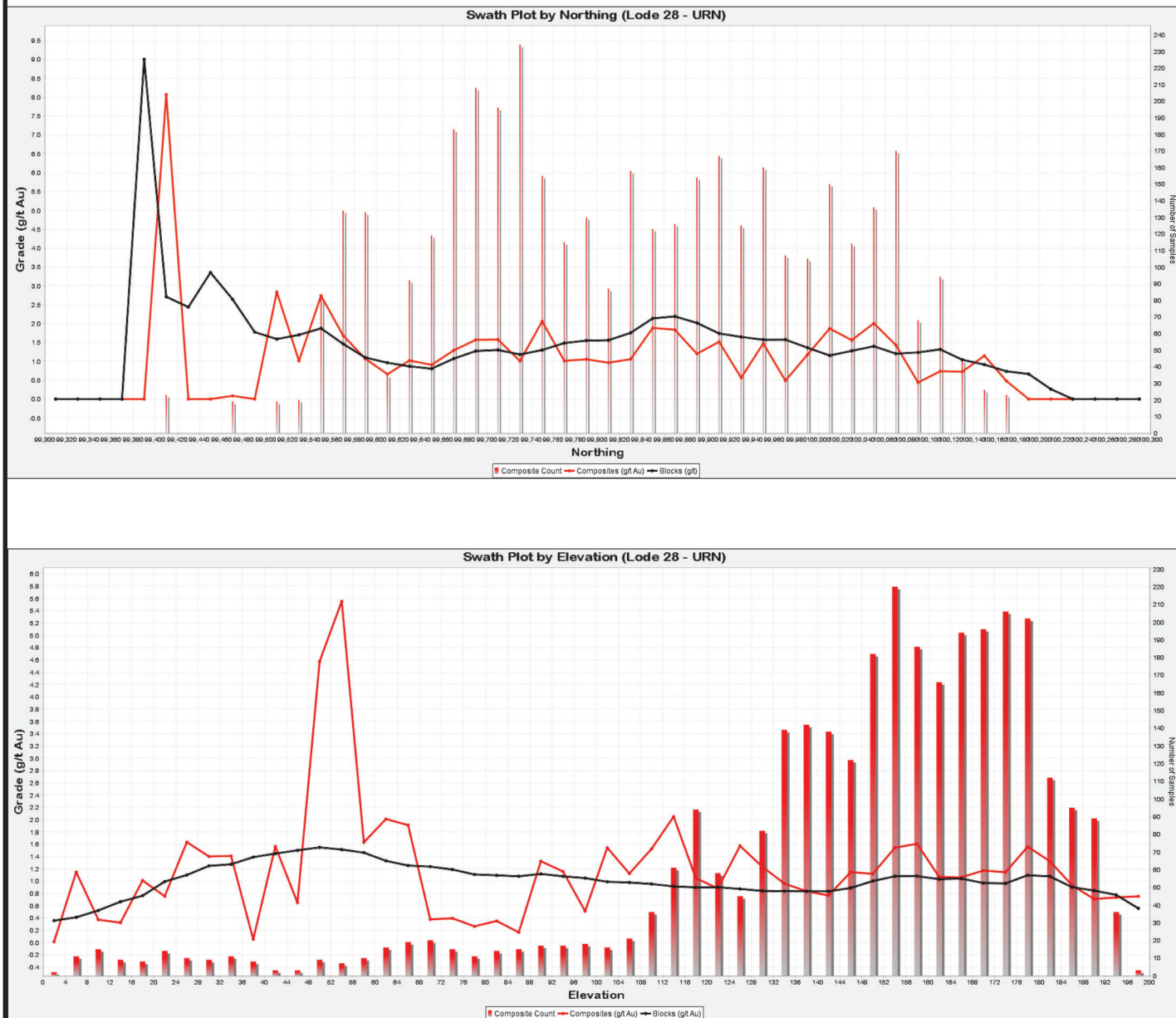


Figure 14-20

Great Panther Mining Limited

Tucano Gold Mine
Amapá State, Brazil

**Swath Plots - Lode 28,
Urucum North Deposit**

March 2020

Source: RPA, 2020.

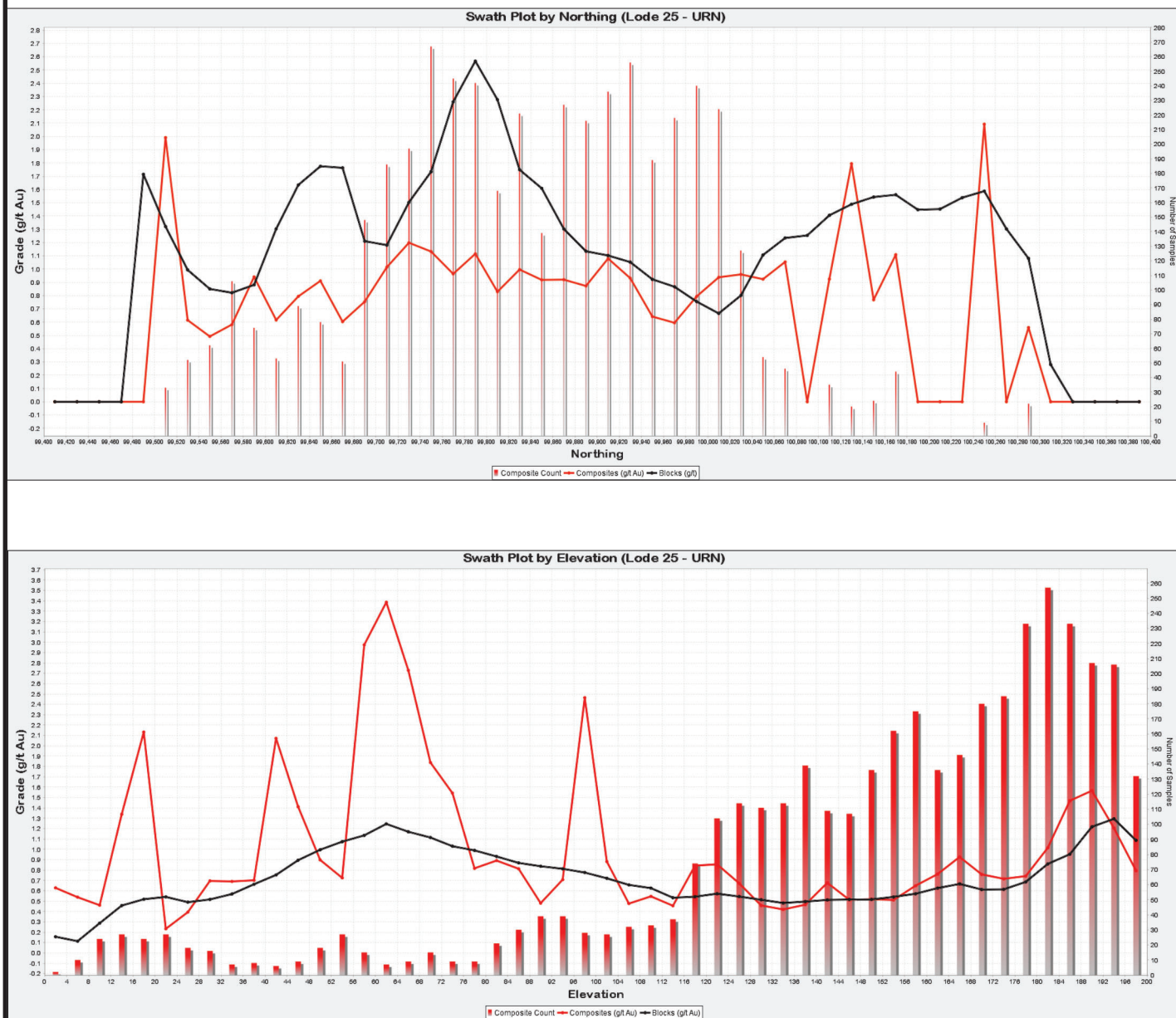


Figure 14-21

Legend:

- Number of Samples
- Block Grades (g/t Au)
- Composites (g/t Au)

Great Panther Mining Limited

Tucano Gold Mine
Amapá State, Brazil

**Swath Plots - Lode 25,
Urucum North Deposit**

March 2020

Source: RPA, 2020.

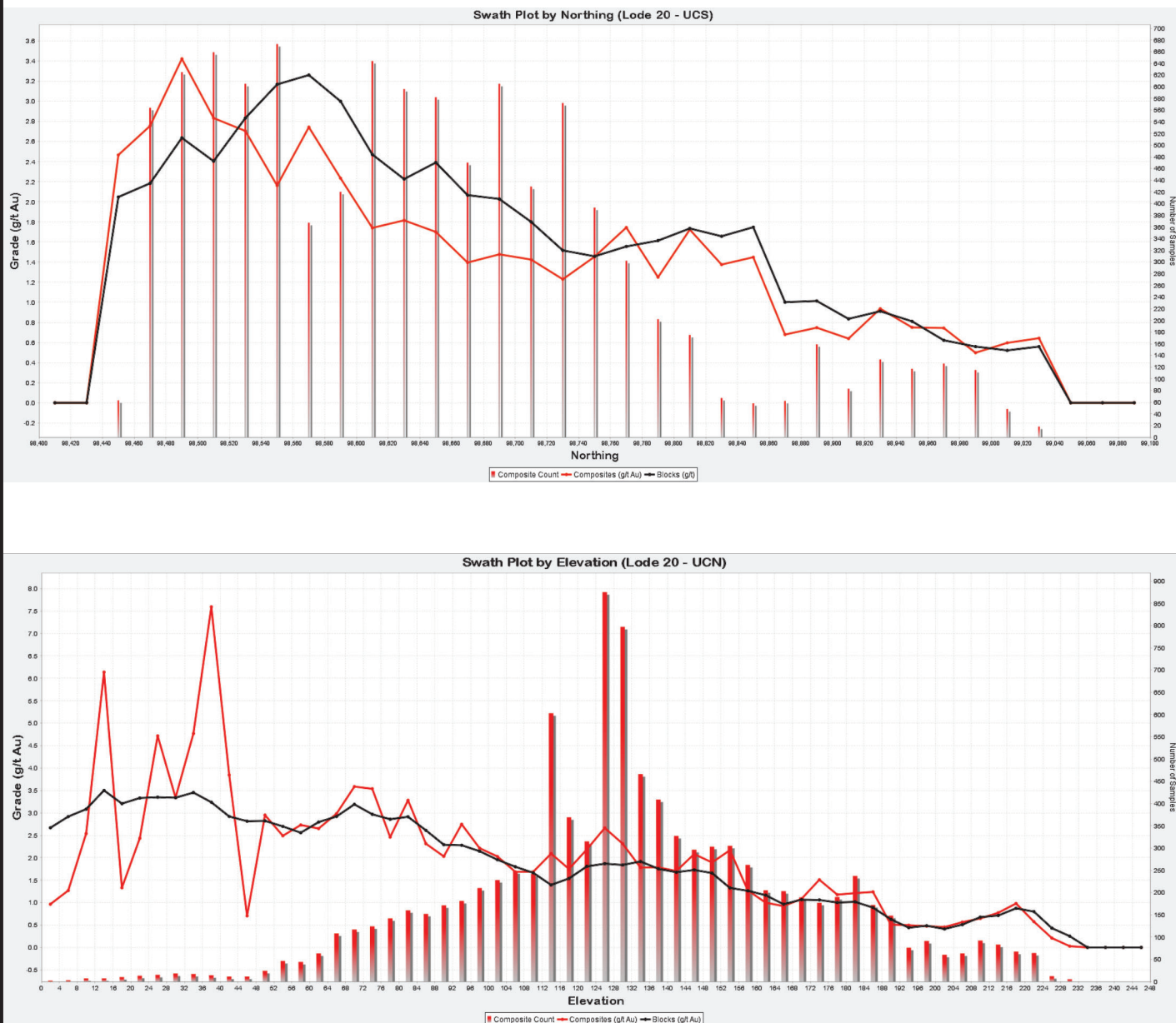
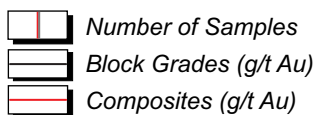


Figure 14-22

Legend:



Great Panther Mining Limited

Tucano Gold Mine
Amapá State, Brazil

**Swath Plots - Lode 20,
Urucum Central Deposit**

March 2020

Source: RPA, 2020.

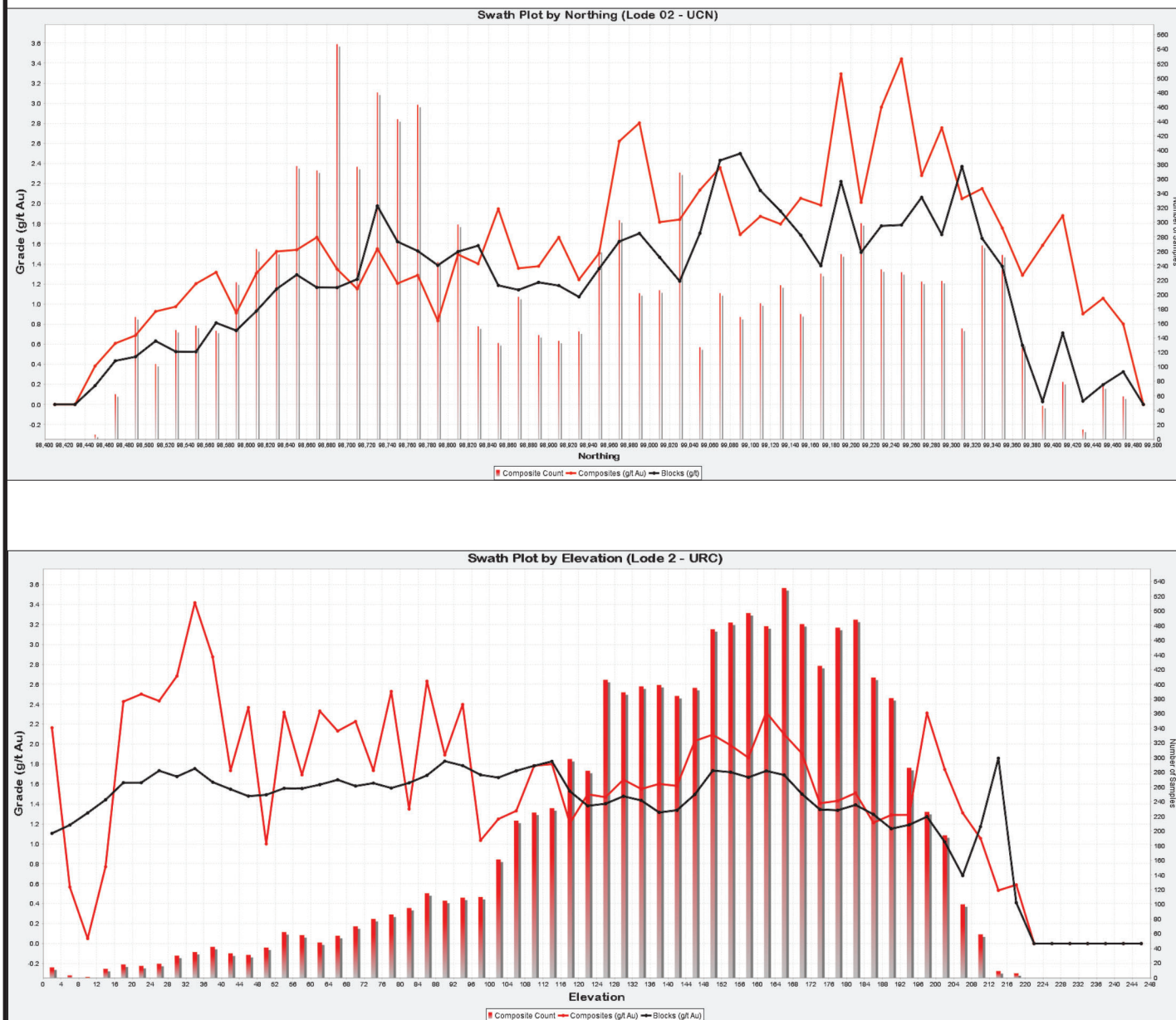


Figure 14-23

Legend:

- Number of Samples
- Block Grades (g/t Au)
- Composites (g/t Au)

Great Panther Mining Limited

Tucano Gold Mine
Amapá State, Brazil

**Swath Plots - Lode 2,
Urucum Central Deposit**

March 2020

Source: RPA, 2020.

CUT-OFF GRADE AND WHITTLE PARAMETERS

Metal prices used for Mineral Reserves are based on consensus, long term forecasts from banks, financial institutions, and other sources. For Mineral Resources, metal prices used are slightly higher than those for Mineral Reserves.

A preliminary pit shell was generated using the Lerchs-Grossman optimization method as a constraint in the preparation of the Mineral Resource estimate report. The input parameters are presented in Table 14-13.

The sensitivity of the resulting pit shell to variations in the gold price was also investigated for the US\$1,600/oz Au and US\$1,700/oz Au cases (Table 14-14). It is important to note that the tonnage and grades presented in the sensitivity reports are provided solely for the purposes of estimating the impact of different metal prices. These tonnages and grades are provided on an unclassified basis only and are not to be construed as estimates of the Mineral Resources.

**TABLE 14-13 SUMMARY OF MINERAL RESOURCE PIT SHELL
INPUT PARAMETERS - URUCUM DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Parameter	Value
Gold Price (Base Case)	US\$1,500/oz Au
Exchange Rate	US\$1:R\$3.8
Mining Cost	
- oxide	\$3.23 /tonne
- fresh rock	\$3.58 /tonne
Processing Cost	
- oxide	\$11.93 /tonne
- fresh rock	\$18.33 /tonne
General and Administration Cost	\$6.15 /tonne
Gold Recovery	93%
Pit Discard Cut-off Grade	
- oxide	0.40 g/t Au
- fresh rock	0.55 g/t Au
Overall wall slope angle	
- oxide	34° - 42°
- fresh	48° - 53°

TABLE 14-14 SENSITIVITY ANALYSIS - URUCUM DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine

Gold Price (US\$/oz Au)	Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)
1,500	4,376	2.08	293
1,600	4,676	2.04	307
1,700	5,070	2.02	329

MINERAL RESOURCE STATEMENT

The Mineral Resources are inclusive of Mineral Reserves. The Mineral Resources are reported for the open pit component of the Urucum deposit using excavation surfaces current as of September 30, 2019. A block cut-off grade of 0.55 g/t Au was used to report the fresh rock Mineral Resources and a block cut-off grade of 0.40 g/t Au was used to report the oxide Mineral Resources (Table 14-15).

TABLE 14-15 SUMMARY OF THE OPEN PIT MINERAL RESOURCES
AS OF SEPTEMBER 30, 2019 - URUCUM DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine

Category	Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)
Measured	1,775	1.76	100
Indicated	2,589	2.30	191
Sub-total, Measured and Indicated	4,364	2.08	291
Inferred	7	3.94	1

Notes:

1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources for the Urucum Open Pit are estimated using drill hole and sample data as of September 30, 2019.
3. Mineral Resources are estimated at a cut-off grade of 0.40 g/t Au for oxidized material and 0.55 g/t Au for fresh rock.
4. Mineral Resources are estimated using a long term gold price of US\$1,500/oz Au and a US\$/R\$ exchange rate of 1:3.8.
5. A minimum width of 3 m was used for preparation of mineralization wireframes.
6. High gold assays were capped to 12 g/t Au for the Urucum South deposit and 20 g/t Au for the Urucum Central deposit, and 15 g/t Au for the Urucum North deposit.
7. Gold grades estimated using the Ordinary Kriging interpolation algorithm were used to prepare the Mineral Resource statements.
8. Mineral Resource statements are prepared using constraining surfaces for open pit Mineral Resources.
9. Mineral Resources, that are not Mineral Reserves do not have demonstrated economic viability.
10. Numbers may not add due to rounding.

Tucano is a currently operating, fully permitted mining and processing operation. Consequently, RPA is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral

Resource estimate. Changes in the commodity prices, operating costs, or metallurgical recoveries could have commensurate impacts upon the Mineral Resource estimates.

UNDERGROUND GENERAL STATEMENT

The underground portion of the Urucum model was subdivided into Urucum North (URN) and Urucum Central, with a geographic divisor at 99,400 mN. The Urucum underground resource covers a strike length of approximately 800 m. The lodes form continuous subparallel, steeply dipping, shallow plunging high grade shoots hosted within BIF. The geometry and plunge of the shoots are interpreted to be controlled by gently plunging F2 fold hinges and steeply dipping fault intersections.

RPA reviewed the Urucum North underground model that included data current to November 2, 2015 and was reported in the 2018 Technical Report prepared for Great Panther by AMC Consultants Pty Ltd. (AMC). RPA reported resources in the underground portion of the Urucum Central deposit from the model described above in the open pit section, using drill hole and sample data as of September 30, 2019.

URUCUM NORTH UNDERGROUND

RPA reviewed the parameters, workflows, and results used to prepare the block model used to report the 2017 underground Mineral Resources at Urucum North underground which was estimated by AMC and included data current to November 2, 2015. Overall, these were judged to be adequate for preparing updated statements of the updated Mineral Resource. Drilling completed since the previous Technical Report was reviewed and, in RPA's opinion, does not materially impact the Mineral Resource estimate.

RPA made several modifications to the resource estimate, including the use of a constraining surface resource pit shell to report open pit resources. Underground resources are reported below the pit surface at a higher cut-off grade. In order to ensure that the underground component has sufficient spatial continuity, RPA constructed underground shapes that were based on a cut-off grade of 1.60 g/t Au and reported all blocks within these shapes as underground Mineral Resources.

TOPOGRAPHY AND EXCAVATION MODELS

A digital copy of the as-mined topographic surface was provided to RPA for the Urucum deposit that was current as of September 30, 2019 (Figure 14-1). The cut-off date for the drill hole database is September 30, 2019.

MINERAL RESOURCE DATABASE

The drill hole database includes 5,674 holes with assays from auger, channel, trench, diamond, RAB, and RC holes. Table 14-16 summarizes the subset of 5,227 holes that intersect the mineralized domains at Urucum North, and Table 14-17 summarizes only those drill holes that intersect the mineralized domains in the underground portion of the deposit.

**TABLE 14-16 SUMMARY OF THE MINERAL RESOURCE DATABASE –
URUCUM NORTH DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Drill Hole Type	Count	Metres
DDH	133	45,088
RC	30	2,716
Channel	7	102
RAB	84	688
Auger	7	43
Total	261	48,637

**TABLE 14-17 SUMMARY OF THE UNDERGROUND PORTION OF THE
MINERAL RESOURCE DATABASE – URUCUM NORTH DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Drill Hole Type	Count	Metres
DDH	114	43,083
RC	11	1,207
Channel	2	71
RAB	-	-
Auger	2	13
Total	129	44,374

RPA conducted several checks on the resource database, including a search for unique, missing, and overlapping intervals; a total depth comparison, duplicate holes, property boundary limits, and a visual search for extreme or deviant survey values.

The resource database is considered by RPA to be sufficiently reliable for grade modelling and Mineral Resource estimation.

LITHOLOGY MODEL

The lithology model is shown in Figure 14-2 and is described in the open pit section of the Urucum deposit.

MINERALIZATION MODELS

Twenty-four mineralized lodes at Urucum North were constructed using a 0.3 g/t Au nominal cut-off, and typically extended 20 m between sections and up to 40 m beyond the last drill hole intersection. No minimum thickness was used for modelling, and lodes may be less than one metre in thickness at depth.

RPA recommends that a minimum mining thickness be used when modelling mineralized domains and that wireframes be snapped to assays.

EXPLORATORY DATA ANALYSIS

AMC calculated statistics for raw assay data by lode domain. RPA reviewed the assay statistics and concludes that it accurately summarizes the data.

COMPOSITING

AMC created one metre downhole composites inside the mineralized domains beginning at the upper contacts and flagged by domain code. If the remaining length was greater than or equal to 0.50 m, the composite was accepted as part of the dataset; if the remaining length was less than 0.50 m, the composite was not included. A total of 3,440 composites were created within the mineralized domains and used for resource estimation.

In RPA's opinion, a composite length of one metre is appropriate at Urucum North. RPA conducted a check on assays and composites within the Urucum North wireframe models and the results were reasonably consistent with data included in the previous Technical Report.

CAPPING HIGH GRADE VALUES

AMC opted to cap high grade assay data after compositing. Each mineralized domain was reviewed for outliers using logarithmic histograms and probability plots. Grade capping was established within the 98th and 100th percentile of the grade distribution curve, and in domains with fewer than 100 composite samples, no grade capping was applied. In domains with uncapped composites, AMC controlled the influence of high grade samples by applying more restrictive ranges during grade interpolations as described below.

RPA reviewed the statistical distribution of the original assay and composite data by plotting histograms and log scale probability plots. In RPA's opinion, the capping values used by AMC on composite samples is acceptable. RPA recommends, however, that capping values be applied to assays prior to compositing.

BULK DENSITY

Bulk density measurements were assigned to a lithological unit and interpolated into the block model using the NN method. A total of 19,754 samples, most within fresh rock, were available.

In RPA's opinion, the average bulk density values of the lithological units at Urucum North appear reasonable.

VARIOGRAPHY AND INTERPOLATION PARAMETERS

AMC grouped all the resource domains together to review the spatial variability at Urucum North: most lodes have too few samples to generate a robust model. Semi-variograms were developed using the one metre capped composite Au samples. The variogram is aligned with the strike and dip of the lodes with ranges of 130 m (major) by 120 m (semi-major) by 25 m (minor).

Gold grades were estimated in three consecutive OK passes using the parent cells, hard boundaries, and one metre capped composites. The radius for the first and second pass is based on the variogram ranges and the search ellipsoid was oriented in the same direction as the variogram. A larger search was used for the third pass to fill all empty blocks. Interpolation and search parameters used by AMC are summarized in Table 14-18.

TABLE 14-18 SUMMARY OF SEARCH PARAMETERS – URUCUM NORTH DEPOSIT

Great Panther Mining Limited – Tucano Gold Mine

Parameter	Pass 1	Pass 2	Pass 3
No. Composites (min/max)	12/32	12/32	4/32
Search type	Octant	Octant	-
Optimal Samples per Octants	3	3	-
Min. drill holes	3	2	1
Search radius (% of variogram)	100%	100%	-
Search radius X (m)	130	130	*
Search radius Y (m)	120	120	*
Search radius Z (m)	25	25	*

Note.* Large enough to estimate all blocks

AMC used a high grade restriction of 20 m to limit the influence of high grade samples at a defined cut-off grade.

BLOCK MODEL CONSTRUCTION

AMC constructed the Urucum North underground block model in the National Grid system (UTM SAD69 Zone 22N) using Surpac software. The estimation was completed in Isatis and imported into the sub-blocked Surpac model. Table 14-19 summarizes the block model parameters at Urucum North.

TABLE 14-19 BLOCK MODEL PARAMETERS - URUCUM NORTH DEPOSIT

Great Panther Mining Limited – Tucano Gold Mine

	Easting (X)	Northing (Y)	Elevation (Z)
Minimum (m)	401,500	97,940	-683
Maximum (m)	402,316	100,440	317
Extents (m)	816	2,500	1,000
Block size (m)	8.0	20.0	20.0
Sub block size (m)	1.0	5.0	2.5
Rotation (° around axis)	0°	0°	0°

Given the narrowness of the mineralized domains, RPA recommends using a smaller block size at Urucum North underground.

CLASSIFICATION

Resources were classified based on the confidence in geological knowledge, and interpretation, drilling density and orientation, variogram model attributes, including the range

of the first structure, and estimation statistics such as slope of regression. AMC visually inspected the classification results and manually re-classified blocks where appropriate.

RPA reviewed the classified block model within the open pit shell. RPA re-assigned the blocks previously classified as Measured to Indicated. In RPA's opinion, the final classified block model is reasonable for this level of study. RPA recommends that the local block classification be adjusted where isolated islands of Inferred blocks occur within large areas of Indicated Mineral Resources.

BLOCK MODEL VALIDATION

RPA carried out several block model validation procedures including:

- Visual comparisons of block gold values versus composite values, and block density values versus sample point values.
- Statistical comparisons.
- Comparison of the volumes of the wireframe models to the block model volume results.
- Trend plots of block gold values by elevation, northing, and easting.
- Comparison of block and composite grades in blocks containing composites.

Block grades were visually examined and compared with composite grades in cross section and on elevation plans. RPA found grade continuity to be reasonable and confirmed that block grades were reasonably consistent with local drill hole assay and composite grades and that there was no significant bias apparent.

To check for conditional bias, trend plots were created which compared the gold block model estimates with the composite and sample average grades below the preliminary Whittle pit shell. In RPA's opinion, there is no significant bias between the resource block grades and the assay composites.

As a final check, RPA compared the volume of the mineralized domain models to the block model volume results. The volume difference is 5%, which RPA considers to be an acceptable result considering the block and sub-block dimensions relative to the mineralized domain widths (i.e., larger difference in domains with thickness that can taper to <1.0 m).

Validation by RPA indicates that the block model is a reasonable representation of the tonnages and grades of the mineralized zones at Urucum North underground.

MINERAL RESOURCE STATEMENT

The Mineral Resources are inclusive of Mineral Reserves. The Mineral Resources are reported for the underground component of the Urucum North deposit using excavation surfaces current as of September 30, 2019 and below the pit shell (see Open Pit section of the Urucum deposit above). To ensure continuity at the underground cut-off grade, RPA constructed underground shapes that were based on a cut-off grade of 1.60 g/t Au and reported all blocks within these volumes as underground Mineral Resources (Table 14-20).

TABLE 14-20 SUMMARY OF THE UNDERGROUND MINERAL RESOURCE ESTIMATE AS OF SEPTEMBER 30, 2019 - URUCUM NORTH DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine

Category	Cut-off Grade (g/t Au)	Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)
Underground				
Fresh	1.60			
Indicated		3,042	4.04	395
Inferred		4,664	2.12	318

Notes:

1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated at a cut-off grade of 1.60 g/t Au depending on envisioned mining methods and mineralization style.
3. Mineral Resources are estimated using a long term gold price of US\$1,500/oz Au, and a US\$/R\$ exchange rate of 1:3.8.
4. Mineral Resources are inclusive of Mineral Reserves.
5. Mineral Resource statements are prepared using constraining surfaces for open pit Mineral Resources.
6. Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.
7. Numbers may not add due to rounding.

Tucano is a currently operating, fully permitted mining and processing operation. Consequently, RPA is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate. Changes in the commodity prices, operating costs, or metallurgical recoveries could have commensurate impacts upon the Mineral Resource estimates.

URUCUM CENTRAL UNDERGROUND

In addition to the tonnage and grades for the underground component of the Mineral Resources from Urucum North, the Mineral Resource statement for the underground component of the Urucum deposit includes additional mineralization in Lodes 1 and 20 of the Urucum Central zone. The Mineral Resources for this zone were estimated using the drilling and sampling information available as of September 30, 2019.

Underground resources at Urucum Central are reported using a constraining surface resource pit and at a higher cut-off grade than resources within the pit shell.

MINERAL RESOURCE STATEMENT

The Mineral Resources are inclusive of Mineral Reserves. The Mineral Resources are reported for the underground component of Urucum Central deposit using excavation surfaces current as of September 30, 2019 and below the pit shell (see Open Pit section of the Urucum deposit above). To ensure continuity at the underground cut-off grade, RPA constructed underground shapes that were based on a cut-off grade of 1.60 g/t Au and reported all blocks within these volumes as underground Mineral Resources (Table 14-21).

TABLE 14-21 SUMMARY OF THE UNDERGROUND MINERAL RESOURCE ESTIMATE AS OF SEPTEMBER 30, 2019 - URUCUM CENTRAL DEPOSIT

Great Panther Mining Limited – Tucano Gold Mine

Category	Cut-off Grade (g/t Au)	Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)
Underground				
Fresh	1.60			
Inferred		852	2.61	71

Notes:

1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated at various cut-off grades depending on envisioned mining methods and mineralization style.
3. Mineral Resources are estimated using a long term gold price of US\$1,500/oz Au, and a US\$/R\$ exchange rate of 1:3.8.
4. Mineral Resources are inclusive of Mineral Reserves.
5. Mineral Resource statements are prepared using constraining surfaces and volumes.
6. Mineral Resources, which are not Mineral Reserves, do not have demonstrated economic viability.
7. Numbers may not add due to rounding.

Tucano is a currently operating, fully permitted mining and processing operation. Consequently, RPA is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate. Changes in the commodity prices, operating costs, or metallurgical recoveries could have commensurate impacts upon the Mineral Resource estimates.

TAP AB DEPOSIT

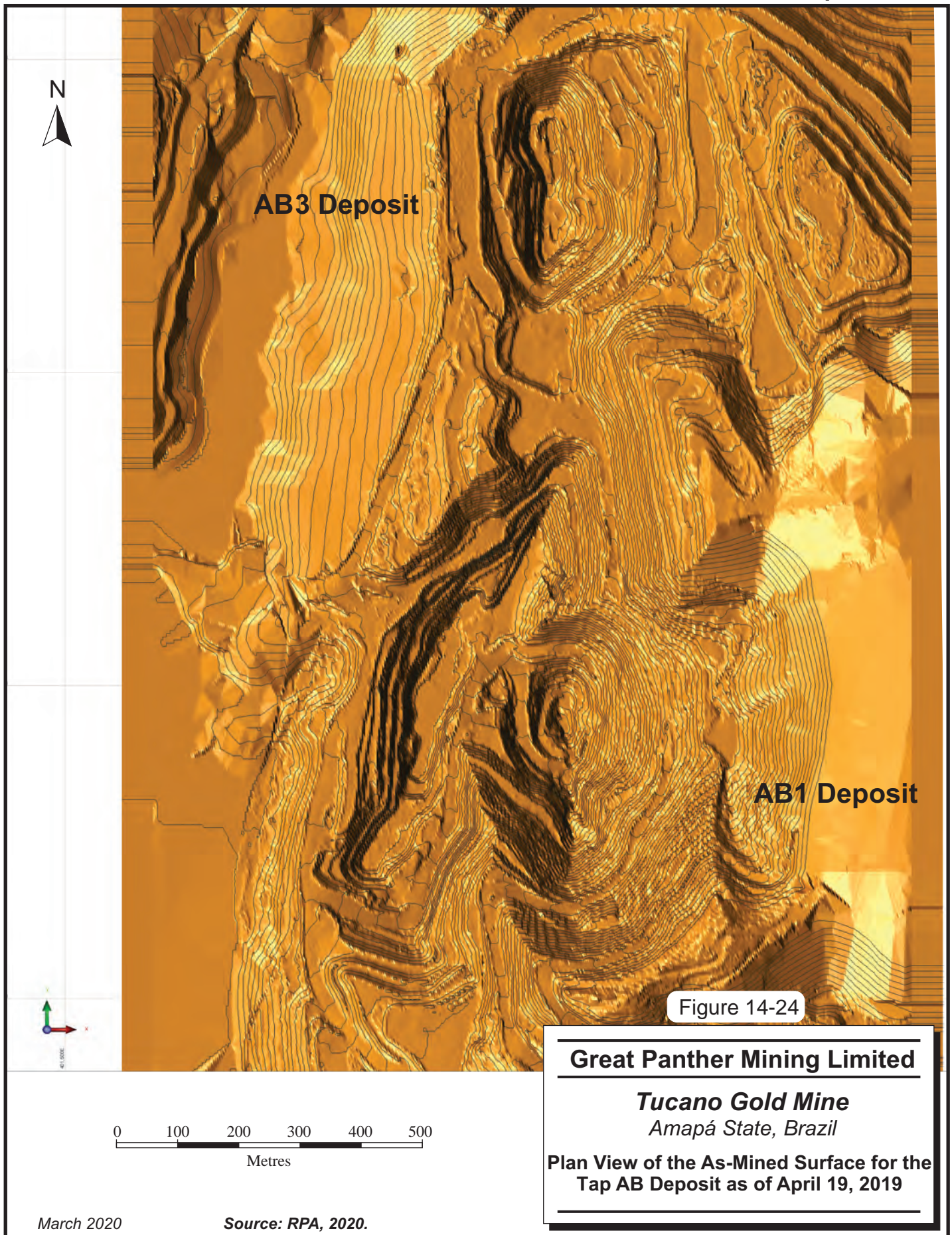
OPEN PIT

TOPOGRAPHY AND EXCAVATION MODELS

Great Panther prepares digital models of the open pit mining excavations on a regular basis as mining progresses using information collected from drone surveys as well as conventional total station surveying equipment. The information collected from these periodic surveys are integrated together from the various mining areas at the Tap AB deposit into one integrated model of the as-mined topographic surface. A digital copy of the as-mined topographic surface was provided to RPA for the Tap AB open pit that was current as of April 19, 2019 (Figure 14-24).

Portions of the Tap AB open pits, principally in the southwest regions of the AB 3 deposit, have been backfilled during the course of mining operations. In order to correctly code the block models, a topographic surface of the “top of rock” was provided by the mine staff. This was used in conjunction with the current topography surface to correctly assign the material types and gold grades for these backfilled regions.

Topographic surveys of the stockpile areas that were active in 2019 were carried out using drone-mounted LIDAR surveying methods. The base of the stockpiles was taken from earlier topographic surfaces that were completed prior to the commencement of building these piles. The volumes of the stockpiles were reported from the resulting merged surfaces and the tonnage was estimated using truck counts.



MINERAL RESOURCE DATABASE

The presence and distribution of the gold mineralization found at the Tap AB deposit is defined by means of diamond drill holes, auger holes, and RC drill holes completed during deposit delineation drilling programs, and RC drill holes, chip/channel samples, RAB hole samples, and blast hole samples taken as part of the grade control sampling program. All information is entered into a master acQuire geological database management system which stores all drill hole and sample information for Tucano.

Subsets from this master database were extracted by Tucano staff and used for preparation of the Tap AB Mineral Resource estimate. All of the drill holes contained within the Tap AB subset of the database were used to prepare the estimate. All of the drill hole data were modified for use by the Leapfrog modelling software package. Additional fields to store such information as the composited assay values and wireframe flags were created as required during preparation of the Mineral Resource estimate.

The cut-off date for the drill hole database is September 30, 2019. The locations of the drill holes that were used to prepare the 2019 Mineral Resource estimate are shown in Section 10. The drilling has outlined gold mineralization along a strike length of approximately 2,100 m and from surface to depths of up to 350 m to 400 m from surface at the AB 3 deposit. A summary of the database is provided in Table 14-22.

**TABLE 14-22 SUMMARY OF THE TAP AB DRILL HOLE DATABASE
AS OF SEPTEMBER 30, 2019
Great Panther Mining Limited – Tucano Gold Mine**

Hole Type	Number of Holes	Total Length (m)
Auger (AG)	7,373	21,155
Chip/Channel (CH)	15,568	460,370
Diamond Drilling (DD)	763	107,604
Rotary Air Blast (RB)	15,887	88,448
Reverse Circulation (RC)	8,481	334,184
Trench Samples (TR)	1,991	55,183
Total	50,064	1,066,944

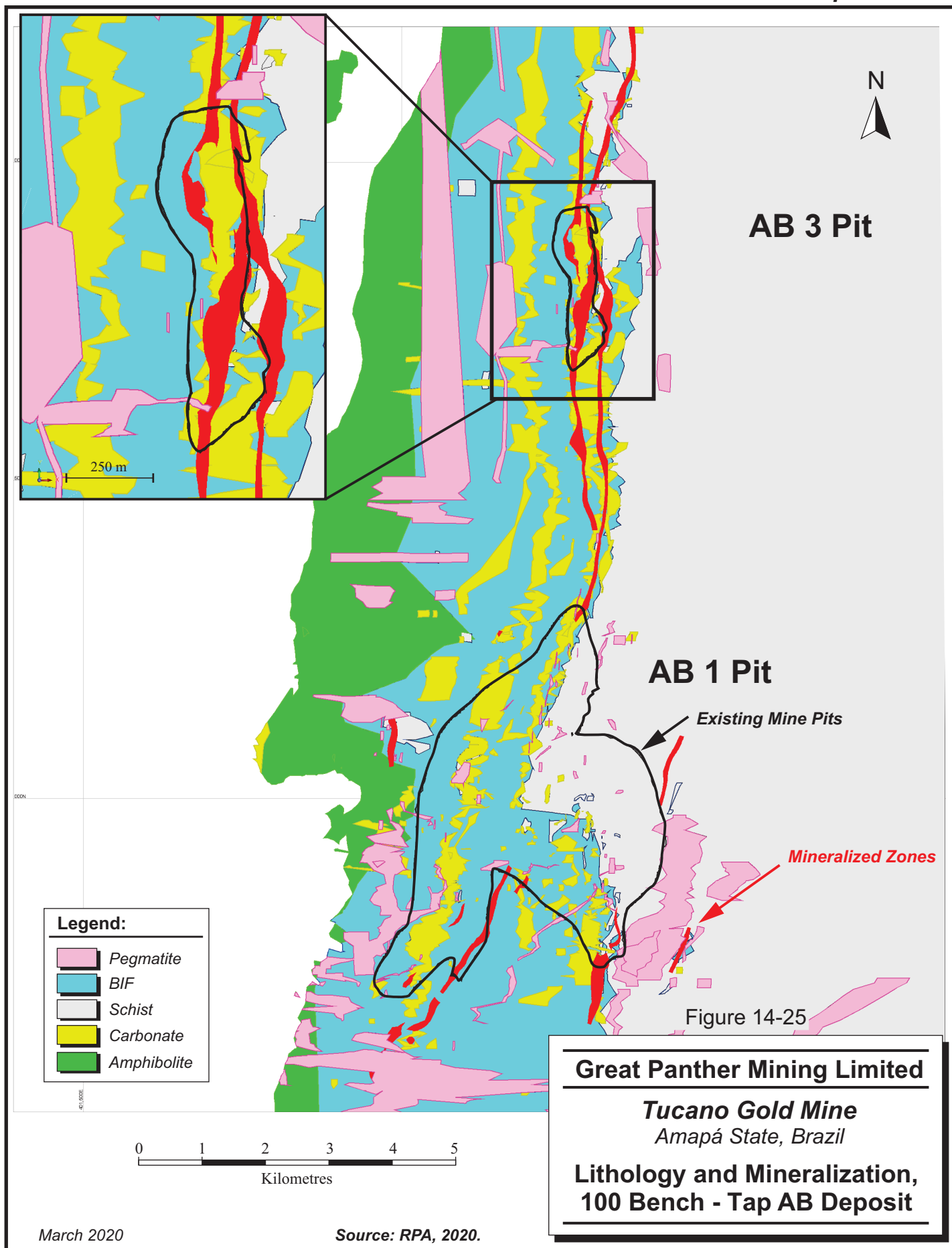
LITHOLOGY MODEL

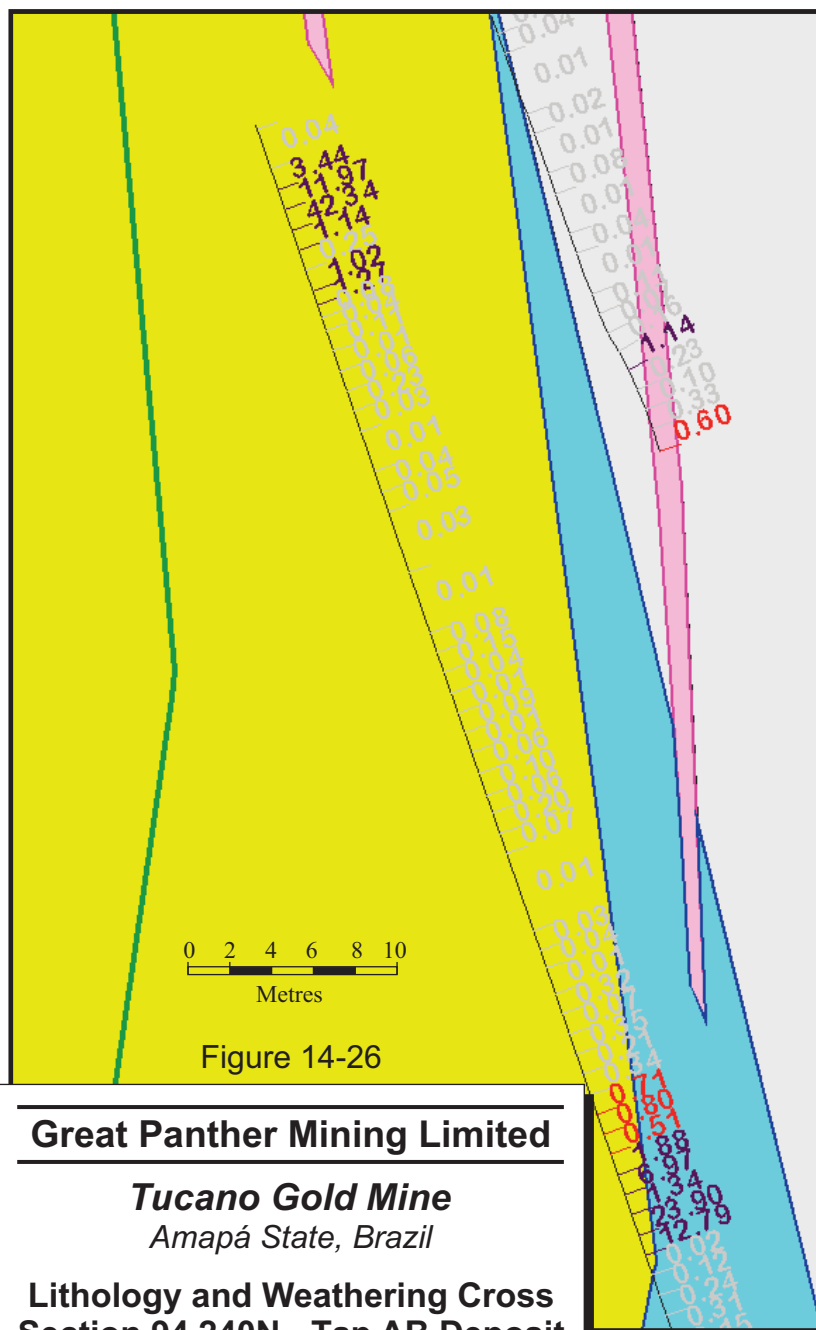
Digital models of the main host rock types encountered at the Tap AB deposit were prepared by the Mine staff using a series of vertical, east-west cross sections that were equally spaced

at 10 m intervals. The Hexagon MineSight software package was used to create the interpretations of the lithological and weathering units.

The main rock types include BIF, a carbonate unit, amphibolite, quartz-sericite schist, and pegmatite (Figure 14-25). The BIF unit has been the host to the majority of the gold mineralization to date, although minor quantities of gold are also hosted by the carbonate unit as well as the East Schist unit. Excluding the pegmatite units, all rock units strike in a general north-south direction and have sub-vertical or steep easterly dips. The stratigraphy takes on a northeasterly strike in the area of the AB 1 deposit. Visual inspection of the pegmatite units by RPA during its visit to the Tucano site suggests that these units have not been subjected to the same degree of regional metamorphism and deformation, and so may represent a post-mineralization intrusion event.

A digital model of the nominal top of the fresh rock has been prepared using available information obtained from drill holes and mining activities. The depth of weathering in the Tap AB deposit varies greatly and weathering can achieve depths in the order of 250 m to 300 m (Figure 14-26). This weathering unit is topped off by the presence of a colluvium layer that represents weathered material that has been re-worked or transported by secondary processes such as erosion or mass flow events. The depth of this colluvium layer varies at the detailed scale but is generally in the order of 10 m.





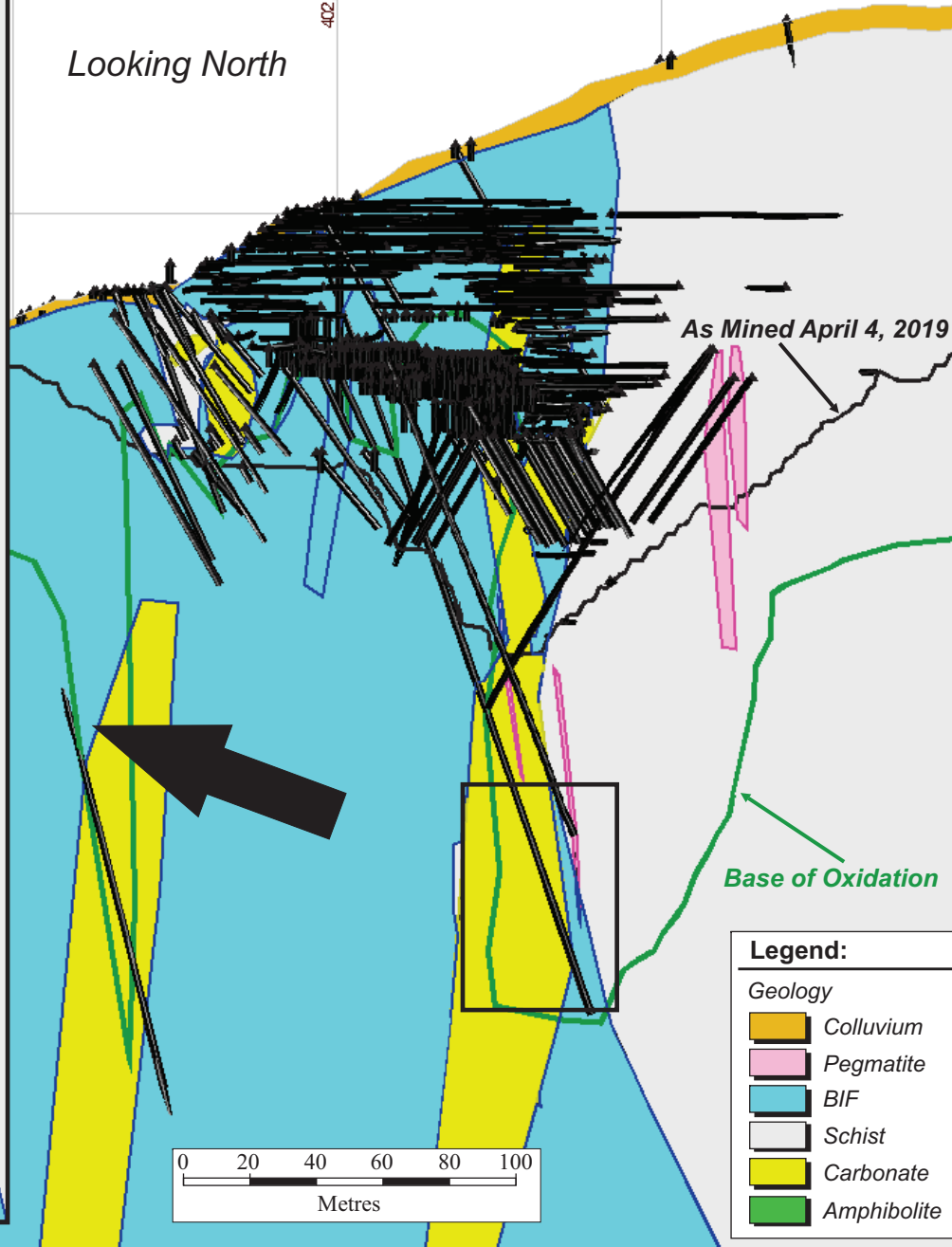
Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Lithology and Weathering Cross
Section 94,240N - Tap AB Deposit**

Looking North



Legend:

Geology

- Colluvium
- Pegmatite
- BIF
- Schist
- Carbonate
- Amphibolite

March 2020

Source: RPA, 2020.

MINERALIZATION MODELS

Gold mineralization at the Tap AB deposit is sub-divided generally into two principal areas referred to as the AB 1 and the AB 3 deposits. A third area of mineralization is located to the south of the AB 1 deposit and is referred to as the Torres area. Digital interpretations of the distribution of the gold mineralization for the Tap AB deposit were prepared by RPA using the Leapfrog software package. The mineralization wireframes were created using a nominal cut-off grade of 0.5 g/t Au across a minimum width of three metres to align with the cut-off grade and minimum width criteria that are currently being employed by the Mine staff for establishing the ore/waste dig packets at the Urucum deposit. It is important to note that the cut-off grade of 0.5 g/t Au represents a pit-discard cut-off grade, which considers processing and G&A costs only. Due to limited available time, RPA created the mineralized wireframe interpretations to a distance of five benches (approximately 20 m) above the current mining surface.

A total of 20 mineralized wireframes were created for the three mineralized areas (Table 14-23). Examples of the interpretations were presented in Section 10. In total, gold mineralization has been modelled along a strike length of approximately 2,100 m and to a depth of approximately 350 m to 400 m from surface.

**TABLE 14-23 LIST OF MINERALIZED WIREFRAMES BY AREA -
TAP AB DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Area	Wireframe IDs
AB1 and Torres	1,2,4,5,6,7,8,9,10,11,12,14,15,16,17,18,19, and 20
AB 3	3,13, and 16

RPA recommends that a second series of wireframe interpretations be prepared for the Tap AB deposit using cut-off grade and minimum width criteria that are reflective of the envisioned operational scenario for an underground mining operation.

EXPLORATORY DATA ANALYSIS AND GRADE CAPPING

Analyses of the gold grade distributions were conducted for those sample assays contained within each of the mineralized wireframes. These analyses included preparation of descriptive statistics along with examination of the grade distribution by means of upper tail histogram plots, decile analyses, and Parrish plots. The purpose of this exercise was to identify whether any outlier gold values are present whose influence on the Mineral Resource estimate must be restrained.

Review of the results of these analyses suggests that an appropriate capping value is approximately 20 g/t Au for the AB1 and Torres mineralization and approximately 30 g/t Au for the AB 3 mineralization (Figures 14-27 and 14-28). A summary of the descriptive statistics for the capped and uncapped raw assays, along with a brief review of the impact of alternate capping values, is presented in Tables 14-24 and 14-25.

FIGURE 14-27 UPPER TAIL HISTOGRAM – AB 1 AND TORRES AREAS

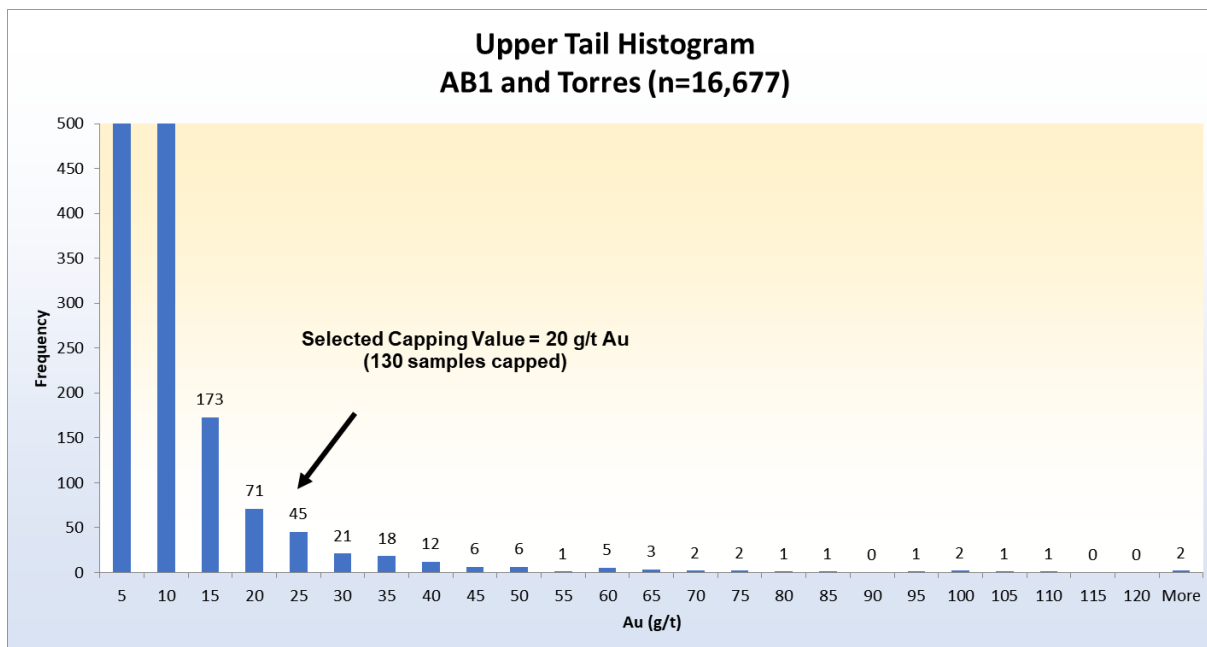
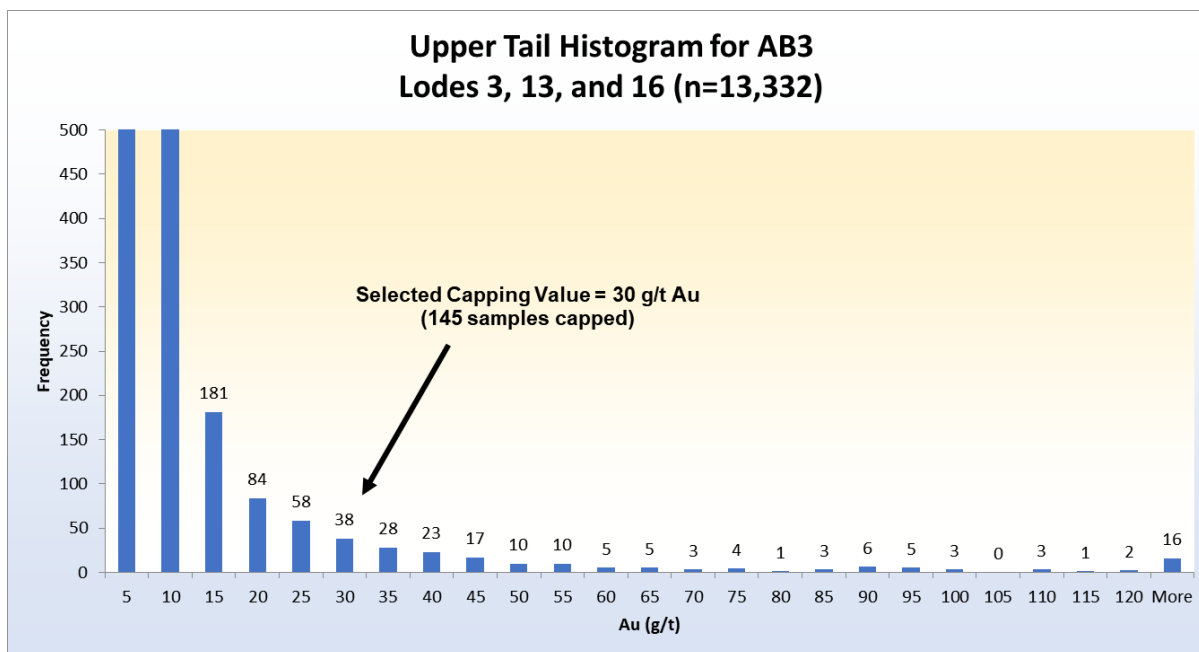


FIGURE 14-28 UPPER TAIL HISTOGRAM - AB 3 AREA



**TABLE 14-24 DESCRIPTIVE STATISTICS OF UNCAPPED RAW
ASSAYS - TAP AB DEPOSIT**
Great Panther Mining Limited – Tucano Gold Mine

Domain	Count	Min	Max	Mean	Variance	StDev	CV	Median
s01	5,461	0.00	104.00	1.80	19.65	4.43	2.47	0.59
s02	3,282	0.00	100.00	1.20	9.00	3.00	2.50	0.60
s03	6,185	0.00	1,084.43	3.26	372.70	19.31	5.92	0.47
s04	303	0.01	14.93	0.87	2.71	1.65	1.89	0.32
s05	345	0.00	21.34	1.67	7.45	2.73	1.64	0.76
s06	185	0.01	14.01	1.39	4.66	2.16	1.56	0.60
s07	1,202	0.00	124.10	1.63	25.97	5.10	3.13	0.70
s08	179	0.01	23.46	0.68	4.09	2.02	2.97	0.19
s09	447	0.00	10.74	1.21	1.85	1.36	1.12	0.71
s10	234	0.01	7.48	0.61	1.32	1.15	1.89	0.08
s11	230	0.01	83.70	2.27	56.00	7.48	3.29	0.67
s12	443	0.00	106.00	1.84	34.64	5.89	3.19	0.66
s13	1,056	0.00	38.63	0.75	3.43	1.85	2.47	0.35
s14	655	0.01	26.90	1.21	4.52	2.13	1.76	0.67
s15	836	0.00	95.78	2.49	44.39	6.66	2.68	0.87
s16	6,104	0.00	109.53	1.50	15.02	3.88	2.58	0.50
s17	98	0.00	139.86	4.81	281.30	16.77	3.49	0.70
s18	2,454	0.00	94.30	1.23	13.92	3.73	3.03	0.33
s19	42	0.02	33.46	3.23	34.13	5.84	1.81	1.03
s20	319	0.00	29.86	1.65	12.90	3.59	2.17	0.57

**TABLE 14-25 DESCRIPTIVE STATISTICS OF CAPPED RAW
ASSAYS - TAP AB DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Domain	Count	Min	Max	Mean	Variance	StDev	CV	Median
s01	5,461	0.00	20.00	1.65	9.76	3.12	1.90	0.59
s02	3,282	0.00	20.00	1.15	4.18	2.05	1.79	0.60
s03	6,185	0.00	30.00	2.25	29.10	5.39	2.39	0.47
s04	303	0.01	14.93	0.87	2.71	1.65	1.89	0.32
s05	345	0.00	20.00	1.66	7.14	2.67	1.61	0.76
s06	185	0.01	14.01	1.39	4.66	2.16	1.56	0.60
s07	1,202	0.00	20.00	1.44	6.46	2.54	1.76	0.70
s08	179	0.01	20.00	0.66	3.22	1.79	2.72	0.18
s09	447	0.00	10.74	1.21	1.85	1.36	1.12	0.71
s10	234	0.01	7.48	0.61	1.32	1.15	1.89	0.08
s11	230	0.01	20.00	1.71	11.05	3.33	1.94	0.67
s12	443	0.00	20.00	1.60	7.37	2.72	1.69	0.66
s13	1,056	0.00	30.00	0.74	2.69	1.64	2.22	0.35
s14	655	0.01	20.00	1.20	4.04	2.01	1.68	0.67
s15	836	0.00	20.00	2.10	12.35	3.51	1.68	0.87
s16	6,104	0.00	30.00	1.46	10.34	3.22	2.21	0.50
s17	98	0.00	20.00	2.83	25.56	5.06	1.79	0.70
s18	2,454	0.00	20.00	1.13	6.06	2.46	2.18	0.33
s19	42	0.02	20.00	2.84	15.41	3.93	1.38	1.03
s20	319	0.00	20.00	1.58	9.39	3.07	1.95	0.57

COMPOSITING

The selection of an appropriate composite length began with examination of the descriptive statistics of the sample lengths of the raw assays and preparation of histograms of the sample lengths. Consideration was also given to the size of the blocks that would be used in the block model.

The majority of the sample lengths in the various mineralized wireframes were found to be one metre in length, with a small percentage of the samples having larger sample lengths (Figure 14-29). Consequently, on the basis of the available information, RPA believes that a composite length of one metre is reasonable.

The capped raw assays were composited individually for each of the 20 mineralized wireframes using the equal length function of the Leapfrog software package. The descriptive statistics of the composite samples for each of the 20 mineralized wireframes are provided in Table 14-26.

FIGURE 14-29 UPPER TAIL HISTOGRAM OF THE SAMPLE LENGTHS WITHIN THE MINERALIZED WIREFRAMES - TAP AB DEPOSIT

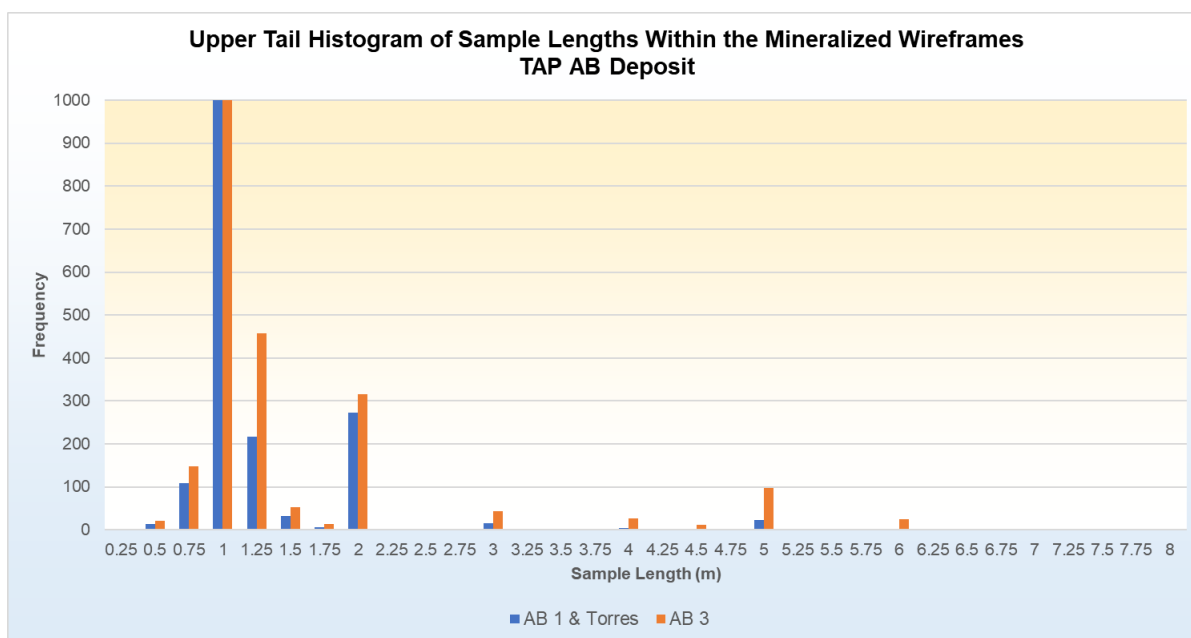


TABLE 14-26 DESCRIPTIVE STATISTICS OF CAPPED COMPOSITED ASSAYS - TAP AB DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine

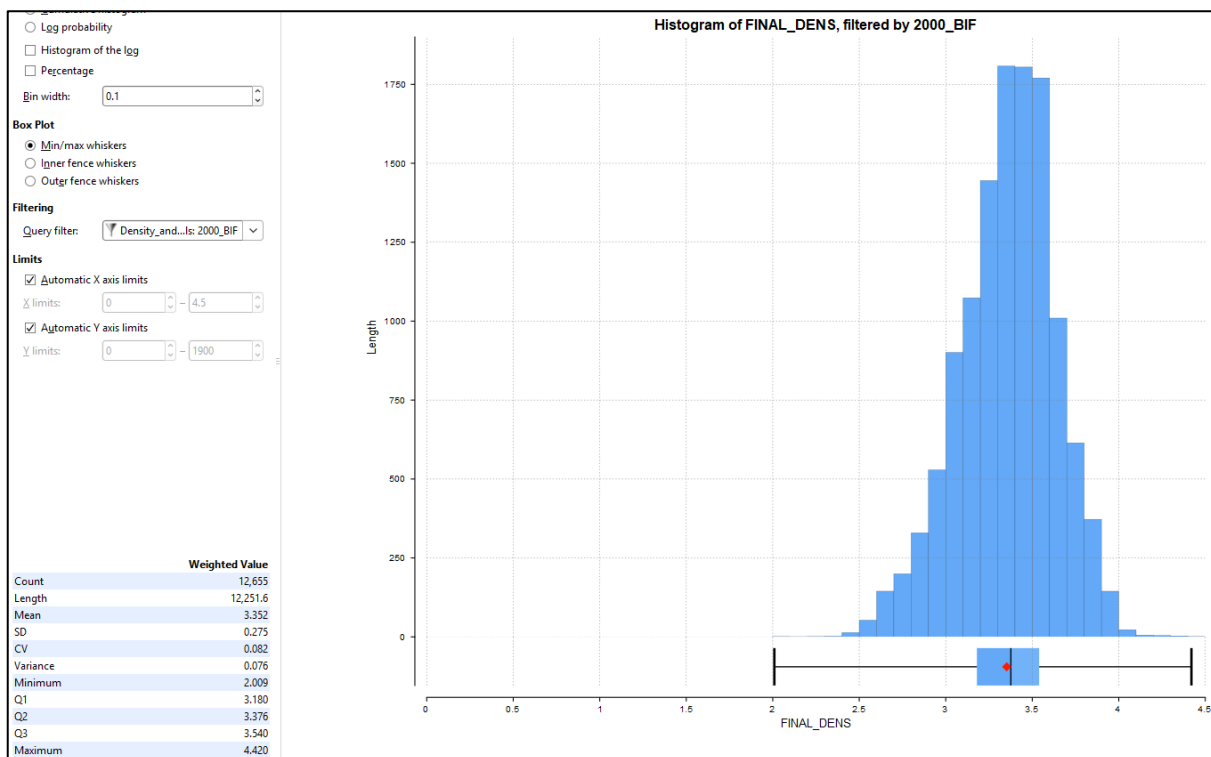
Domain	Count	Min	Max	Mean	Variance	StDev	CV	Median
s01	5,462	0.00	20.00	1.65	8.76	2.96	1.80	0.62
s02	3,309	0.00	20.00	1.15	4.01	2.00	1.75	0.61
s03	6,257	0.00	30.00	2.25	27.49	5.24	2.33	0.50
s04	298	0.01	14.93	0.87	2.71	1.65	1.89	0.34
s05	341	0.00	20.00	1.66	7.08	2.66	1.61	0.78
s06	183	0.01	14.01	1.39	4.56	2.14	1.54	0.61
s07	1,263	0.00	20.00	1.44	6.38	2.53	1.75	0.70
s08	173	0.01	20.00	0.66	3.21	1.79	2.72	0.19
s09	451	0.00	10.74	1.21	1.84	1.36	1.12	0.71
s10	230	0.01	7.48	0.61	1.19	1.09	1.79	0.09
s11	232	0.01	20.00	1.71	10.66	3.27	1.91	0.71
s12	422	0.00	20.00	1.60	6.72	2.59	1.62	0.66
s13	1,341	0.00	30.00	0.74	2.67	1.63	2.21	0.35
s14	656	0.01	20.00	1.20	3.99	2.00	1.67	0.67
s15	828	0.00	20.00	2.10	11.23	3.35	1.60	0.90
s16	6,357	0.00	30.00	1.46	9.79	3.13	2.15	0.52
s17	110	0.00	20.00	2.83	24.16	4.92	1.74	0.69
s18	2,636	0.00	20.00	1.13	5.99	2.45	2.17	0.33
s19	43	0.02	16.90	2.84	12.28	3.51	1.23	1.08
s20	328	0.00	20.00	1.58	9.23	3.04	1.93	0.58

BULK DENSITY

A large number of density measurements (35,076 in total) is available for the various lithological and weathering units present at the Tap AB deposit. A summary of the various measurement methods was provided in Section 10. For the purposes of this Mineral Resource estimate, each of these density measurements was assigned to one of the principal lithological units using the wireframe interpretations described above. Similarly, each of the density measurements were assigned to either oxidized or fresh rock as defined by the interpreted oxidized surface. Only the dry, bulk density measurements were used to code the grade-block model. An example of the distribution of the dry density values for the un-weathered BIF unit is presented in Figure 14-30. A summary of the density values that were coded into the grade-block model is presented in Table 14-27.

RPA observes that the density for the oxidized portion of the BIF unit is derived from a limited number of measurements. RPA recommends that additional measurements of the dry bulk density be collected for the BIF unit.

FIGURE 14-30 HISTOGRAM OF THE DRY BULK DENSITIES FOR THE UN-WEATHERED BANDED IRON FORMATION - TAP AB DEPOSIT



**TABLE 14-27 SUMMARY OF DRY BULK DENSITIES BY LITHOLOGY -
TAP AB DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Lithology Unit	Mean Bulk Density
Oxide, Banded Iron Formation	2.23
Oxide, Other	1.93
Colluvium	1.77
Banded Iron Formation	3.35
Carbonate	3.11
Quartz Sericite Schist	2.84
Pegmatite	2.80
Amphibolite	2.80

TREND ANALYSIS

Grade Contouring:

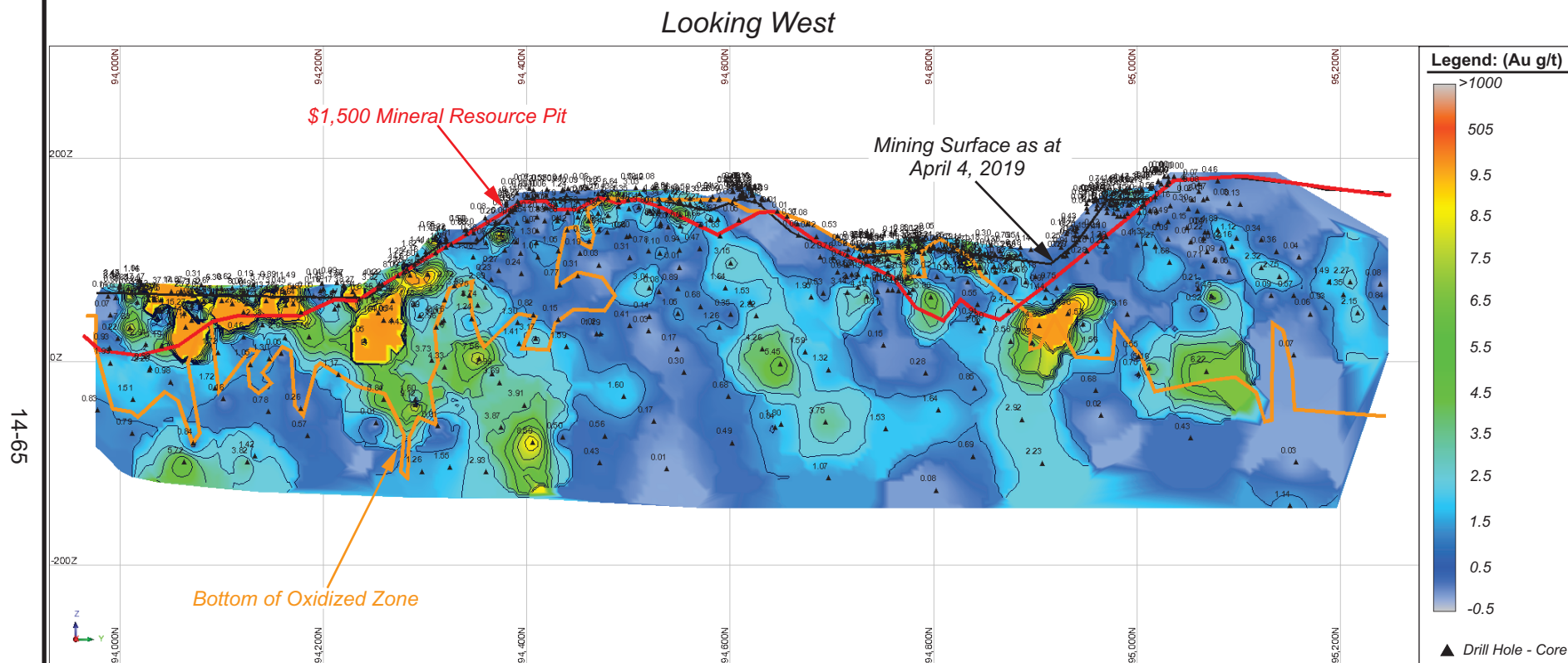
As an aid in carrying out variography studies to understand the continuity of the gold grades in the various mineralized wireframes, RPA prepared a series of traditional longitudinal projections for a selection of the mineralized wireframes present at the Tap AB deposit. For this exercise, a data file was prepared that contained the average (uncapped) gold grade across the entire width of the mineralized wireframe model for each drill hole (and channel sample) that pierced the wireframe model. The resulting average grades of the collection of pierce points for any given wireframe model were then contoured using the contouring function of the GEOVIA Surpac (v. 2019, r1) software modelling package. The results of this contouring exercise are presented in Figures 14-31 through 14-34, inclusive.

Examination of the grade distribution for wireframe S03 of the Tap AB deposit reveals that this wireframe has been systematically evaluated by DD at a spacing of approximately 50 m x 50 m to a depth of approximately 200 m below the current mining surface. The density of drill hole and sample information increases at shallow levels as information from grade control drilling programs is available. The drilling has identified several zones of elevated gold grades. In general, the grades within these higher grade zones can be seen to be oriented along a moderate to steep north plunge. In many cases, the down-plunge limits of these higher grade shoots have not been defined by drilling. In contrast, the higher grade zones located immediately below the mining surface in the AB 1 portions of the zone can be seen to occur as pods measuring in the order of approximately 25 m to 50 m in size. In addition, it is important to note that a significant proportion of the higher grade mineralization resides within the digital model of the oxidized material which could have a positive impact on the mine's performance.

The down-plunge limits of many of the higher grade mineralized shoots within the S03 wireframe of the Tap AB deposit do not appear to be defined by drilling in the wireframes examined. Additional drilling is warranted.

RPA recommends that the location of the oxidized to fresh rock transition at the Tap AB deposit be determined to a higher degree of accuracy, particularly in the area of the AB 1 deposit.

The distribution of the gold grades for wireframes S01, S02, and S16 exhibit similar podiform characteristics.



0 50 100 150 200 250
Metres

Figure 14-31

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Longitudinal Projection of
Lode S03 - AB 3 Deposit**

Looking West

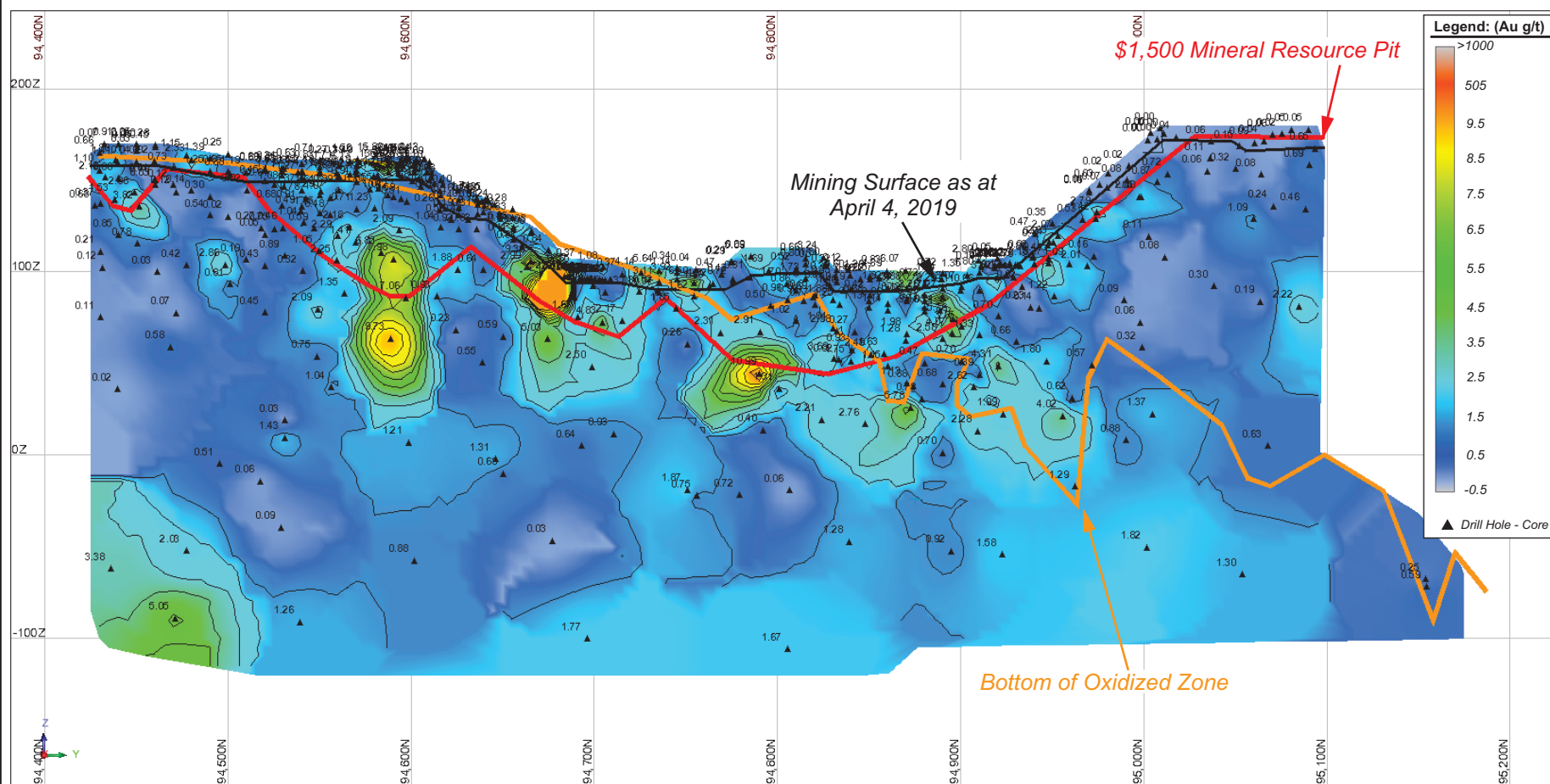


Figure 14-32

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

Longitudinal Projection of
Lode S16 - AB 3 Deposit

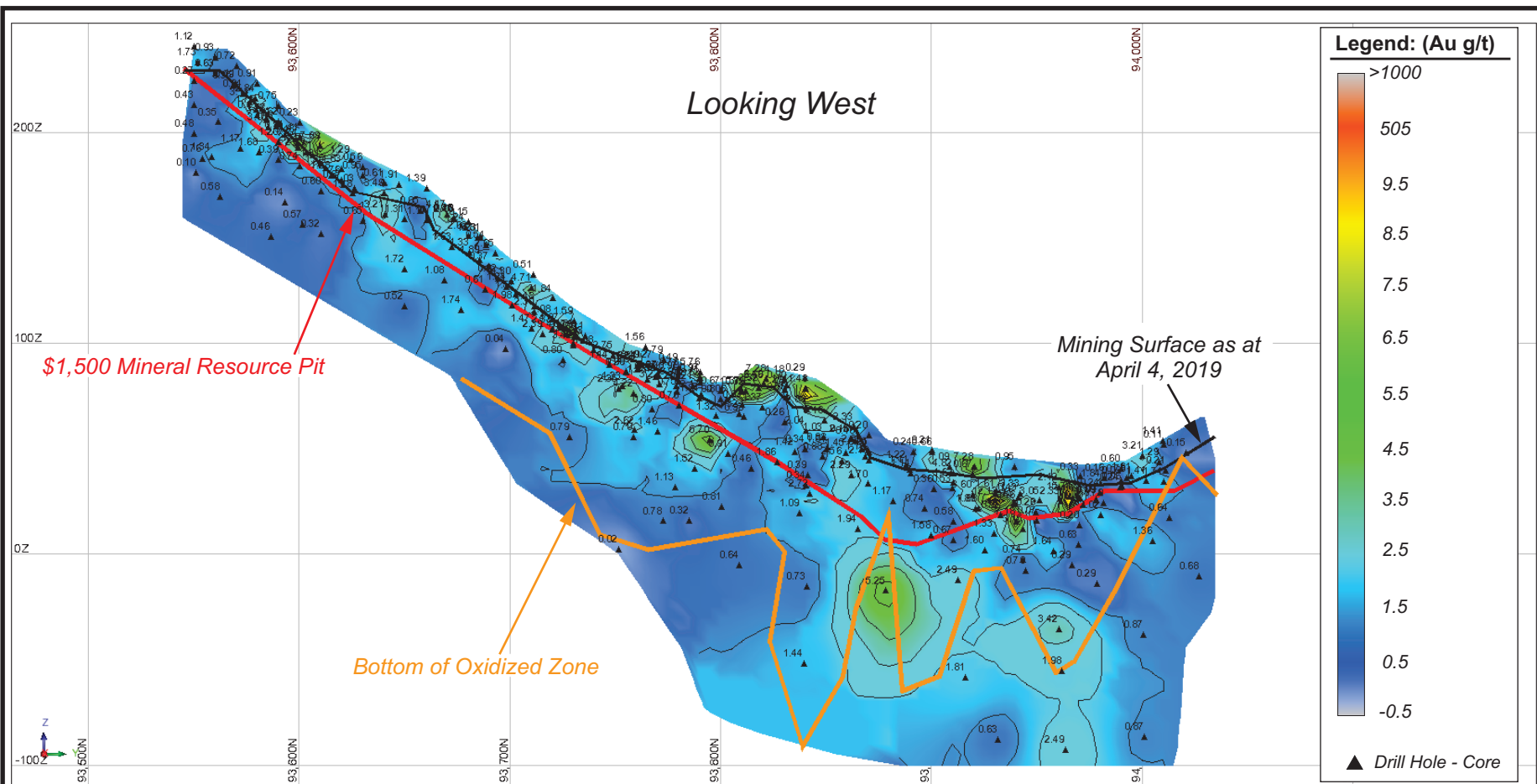


Figure 14-33

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Longitudinal Projection of
Lode S01 - AB 1 Deposit**

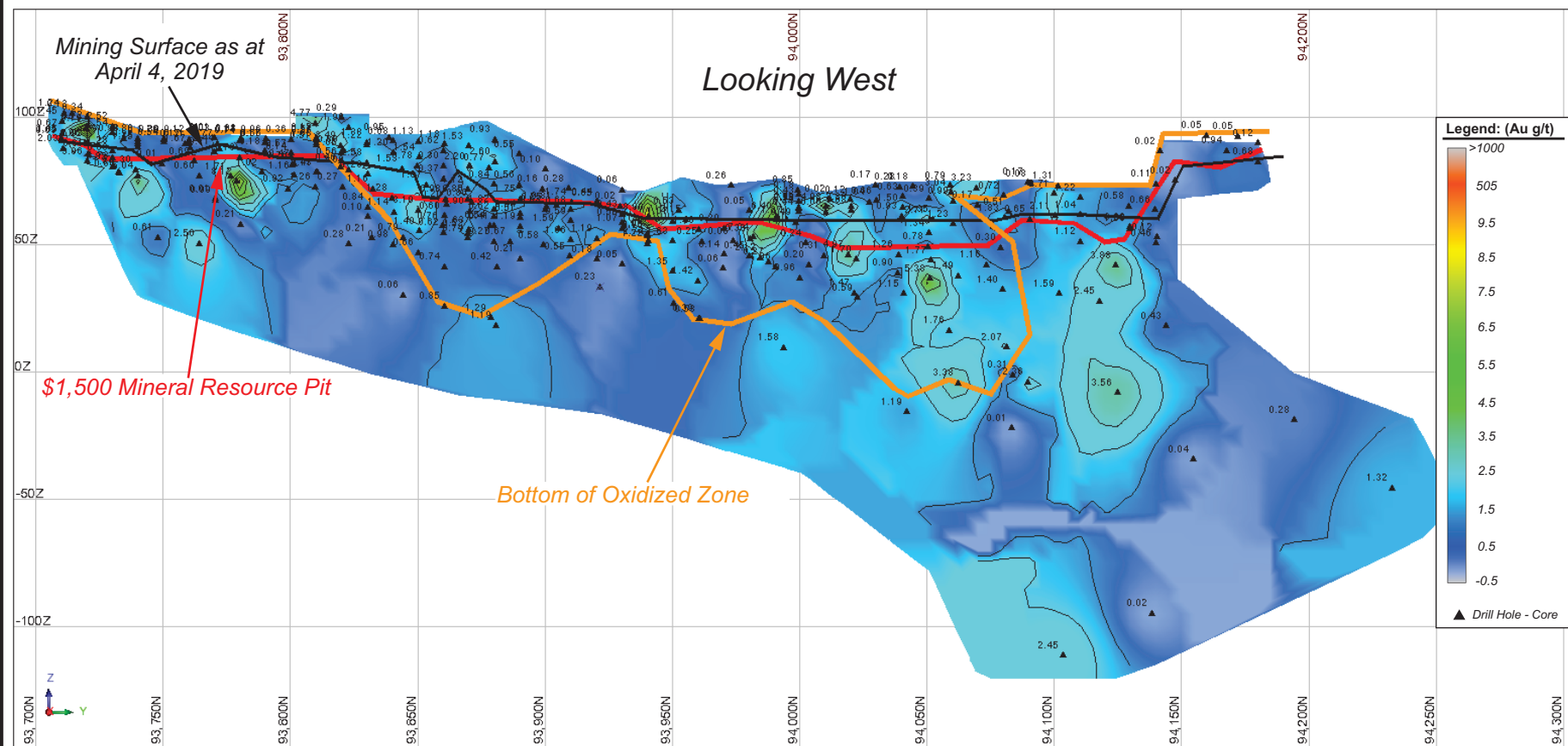


Figure 14-34

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Longitudinal Projection of
Lode S02 - AB 1 Deposit**

Variography:

An evaluation of the spatial continuity of the gold grades for the Tap AB deposit began with a review of the number of informing samples for each of the 20 mineralized wireframe models. This review indicated that many of the wireframe models had relatively small volumes with corresponding small numbers of sample information. RPA therefore elected to carry out its evaluation of the spatial continuity of the gold grades for the Tap AB deposit for a selection of the larger wireframes which had a sufficient number of samples to generate meaningful variogram reports.

Variograms for these selected mineralized wireframes were prepared using the variography function of the Leapfrog software package. Example variograms for two of the larger mineralized wireframes are presented in Figures 14-35 and 14-36. Summary variogram parameters for wireframes S01, S02 (AB 1 deposit), and S03 (AB 3 deposit) are presented in Table 14-28.

FIGURE 14-35 SAMPLE VARIOGRAMS, WIREFRAME S03 – TAP AB 3 DEPOSIT

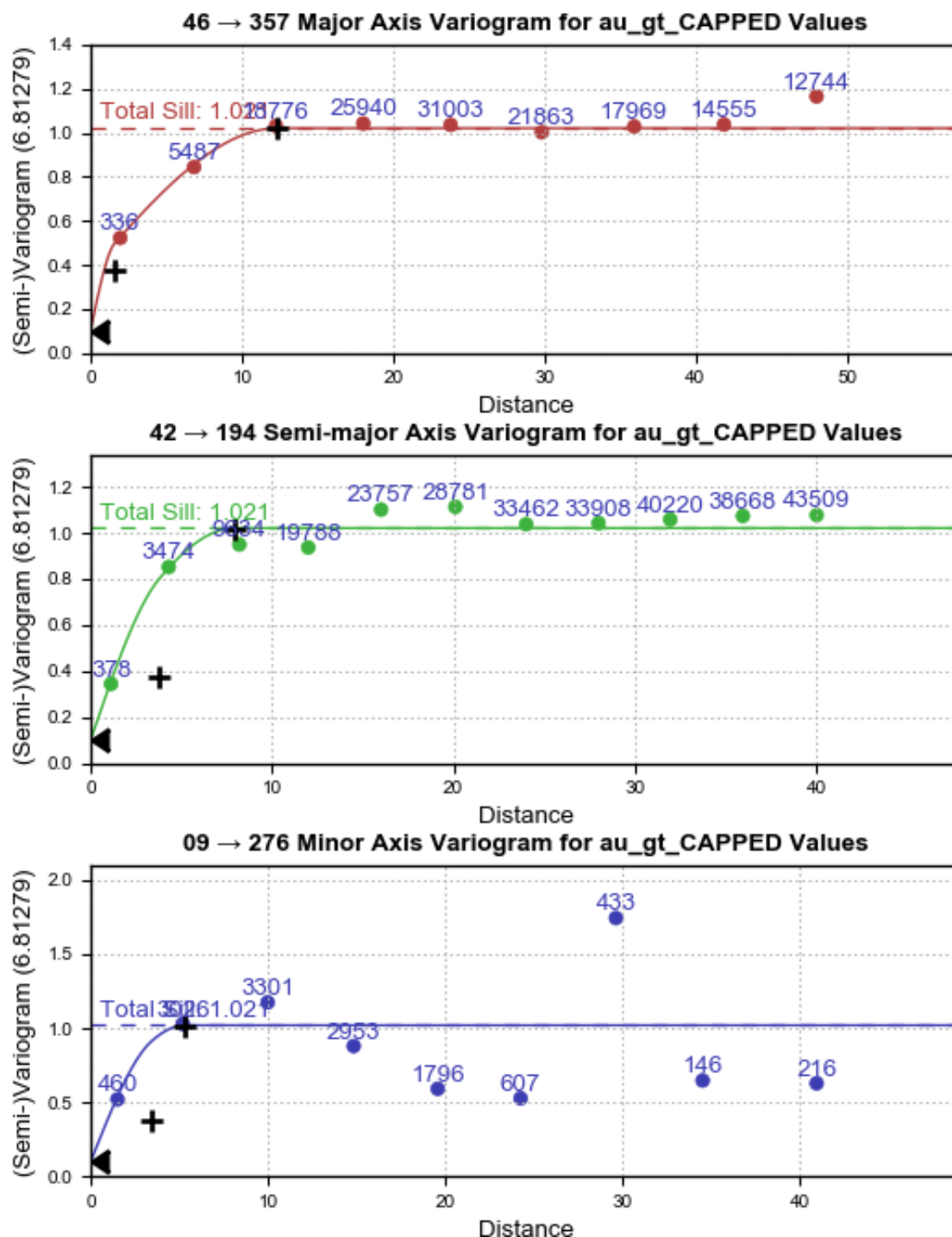


FIGURE 14-36 SAMPLE VARIOGRAMS, WIREFRAME S02 - TAP AB 1 DEPOSIT

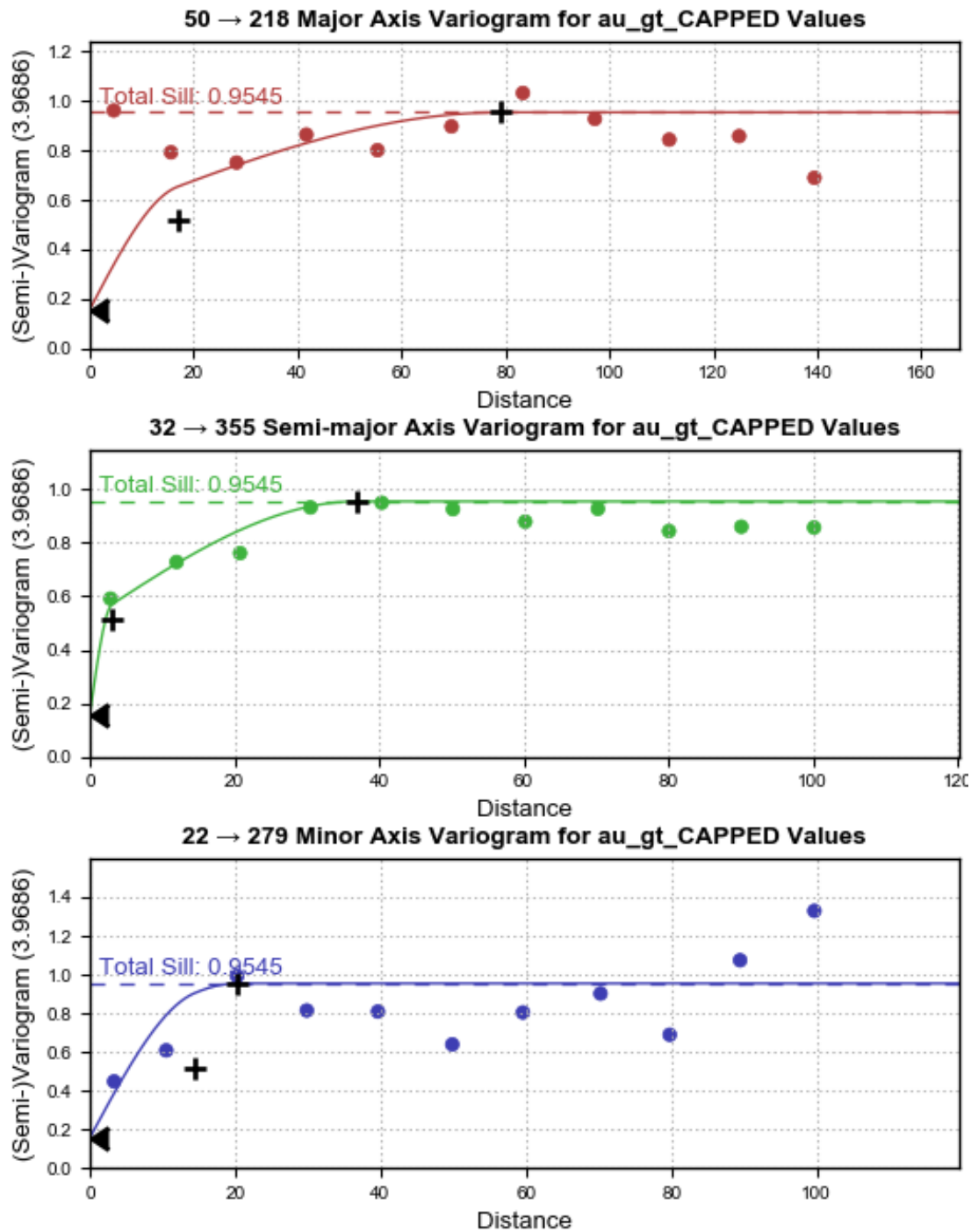


TABLE 14-28 SUMMARY OF VARIOGRAM PARAMETERS - TAP AB DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine

Item	S1	S2
S02 (Nugget (C0 = 0.15))		
Type	Spherical	Spherical
Sill	0.35	0.43
Range (m), Major (Az 218/50)	16.87	79.13
Range (m), Intermediate (Az 355/32)	3.07	36.84
Range (m), Minor (Az 279, 22)	14.34	20.30
S03 (Nugget (C0 = 0.10))		
Type	Spherical	Spherical
Sill	0.27	0.64
Range (m), Major (Az 357, 46)	1.59	12.34
Range (m), Intermediate (Az 194, 42)	3.77	7.95
Range (m), Minor (Az 276, 09)	3.42	5.32

BLOCK MODEL CONSTRUCTION

An upright, non-rotated block model was created by RPA using the Leapfrog software package with the long axis of the blocks being oriented along the strike of the mineralized wireframe models (i.e. to the north). The selected block sizes were five metres in the north-south direction (along strike) by three metres in the east-west direction (across strike), and four metres in height. The block sizes were selected so as to match with the block sizes used for the short term grade control program and daily production planning.

The block model used a sub-block approach for coding the wireframes found at the Tap AB deposit, with the minimum sub-block sizes being set at one metre by one metre by one metre. A number of attributes were also created to store such information as gold grades, distances to and the number of informing samples, domain codes, resource classification codes, etc. The block model origins, dimensions, and attributes are provided in Table 14-29, and a list of the attributes used is provided in Table 14-30.

**TABLE 14-29 SUMMARY OF BLOCK MODEL ORIGIN AND EXTENT -
TAP AB DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Type	Y	X	Z
Minimum Coordinates	92,740	401,640	-203
Maximum Coordinates	95,640	402,855	321
User Block Size	5	3	4
Min. Block Size	1	1	1
Rotation	0.000	0.000	0.000

**TABLE 14-30 SUMMARY OF BLOCK MODEL ATTRIBUTES - TAP AB DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Attribute	Type	Decimals	Description
Mineralization	character	N/A	mineralization pod (s01 to S20)
Category	character	N/A	2 for blocks inside a mineralization wireframe, 4 elsewhere
density_by_average	real	2	density value, t/m ³
AU_ID3_FINAL	real	5	g/t Au by ID ³
AU_NN_FINAL	real	5	g/t Au by NN
AU_OK_FINAL	real	5	g/t Au by OK. NOTE: only a test, not estimated for all wireframes
mined status	character	N/A	backfill, air, mined, rock
rocktype	character	N/A	backfill=99, air=0 ,mined=0, rock=1, air
rock_type_integer	integer	N/A	backfill=99, air=0 ,mined=0, rock=1, air
cat_integer	integer	N/A	2 for blocks inside a mineralization wireframe, 4 elsewhere
pit_slope	integer	N/A	oxide sw=1, oxide se=2, oxide nw=6, oxide ne=7, fresh sw=3, fresh se=4, fresh nw=8, fresh ne=9, others=5
mined_status 2	character	N/A	FINAL mined status for reporting: air, backfill, mined, rock
AU_ID3_minD	real	5	minimum distance to a sample in AU ID ³ interpolation
AU_ID3_Dom	character	N/A	interpolation and domain label
AU_ID3_Est	character	N/A	pass and domain used to interpolate block

SEARCH STRATEGY AND GRADE INTERPOLATION PARAMETERS

The search strategies used to estimate the gold grades into the block model are summarized in Table 14-31. The dynamic anisotropy function of the Leapfrog software package was used to vary the search ellipse orientations using azimuth and dip information collected from both the hanging wall and footwall surfaces of each mineralized wireframe in turn. Gold grades were estimated for each mineralized wireframe individually using the NN, OK, and ID³ interpolation algorithms using the Leapfrog software package. The gold grades for only selected wireframes were estimated using the OK interpolation algorithm.

A three-pass estimation approach with high grade restrictions was applied using “hard” domain boundaries for both selection of composite samples for grade estimation as well as “hard” block model boundaries to control which blocks receive estimated gold grades. Only data contained within the respective mineralized wireframes were used to estimate the gold grades, and only those blocks within the respective mineralized wireframes were allowed to receive grade estimates. Only the capped, composited grades were used to estimate the grades.

The gold grades estimated using the ID³ interpolation algorithm were selected for preparation of the Mineral Resource estimate. The gold grades for any blocks lying within the pegmatite unit were reduced to zero. The gold grades for those portions of wireframe S18 that resided within the backfilled area of the AB 1 open pit were reduced to zero to ensure proper reporting of the Mineral Resources.

For mine planning purposes, gold grades were also estimated for those volumes for which drill hole and sample information were available and that resided beyond the limits of the mineralized wireframes. The grades for these areas were estimated using composites of the capped gold grades, an isotropic search ellipse, and the ID³ interpolation algorithm. For clarity, these gold grades were estimated for mine planning purposes only and were not considered in any estimates of the Mineral Resources.

TABLE 14-31 SUMMARY OF SEARCH STRATEGIES - TAP AB DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine

Item	Description
Boundary conditions- data	Hard
Boundary conditions- blocks	Hard
Estimation Pass1	Search Radius 30x20x10; Maximum 3 samples per hole; Minimum 3 samples (Means Minimum 1 drill hole); Maximum 12 Samples; no outlier restriction
Estimation Pass2	Search Radius 60x40x10; Maximum 3 samples per hole; Minimum 3 samples (Means Minimum 1 drill hole); Maximum 12 Samples; 50% distance outlier restriction
Estimation Pass3	Search Radius 120x80x10; Maximum 3 samples per hole; Minimum 3 samples (Means Minimum 1 drill hole); Maximum 12 Samples; 25% distance outlier restriction
Outlier Restriction Threshold	All domains except S10 = 10.00 g/t S10 = 7.48 g/t

CLASSIFICATION

Definitions for resource categories used in this Technical Report are consistent with those defined by CIM (2014) and adopted by NI 43-101. The classification criteria were developed by consideration of the spatial continuity of the gold grades as suggested by the variograms, the density of available sample information, the degree of confidence in the estimation of the material densities, and the location of the mineralization in relation to the constraining surface (pit shell) used to assist in reporting of the Mineral Resources.

All estimated blocks contained within the constraining surface that were within the mineralized wireframe outlines were classified into the Indicated Mineral Resource category. All remaining blocks in the block model that were within the mineralized wireframe outlines but located below the constraining surface were classified into the Inferred Mineral Resource category.

All blocks with estimated grades that are located between the mineralized wireframe outlines were not classified.

BLOCK MODEL VALIDATION

Validation of the results of the Mineral Resource block model included visual comparisons, evaluation of the accuracy of the block model coding and global accuracy of the estimated grades, and evaluation of the local accuracy by preparation of swath plots. No reconciliation with the short term grade control block model was carried out.

Visual Comparisons:

Visual comparisons between the contoured and estimated gold grades were conducted for selected mineralized wireframes of the various lodes at the Tap AB deposit in longitudinal view (Figures 14-37 to 14-40, inclusive). It can be seen that, while a general agreement is present between the distribution of the estimated gold grades and the contoured drill hole grades for those portions within the Mineral Resource pit surface, differences are present at the local scale.

Visual comparisons of the estimated block grades with the drill hole assays showed a similar good general correlation between the estimated grades and the informing samples.

Looking West

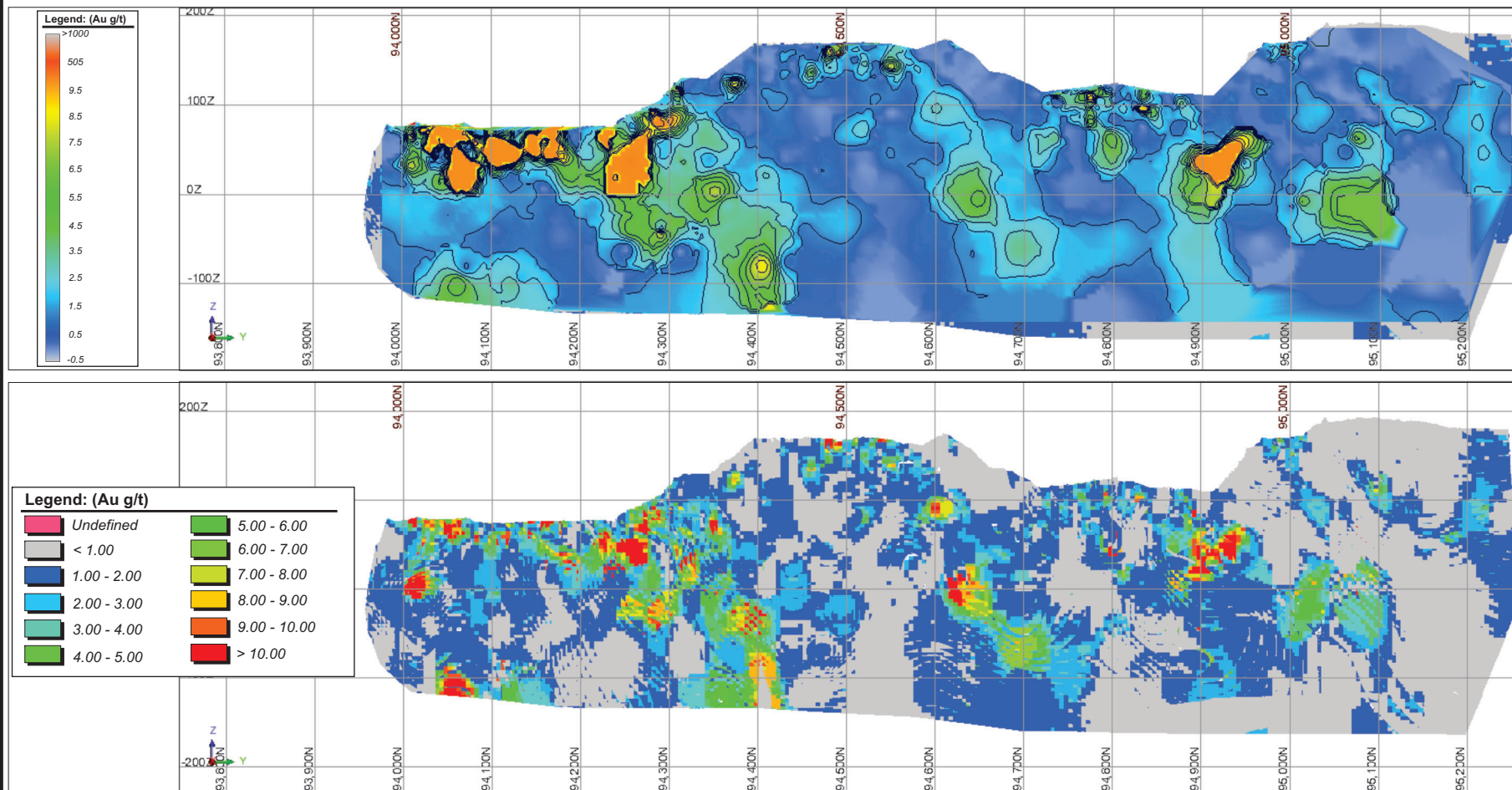


Figure 14-37

Great Panther Mining Limited

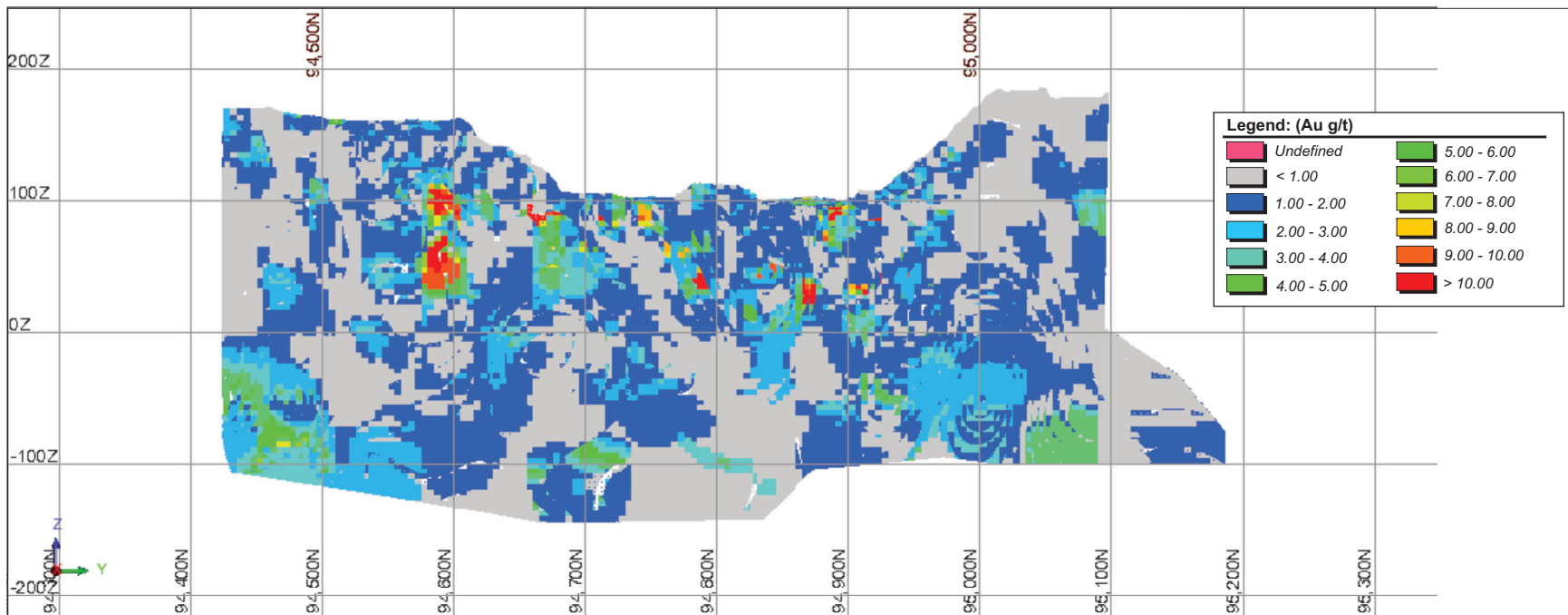
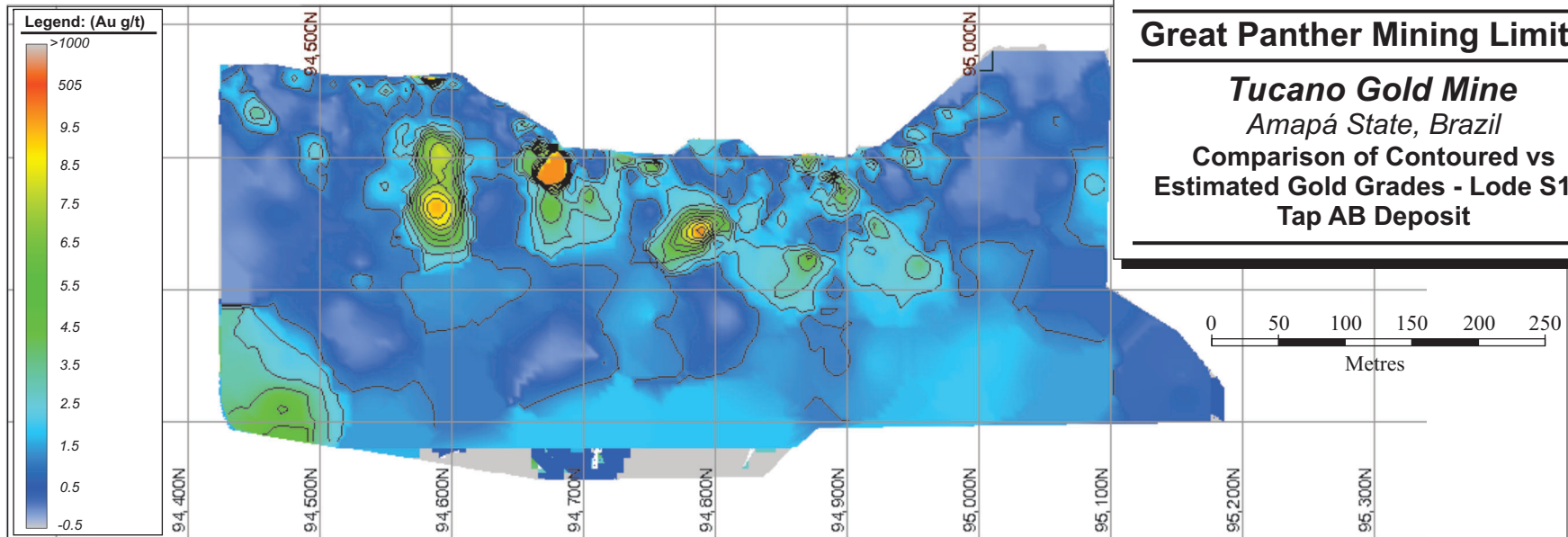
Tucano Gold Mine

Amapá State, Brazil

**Comparison of Contoured vs
Estimated Gold Grades - Lode S03,
Tap AB Deposit**

Looking West

Figure 14-38



March 2020

Source: RPA, 2020.

Looking West

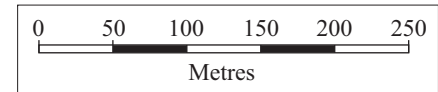
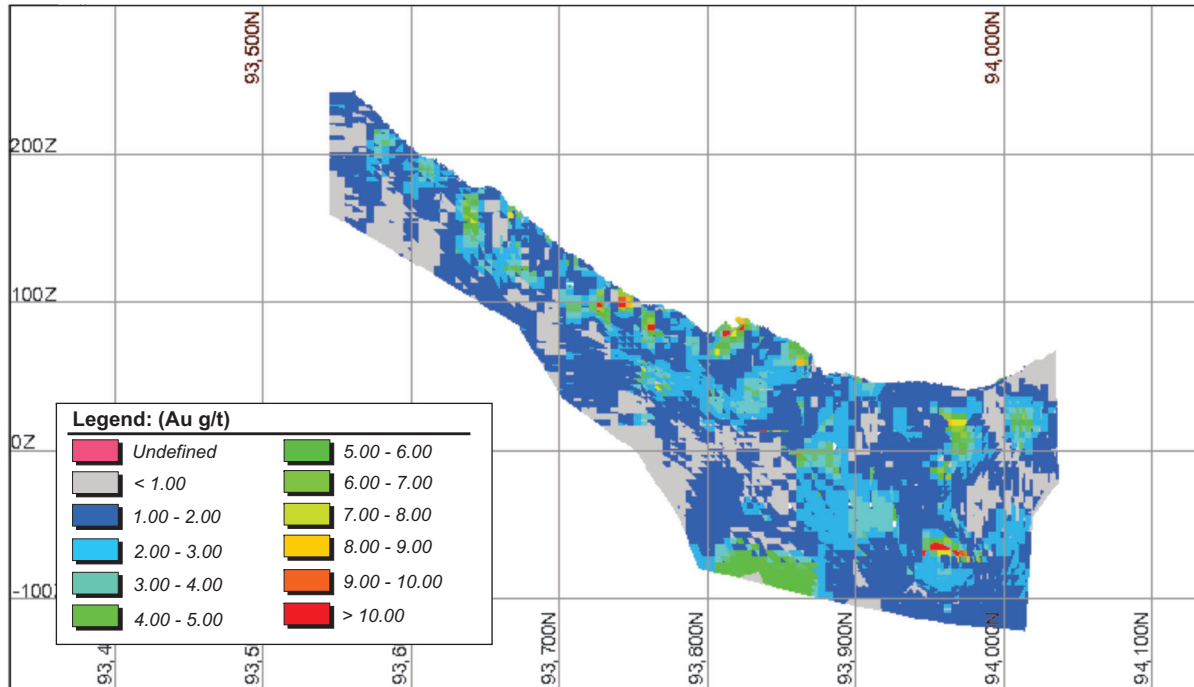
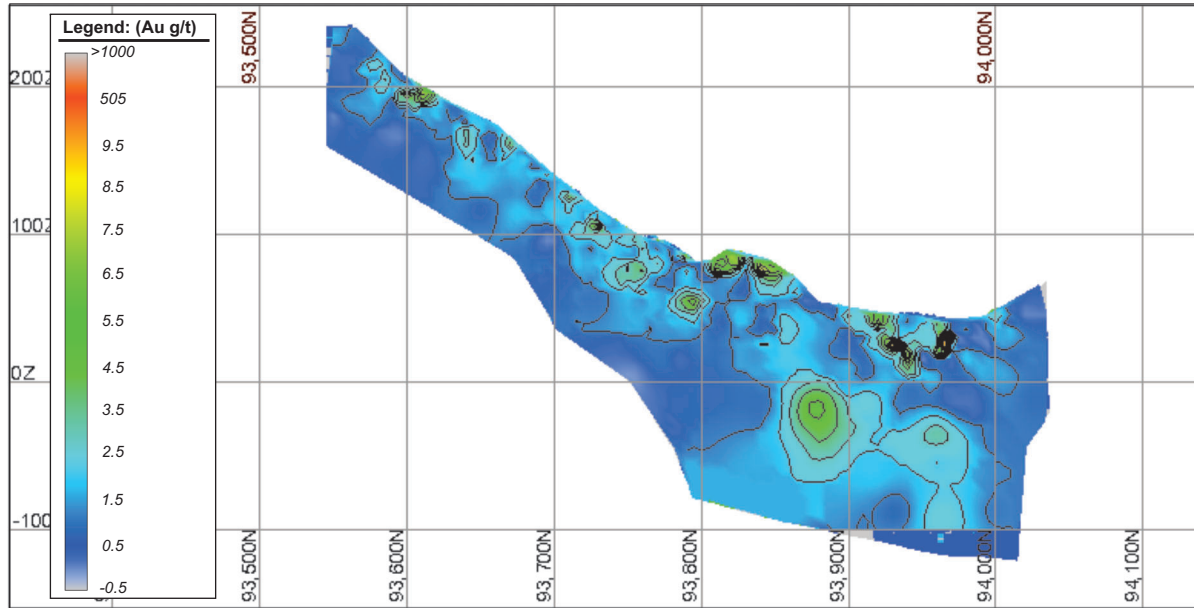


Figure 14-39

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Comparison of Contoured vs
Estimated Gold Grades - Lode S01,
Tap AB Deposit**

March 2020

Source: RPA, 2020.

Looking West

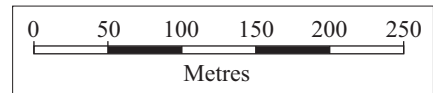
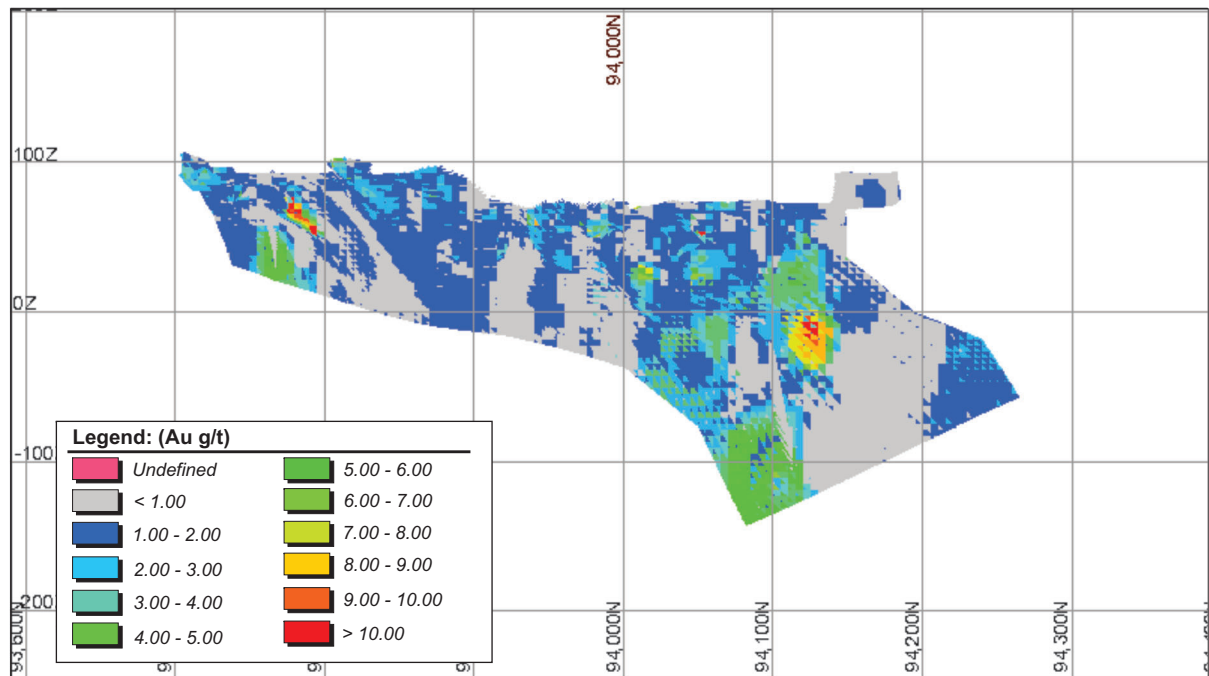
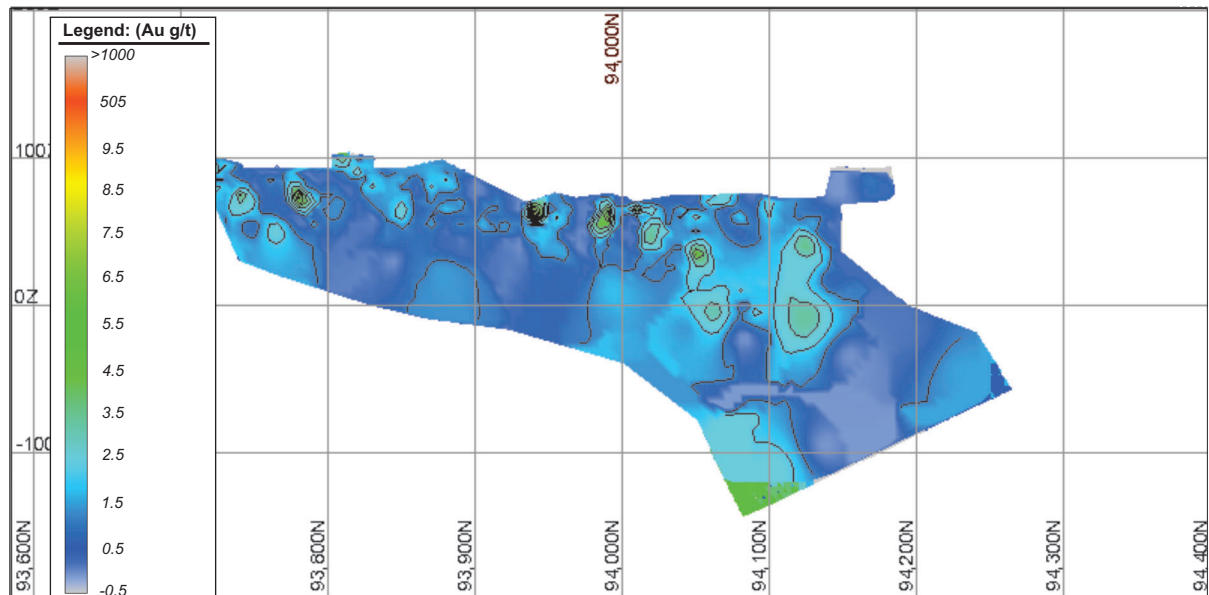


Figure 14-40

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Comparison of Contoured vs
Estimated Gold Grades - Lode S02,
Tap AB Deposit**

March 2020

Source: RPA, 2020.

Swath Plots:

Swath plots in section and plan (i.e., bench) views were prepared for selected lodes in which the average capped, composited assays were compared with the average of the estimated block grades. Examples are presented in Figures 14-41 and 14-42. Examination of these plots suggests that good agreement is present between the estimated grades and the informing samples for those portions of the block model containing a high density of drilling and sampling information. Higher variances are observed in areas where the density of sample information is reduced. A degree of smoothing is also observed.

FIGURE 14-41 SWATH PLOT BY NORTHING, LODE S03 - TAP AB DEPOSIT

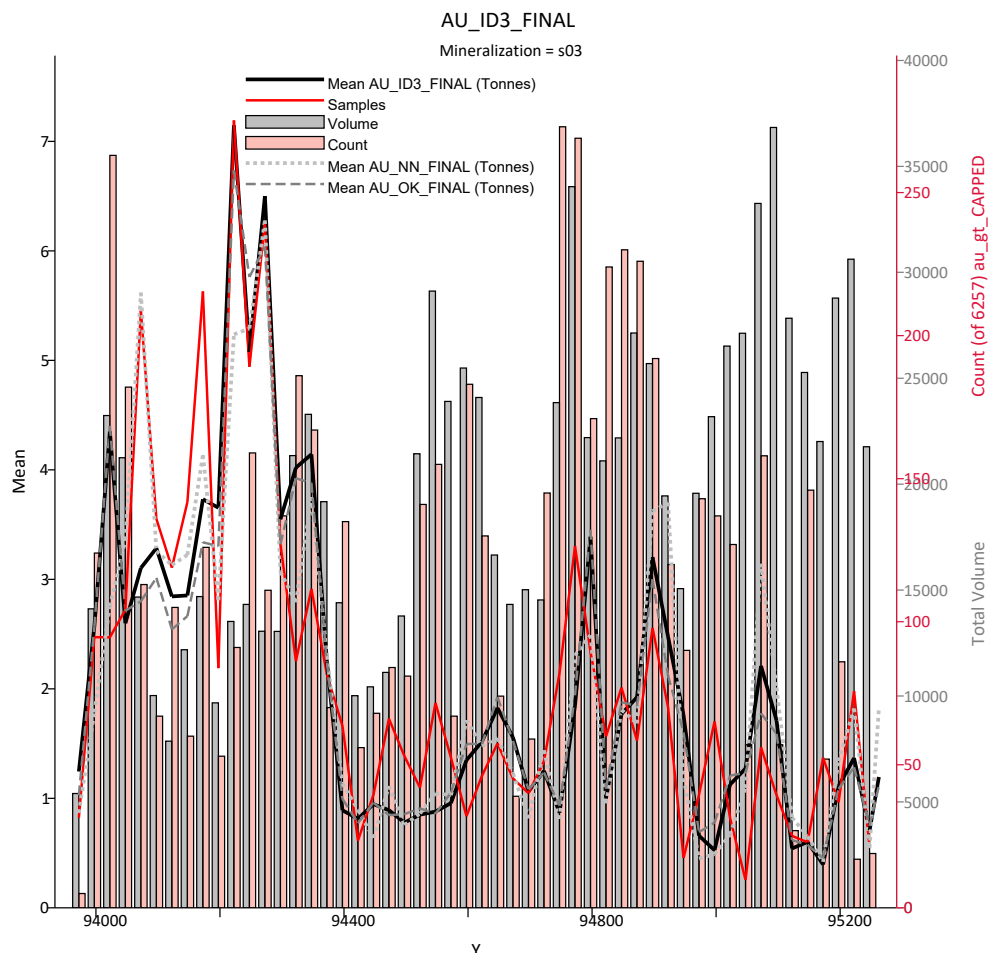
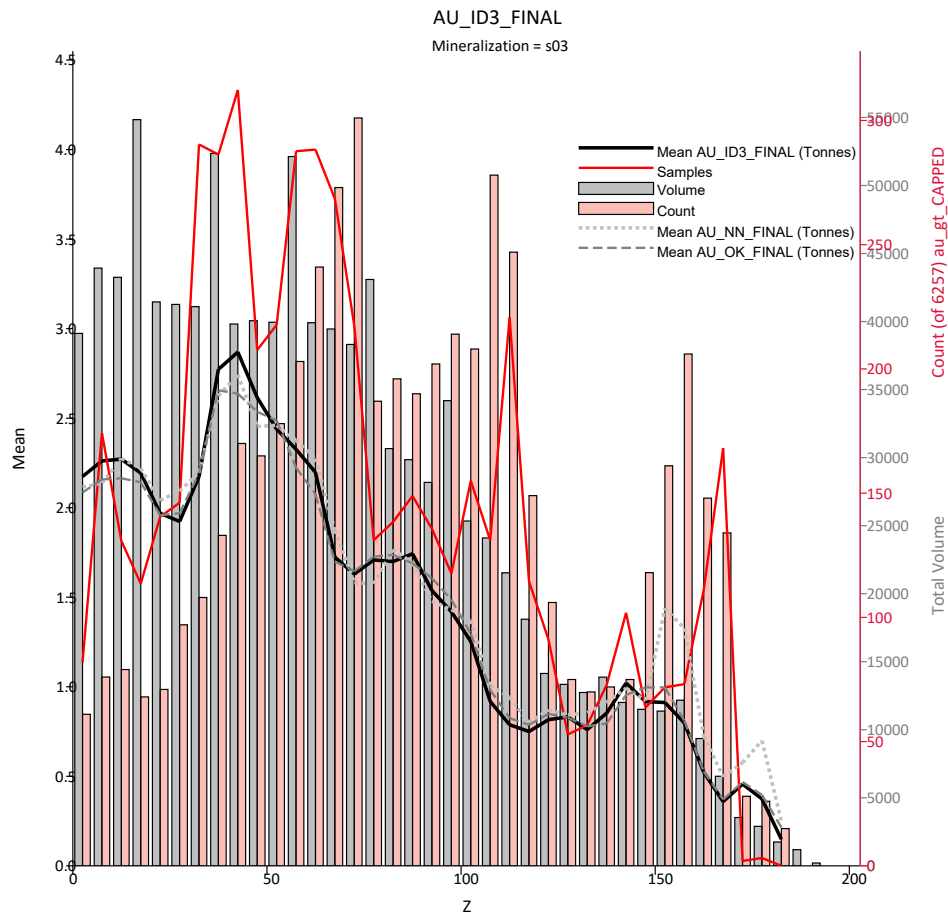


FIGURE 14-42 SWATH PLOT BY ELEVATION, LODS S03 - TAP AB DEPOSIT



On the basis of its review and validation activities, RPA is of the opinion that the long term Mineral Resource block model for the Tap AB deposit is sufficiently acceptable for use in preparing Mineral Resource estimates.

CUT-OFF GRADE AND WHITTLE PARAMETERS

Metal prices used for Mineral Reserves are based on consensus, long term forecasts from banks, financial institutions, and other sources. For Mineral Resources, metal prices used are slightly higher than those for Mineral Reserves.

A preliminary pit shell was generated using the Lerchs-Grossman optimization method as a constraint in the preparation of the Mineral Resource estimate report. The input parameters are presented in Table 14-32.

The sensitivity of the resulting pit shell to variations in the gold price was also investigated for the US\$1,600/oz Au and US\$1,700/oz Au cases (Table 14-33). It is important to note that the tonnage and grades presented in the sensitivity reports are provided solely for the purposes of estimating the impact of different metal prices. These tonnages and grades are provided on an unclassified basis only and are not to be construed as estimates of the Mineral Resources.

**TABLE 14-32 SUMMARY OF MINERAL RESOURCE PIT SHELL
INPUT PARAMETERS - TAP AB DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Parameter	Value
Gold Price (Base Case)	US\$1,500/oz Au
Exchange Rate	US\$1:R\$3.8
Mining Cost	
- oxide	\$3.02 /tonne
- fresh rock	\$3.28 /tonne
Processing Cost	
- oxide	\$11.93 /tonne
- fresh rock	\$18.33 /tonne
General and Administration Cost	\$6.15 /tonne
Gold Recovery	93%
Pit Discard Cut-off Grade	
- oxide	0.40 g/t Au
-fresh rock	0.55 g/t Au
Overall wall slope angle	
- oxide	36°
- fresh	43° - 51°

**TABLE 14-33 SENSITIVITY ANALYSIS - TAP AB DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Gold Price (US\$/oz Au)	Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)
1,500	1,501	2.39	115
1,600	1,690	2.29	124
1,700	2,224	2.14	153

MINERAL RESOURCE STATEMENT

The Mineral Resources are inclusive of Mineral Reserves. The Mineral Resources are reported for the open pit component of the Tap AB deposit using excavation surfaces current as of April 19, 2019. A block cut-off grade of 0.55 g/t Au was used to report the fresh rock Mineral Resources and a block cut-off grade of 0.40 g/t Au was used to report the oxide Mineral Resources (Table 14-34).

**TABLE 14-34 SUMMARY OF THE OPEN PIT MINERAL RESOURCE
ESTIMATE AS OF SEPTEMBER 30, 2019 - TAP AB DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Category	Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)
Measured	-	-	-
Indicated	1,607	2.33	120
Sub-total, Measured and Indicated	1,607	2.33	120
Inferred	-	-	-

Notes:

1. CIM (2014) definitions were followed for the Mineral Resource Estimate.
2. The Mineral Resources for the Tap AB Open Pit are estimated using drill hole and sample data as of September 30, 2019.
3. Mineral Resources are estimated at a cut-off grade of 0.40 g/t Au for oxidized material and 0.55 g/t Au for fresh rock.
4. Mineral Resources are estimated using a long-term gold price of US\$1,500/oz Au, and a US\$/R\$ exchange rate of 1:3.8.
5. A minimum width of 3 metres was used for preparation of mineralization wireframes.
6. High gold assays were capped to 20 g/t Au for the AB 1 deposit and 30 g/t Au for the AB 3 deposit.
7. Gold grades estimated using the Inverse Distance (Power 3) interpolation algorithm were used to prepare the Mineral Resource statements.
8. Mineral Resource statements are prepared using constraining surfaces for open pit Mineral Resources.
9. Mineral Resources, which are not Mineral Reserves, do not have demonstrated economic viability.
10. Numbers may not add due to rounding.

Tucano is a currently operating, fully permitted mining and processing operation. Consequently, RPA is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate. Changes in the commodity prices, operating costs, or metallurgical recoveries could have commensurate impacts upon the Mineral Resource estimates.

UNDERGROUND

RPA reported resources in the underground portion of the Tap AB deposit from the model described above in the open pit section, using drill hole and sample data as of September 30, 2019.

MINERAL RESOURCE STATEMENT

The Mineral Resources are inclusive of Mineral Reserves. The Mineral Resources are reported for the underground component of the Tap AB deposit using excavation surfaces current as April 19, 2019 and reported below the open pit shell (see Open Pit section of the Tap AB deposit above). To ensure continuity at the underground cut-off grade, RPA constructed shapes within the oxide and fresh rock at Tap AB. Within the oxide rock, reporting

shapes were based on a cut-off grade of 2.10 g/t Au and, within fresh rock, reporting shapes were based on a cut-off grade of 1.60 g/t Au. RPA reported all blocks within these volumes as underground Mineral Resources (Table 14-35).

TABLE 14-35 SUMMARY OF THE UNDERGROUND MINERAL RESOURCE ESTIMATE AS OF SEPTEMBER 30, 2019 - TAP AB DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine

Category	Cut-off Grade (g/t Au)	Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)
Underground				
Oxide	2.10			
Indicated		174	4.94	28
Inferred		1,436	2.33	108
Fresh	1.60			
Indicated		184	4.33	26
Inferred		4,331	2.06	287
Total				
Indicated		357	4.63	53
Inferred		5,767	2.13	395

Notes:

1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated at various cut-off grades depending on envisioned mining methods and mineralization style.
3. Mineral Resources are estimated using a long-term gold price of US\$1,500/oz Au, and a US\$/R\$ exchange rate of 1:3.8.
4. Mineral Resources are inclusive of Mineral Reserves.
5. Mineral Resource statements are prepared using constraining surfaces for open pit Mineral Resources.
6. Mineral Resources, which are not Mineral Reserves, do not have demonstrated economic viability.
7. Numbers may not add due to rounding.

Tucano is a currently operating, fully permitted mining and processing operation. Consequently, RPA is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate. Changes in the commodity prices, operating costs, or metallurgical recoveries could have commensurate impacts upon the Mineral Resource estimates.

URUCUM EAST AND DUCKHEAD DEPOSITS

DUCKHEAD DEPOSIT

Mineralization at the Duckhead deposit is controlled by the intersection of steep east-west striking shear zones with BIF lithological contacts forming steeply west plunging high grade shoots.

RPA reviewed the parameters, workflows, and results used to prepare the block model used to report the 2017 Mineral Resource at Duckhead estimated by AMC. Overall, these were judged to be adequate for preparing updated statements of the updated Mineral Resource. RPA made several modifications to the resource estimated, including the use of a constraining surface resource pit shell to report open pit resources. Underground resources are reported below the pit surface at a higher cut-off grade.

No additional work has been incorporated into the Duckhead model since the previous estimate.

TOPOGRAPHY

A digital copy of the as-mined topographic surface was provided to RPA for the Duckhead deposit that was current as of September 30, 2019. The resulting digital terrain surface (DTM) is available in AutoCAD Drawing Exchange (DXF) format.

RESOURCE DATABASE

The Duckhead model was updated with new drill hole results as of February 23, 2017. The drill hole database provided to RPA for review includes 4,821 holes with assays from auger, channel, diamond, RAB, RC, and trenches. Table 14-36 summarizes the subset of 1,735 holes that intersect the mineralized domains at Duckhead.

TABLE 14-36 SUMMARY OF THE RESOURCE DATABASE - DUCKHEAD DEPOSIT

Great Panther Mining Limited – Tucano Gold Mine

Drill Hole Type	Count	Metres
DDH	72	9,686
RC	1,059	51,971
Channel	20	630
RAB	418	2,577
Auger	133	630
Trench	33	1,209
Total	1,735	66,703

RPA conducted several checks on the resource database including a search for unique, missing, and overlapping intervals; a total depth comparison, duplicate holes, property boundary limits, and a visual search for extreme or deviant survey values.

The resource database is considered by RPA to be sufficiently reliable for grade modelling and Mineral Resource estimation.

LITHOLOGICAL MODEL

The Duckhead geological model was constructed using 10 m spaced northeast-southwest sections cut oblique to the strike of the stratigraphy. Modelled lithologies include a main BIF unit with internal carbonates, schists, and amphibolites.

A weathering surface defining the base of oxidation was interpreted using drill holes.

MINERALIZATION MODELS

Twenty-four mineralized resource domains were interpreted and modelled in three dimensions (3D) using vertical and plan sections. Where there was an adequate amount of data, wireframes were sub-domained into oxide and sulphide for gold grade estimation. Duckhead is characterized by high grade assays in the core of the deposit, and nested grade shells were used to limit smearing and restrict the influence of these data during estimation.

The modelling for Duckhead covers the main Duckhead pit and the surrounding smaller deposits.

Nominal cut-off grades used to develop nested grade shells are summarized in Table 14-37.

TABLE 14-37 AMC GOLD CUT-OFF GRADES USED FOR NESTED GRADE SHELLS – DUCKHEAD DEPOSIT

Great Panther Mining Limited – Tucano Gold Mine

Domain	Lode Name	Lode Code	Cut-off Grade (g/t Au)
Main	Extreme Grade Core	Lode 1	50
	High Grade Envelope	Lode 2	2.0
	Low Grade Envelope	Lode 3	0.3
Hanging Wall	High Grade Envelope	Lode 4	2.0
	Low Grade Envelope	Lode 4	0.3

The remaining Duckhead lodes were modelled using a 0.3 g/t Au cut-off grade.

RPA recommends that a minimum mining thickness be used when modelling mineralized domains and that wireframes be snapped to assays.

EXPLORATORY DATA ANALYSIS

AMC calculated statistics for raw assay data by lode domain and weathering sub-domain (if applicable). RPA reviewed the assay statistics and concludes that it accurately summarizes the data.

COMPOSITING

AMC created two metre downhole composites inside the mineralized domains beginning at the upper contacts and flagged by lode code. If the remaining length was greater than or equal to 0.95 m, the composite was accepted as part of the dataset; if the remaining length was less than 0.95 m, the composite was not included. Composites with a majority length inside the pegmatite wireframes that crosscut mineralized domains were removed to minimize internal dilution. A total of 8,365 composites were created and used for resource estimation.

In RPA's opinion, a composite length of two metres is appropriate at Duckhead, and there is negligible bias and reduction (or increase) in gold grade between raw assays and uncapped composites. RPA conducted a check on assays and composites within the wireframe models and the results were reasonably consistent with data included in the previous Technical Report.

CAPPING HIGH GRADE VALUES

AMC opted to cap high grade assay data after compositing. Each mineralized domain was reviewed for outliers using logarithmic histograms and probability plots. In domains with uncapped composites, AMC controlled the influence of samples by applying more restrictive ranges during grade interpolations as described below.

RPA reviewed the statistical distribution of the original assay and composite data by plotting histograms and log scale probability plots. In RPA's opinion, the capping values used by AMC on composite samples is acceptable. RPA recommends, however, that capping values be applied to assays prior to compositing.

BULK DENSITY

Within the Duckhead project, 4,516 bulk density measurements are available, within oxide weathering units and within fresh rock. Density measurements were assigned to a lithological unit and interpolated into the block model using the NN method.

In RPA's opinion, the average bulk density values of the lithological units at Duckhead appear reasonable.

VARIOGRAPHY AND INTERPOLATION PARAMETERS

AMC sub-divided capped composites into four groups based on the orientation of the mineralized domain. Lode 1 contains most of the resources at Duckhead and was treated as a separate group.

Gold grades were estimated in three consecutive OK passes using the parent cells, hard boundaries, and two metre capped composites. The radius for the first and second pass is based on the variogram ranges and the search ellipsoids are oriented in the same direction as the variogram models. A larger search was used for the third pass to fill all empty blocks. Interpolation and search parameters used by AMC are summarized in Table 14-38.

TABLE 14-38 SUMMARY OF SEARCH PARAMETERS – DUCKHEAD DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine

Parameter	Pass 1	Pass 2	Pass 3
No. Composites (min/max)	4/32	4/32	1/4
Search type	Octant	Octant	-
Optimal Samples per Octants	3	2	-
Min. drill holes	3	2	1
Search radius (% of variogram)	85-90%	-	-
Search radius X (m)	20-30	40-60	1,500
Search radius Y (m)	30-50	60-100	1,500
Search radius Z (m)	10-20	20-40	100

BLOCK MODEL CONSTRUCTION

AMC constructed the Duckhead block model in the National Grid system (UTM SAD69 Zone 22N) using Surpac software. The estimation was completed in Isatis and imported into the sub-blocked Surpac model. Table 14-39 summarizes the block model parameters at Duckhead.

TABLE 14-39 BLOCK MODEL PARAMETERS – DUCKHEAD DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine

	Easting (X)	Northing (Y)	Elevation (Z)
Minimum (m)	407,750	87,750	-250
Maximum (m)	409,750	90,250	300
Extents (m)	2,000	2,500	550
Block size (m)	5.0	10.0	2.0
Sub block size (m)	0.625	2.5	1.0
Rotation (° around axis)	0°	-45°	0°

CLASSIFICATION

Resources were classified based on the confidence in geological knowledge and interpretation, drilling density and orientation, variogram model attributes, including the range of the first structure, and estimation statistics such as slope of regression. AMC visually inspected the classification results and manually re-classified blocks where appropriate.

RPA reviewed the classified block model within the open pit shell. RPA re-assigned the blocks previously classified as Measured to Indicated. RPA re-classified all resource blocks below the reporting pit shell to the Inferred category. In RPA's opinion, the final classified block model is reasonable for this level of study. RPA recommends that the local block classification be

adjusted within the open pit in areas where isolated islands of Inferred blocks occur within large areas of Indicated Mineral Resources.

BLOCK MODEL VALIDATION

RPA carried out several block model validation procedures including:

- Visual comparisons of block gold values versus composite values, and block density values versus sample point values.
- Statistical comparisons.
- Comparison of the volumes of the wireframe models to the block model volume results.
- Trend plots of block gold values by elevation, northing, and easting.
- Comparison of block and composite grades in blocks containing composites.

Block grades were visually examined and compared with composite grades in cross section and on elevation plans. RPA found grade continuity to be reasonable and confirmed that block grades were reasonably consistent with local drill hole assay and composite grades and that there was no significant bias apparent.

To check for conditional bias, trend plots were created which compared the gold block model estimates with the composite and sample average grades within the preliminary Whittle pit shell. In RPA's opinion, there is no significant bias between the resource block grades and the assay composites.

As a final check, RPA compared the volume of the mineralized domain models to the block model volume results. The volume difference is 1.4%, which RPA considers to be an acceptable result.

Validation by RPA indicates that the block model is a reasonable representation of the tonnages and grades of the mineralized zones at Duckhead.

CUT-OFF GRADE AND WHITTLE PARAMETERS

Metal prices used for Mineral Reserves are based on consensus, long term forecasts from banks, financial institutions, and other sources. For Mineral Resources, metal prices used are slightly higher than those for Mineral Reserves.

A preliminary pit shell was generated using the Lerchs-Grossman optimization method as a constraint in the preparation of the Mineral Resource estimate report. The input parameters are presented in Table 14-40.

**TABLE 14-40 SUMMARY OF MINERAL RESOURCE PIT SHELL
INPUT PARAMETERS – DUCKHEAD DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Parameter	Value
Gold Price (Base Case)	US\$1,500/oz Au
Exchange Rate	US\$1:R\$3.8
Mining Cost	
- oxide	\$3.02 /tonne
- fresh rock	\$3.28 /tonne
Processing Cost	
- oxide	\$11.93 /tonne
- fresh rock	\$18.33 /tonne
General and Administration Cost	\$6.15 /tonne
Gold Recovery	93%
Pit Discard Cut-off Grade	
- oxide	0.40 g/t Au
-fresh rock	0.55 g/t Au
Overall wall slope angle	
- oxide	36°
- fresh	43° - 51°

MINERAL RESOURCE STATEMENT

The Mineral Resources are inclusive of Mineral Reserves. The Mineral Resources are reported for the open pit component of the Duckhead deposit using excavation surfaces current as of December 31, 2016 and are constrained by a pit shell. A block cut-off grade of 0.55 g/t Au was used to report the fresh rock Mineral Resources and a block cut-off grade of 0.40 g/t Au was used to report the oxide Mineral Resources (Table 14-40). The Mineral Resources are reported for the underground component of the Duckhead deposit below the pit shell. A block cut-off grade of 1.60 g/t Au was used to report the fresh rock Mineral Resources and a block cut-off grade of 2.10 g/t Au was used to report the oxide Mineral Resources (Table 14-41).

TABLE 14-41 SUMMARY OF THE OPEN PIT AND UNDERGROUND MINERAL RESOURCE ESTIMATES AS OF SEPTEMBER 30, 2019 - DUCKHEAD DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine

Category	Cut-off Grade (g/t Au)	Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)
Open Pit				
Oxide	0.4			
Indicated		64	4.36	9
Inferred		6	1.71	0.4
Fresh	0.55			
Indicated		118	2.06	8
Inferred		5	4.14	1
Total				
Indicated		183	2.87	17
Inferred		12	2.79	1
Underground				
Oxide	2.10			
Indicated		-	-	-
Inferred		33	4.2	5
Fresh	1.60			
Indicated		-	-	-
Inferred		230	2.05	15
Total				
Indicated		-	-	-
Inferred		263	2.32	20

Notes:

1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated at various cut-off grades depending on envisioned mining methods and mineralization style.
3. Mineral Resources are estimated using a long-term gold price of US\$1,500/oz Au, and a US\$/R\$ exchange rate of 1:3.8.
4. A minimum width of 1 m was used for preparation of mineralization wireframes.
5. Mineral Resources are inclusive of Mineral Reserves.
6. Mineral Resource statements are prepared using constraining surfaces for open pit Mineral Resources.
7. Mineral Resources, that are not Mineral Reserves, do not have demonstrated economic viability.
8. Numbers may not add due to rounding.

Tucano is a currently operating, fully permitted mining and processing operation. Consequently, RPA is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate. Changes in the commodity prices, operating costs, or metallurgical recoveries could have commensurate impacts upon the Mineral Resource estimates.

URUCUM EAST DEPOSIT

Mineralization at the Urucum East deposit occurs within the bedrock and within colluvium. Mineralization within bedrock occurs as a single lode hosted in a wedge of carbonate and altered BIF. The mineralized lode is covered by a blanket of poorly mineralized colluvium.

RPA reviewed the parameters, workflows, and results used to prepare the block model used to report the 2017 Mineral Resource at Urucum East estimated by AMC. Overall, these were judged to be adequate for preparing updated statements of the updated Mineral Resource. RPA made several modifications to the resource estimated, including the use of a constraining surface resource pit shell to report open pit resources. Underground resources are reported below the pit surface at a higher cut-off grade.

TOPOGRAPHY

A digital copy of the topographic surface was provided to RPA for the Urucum East deposit that was current as of September 30, 2019. The resulting DTM is available in DXF format. Although there has been mining activity on the Urucum deposit, no mining has occurred at Urucum East.

RESOURCE DATABASE

Table 14-42 summarizes the resource database used to estimate Mineral Resources at Urucum East. The Urucum East drill hole database includes all drilling data available as of August 12, 2013, with samples from RC and DD. No additional drilling has been completed at Tucano since that date.

TABLE 14-42 SUMMARY OF THE RESOURCE DATABASE – URUCUM EAST DEPOSIT

Great Panther Mining Limited – Tucano Gold Mine

Drill hole Type	Count	Metres
DDH	65	6,252
RC	4	303
Total	69	6,555

RPA conducted several checks on the resource database, including a search for unique, missing, and overlapping intervals; a total depth comparison, duplicate holes, property boundary limits, and a visual search for extreme or deviant survey values.

The resource database is considered by RPA to be sufficiently reliable for grade modelling and Mineral Resource estimation.

LITHOLOGICAL MODEL

The Urucum East geological model defined the major rock types surrounding the resource area. Modelled lithologies include colluvium, schist, pegmatite, carbonates and calcsilicates, and BIF/iron formation.

A weathering surface defining the base of oxidation was interpreted using drill holes. The combination of the lithological and weathering models is the primary basis for assigning global bulk density values.

MINERALIZATION MODELS

A single mineralized domain was modelled within bedrock as an east-west striking, gently dipping tabular body. Mineralization within bedrock occurs as a single lode hosted in a wedge of carbonate and altered BIF within a swarm of barren pegmatite dykes. The overlying colluvium within the Tucano area is poorly mineralized; a separate domain was not modelled, rather the entire lithological model was used for gold estimation. Table 14-43 summarizes the mineralized domains on the Urucum East project.

TABLE 14-43 MINERALIZED DOMAINS - URUCUM EAST DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine

Domain	Zone Code
High Grade Lode	100
Colluvium Domain	200

EXPLORATORY DATA ANALYSIS

AMC calculated statistics for raw assay data by lode domain and weathering subdomain (if applicable). Mineralization within the High Grade Lode is significantly higher grade (mean of 1.7 g/t Au) than within the Colluvium Domain (mean of 0.02 g/t Au). RPA reviewed the assay statistics and concludes that they accurately summarize the data.

COMPOSITING

AMC created one metre downhole composites inside the mineralized domains beginning at the upper contacts and flagged by domain code. The residual length remaining when drill hole intersections were not even multiples of the composite length, were distributed equally

throughout the composite samples within the intersection. A total of 896 composites were created within the mineralized domains and used for resource estimation.

In RPA's opinion, a composite length of one metre is appropriate at Urucum East. RPA conducted a check on assays and composites within the wireframe models and the results were reasonably consistent with data included in the previous Technical Report.

CAPPING HIGH GRADE VALUES

AMC reviewed high grade values of the one metre assay composites for capping. Each mineralized domain was reviewed for outliers using logarithmic histograms and probability plots. AMC did not apply high grade caps and cited the moderate CV and lack of extreme outliers to support this conclusion. RPA concurs with AMC's conclusion after reviewing the statistical distribution of original assays and composite data.

BULK DENSITY

Within the Urucum East project, 1,719 bulk density measurements are available, 16% within oxide weathering units and 84% within fresh rock. Density measurements were assigned to a lithological unit and a global bulk density value was assigned to block model by lithology code.

In RPA's opinion, the average bulk density values of the lithological units at the Urucum East project appear reasonable.

VARIOGRAPHY AND INTERPOLATION PARAMETERS

Directional variography was completed on the one metre downhole composites at a lag distance of 25 m. The variograms developed for the High Grade domain followed the structure of the lode, with a maximum range of 76 m down plunge. An omni-directional variogram model with a maximum range of 125 m was modelled for the Colluvium domain.

Gold grades were estimated in a single OK pass using the parent cells, hard boundaries, and one metre capped composites. The radius for each pass is based on the variogram ranges. Interpolation and search parameters used by AMC are summarized in Table 14-44.

TABLE 14-44 SUMMARY OF SEARCH PARAMETERS – URUCUM EAST DEPOSIT

Great Panther Mining Limited – Tucano Gold Mine

Parameter	High Grade Domain	Colluvium Domain
No. Composites (min/max)	3/20	4/24
Min. drill holes	1	1
Search radius (% of variogram)	100%	100%
Search radius X (m)	76	155
Search radius Y (m)	53	155
Search radius Z (m)	7.6	155

BLOCK MODEL CONSTRUCTION

The Urucum East block model was created in the National Grid system (UTM SAD69 Zone 22N) and block estimation was completed by AMC using Surpac software. Table 14-45 summarizes the block model parameters at Urucum East.

TABLE 14-45 BLOCK MODEL PARAMETERS – URUCUM EAST DEPOSIT

Great Panther Mining Limited – Tucano Gold Mine

	Easting (X)	Northing (Y)	Elevation (Z)
Minimum (m)	402,600	100,000	0
Maximum (m)	403,250	100,490	320
Extents (m)	650	490	320
Block size (m)	5.0	10.0	2.0
Sub block size (m)	0.625	2.5	1.0
Rotation (° around axis)	0°	0°	0°

CLASSIFICATION

RPA reviewed the classified block model at Urucum East. RPA re-classified all blocks within the open pit shell as Indicated and all blocks below the reporting pit shell to Inferred. There are no Measured Resources at Urucum East.

In RPA's opinion, the final classified block model is reasonable for this level of study.

BLOCK MODEL VALIDATION

RPA carried out several block model validation procedures including:

- Visual comparisons of block gold values versus composite values, and block density values versus sample point values.
- Statistical comparisons.

- Comparison of the volumes of the wireframe models to the block model volume results.
- Trend plots of block gold values by elevation, northing, and easting.
- Comparison of block and composite grades in blocks containing composites.

Block grades were visually examined and compared with composite grades in cross section and on elevation plans. RPA found grade continuity to be reasonable and confirmed that block grades were reasonably consistent with local drill hole assay and composite grades and that there was no significant bias apparent.

To check for conditional bias, trend plots were created which compared the gold block model estimates with the composite and sample average grades within the preliminary Whittle pit shell. In RPA's opinion, there is no significant bias between the resource block grades and the assay composites.

As a final check, RPA compared the volume of the mineralized domain models to the block model volume results. The volume difference is <0.1%, which RPA considers to be an acceptable result.

Validation by RPA indicates that the block model is a reasonable representation of the tonnages and grades of the mineralized zones at Urucum East.

CUT-OFF GRADE AND WHITTLE PARAMETERS

Metal prices used for Mineral Reserves are based on consensus, long term forecasts from banks, financial institutions, and other sources. For Mineral Resources, metal prices used are slightly higher than those for Mineral Reserves.

A preliminary pit shell was generated using the Lerchs-Grossman optimization method as a constraint in the preparation of the Mineral Resource estimate report. The input parameters are presented in Table 14-46.

**TABLE 14-46 SUMMARY OF MINERAL RESOURCE PIT SHELL
INPUT PARAMETERS – URUCUM EAST DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine**

Parameter	Value
Gold Price (Base Case)	US\$1,500/oz Au
Exchange Rate	US\$1:R\$3.8
Mining Cost	
- oxide	\$3.02 /tonne
- fresh rock	\$3.28 /tonne
Processing Cost	
- oxide	\$11.93 /tonne
- fresh rock	\$18.33 /tonne
General and Administration Cost	\$6.15 /tonne
Gold Recovery	93%
Pit Discard Cut-off Grade	
- oxide	0.40 g/t Au
-fresh rock	0.55 g/t Au
Overall wall slope angle	
- oxide	36°
- fresh	43° - 51°

MINERAL RESOURCE STATEMENT

The Mineral Resources are inclusive of Mineral Reserves. The Mineral Resources are reported for the open pit component of the Urucum East deposit using excavation surfaces current as of December 31, 2016 and are constrained by a pit shell. A block cut-off grade of 0.55 g/t Au was used to report the fresh rock Mineral Resources and a block cut-off grade of 0.40 g/t Au was used to report the oxide Mineral Resources (Table 14-46). The Mineral Resources are reported for the underground component of the Urucum East deposit below the pit shell. A block cut-off grade of 1.60 g/t Au was used to report the fresh rock Mineral Resources and a block cut-off grade of 2.10 g/t Au was used to report the oxide Mineral Resources (Table 14-47).

TABLE 14-47 SUMMARY OF THE OPEN PIT AND UNDERGROUND MINERAL RESOURCE ESTIMATE AS OF SEPTEMBER 30, 2019 - URUCUM EAST DEPOSIT
Great Panther Mining Limited – Tucano Gold Mine

Category	Cut-off Grade (g/t Au)	Tonnage (000)	Grade (g/t Au)	Contained Metal (000 oz Au)
Open Pit				
Oxide	0.4			
Indicated		143	2.09	10
Underground				
Fresh	1.60			
Inferred		100	2.11	7
Total				
Indicated		143	2.09	10
Inferred		100	2.11	20

Notes:

1. CIM (2014) definitions were followed for Mineral Resources.
2. Mineral Resources are estimated at various cut-off grades depending on envisioned mining methods and mineralization style.
3. Mineral Resources are estimated using a long term gold price of US\$1,500/oz Au, and a US\$/R\$ exchange rate of 1:3.8.
4. A minimum width of 1 m was used for preparation of mineralization wireframes.
5. Mineral Resources are inclusive of Mineral Reserves.
6. Mineral Resource statements are prepared using constraining surfaces for open pit Mineral Resources.
7. Mineral Resources, that are not Mineral Reserves, do not have demonstrated economic viability.
8. Numbers may not add due to rounding.

Tucano is a currently operating, fully permitted mining and processing operation. Consequently, RPA is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate. Changes in the commodity prices, operating costs, or metallurgical recoveries could have commensurate impacts upon the Mineral Resource estimates.

TAP C DEPOSIT

RPA reviewed the parameters, workflows, and results used to prepare the block model used to report the 2017 Mineral Resource at Tap C estimated by AMC. Overall, these were judged to be adequate for preparing updated statements of the updated Mineral Resource. RPA made several modifications to the resource estimated, including the use of a constraining surface resource pit shell to report open pit resources with a topography surface that accounts for all mining activity current as of September 30, 2019.

In RPA's opinion, results from the pit optimization at Tap C demonstrate that the unmined material remaining at Tap C does not satisfy the CIM (2014) requirement of "reasonable prospects for economic extraction". No Mineral Resources have been reported.

RPA recommends that the down-dip projections of the BIF and carbonate units for the Tap C sector be evaluated for their potential of hosting significant quantities of gold mineralization.

COMPARISON TO PREVIOUS ESTIMATES

A comparison to the previous June 30, 2017 Mineral Resource estimates is provided in Table 14-48 below.

TABLE 14-48 COMPARISON OF CURRENT AND PREVIOUS MINERAL RESOURCE ESTIMATES
Great Panther Mining Limited – Tucano Gold Mine

Resource Estimates	Measured plus Indicated			Inferred		
	Tonnes (000)	Grade (g/t Au)	Contained Metal (000 oz Au)	Tonnes (000)	Grade (g/t Au)	Contained Metal (000 oz Au)
June 30, 2017	40,742	1.71	2,240	16,351	2.19	1,150
Depletion	5,681	1.49	271	-	-	-
Depleted June 2017 Model	35,061	1.75	1,969	16,351	2.19	1,150
September 30, 2019	13,482	2.22	960	11,664	2.16	812
Difference	-21,579	0.47	-1,009	-4,687	-0.02	-339
% Difference	-62%	27%	-51%	-29%	-1%	-29%

The 2019 Tucano Mineral Resource estimates result in a 51% reduction in Measured & Indicated gold ounces after accounting for a 62% reduction in ore tonnage and a 27% increase in gold grades.

The 2017 estimate was made up of eight block models, two of which used a multiple indicator kriging or "MIK" geostatistical approach (Urucum and TAP AB open pit models). The other six block models (all other deposits, including Urucum North underground) used grade estimation domains and either ordinary kriging or inverse distance interpolation methods. These estimates are described in a Technical Report dated October 31, 2018.

The most significant change in the 2019 estimates is the geological interpretation of the mineralized zones. RPA and Great Panther interpreted mineralized zones as discrete lodes, which in turn were used to constrain the block grade estimates. The 2017 resource model used a geostatistical approach with limited manual interpretation, partially due to the predominance of oxide ore mining at the time of that estimate.

The 2019 tonnage of open pit resources was further reduced at the resource reporting stage given that the reporting pit shells optimized on the more laterally constrained 2019 model were shallower than those used in 2017.

Further reductions are due to changes in the following areas:

- The use of pit shells to report the Mineral Resources for the satellite zones, as opposed to an unconstrained approach not using pit shells in the previous estimate.
- Additional drill hole information.
- Higher cut-off grades for creating the mineralization interpretation that reflects the current operating parameters.
- Use of more conservative grade capping to address outlier assays.
- Revised compositing lengths and procedures.

15 MINERAL RESERVE ESTIMATE

SUMMARY

The Mineral Reserve estimate for the Tucano Project conforms to the CIM (2014) definitions as incorporated under NI 43-101 guidelines. To convert Mineral Resources to Mineral Reserves, RPA applied modifying factors of dilution and mineral extraction to only the Measured and Indicated categories of the Mineral Resource. Inferred Resources are not included in the Mineral Reserves. The Mine consists of both open pit and underground Mineral Resources for which Mineral Reserves have been independently estimated.

The Mineral Reserve statement for the Mine is presented in Table 15-1. The estimate is based on the newly developed 2019 resource block models as described in Section 14. This Mineral Reserve estimate includes open pit mining in Urucum, Tap AB, Urucum East, and Duckhead and underground mining in the Urucum deposit.

TABLE 15-1 SUMMARY OF THE MINERAL RESERVE ESTIMATE AS OF SEPTEMBER 30, 2019
Great Panther Mining Limited – Tucano Gold Mine

Category	Tonnage (000 t)	Grade (g/t Au)	Contained Metal (000 oz Au)
Proven			
Open Pit	1,212	1.79	70
Underground	189	3.78	23
Surface Stockpiles	2,446	0.71	56
Probable			
Open Pit	3,297	2.20	233
Underground	1,976	4.17	265
Surface Stockpiles	0	0	0
Proven & Probable			
Open Pit	4,509	2.09	302
Underground	2,164	4.13	288
Surface Stockpiles	2,446	0.71	56
Total Proven & Probable	9,119	2.20	646

Notes:

1. CIM (2014) definitions were followed for Mineral Reserves.
2. Open pit Mineral Reserves are estimated within designed pits above marginal cut-off grades that vary from 0.51 g/t Au to 0.62 g/t Au for oxide ore and 0.65 g/t Au to 0.72 g/t Au for sulphide ore. The cut-off grades are derived based on a gold price of US\$1,250/oz Au and operating costs sourced from the current operations and mining contracts at an US\$/R\$ exchange rate of 1:3.8.

3. Mineral Reserves incorporate estimates of dilution and mineral losses.
4. Underground Mineral Reserves were estimated using an incremental cut-off grade of 2.4 g/t Au.
5. A minimum mining width of 20 m was used for open pit Mineral Reserves and 3 m was used for underground Mineral Reserves.
6. The Mineral Reserve estimate includes surface stockpiles.
7. Average metallurgical process recovery: 93%.
8. Bulk density is 2.19 t/m³.
9. Numbers may not add due to rounding.

The base case financial analysis shows that the Tucano life-of-mine plan (LOM) founded on the Mineral Reserve estimates in Table 15-1 provide positive cash flows throughout the mine's operating life, confirming that the Mineral Reserves are economically mineable and that economic extraction can be justified.

RPA is not aware of any mining, metallurgical, infrastructure, permitting, or other relevant factors that could materially affect the Mineral Reserve estimate.

OPEN PIT MINERAL RESERVES

The open pit Mineral Reserves were estimated through the use of mine planning software, the Mineral Resource estimate, the September 30, 2019 topography surface, and mine design parameters described in this Technical Report. The optimized pit shells were used as a guide for the detailed mine design that include pit ramps. The oxide and fresh Mineral Reserve estimates are founded on the whole block mining.

DILUTION AND EXTRACTION

Numerous sources of dilution are considered to account for internal dilution due to resource model block regularization, external dilution resulting from geological/geometric contacts, and operational dilution that accounts for production errors, pressures and schedule demands.

For mine planning purposes, all resource models containing selective mining units (SMU) that are considered inadequate for open pit mining operations, including the Tap AB, Duckhead and Urucum East, were re-blocked to a minimum practical size dig block that can be excavated by mining equipment currently employed on site. The total dilution inherited due to SMU regularization was estimated inside the previous pit design and above the resource cut-off grade 0.5 g/t Au.

The Urucum North resource model, which contains blocks with the partial percent mineralization estimated for percent inside the orebody wireframes, was converted to a whole block model, in order to standardize the entire Urucum model in which the mineralization SMU approximates an entire 3 m x 5 m x 4 m resource block. The dilution during the model conversion inside the pit design and above 0.5 g/t Au cut-off grade was estimated at 10%.

The external (contact) dilution has been estimated utilizing the Urucum and Tap AB regularized models (block size 3 m x 5 m x 4 m), both prepared by Tucano Technical Services (TTS). External edge dilution is based on an analysis of the waste blocks in contact with ore blocks. It is estimated that a dilution of approximately 0.5 m will be incurred at the contacts with waste rock during the vein excavation by the ore loading units (i.e., 6.5 m³ hydraulic excavators). The MineSight mining software routine “gndiln.dat” (GNDLN) was utilized to calculate the number of dilution edges (i.e., waste block contacts with an ore block) on a bench by bench basis. The maximum number of waste contacts for an ore block on a particular bench can be four.

It is assumed that ore blocks with only one waste contact have a minimum mining dilution (20%) and ore blocks with two, three, or four waste contacts will incur dilution of 40%, 60%, and 80%, respectively. Isolated ore blocks completely surrounded with waste are considered ore loss. In addition, ore loss includes allowances for misdirected truckloads and occasional losses where excessive dilution during excavation reduces the mining grade below the cut-off grade. Weighted external dilution is then calculated on the remaining blocks. External dilution and mineral extraction, based on the Indicated Mineral Resources only and above a cut-off grade of 0.5 g/t Au, are estimated at 19% and 3% in the Urucum pit and 20% and 5% in the Tap AB pit, respectively.

In conclusion, since the Tap AB resource model has inherited approximately 23% dilution due to SMU regularization, the additional external (contact dilution) of 20%, normally incurred at the contacts with waste rock during the vein excavation, was considered excessive. The Urucum North model regularization includes 10% dilution. Additional contact dilution of 9% was added to match the 19% total dilution estimated in the other Urucum deposits. Table 15-2 summarizes the dilution and mineral extraction modifying factors used for Mineral Resource to Mineral Reserve conversion.

TABLE 15-2 DILUTION AND MINERAL EXTRACTION ESTIMATES
Great Panther Mining Limited – Tucano Gold Mine

Area	Mineralized Zone	Dilution (%)	Extraction (%)
Urucum	Fresh Rock	19	95
Tap AB	Oxide Rock	23	93
	Fresh Rock	23	94
Urucum East	Oxide Rock	10	95
	Fresh Rock	10	95
Duckhead	Oxide rock	10	95
	Fresh Rock	10	95

CUT-OFF GRADE

In order to determine if material within the open pit should be sent to the mill for processing or to the waste rock dump, a marginal cut-off grade has been calculated. The marginal cut-off grade, which is referred to as the “Open Pit Discard Cut-off” in the CIM Estimation of Mineral Resource and Mineral Reserves Best Practice Guidelines, differs from the breakeven cut-off grade since mining costs are excluded from the calculation. The reason for excluding the mining costs is that material already defined to be within the limits of the open pit must be mined regardless if it is classified as ore or waste in order to access the bench below. The only exception where a mining cost would be included in the marginal cut-off grade calculation is if there is an incremental cost for mining ore relative to mining waste. Therefore, ore related cost such as grade control drilling, ore re-handle and crusher feed, were included along with the processing and G&A costs.

RPA estimated a marginal cut-off grade that could be applied to the mine planning block model to initiate the open pit mine planning process for the Tucano Project. The marginal cut-off grades are derived based on a gold price of US\$1,450/oz Au for Urucum North and US\$1,350/oz Au for the other deposits and operating costs sourced from the current operations and mining contracts at a US\$/R\$ exchange rate of 1:3.8. The estimated marginal cut off grades are summarized in Table 15-3 for all deposits. A distinction between material types was made (oxide / fresh) in order to capture the variation in mining and processing costs.

TABLE 15-3 PIT MARGINAL CUT-OFF GRADE ESTIMATE
Great Panther Mining Limited – Tucano Gold Mine

Parameters	Units	URN	URCN	URCS	URS	Tap AB	DH	URE
Revenue								
Gold Price	US\$/oz Au	1,450	1,350	1,350	1,350	1,350	1,350	1,350
Exchange Rate	US\$/R\$	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Gold Payable	%	99.95	99.95	99.95	99.95	99.95	99.95	99.95
Refining Charges	R\$/oz Au	77.88	77.88	77.88	77.88	77.88	77.88	77.88
Royalties	%	3.14	3.14	3.14	3.14	3.14	3.14	3.14
Process Recovery	%	93.0	93.0	93.0	93.0	93.0	93.0	93.0
Net Revenue	R\$/g	157.2	146.2	146.2	146.2	146.2	146.2	146.2
Operating Cost								
Grade Control	R\$/t	3.23	3.23	3.23	3.23	3.23	3.23	3.23
Ore Re-handle	R\$/t	7.80	7.59	7.48	6.88	8.38	8.38	15.24
Crusher Feed	R\$/t	2.58	2.58	2.58	2.58	2.58	2.58	2.58
Processing, oxide	R\$/t	45.34	45.34	45.34	45.34	45.34	45.34	45.34
Processing, fresh	R\$/t	69.67	69.67	69.67	69.67	69.67	69.67	69.67
G & A	R\$/t	23.38	23.38	23.38	23.38	23.38	23.38	23.38
COG, oxide	g/t Au	0.52	0.56	0.56	0.56	0.51	0.57	0.61
COG, fresh	g/t Au	0.68	0.73	0.73	0.72	0.68	0.73	0.78

UNDERGROUND MINERAL RESERVES

The underground Mineral Reserves were estimated through the use of mine planning software, the Mineral Resource estimate, and mine design parameters described in this Technical Report.

CUT-OFF CRITERIA

Underground Mineral Reserves were estimated using an incremental cut-off grade of 2.4 g/t Au. The basis for this COG is presented in Table 15-4.

TABLE 15-4 UNDERGROUND CUT-OFF GRADE ESTIMATE
Great Panther Mining Limited – Tucano Gold Mine

Item	Units	
Production Rate	tpd	1,500
Gold Price	US\$/oz	1,250
Recovery	%	93%
Dore Payable	%	99.95%
FX	\$R/US\$	3.8
Refining Cost	\$R/oz	77.78
Royalties	%	3.14%
Ore Value	US\$/g	35.55
Operating Costs		
Mining	US\$/t	50.00
Milling	US\$/t	25.00
G&A	US\$/t	10.00
Total	US\$/t	85.00
COG	g/t Au	2.4

RPA notes that the incremental costs do not include any development costs or contractor equipment leasing costs.

MSO ESTIMATES

The following criteria were utilized for the MSO stope shapes in determining the mining inventories:

- The typical stope height is 20 m (i.e., same as the sublevel interval), although some stopes near the upper resource boundaries are 10 m or 15 m in height.
- Stope lengths for Up-hole Retreat are 50 m, whereas Avoca stopes are continuous without pillars.
- COG of 2.4 g/t Au.
- Planned dilution consists of 0.5 m footwall plus 0.5 m hanging wall.
- Minimum mining width of 2.0 m (plus 1.0 m of dilution).
- Minimum pillar distance between parallel lodes 10.0 m.
- Isolated stopes requiring excessive development were not included.

The MSO parameters are summarized in Table 15-5.

TABLE 15-5 MSO PARAMETERS
Great Panther Mining Limited – Tucano Gold Mine

Item	Unit	Value
Cut-off grade for MSO stope shapes (before dilution added)	g/t Au	1.6
Minimum mining width	m	2.0
Dilution skin width – total	m	1.0
Stope height 1	m	20
Stope height 2 from base	m	15
Stope height 3 from base	m	10
Stope increment - strike length	m	25
Minimum transverse pillar width	m	10
Include inventory within pit “reserve” pit design *	Flag (1/0)	yes
Conduct stope-adjacency smoothing	Flag (y/n)	no
Reference X start for stope shape grid & extent	Easting m	401880 200
Reference Y start for stope shape grid & extent	Northing m	99310 1075
Reference Z start for stope shape grid & extent	Elevation m	-590 800
Maximum weathered rock inside stope shape	WEATH=5000 %	10
Block model: "urucum_ug_resources2015_v17"	Version date	ugv17d # 8Oct2015

MINING RECOVERY FACTORS

The following ore losses were applied to the stope tonnes after the MSO stope shapes were generated (after subtracting the ore development tonnes):

- Up-hole Retreat mining areas (mining in a down-dip direction)
- 6 m rib pillar every 50 m equivalent to 12% ore loss.
- 2% ore loss for difficult to muck ore at the bottom of stopes.
- Total ore loss = 14%.

Avoca stoping areas (mining in an up-dip direction)

- 2% ore loss for difficult to muck ore at the bottom of stopes.

Sill pillar recovery

- Ore loss = 35% due to mining below unconsolidated rockfill.

Ore development recovery

- Recovery of development ore has been assumed to be 100% (Note: development dilution is captured in the development wireframes when assessed by Mine24D).

COMPARISON TO PREVIOUS ESTIMATES

A comparison to the previous June 30, 2017 Mineral Reserve estimates is provided in Table 15-6 below:

TABLE 15-6 COMPARISON OF CURRENT AND PREVIOUS MINERAL RESERVES ESTIMATES
Great Panther Mining Limited – Tucano Gold Mine

Reserve Estimate	Tonnes ('000's)	Total Proven and Probable	
		Grade (g/t Au)	Ounces ('000's)
June 30, 2017	24,470	1.79	1,406
Depletion	5,681	1.49	271
Depleted June 2017 Model	18,789	1.88	1,135
September 30, 2019	9,119	2.20	646
Difference	-9,670	0.32	-489
% Difference	-51%	17%	-43%

The 2019 Reserve Estimate resulted in a 43% reduction in gold ounces compared to the 2017 Reserve Estimate as the 51% reduction in ore tonnes is partly offset by a 17% improvement in average gold grades.

The decrease is primarily due to the change in the underlying Mineral Resources, as well as an increase in cut-off grades to reflect current operating parameters.

16 MINING METHODS

OPEN PIT MINING

The Tucano Gold Mine is a well established open pit mining operation comprising four open pits, Urucum, Urucum East, Tap AB, and Duckhead. The mine production to date has been sourced from all deposits except Urucum East. The mine production history up to September 30, 2019 is summarized in Table 16-1.

TABLE 16-1 MINE PRODUCTION HISTORY
Great Panther Mining Limited – Tucano Gold Mine

Pit Production		2015¹	2016	2017	2018	2019²	Total
ROM Mined	000 t	2,621	2,807	2,926	2,441	1,809	12,604
Gold Grade	000 t	1.47	1.66	1.62	1.62	1.63	1.60
Contained Gold	000 oz	124	150	152	127	95	647
Waste Mined	000 t	12,223	16,676	18,354	18,217	14,958	80,428
Total Production	000 t	14,844	19,483	21,279	20,657	16,768	93,032
Strip Ratio	W/ROM	4.7	5.9	6.3	7.5	8.3	6.4

Notes:

1. Mine production since May 2015
2. Mine production by the end of September 2019

Mine production within the presently developed LOM pits is the responsibility of a mining contractor, U&M Mineração e Construção S.A. (U&M), and utilizes conventional earthmoving equipment with drill and blast, load and haul operations. The mined ore is blasted in 4 m benches with backhoe excavators loading ore and waste into off-highway dump trucks. Mined ore is either temporarily stockpiled or fed directly to the crusher.

The mining contractors were appointed with effect from 2015. The contractor is responsible for providing the necessary equipment and manpower to meet the LOM production requirements with the current contract rates projected to be used for the entire LOM plan. In addition to earthmoving responsibilities for both waste and ore, the contractors are responsible for production drilling, pre-shear drilling, pit dewatering, ore re-handle, crusher feed, maintenance and supervision of their fleet of equipment.

The Tucano Gold Mine has estimated Mineral Reserves of 6.96 Mt at an average ROM head grade of 1.60 g/t Au, comprising 1.97 Mt at 1.36 g/t Au of oxide ore and 4.98 Mt at 1.70 g/t Au

of sulphide ore. The overall LOM stripping ratio is approximately 6.0 (tonnes waste per tonne ore mined). In 2019, the pit production averaged close to 62,000 tpd including one month with over 87,000 tpd mined. There has been no underground mining at the Tucano Gold Mine to date.

MINE PLANNING BLOCK MODEL

The mine planning block models used for the mine design are based on 3D resource block models for the Tucano deposit as presented in Section 14. The resource models contain in situ density, ore/waste codes, oxide/fresh rock codes, lithology codes, mineralization codes, resource classification, ore and waste percentage, and in situ gold grade.

Resource models for the Tap AB, Urucum East, and Duckhead deposits are sub-blocked models with various subblock sizes, the smallest size being 0.5 m x 0.625 m x 0.5 m. Since, the subblock size is considered inadequate for open pit mining operations, given the size of the loading units currently in use (i.e., 6.5m³ and 15.0m³ bucket capacity) the resource models have been regularized to a block size of 3 m x 5 m x 4 m for Tap AB, and 2.5 m x 5 m x 4 m for Urucum East and Duckhead. Model regularizations were prepared by Tucano Technical Services. It should be noted that gold grade in the waste blocks was capped at 0.25 g/t Au.

The regularized resource block models were utilized for external (contact) dilution and mineral extraction estimate, as explained in Section 15. The total dilution and mineral extraction estimates, presented in Table 15-2, were incorporated in the mine planning block models with diluted block tonnes and diluted gold grades and used for the pit optimization analysis and mine planning. Each block in the regularized model contains the quantities of diluted mineralized tonnes and grades including the tonnages of mining dilution and ore loss, where $\text{ore loss (\%)} = 100\% - \text{mining recovery (\%)}$.

Block sizes of 3 m x 5 m x 4 m in Urucum and Tap AB and 2.5 m x 5 m x 4 m in Urucum East and Duckhead deposits were selected for the mine planning block model. RPA considers this to be a reasonable block size for mining selectivity for the proposed scale of operations and equipment currently in use and notes that the block height is equal to the proposed mining operations bench height.

Additional model items coded into the mine planning model are overall pit slopes, TOPO% representing the percent of the block below the September 30, 2019 topographic surface, ore

and waste volume and mass per block, gold contained and gold recovered per block, and economic parameters including various costs per block, revenue per block, and block value.

GEOTECHNICAL ASSESSMENT FOR PIT SLOPE DESIGN

Several geotechnical assessments have been conducted on the Tucano Project. The pit slope design parameters for this study, summarized in Table 16-2, are based on the geotechnical recommendations from the following reports:

- Technical Memorandum titled “Tap AB & Urucum pit re-design review” by Peter O’Byrne & Associates, dated May 4, 2016, and
- Report titled “Urucum Pit, Slope Stability Analysis” by Luis Navarro geology and services, dated September 2019

Different slope configurations were estimated for oxide and fresh rocks because of the difference in competence. Fresh rocks are by nature stronger and able to remain stable at steeper slope angles whereas the oxidized rocks tend to crumble and fail at steep angle.

TABLE 16-2 GEOTECHNICAL DESIGN RECOMMENDATIONS
Great Panther Mining Limited – Tucano Gold Mine

Material	Bench Face Angle (°)	Bench Height (m)	Berm Width (m)	Inter-Ramp Angle (°)
Urucum				
Oxide	70	4	3.0	42
Fresh	75	24	8.0	60
Tap AB, Urucum East & Duckhead				
Oxide	70	4	3.0	42
Fresh	75	20	8.0	56

Other relevant findings and recommendations include the following:

ROCK WEATHERING

Rock weathering is significantly deeper in Tap AB than at Urucum. Weathered (weaker) rock is less capable of standing steeply and is more susceptible to run-off erosion. At Tucano, inherent strength differences amongst rock types can, and locally does, result in significantly different responses to weathering and subsequent performance on exposure. For example, BIF rocks and pegmatite intrusions have different weathering susceptibility, where near-surface pegmatites weather deeply and degrade rapidly on exposure, particularly when subject

to erosion forces. A benefit of mining in weathered rock however, results from the ability to form the designed wall profile with relative precision due to the ability to mechanically excavate the material.

ROCK STRUCTURE

The orientation and shear strength of naturally occurring defects exposed in or located close behind pit walls have a dominant influence on open pit slope stability, even in highly weathered rocks. It is important that all practicable efforts are made to identify structural defect patterns in weathered rock units. A reasonable starting position is to assume that the defect patterns identified in fresh rock persist into the overlying weathered rock mass.

GROUNDWATER

Hydraulic pressures generated by groundwater in pit walls are inevitably destabilising influences. Pit dewatering and wall depressurisation must be accepted as integral components of mining at Tucano. Progressive depressurisation drilling into pit walls (once mining progresses below the pre-mining groundwater level) must be incorporated as a routine task in pit development. Control of inflows and general in-pit drainage must be given adequate priority to minimise degradation of ramp running surfaces and slope erosion generally.

SURFACE WATER

There is sufficient rainfall run-off at Tucano to cause major pit slope erosion and access / haulage road damage. Significant ponding also occurs locally. Surface drainage at Tucano is inadequate and substantial work is required to redress the situation. Considerations should be given to lining / sealing drains in critical locations. Use of fabrics may also be warranted in reinforcing roadways in critical areas. Plans are also required to reduce inflow to open pit walls and ramps. This will require detailed review of natural drainage around each deposit. The pit catchment is substantial, and it is inevitable that a large volume of run-off will need to be directed to the pit sumps. Considerations need to be given to lining major drains on the bench stack berms and developing multiple rock-armoured or lined drop structures within each stack.

HARD ROCK SLOPES

To achieve the inter ramp angles (IRA) presented in Table 16-2, a certain amount of controlled production blasting is required to minimize blast damage to the pit slope including pre-split drilling in hard rock walls. A substantial improvement is evident in blasting practices conducted to date (Figure 16-1).

FIGURE 16-1 PIT WALL IN URUCUM PIT



URUCUM CENTRAL SOUTH PIT

As noted in the Company's news releases on October 7, 2019 and October 15, 2019, the west wall of the UCS pit underwent slope displacement on October 6, 2019. Since then, the pit has been closed to mining while GPM works toward a remediation plan with the assistance of the independent consulting firm Knight Piésold & Co.

Pending completion of the remediation plan, the UCS pit continues to be included in the LOM Plan, with a Mineral Reserve Estimate (Proven and Probable) of approximately 88,000 ounces of gold. Current estimates for UCS include conservative adjustments to pit wall configurations based on preliminary geotechnical findings.

In RPA's opinion, the reserves are recoverable, however, that recovery is subject to further evaluation based on the geotechnical data gathering now underway. The data gathering will include the collection of additional geotechnical information from five geotechnical core holes commencing in April 2020.

Following completion of data collection, an assessment will be made as to whether remediation of the UCS pit to mine the current reserves will be completed. If the remediation plan is determined not to be feasible, then the current UCS pit reserves may not be mined.

If the remediation can be implemented as planned, the Company expects to be in a position to begin remedial work on the west wall of the UCS pit during the third quarter of 2020 and to resume ore mining in the fourth quarter of 2020.

WASTE DUMP STABILITY

The waste dump slope parameters comprise 10 m high lifts with re-shaped 29° face angles, separated by 7 m wide berms, appropriately graded to control water flow. The resultant slope inclination is 22°. Observations and spot measurement of face angles on some as-built dump face angles indicates ranges from 35° to 38°. It is understood that these constructions are interim dumps that will be re-shaped in the future.

All observed waste dumps were inferred to be fundamentally stable, however reference to original topography and natural surface soil conditions indicates that it is most important to ensure that pre-dumping preparation is thorough. In some instances at Tucano, dump stability could be compromised by foundation inclination, foundation conditions and infiltrations / entrapment of water. A series of simple two-dimensional stability analysis indicates that failure to remove weak clay-rich soils from slightly inclined dump foundations could result in dump slope instability.

PIT OPTIMIZATION

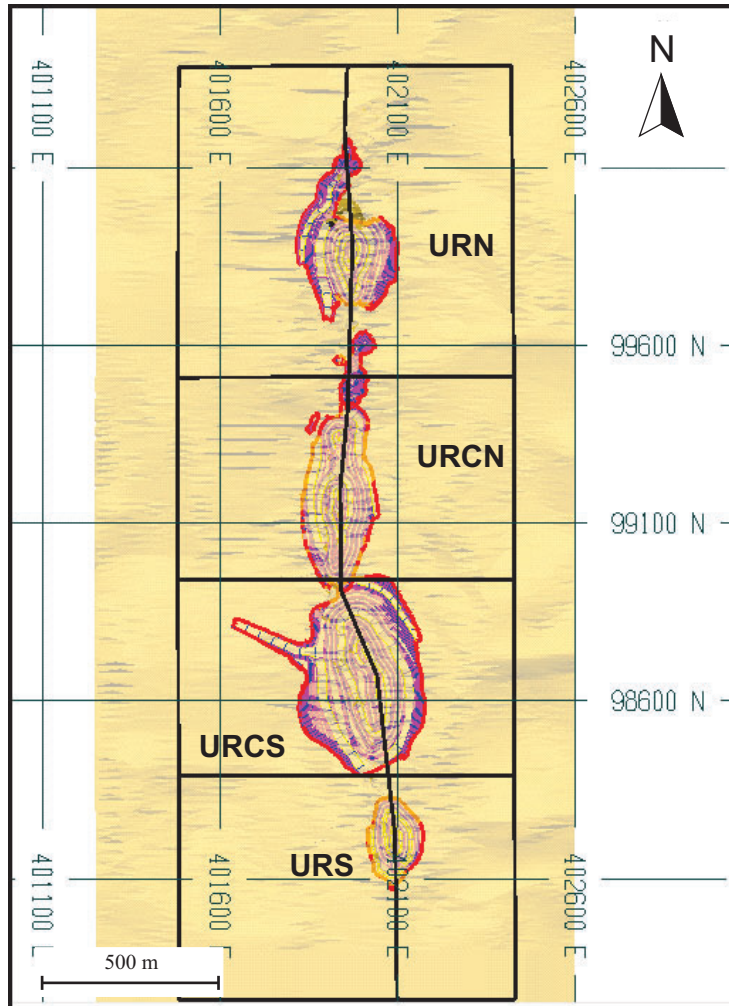
PIT OPTIMIZATION INPUT PARAMETERS

The pit optimization analysis was carried out on the diluted regularized block model described in Section Mine Planning Block Model. The pit optimization was carried out using the MS Economic Planner module of Hexagon's MinePlan software. The optimizer uses the Lerchs-Grossman (LG) algorithm to determine the economic pit limits based on the block net value (block value = block revenue – block total operating cost) and preliminary estimates for pit overall slope angles (OSA).

The OSAs are determined in conjunction with the geotechnical recommendations outlined in Table 16-2 and expected haulage ramp layout, ramp width, and the projected number of ramps in the pit wall. The ramp width is calculated to be 24 m to accommodate a 90-tonne capacity

truck and it was considered for two-way traffic. Figure 16-2 illustrates geotechnical sectors utilized in Urucum and Tap AB pits and shows the oxide/fresh rock contact surface used to distinguish sectors in oxide and fresh rock.

Urucum Deposit



Tap AB Deposit

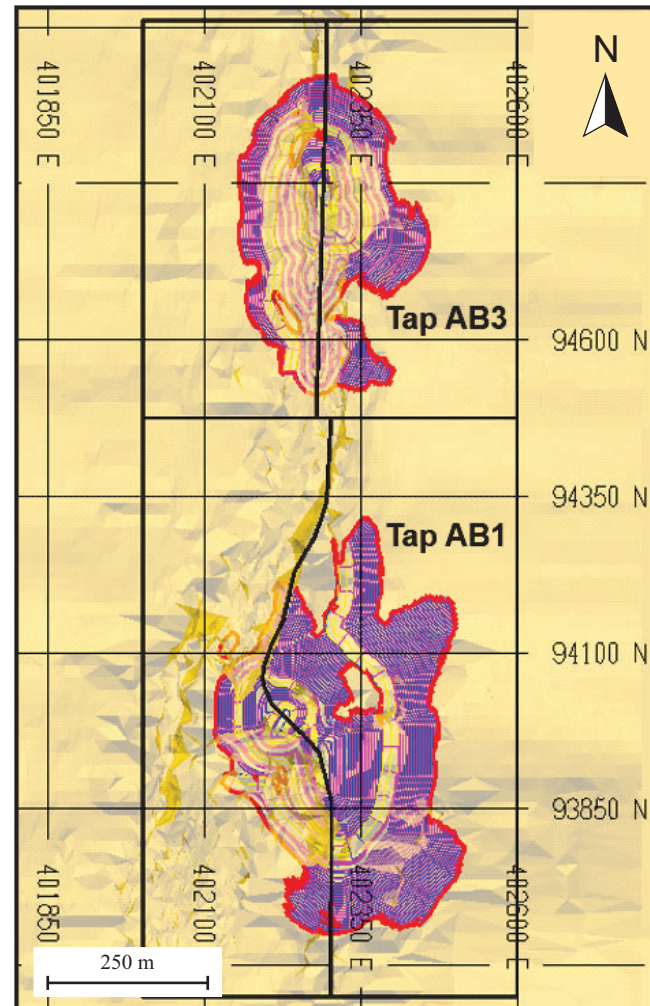


Figure 16-2

Great Panther Mining Limited

Tucano Gold Mine
Amapá State, Brazil

Geotechnical Sectors

The estimated OSA utilized in pit optimization are summarized in Table 16-3.

TABLE 16-3 PIT OVERALL SLOPE ANGLE ESTIMATE
Great Panther Mining Limited – Tucano Gold Mine

Pit	Rock Type	Pit Wall	IRA (°) of Stack	Stack Height (m)	2-way Ramps #	Single Ramps #	OSA (°)
Urucum	Oxide	West	42	60	0	0	42
South	Oxide	East	42	60	0.5	0	38
(URS)	Fresh	West	60	120	1	0.5	50
	Fresh	East	60	120	1	0.5	50
Urucum	Oxide	West	42	60	1	0	34
Central	Oxide	East	42	60	0	0	42
South	Fresh	West	60	120	1	1	48
(URCS)	Fresh	East	60	120	1	0	53
Urucum	Oxide	West	42	60	0	0	42
Central	Oxide	East	42	60	0	0	42
North	Fresh	West	60	120	1	0.5	50
(URCN)	Fresh	East	60	120	1	0	53
Urucum	Oxide	West	42	60	0	0	42
North	Oxide	East	42	60	0	0	40
(URN)	Fresh	West	60	120	1	0.5	49
	Fresh	East	60	120	1	0.5	50
Tap AB 1	Oxide	West	42	60	0.75	0	36
	Oxide	East	42	60	0.75	0	36
	Fresh	West	56	200	2	0	48
	Fresh	East	56	200	1	0.5	51
Tap AB 3	Oxide	West	42	60	0.75	0	36
	Oxide	East	42	60	0.75	0	36
	Fresh	West	56	200	2	2	43
	Fresh	East	56	200	0	0.5	55
Duckhead	Oxide	West	42	60	1	0	36
	Oxide	East	42	60	1	0	36
	Fresh	West	56	60	0	1	49
	Fresh	East	56	60	0	1	49
Urucum	Oxide	South	42	38	0	1	36
East	Oxide	North	42	66	0	0	42

The net value for each block was calculated using the model calculation script in Hexagon's MinePlan Software, based on the set of input economic parameters, i.e., costs, recoveries and long-term gold price assumptions. Operating costs were sourced from the current operations (actual 2019 costs and cost data projected for the 2020 Budget) and unit operating cost from

the actual mining contracts. Table 16-4 summarizes the parameters used for the block net value calculation.

TABLE 16-4 NET BLOCK VALUE INPUT PARAMETERS
Great Panther Mining Limited – Tucano Gold Mine

Parameter	Units	Value
Resource Classification	Categorical	Measured & Indicated
Revenue		
Gold Price	US\$/oz Au	1250
Exchange Rate	R\$/US\$	3.80
Gold Payable	%	99.95
Refining Charges	R\$/oz Au	77.88
Royalties	%	3.14
Process Recovery	%	93.00
Re-handled Ore Swell	%	30.00
Operating Costs		
Mining Cost, Oxide Ore, Tucano*	R\$/t	76.02
Mining Cost, Fresh Ore, Tucano*	R\$/t	101.96
Mining Cost, Oxide Waste, Tucano**	R\$/t	4.07
Mining Cost, Fresh Waste, Tucano***	R\$/t	5.69
Pre-split Drilling Cost, U&M	R\$/m3	0.91
Mining Cost, Oxide Ore, U&M***	R\$/m3	Variable
Mining Cost, Transit Ore, U&M***	R\$/m3	Variable
Mining Cost, Fresh Ore, U&M***	R\$/m3	Variable
Mining Cost, Oxide Waste, U&M***	R\$/m3	Variable
Mining Cost, Transit Waste, U&M***	R\$/m3	Variable
Mining Cost, Fresh Waste, U&M***	R\$/m3	Variable
Ore Re-handle, U&M****	R\$/m3	Variable
Crusher Feed, U&M	R\$/t	2.58
Block Net Value	R\$	Block Revenue – Block Cost

Notes:

* Tucano fixed ore unit cost: base mining, process and G&A costs, mine geology, grade control and laboratory costs.

**Tucano fixed waste unit base mining cost: dewatering, production drilling, loading, hauling, blasting

***U&M contractor variable unit mining cost (drilling, loading, hauling), dependant on haul distance and associated unit costs defined in the mining contract

****U&M contractor variable unit cost for ore re-handle, dependant on haul distance and associated unit costs defined in the mining contract

In accordance with the guidelines of National Instruments NI 43-101 Standards of Disclosure for Mineral Projects and the Canadian Institute of Mining, Metallurgy and Petroleum's Definition Standards for Mineral Resources and Mineral Reserves, only those ore blocks classified in the Measured and Indicated categories are allowed to drive the pit optimizer for a feasibility level

study. Inferred resource blocks, regardless of grade and recovery, bear no economic value and are treated as waste.

PIT OPTIMIZATION RESULTS

A series of nested LG pit shells were generated by varying the gold price (revenue factor) from US\$1,250/oz Au to US\$2,000/oz Au. Nested pit shells are utilized for incremental and net value (i.e., operating margin) analysis to select the pit shell to guide the ultimate pit design. Pit optimization results by pit are summarized in Table 16-5.

TABLE 16-5 PIT OPTIMIZATION RESULTS
Great Panther Mining Limited – Tucano Gold Mine

Pit Shell	Gold Price (US\$/oz Au)	ROM (Tonnes)	Au (g/t Au)	Gold (oz)	Strip Ratio	Value R\$M
Urucum North	1,250	375,743	1.74	21,071	3.21	36.5
	1,350	429,400	1.69	23,332	3.53	36.5
	1,450	766,514	1.64	40,414	6.32	30.8
	1,500	941,210	1.61	48,667	6.86	25.9
	1,550	985,143	1.59	50,459	6.9	24.6
	1,600	1,019,555	1.59	52,229	7.07	23.0
Urucum Central North	1,250	981,773	2.13	67,088	6.05	110.2
	1,350	1,039,144	2.11	70,524	6.31	111.0
	1,450	1,075,659	2.09	72,373	6.41	110.5
	1,500	1,086,387	2.09	73,577	6.52	110.2
	1,550	1,124,496	2.08	75,038	6.7	108.5
	1,600	1,266,434	2.04	83,019	7.85	96.1
Urucum Central South	1,250	1,319,609	2.27	96,347	6.99	158.5
	1,350	1,449,707	2.22	103,677	7.27	159.0
	1,450	1,581,746	2.18	110,854	7.55	157.3
	1,500	1,591,247	2.17	111,237	7.54	157.2
	1,550	1,619,378	2.17	113,039	7.68	156.0
	1,600	1,680,284	2.15	116,305	7.87	153.3
Urucum South	1,250	269,163	1.9	16,406	7.07	29.5
	1,350	334,433	1.83	19,650	7.13	30.1
	1,450	351,640	1.81	20,413	7.14	29.9
	1,500	364,741	1.79	21,008	7.21	29.5
	1,550	385,113	1.77	21,876	7.29	28.8
	1,600	397,383	1.76	22,524	7.47	28.2

Pit Shell	Gold Price (US\$/oz Au)	ROM (Tonnes)	Au (g/t Au)	Gold (oz)	Strip Ratio	Value R\$M
Tap AB 1	1,250	672,314	2.06	44,427	10.61	66.0
	1,350	736,862	2	47,355	10.57	66.4
	1,450	750,944	1.98	47,812	10.49	66.2
	1,500	755,941	1.97	47,944	10.44	66.1
	1,550	763,449	1.96	48,207	10.42	65.9
	1,600	767,402	1.96	48,337	10.42	65.6
Tap AB 3	1,250	470,231	2.5	37,726	11.45	64.5
	1,350	509,096	2.43	39,787	11.54	64.6
	1,450	522,464	2.42	40,573	11.64	64.3
	1,500	531,104	2.41	41,180	11.81	64.0
	1,550	532,820	2.41	41,270	11.82	64.0
	1,600	537,441	2.4	41,497	11.83	63.8
Duckhead	1,350	227,020	2.64	19,282	20.6	18.7
	1,450	331,636	2.13	22,754	17	16.6
	1,500	336,853	2.12	22,978	16.92	16.3
	1,550	383,542	2	24,627	16.23	14.4
	1,600	404,450	1.96	25,452	16.24	13.1
Urucum East	1,450	106,102	1.97	6,721	12.49	6.1

Individual pit shell selection was made based on the following criteria:

- Urucum North (URN) pit shell was selected for the gold price US\$1,450/oz Au since the lower gold price pit shells did not generate the pit that provides adequate mining width for the ultimate pushback relevant to the existing pit
- Urucum Central North (URCN) and Urucum Central South (URCS) pit shells are selected for the base gold price of US\$1,250/oz Au.
- Urucum South (URS) pit shell is selected for the gold price US\$1,500/oz Au since most of the stripping is already completed for that pit size
- Tap AB 1 (AB 1) and Tap AB 3 (AB 3) pit shells were selected for the gold price US\$1,350/oz Au, that provides the highest pit value and considering the minimum mining width for the final pushback
- Duckhead (DH) pit shell was selected for the gold price US\$1,350/oz Au considering the minimum mining width for the final pushback, since the US\$1,250/oz Au shell does not provide the minimum mining width
- Urucum East (URE) pit shell was selected for the gold price US\$1,450/oz Au.

Contained quantities within the selected pit shells are summarized in Table 16-6.

TABLE 16-6 SELECTED PIT SHELL QUANTITIES
Great Panther Mining Limited – Tucano Gold Mine

Pit Shell	ROM (Tonnes)	Au (g/t Au)	Gold (oz)	Strip Ratio
Urucum North	766,514	1.64	40,414	6.32
Urucum Central North	981,773	2.13	67,088	6.05
Urucum Central South	1,319,609	2.27	96,347	6.99
Urucum South	364,741	1.79	21,008	7.21
Tap AB 1	736,862	2.00	47,355	10.57
Tap AB 3	509,096	2.43	39,787	11.54
Duckhead	227,020	2.64	19,282	20.60
Urucum East	106,102	1.97	6,721	12.49
Total	5,011,717	2.10	338,002	8.44

PIT DESIGN

Mine design criteria are based on a conventional surface mine operation using 15 m³ shovels for waste loading; 6.5 m³ excavators for ore loading; and haulage by a mixed fleet of 36-tonne, 90-tonne, and 136-tonne capacity trucks.

The ultimate pit design incorporates pit slope geotechnical parameters (bench face angle, inter ramp angles, and berm widths) for the oxide and fresh rock and pit sectors, includes haulage ramps, and takes into account minimum mining width based on the open pit mining equipment selected. The haul ramps are designed at 24m width for 90-tonne class trucks two-way traffic and will be used as appropriate as single lane ramp for 136-tonne class trucks. For the last four benches of the ramp in the pit bottom, the haul road is narrowed to a width of 10 m, suitable for a 36-tonne class truck single lane traffic. The maximum ramp gradient is 10%. All roads require a cap of crushed rock to facilitate all-season use.

The design premise was to mine the pits to a minimum mining width of 30 m, then use a backhoe for the final narrow bench of the pit. To date, there are final pit slopes partially excavated in the Urucum North and Urucum South pits that prove the slope angles recommended in the geotechnical design have been followed. Luis Navarro, a geotechnical consultant, has visited the mine to assess the rock walls and has provided suggestions for practices to improve wall stability. There is a risk that the failure to attain the design pit slopes will result in pit wall instability and the loss of ore at the pit bottom.

The pit design parameters are summarized in Table 16-7.

TABLE 16-7 PIT DESIGN PARAMETERS
Great Panther Mining Limited – Tucano Gold Mine

Parameter	Units	Oxide Rock	Fresh Rock
Pit Slope			
Bench Height	m	4	4
Bench Face Angle	deg	70	75
Berm Vertical Interval	m	4	24
Berm Width	m	3	8.0
Inter-ramp Slope Angle	deg	42	60
Pit Ramp Parameters			
Maximum ramp gradient	%	10	10
Two-way Ramp Width	m	24	24
Single Lane Ramp Width (near pit bottom)	m	10	10

The open pit design contains eight pits within the selected pit optimization shells utilized to guide the ultimate pit design:

- Urucum North (URN)
- Urucum Central North (URCN)
- Urucum Central South (URCS)
- Urucum South (URS)
- Tap AB 1 (AB 1)
- Tap AB 3 (AB 3)
- Duckhead (DH)
- Urucum East (URE)

All pits have been designed with 4 m operating bench heights. For pits with catch benches at 24 m intervals it may be possible in some higher elevation areas to mine waste rock on 8 m or 12 m high benches, which is more cost effective and may facilitate higher pit sinking rates in terms of vertical metres per year. This is considered a project opportunity that has not been incorporated into the base case mine plan. To maximize ore selectivity and minimize dilution it is expected that ore will be mined only on 4 m benches.

The ultimate pit designs in a plan and sectional view are illustrated in Figures 16-3 to 16-10.

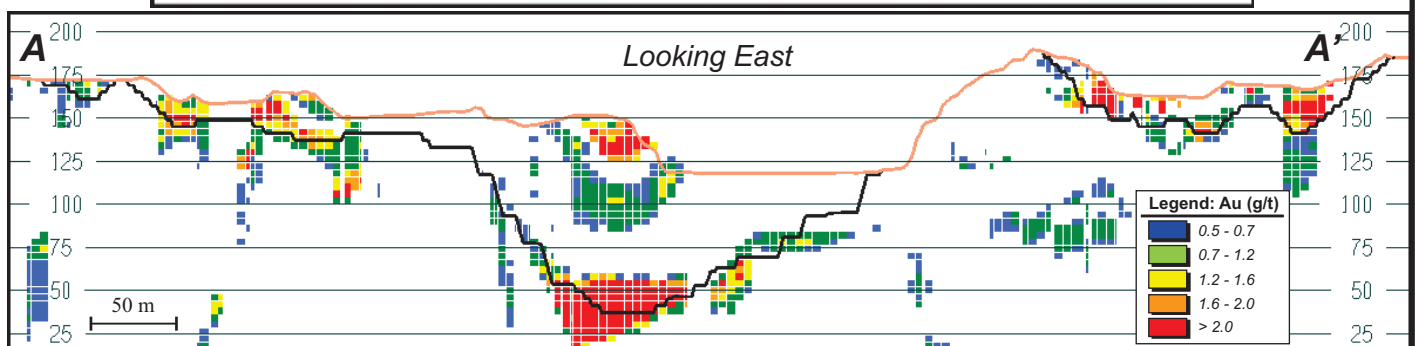
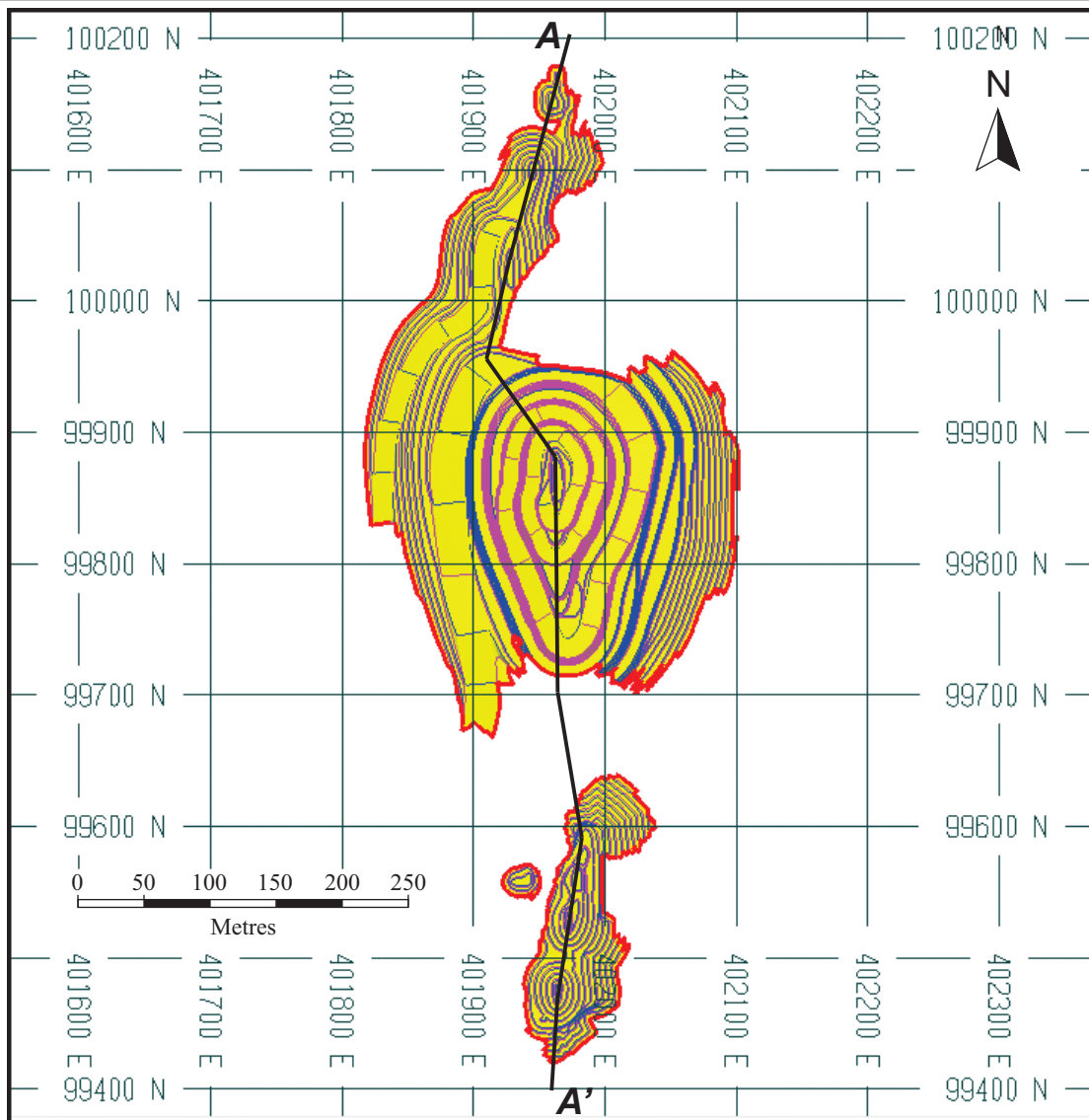


Figure 16-3

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Urucum North Ultimate Pit Design
with A-A' Long Section**

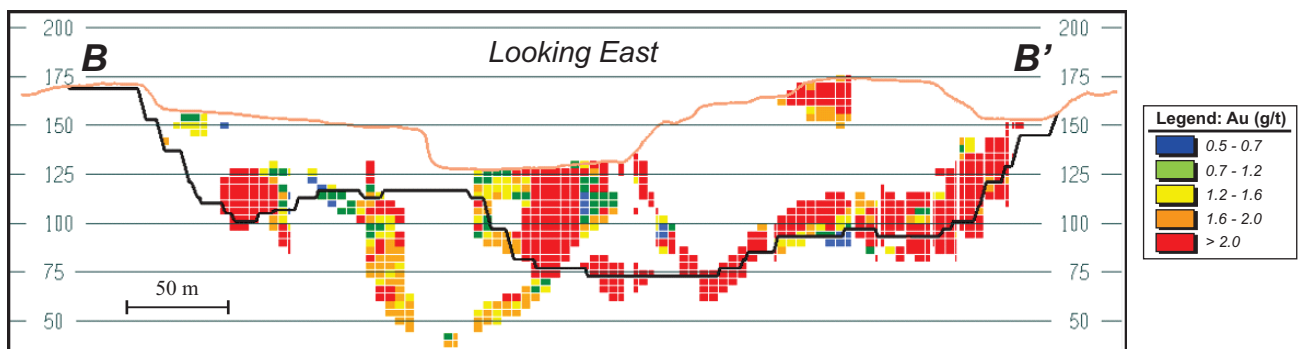
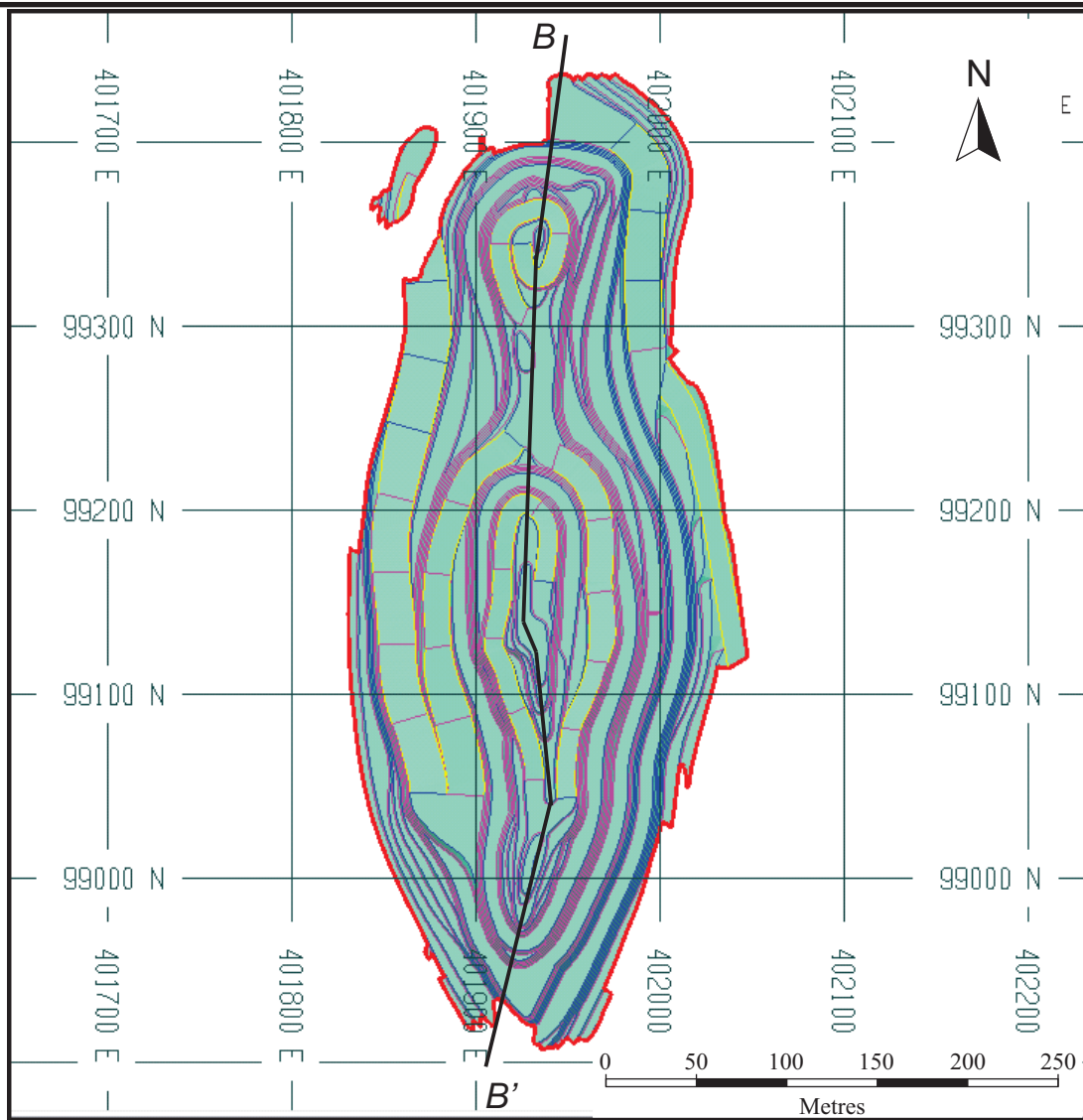


Figure 16-4

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Urucum Central North Ultimate Pit
Design with B-B' Long Section**

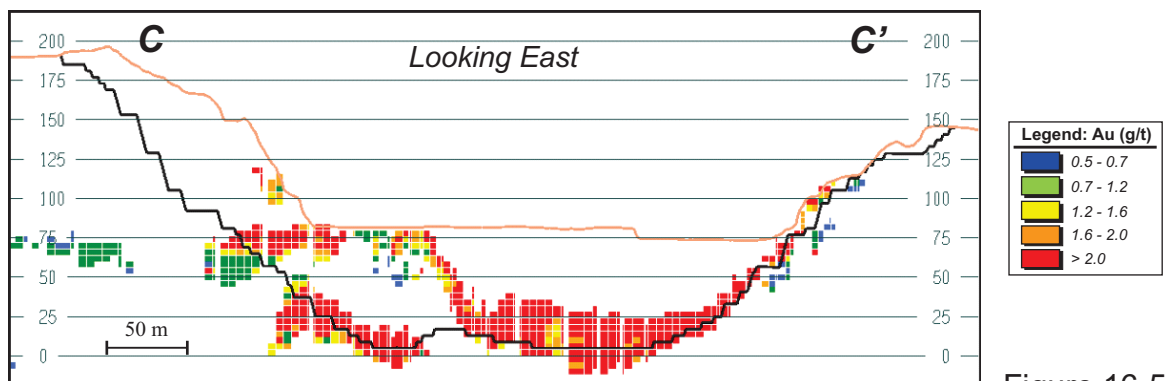
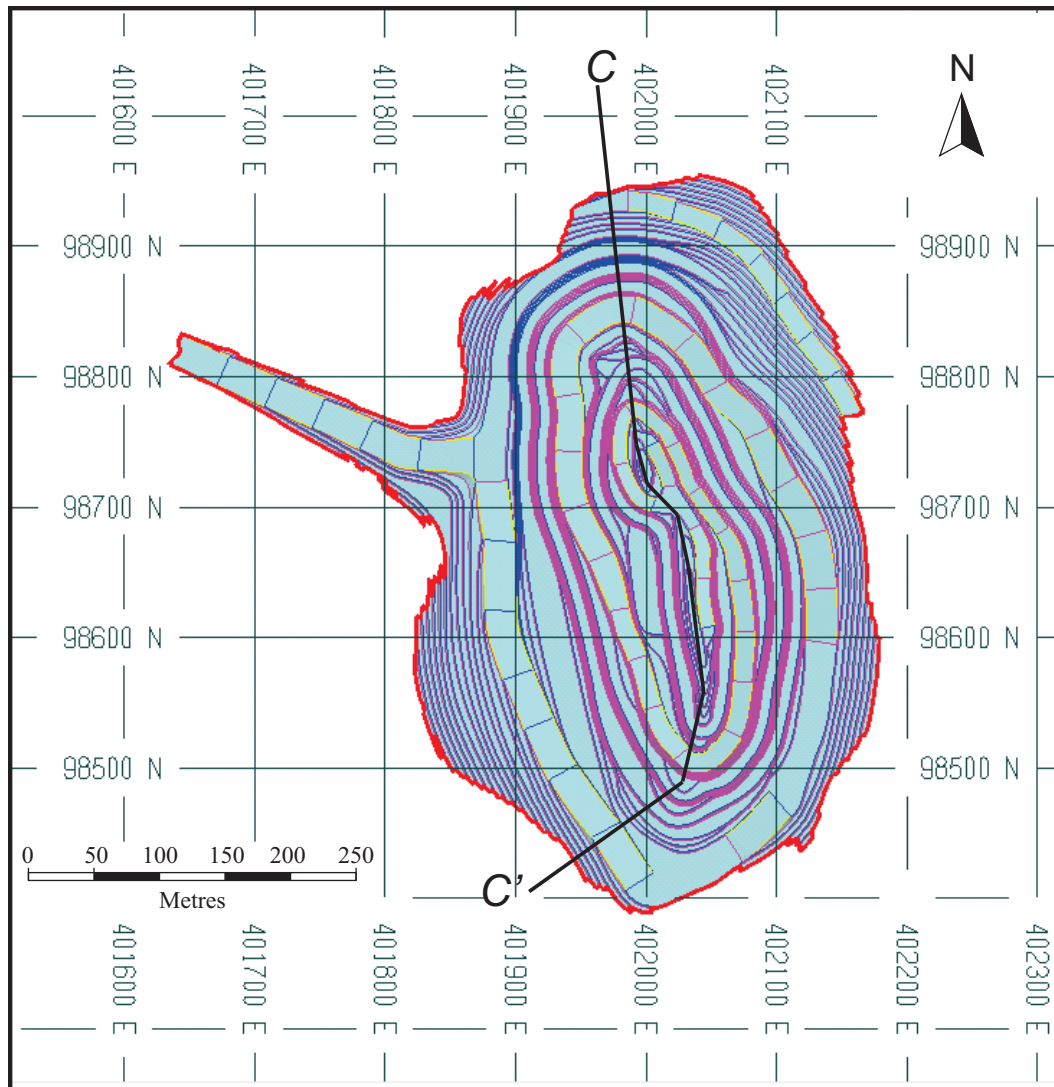


Figure 16-5

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Urucum Central North Ultimate Pit
Design with C-C' Long Section**

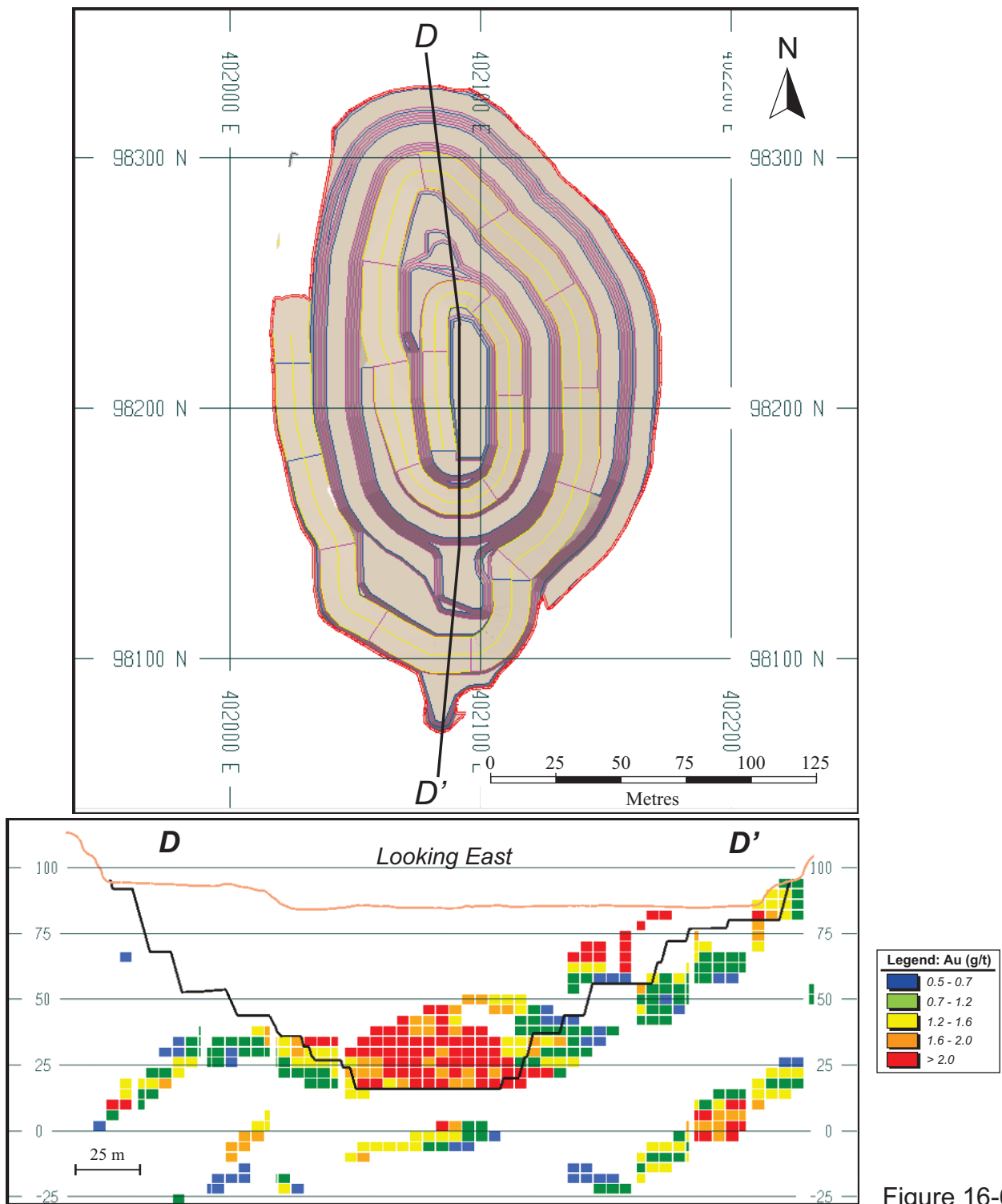


Figure 16-6

Great Panther Mining Limited
Tucano Gold Mine
 Amapá State, Brazil
**Urucum South Ultimate Pit Design
 with D-D' Long Section**

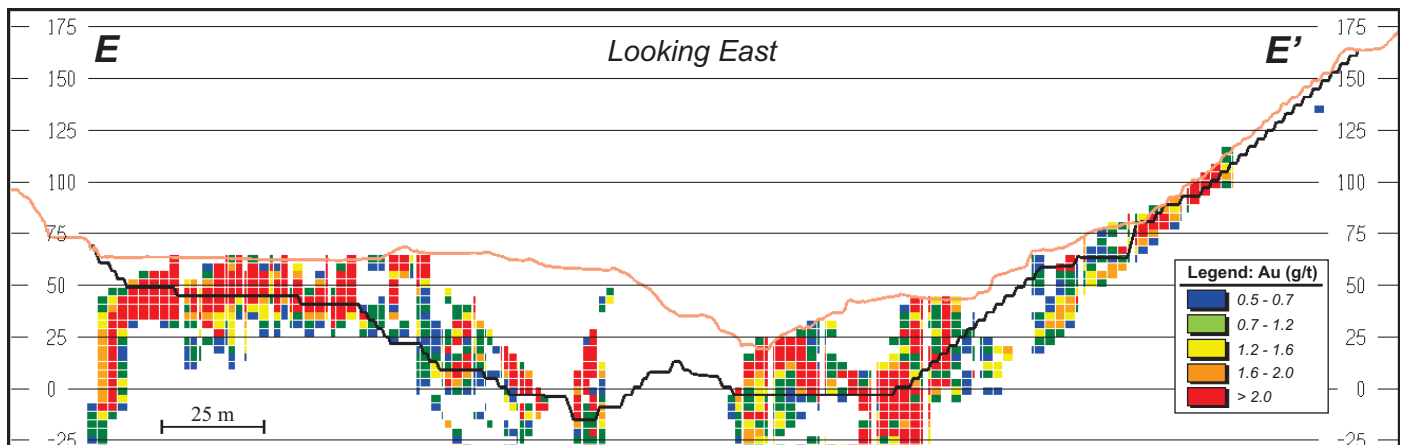
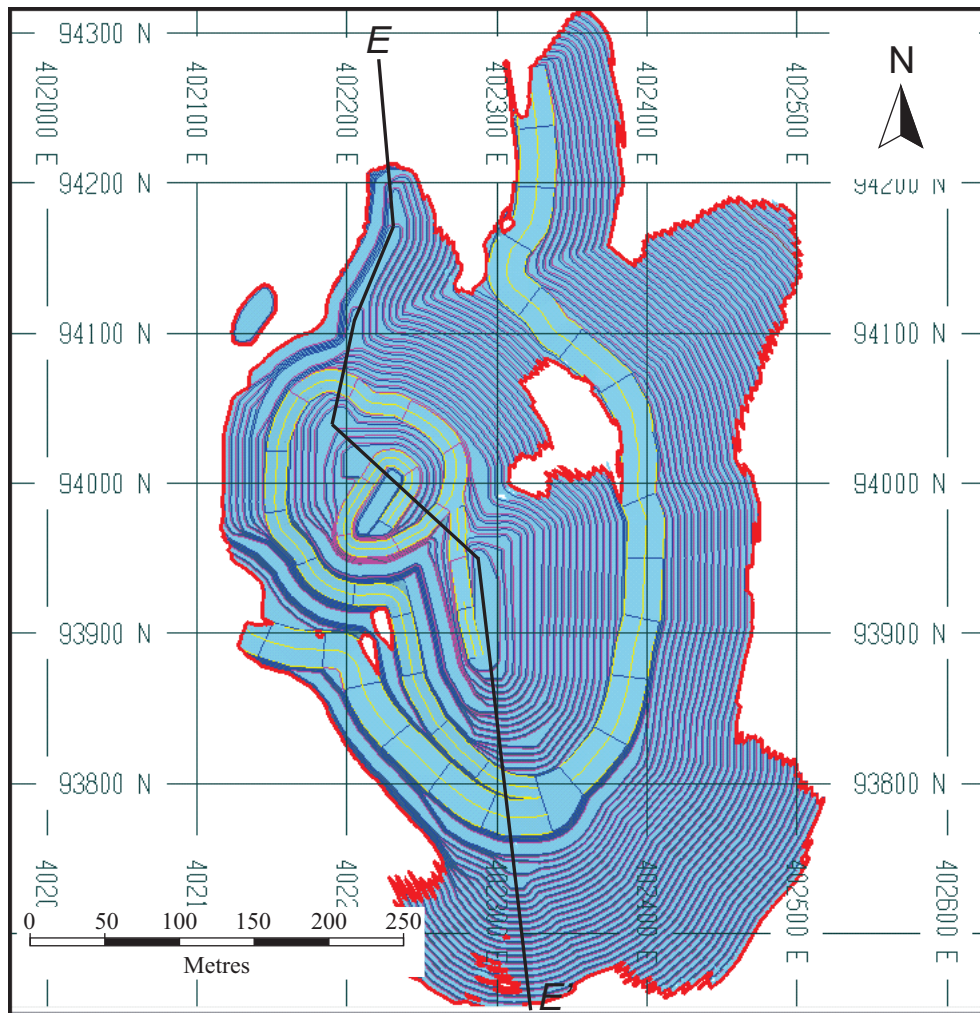


Figure 16-7

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Tap AB 1 Ultimate Pit Design
with E-E' Long Section**

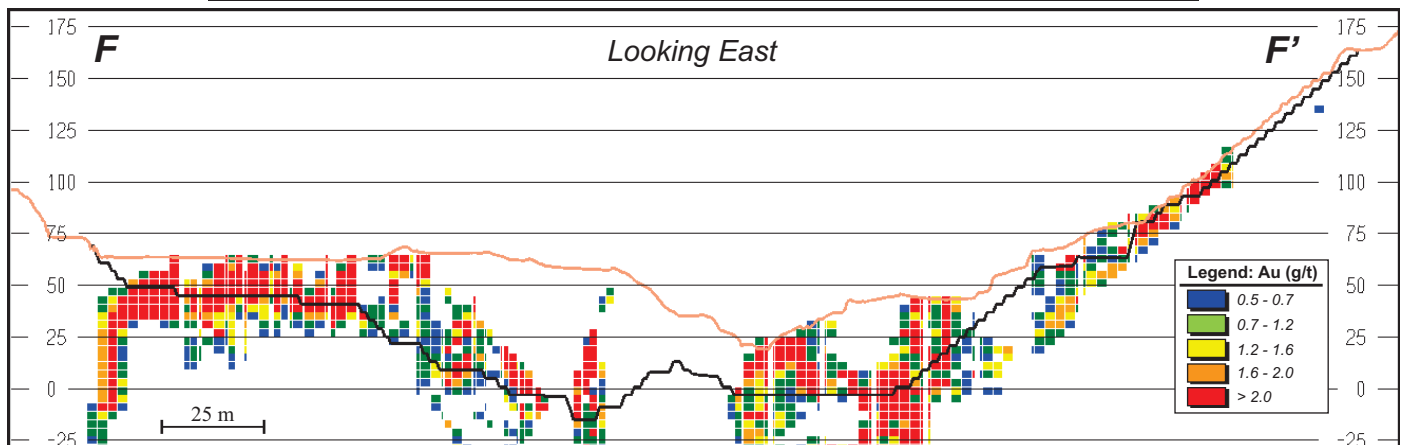
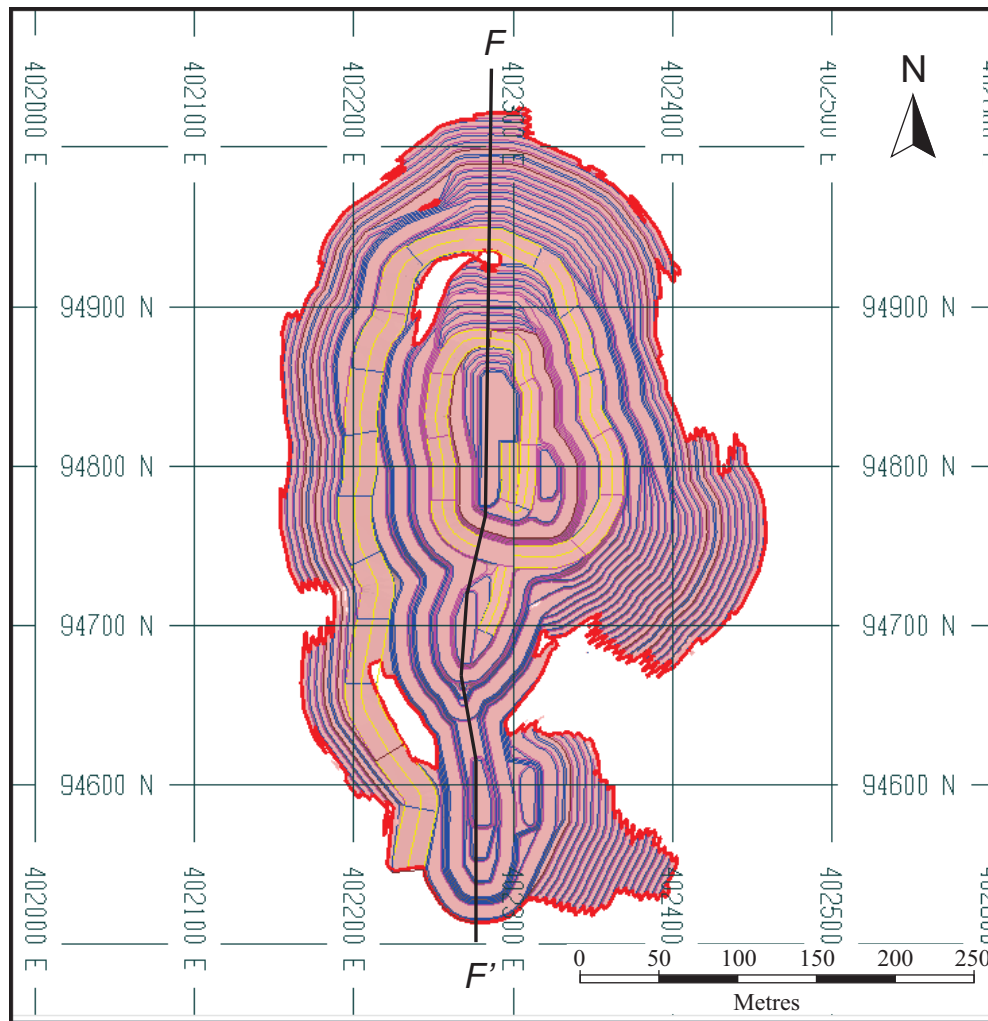


Figure 16-8

Great Panther Mining Limited

Tucano Gold Mine
Amapá State, Brazil

**Tap AB 3 Ultimate Pit Design
with F-F' Long Section**

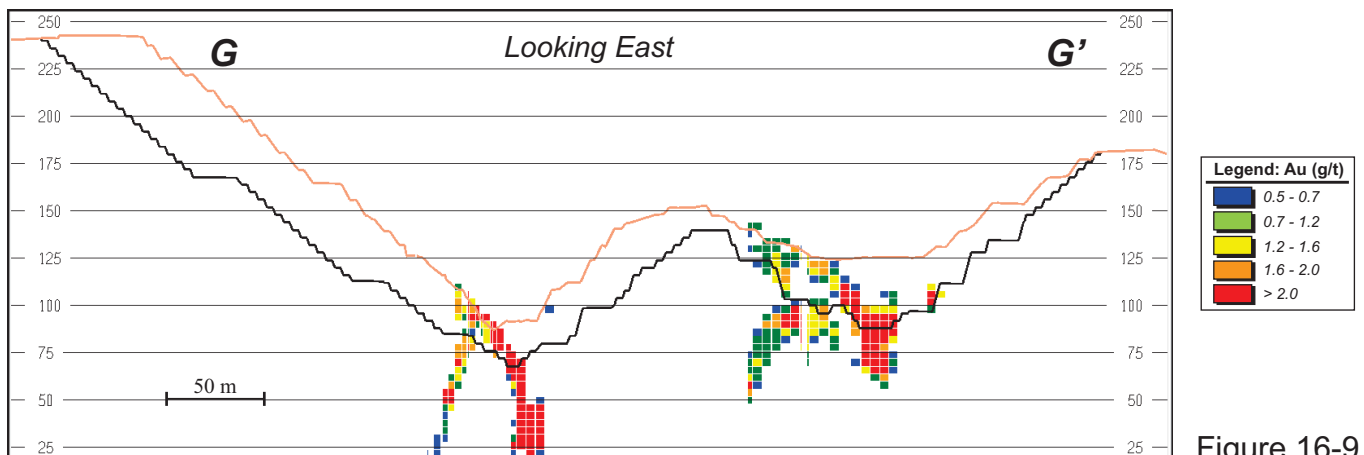
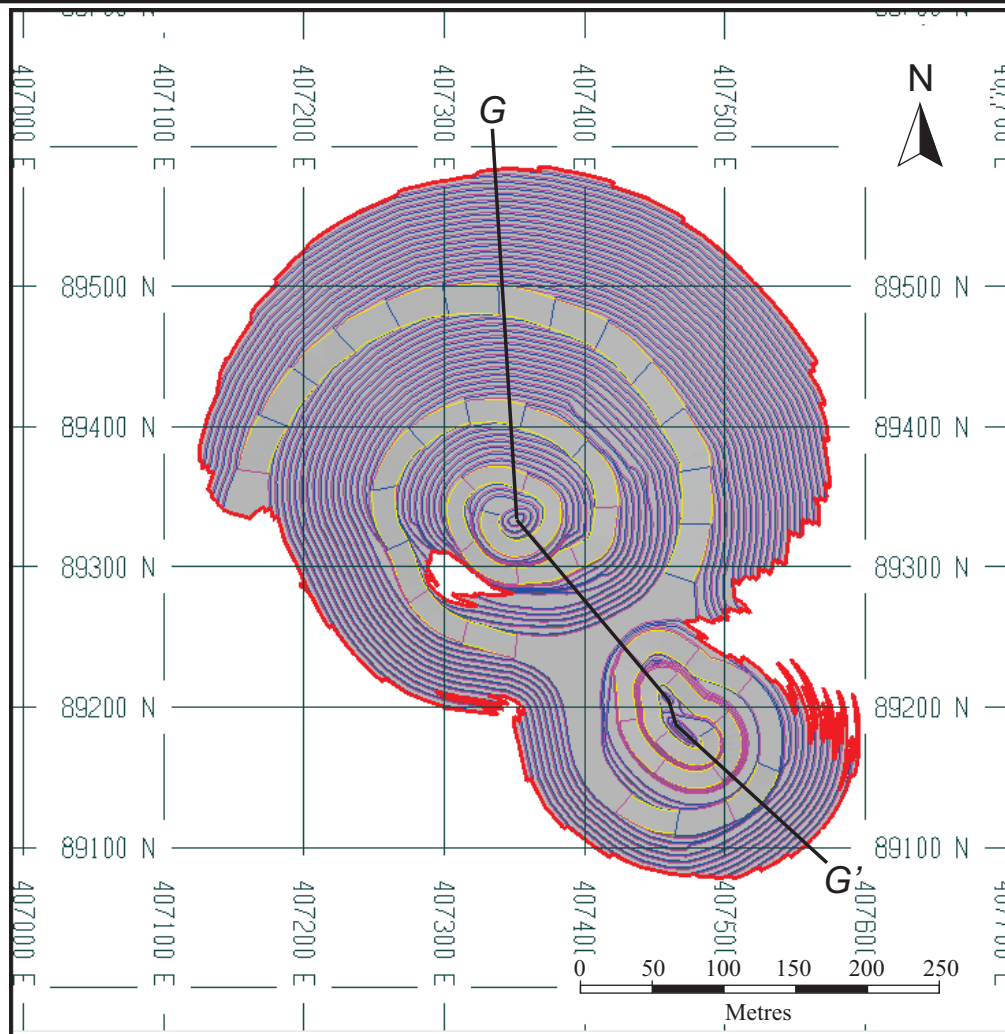


Figure 16-9

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Duckhead Ultimate Pit Design
with G-G' Long Section**

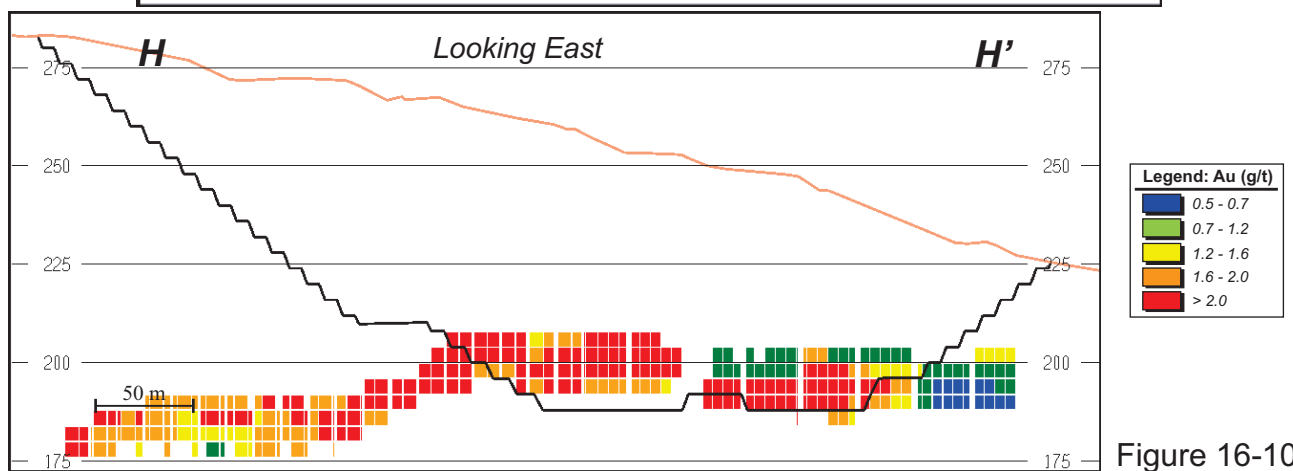
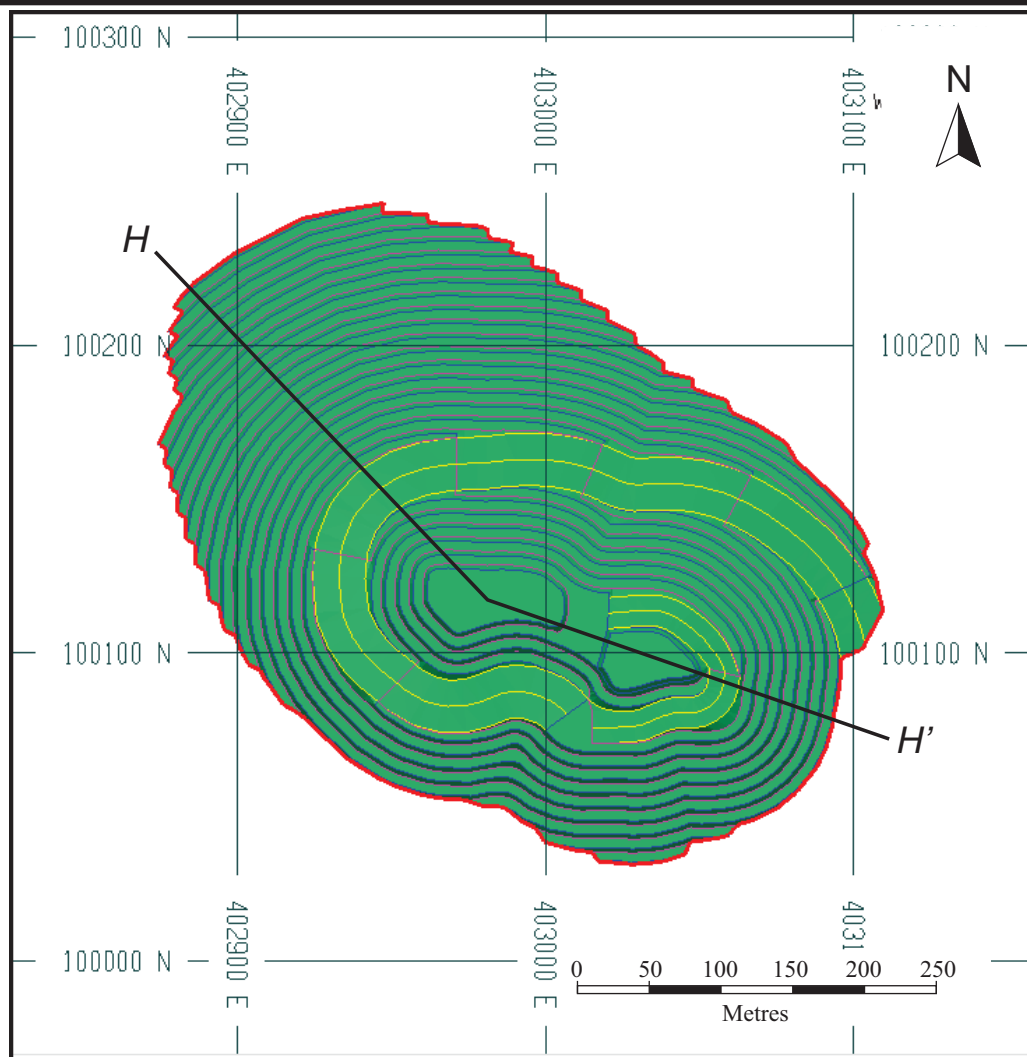


Figure 16-10

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Urucum East Ultimate Pit Design
with H-H' Long Section**

WASTE ROCK DUMP

The waste rock dumps (WRD) are located as close as practical to the open pits to minimize haul distances and haul truck cycle time for each pit phase, considering the pit waste disposal requirements, access road and facility layout, and geotechnical parameters. A portion of the waste rock from the pit is scheduled to be used for the tailings embankment construction. The waste rock dump design parameters include:

- Overall dump slope angle of 2.5H:1V or 22°
- A haulage ramp that is 25 m wide at a 10% gradient
- A swell factor of 1.15 for placed oxide rock
- A swell factor of 1.30 for placed broken fresh rock

The waste rock dump designs are illustrated in Figure 16-11 and 16-12.

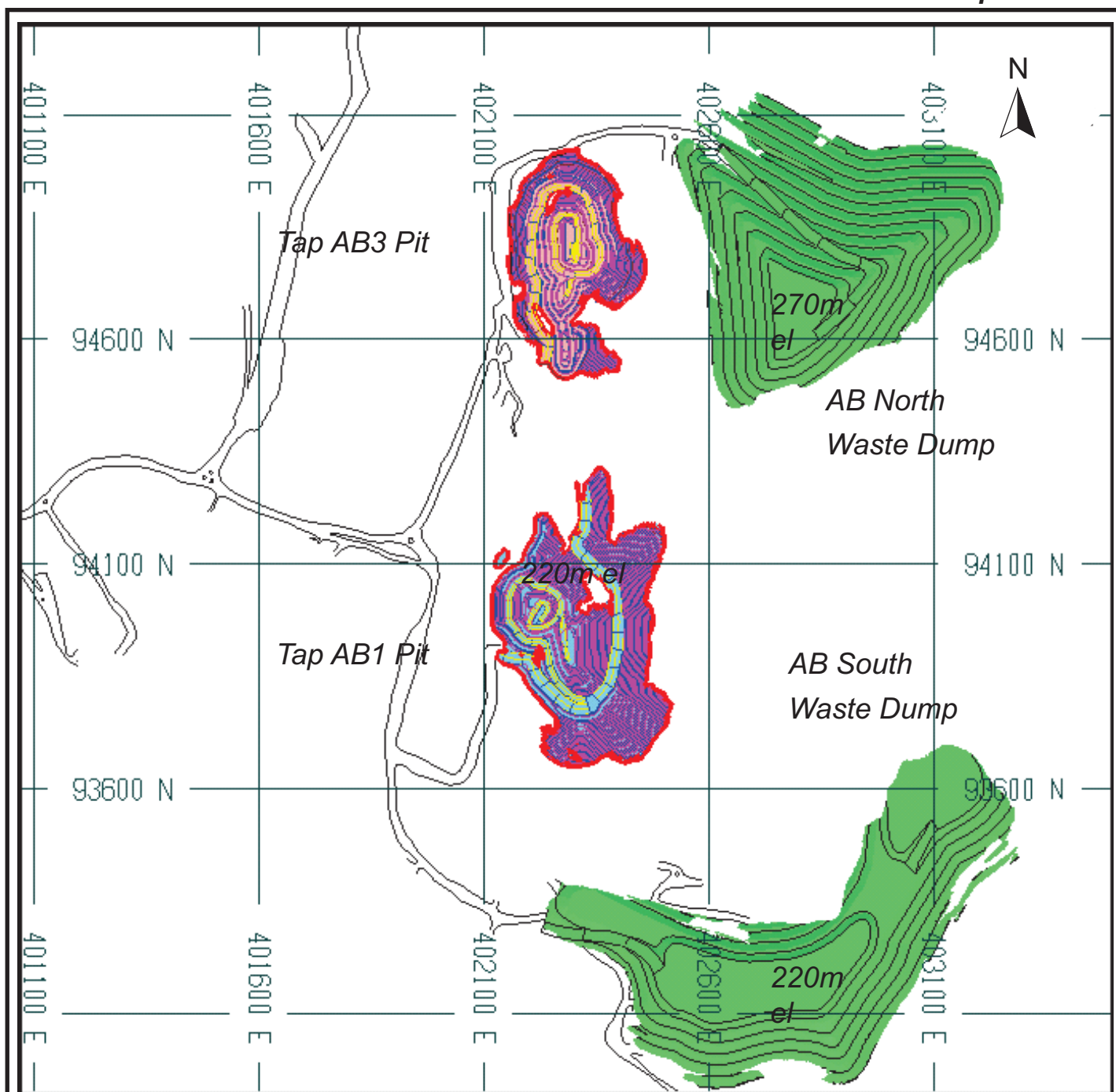


Figure 16-11

Great Panther Mining Limited

Tucano Gold Mine
Amapá State, Brazil

Tap AB Waste Rock Dumps

0 100 200 300 400 500
Metres

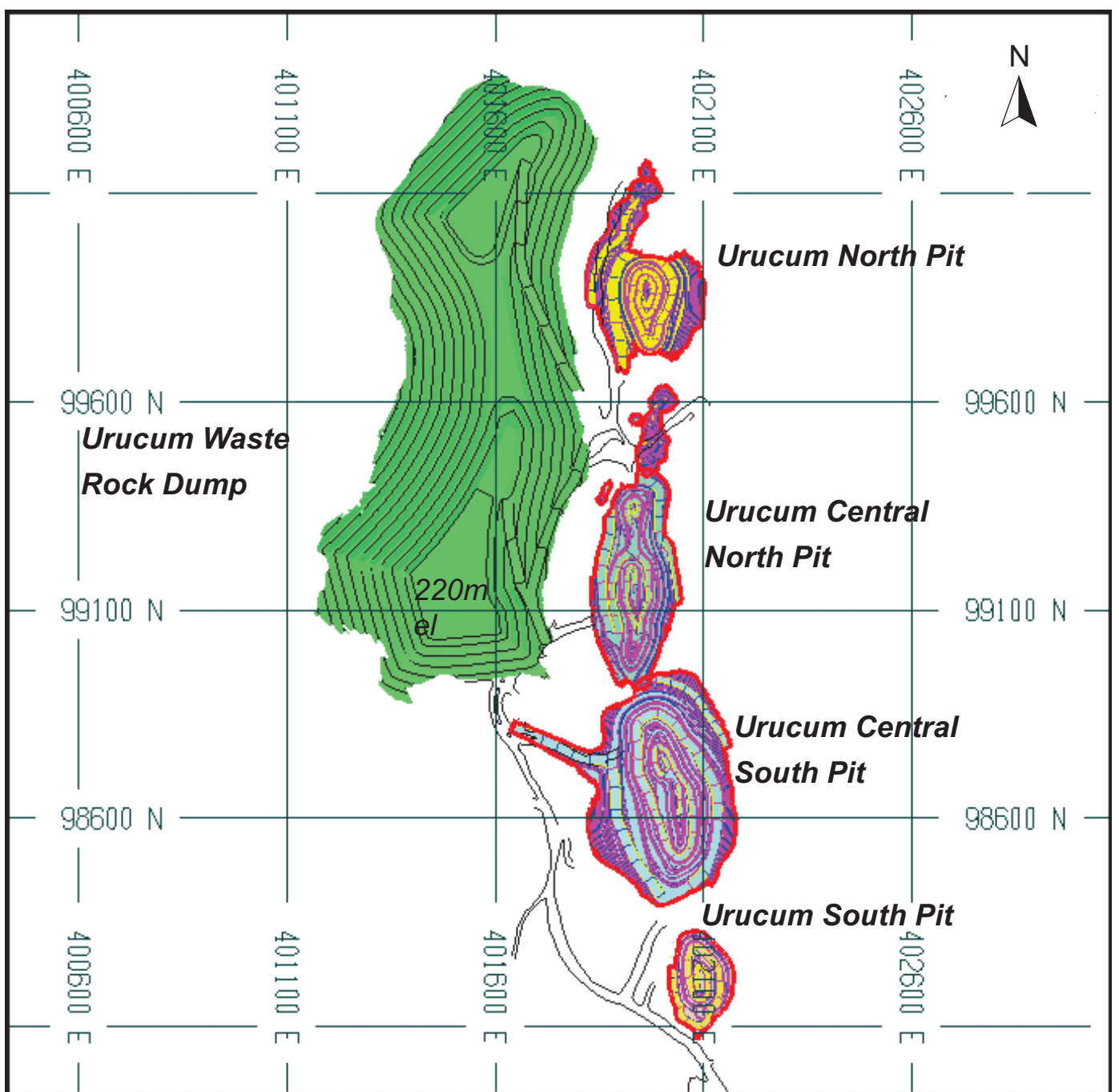


Figure 16-12

Great Panther Mining Limited

Tucano Gold Mine
Amapá State, Brazil

Urucum Waste Rock Dumps

The WRD are constructed in a bottom-up configuration consisting of 10 m vertical lifts. The designed capacities of the waste rock dumps have sufficient capacity to accept the entire waste rock volume that will be mined from the open pits. Backfilling of mined out pits is not proposed either because underground mining is planned beneath the pits or because the pits are not depleted until the end of the open pit mine life.

PIT MINING QUANTITIES

Mining quantities are reported from the mine planning block model that contains allowances for dilution and mining extraction, presented in Table 15-2, as material below the end of September 30, 2019 topography to ultimate pit limits. ROM ore quantities and plant feed estimates are founded only on Measured and Indicated Mineral Resources. ROM quantities are based on whole block mining and total 4.5 Mt at a grade of 2.09 g/t Au with a strip ratio averaging 9.3:1. Mining quantities within the designed pits are summarized in Table 16-8.

TABLE 16-8 PIT MINING QUANTITIES
Great Panther Mining Limited – Tucano Gold Mine

Pit Shell	ROM (Tonnes)	Au (g/t Au)	Gold (oz)	Strip Ratio
Urucum North	737,279	1.60	37,861	6.06
Urucum Central North	940,809	2.10	63,407	6.84
Urucum Central South	1,192,324	2.30	88,294	7.99
Urucum South	319,092	1.84	18,826	5.60
Tap AB 1	593,473	1.99	37,957	9.64
Tap AB 3	476,406	2.26	34,566	9.08
Duckhead	136,863	3.29	14,490	59.12
Urucum East	112,646	1.95	7,060	14.07
Total	4,508,892	2.09	302,461	9.30

Overall, oxide ROM comprises 22% of the total open pit ore tonnage and 34% of total waste tonnage to be mined. Oxide tonnages and grades in Table 16-8, and elsewhere in this document, are reported on a dry basis.

It is anticipated that dewatering of the two deepest pits, i.e., Urucum and Tap AB, will involve stage pumping from the pit bottom. Relatively minor pit design revisions are required in order to incorporate intermediate elevation pit sumps and water collection / diversion ditches on the pit highwalls.

The mining quantities in Table 16-8 were compared to contained quantities within the pit optimization shells that guided the designs (Table 16-6). The waste rock quantities are within 1% difference. The average gold grade is within 0.5% difference. The designed pits contain 10% less ROM at a 10% higher strip ratio. The lower strip ratio in the pit shells is believed due to approximate allowance for the ramps used in the pit optimization versus the more accurate inclusion of ramps in the pit design. However, the highest discrepancy is noted in Duckhead pit design with the strip ratio three times higher versus LG pit shell, i.e., 59:1 versus 20:1. Therefore, the revision to the Duckhead pit design is warranted and it is recommended that this should be investigated as a project opportunity.

OPEN PIT PRODUCTION SCHEDULE

A quarterly pit production schedule was generated with the objective of meeting a target processing rate of approximately 10,000 tpd at an average 92% annual plant availability and also to provide sufficient waste fill for the construction of the next stage of the tailings embankment. ROM quantities and plant feed estimates are based on Measured and Indicated Mineral Resources.

The mine production schedule has been prepared quarterly based on the mining activities commencing in Q4 2019. The pit production is founded on mining the ultimate pit bench-by-bench without phases or subdivisions. Preproduction stripping is required in Q3 2019 and Q1 2020 in order to prepare the pit Tap AB 1 and Tap AB 3 for sustained plant feed, followed by two full years of operation. Preproduction stripping of the Urucum East and Duckhead pits was delayed as much as possible, due to higher strip ratio. The LOM mining rate averages approximately 66,000 tpd. The maximum mining rate is about 79,000 tpd, only during the dry season, i.e., July to December.

The plan feed comprises the ROM from the pit and from the stockpiles. The pit ROM production is projected to be a direct feed to the crusher, complemented with the ROM re-handled on as needed basis. Stockpile inventory as of September 30, 2019 is presented in Table 16-9.

TABLE 16-9 PIT STOCKPILE INVENTORY AS OF SEPTEMBER 30, 2019
Great Panther Mining Limited – Tucano Gold Mine

Stockpile	ROM (t)	Au (g/t)	Gold (oz)
Total HG Oxide	49,794	0.96	1,540
Total LG Oxide	912,763	0.58	17,129
Total Spent Ore, Oxide	37,139	0.70	839
Total Mill Scats, Sulphide	94,642	1.53	4,664
Total VHG Sulphide	27,720	1.84	1,639
Total HG Sulphide	183,996	0.96	5,699
Total LG Sulphide	617,704	0.63	12,569
ROM pad expansion	522,186	0.70	11,826
Total	2,445,946	0.71	55,909

The LOM pit production and plant feed schedule is summarized in Table 16-10 and illustrated in Figures 16-13 and 16-14. The tonnages presented are all on a dry basis.

TABLE 16-10 OPEN PIT PRODUCTION SCHEDULE
Great Panther Mining Limited – Tucano Gold Mine

Period		Total	2019 Q4	2020 Q1	2020 Q2	2020 Q3	2020 Q4	2021 Q1	2021 Q2	2021 Q3	2021 Q4
Open Pit Mining											
ROM - Oxide	kt	972	69	21	29	98	204	348	190	13	0
ROM - Fresh	kt	3,536	501	422	377	337	270	412	431	637	150
Open Pit ROM Total	kt	4,509	570	443	406	435	474	760	621	650	150
Stockpile Inventory											
ROM - Oxide	kt	1,000	45	5	93	427	383	47	0	0	0
ROM - Fresh	kt	1,446	241	361	322	0	0	0	202	214	107
Stockpile ROM Total	kt	2,446	286	366	415	427	383	47	202	214	107
Total ROM, Pit + Stockpile											
ROM - Oxide	kt	1,972	114	26	122	525	587	394	190	13	-
ROM - Fresh	kt	4,983	742	783	699	337	270	412	633	851	256
Total ROM, Pit + Stockpile	kt	6,955	856	809	821	862	857	806	822	864	256
Au Grade	g/t	1.60	1.36	1.33	1.31	1.31	1.32	1.94	1.90	2.17	2.21
Contained Au	koz	358	37	35	35	36	36	50	50	60	18
ROM - Oxide Portion	%	28%	13%	3%	15%	61%	68%	49%	23%	1%	0%
Waste – Oxide Rock	kt	15,802	1,383	803	2,524	3,882	4,012	2,298	879	23	0
Waste - Fresh Rock	kt	26,139	4,248	4,195	2,942	2,483	2,268	3,072	4,343	2,430	157
Waste - Total	kt	41,941	5,631	4,998	5,467	6,364	6,280	5,370	5,222	2,453	157
Saprolite Portion	%	38%	25%	16%	46%	61%	64%	43%	17%	1%	0%
Strip Ratio	W/O	6.0	6.6	6.2	6.7	7.4	7.3	6.7	6.3	2.8	0.6
Total Moved - Oxide	kt	17,774	1,497	829	2,647	4,407	4,599	2,692	1,068	36	0
Total Moved - Fresh	kt	31,121	4,990	4,978	3,641	2,820	2,538	3,484	4,976	3,282	413
Grand Total Moved	kt	48,896	6,487	5,807	6,288	7,226	7,137	6,176	6,044	3,317	413
Oxide portion	%	36%	23%	14%	42%	61%	64%	44%	18%	1%	0%
Open pit mining rate	ktpd	53	71	65	69	79	78	69	66	36	4
Plant Feed											
Plant Feed from Pit	kt	4,509	570	443	406	435	474	760	621	650	150
Plant Feed from Stockpile	kt	2,446	285	366	416	426	381	49	201	212	109
Plant Feed - Oxide	kt	1,972	114	26	122	525	586	396	189	13	0
Plant Feed - Fresh	kt	4,983	741	782	700	337	270	413	633	849	259
Total Plant Feed	kt	6,955	856	809	822	862	856	809	822	862	259
Au Grade	g/t	1.60	1.36	1.33	1.31	1.31	1.32	1.94	1.90	2.17	2.21
Oxide Feed Portion	%	28%	13%	3%	15%	61%	68%	49%	23%	2%	0%
Nominal Rate per Cal Day	tpd	9,151	9,299	8,986	9,034	9,365	9,299	8,986	9,034	9,365	8,632
Plant Availability	%	91.5%	93.0%	89.9%	90.3%	93.7%	93.0%	89.9%	90.3%	93.7%	86.3%
Feed Rate, Plant Avail 92%	tpd	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000

FIGURE 16-13 TOTAL MATERIAL MINED BY ROCK TYPE

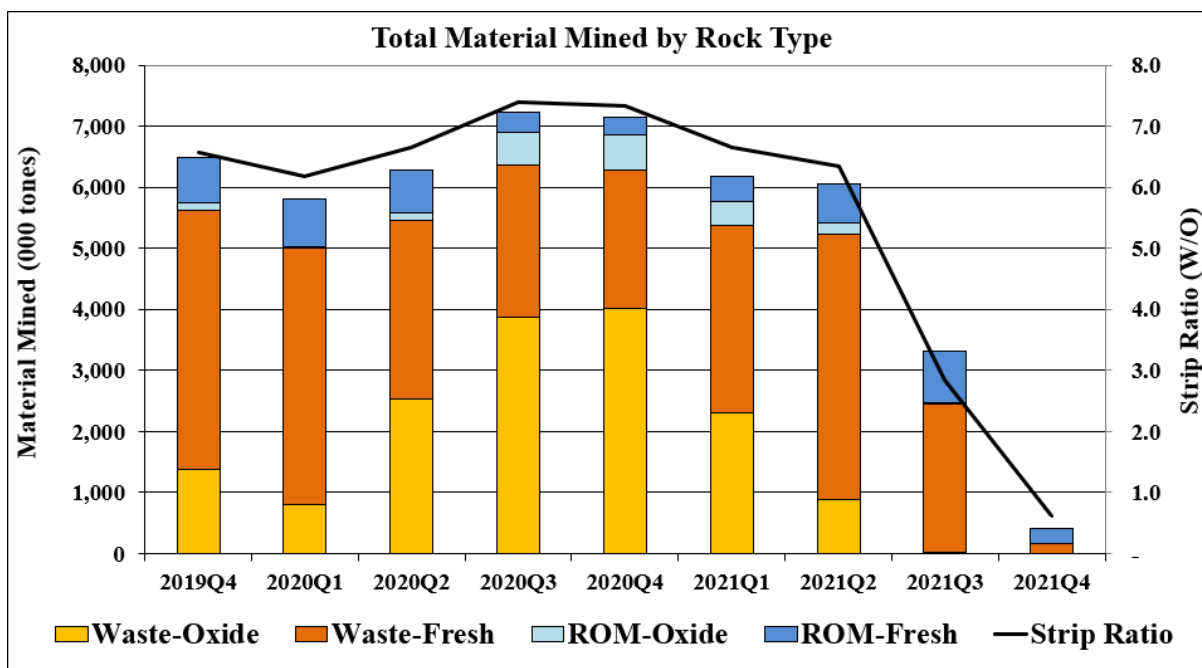
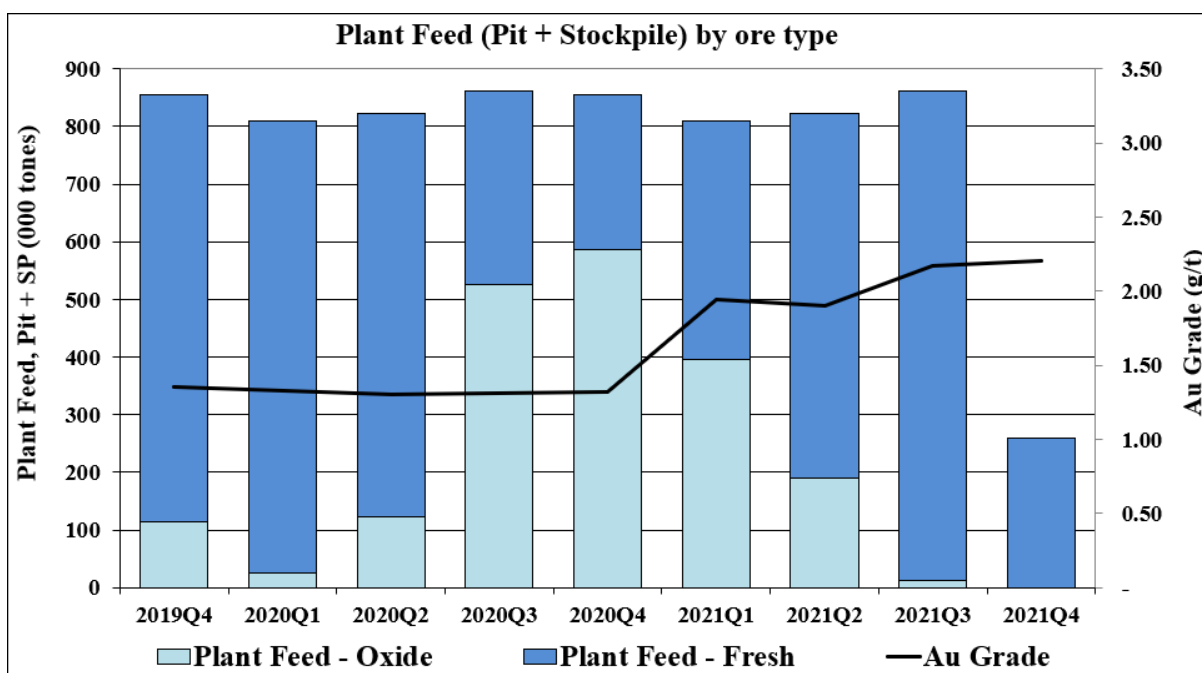


FIGURE 16-14 PLANT FEED BY ROCK TYPE



OPEN PIT OPERATION

PIT EQUIPMENT

Open pit mining is currently being undertaken by a mine contractor U&M Mineração e Construção S.A., one of the largest mining contractors in Brazil. The mining operations are based on the use of hydraulic excavators and a haul truck fleet engaged in conventional open pit mining techniques. Excavated material is loaded to trucks and hauled to either the ROM, ore stockpiles, or the waste dump.

Waste rock is typically drilled on 8 m high benches by 140 mm drill rigs utilizing a drill pattern of 4.1 m burden by 4.7 m spacing and blasted at a powder factor of 0.798kg/m³. Mineralized rock is typically blasted on 4 m benches by smaller drills (102 mm) utilizing a tighter drill pattern of 2.3 m burden by 2.8 m spacing at the higher powder of 1.26 kg/m³. Due to groundwater inflow at the oxide/transition contact, water-resistant emulsion explosive is utilized. Final pit walls, as well as the temporary pit walls during the phasing are pre-split. Ore and waste are fired together. For wide fresh mineralization, the ore can be blasted separately in order to minimize contact dilution. Excavation of oxide rock does not require drilling and blasting.

Ore sent to the ROM is stockpiled on oxide or fresh locations within various cut-off grade categories to facilitate blending to achieve the desired oxide / fresh proportion and grade.

Primary ore and waste loading equipment are 6.5 m³ and 15 m³ excavators supported by 4.2 m³ wheel loaders utilized for in pit loading and ore loading at the crusher. Haulage equipment is comprised of 36-tonne, 90-tonne, and 136-tonne truck fleets.

The major mine production equipment that U&M uses at the Tucano Gold Mine is outlined in Table 16-11. In addition, there are numerous light vehicles, support units, lighting plants and pumps.

TABLE 16-11 MINING FLEET
Great Panther Mining Limited – Tucano Gold Mine

Manufacturer	Model	Units
Sandvik	Drill, Panther 1500i, DX 680	12
Hitachi	Excavator, EX-1200	5
Hitachi	Excavator, EX-2500	4
Hyundai	Excavator, HX-220	6
Caterpillar	Loader, 980	5

Manufacturer	Model	Units
Caterpillar	Truck, 740	11
Caterpillar	Truck, 777	20
Komatsu	Truck, 730 E	6
Caterpillar	Dozer, D9	5
Caterpillar	Dozer, D6	1
Caterpillar	Grader, 16H, 14M	5
Mercedes	Truck, 8x4	15
Case	Rock Breaker	3
	Road Roller	1
Mercedes, Volvo	Water trucks	4
	Fuel Truck	5

MODE OF OPERATION

The open pit is scheduled to operate 365 days per year, 24 hours per day. The U&M work schedule utilizes four crews working two 9-hour shifts and one 6-hour shift.

Equipment productivity and utilization factors and equipment operating hours estimates per shift depending on seasonal conditions (dry, transitional, or wet season during the calendar year), are summarized in Table 16-12.

TABLE 16-12 OPERATING HOURS PER SHIFT
Great Panther Mining Limited – Tucano Gold Mine

Season	Days	Factor	Utilization	Operating Hours/Shift
Dry	122	100%	83.0%	6:38
Transitional	92	80%	66.4%	5:18
Wet	151	60%	49.8%	3:59

Mine equipment production and utilization factors that impact on equipment operation and fleet size are defined for the various seasonal conditions, rock type, and mining conditions (various bench and ramp widths), as presented in Table 16-13:

TABLE 16-13 EQUIPMENT PRODUCTIVITY AND UTILIZATION FACTORS
Great Panther Mining Limited – Tucano Gold Mine

Mining Condition	Production Factor	Utilization Factor	Total Factor	Description
Season Factor	95%	84%	UR=90%	Time loss due to lower truck availability; Waiting time due to
Trans			AB=80%	Waste Dump and access Condition/Maintenance;
				Productivity loss due to overall harder operation conditions

Mining Condition	Production Factor	Utilization Factor	Total Factor	Description
Season Factor Trans	90%	67%	UR=80% AB=60%	Time loss due to lower truck availability; Waiting time due to Waste Dump and access Condition/Maintenance; Productivity loss due to overall harder operation conditions
Fresh Rock Mining	90%	94%	85%	Time Loss waiting for drilling; Time loss for Blasting; Productivity loss due to harder digging conditions.
Ore Mining	95%	84%	80%	Time loss waiting for Geo Grade control and/or Topography marking; Productivity loss due to selective mining
Bench Width<50m	90%	83%	75%	Time loss due to increased truck spotting time; Time loss for dig face advance; Productivity loss due to constrained operational space
Bench Width<25m	80%	63%	50%	Time loss due to increased truck spotting time; Time loss for dig face advance; Productivity loss due to constrained operational space
Ramp Width=14m	100%	70%	70%	Time loss due to increased time waiting for trucks in single line ramps
Ramp Width=10m	100%	50%	50%	Time loss due to increased time waiting for trucks in single line ramps

MANPOWER

The mine is operating, and the mine manpower at the end of September 2019 is summarized in Table 16-14. The mine manpower includes owner and contractor personnel. The ongoing open pit operations will require this level of manpower for most of the next two years. Additional manpower will be required for the underground operations.

TABLE 16-14 CURRENT MANPOWER
Great Panther Mining Limited – Tucano Gold Mine

Area	Total
Mine Operations	66
Mine Maintenance	
Mine Engineering	17
Mine Geology	47
Total Mine	130
Mill Operations	76
Mill Maintenance	56
Electrical & Power	
Laboratory	4
Total Mill	136
G&A	89
Total AGM	355

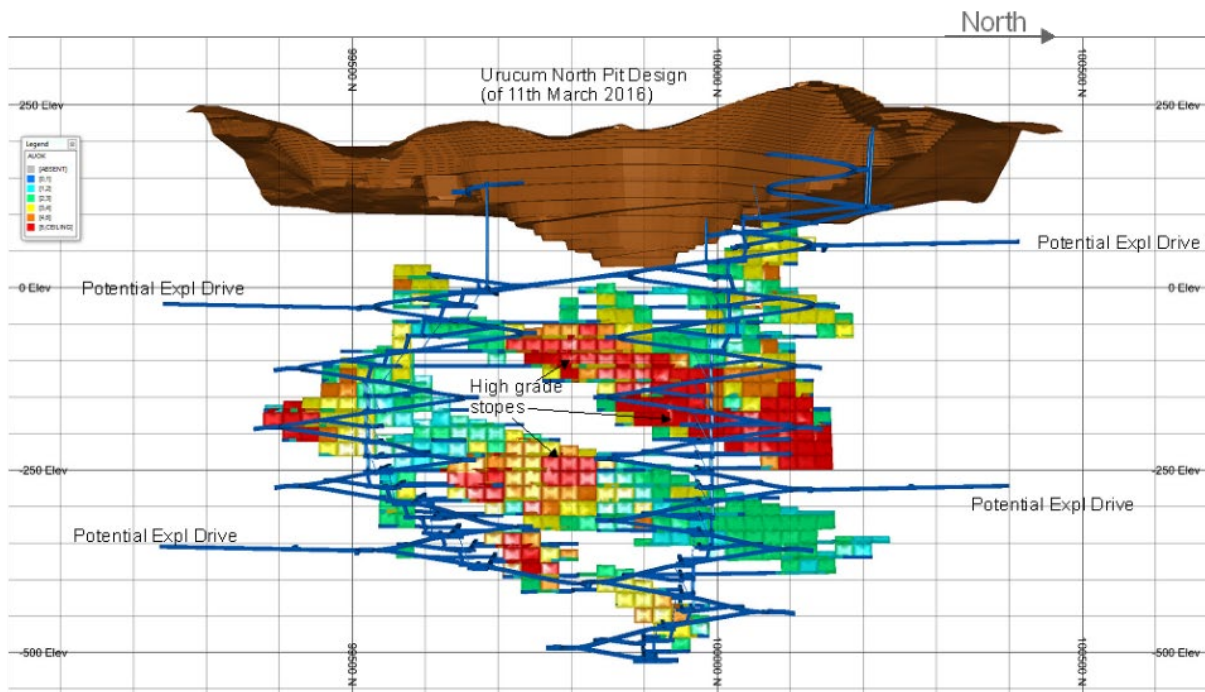
Area	Total
Temporary	-
Exploration	26
Total Company	381
Contractors	438
U&M	674
Total Contractors	1,112
Total Manpower	1,493

UNDERGROUND MINING METHODS

The underground mine Project sits below the Urucum North open pit. Access would be via a single portal located at the north end of the Urucum North pit (Figure 16-15). The mine layout is based on the following criteria:

- Twin declines accessing the north and south parts of the orebody.
- Portal situated on the north side of the Urucum North open pit.
- North and south exhaust ventilation raises.
- 20 m sublevel interval.
- Stopes accessed by a footwall drive and crosscuts on every sublevel.
- Decline development initiates in Year 1.
- Mine plan targets Measured, Indicated and Inferred Mineral Resources down to 500 mRL (750 mbs).

FIGURE 16-15 LONGITUDINAL SECTION - URUCUM NORTH UNDERGROUND MINE



GEOTECHNICAL CONSIDERATIONS

Geotechnical data from an infill drill program below the Urucum North Pit indicates that the ground conditions at the Urucum North are suitable for open stoping mining methods. Furthermore, stopes measuring 50 m in length and 20 m in height will be feasible. It will be possible to mine multiple benches simultaneously in the same ore block. As the ore lodes are steeply dipping and relatively narrow, they are suitable for a longitudinal version of longhole open stoping.

The base of weathering is relatively shallow. It occurs less than 50 m over the orebody and less than 30 m over the country-rock. Consequently, it will have minimal effect on the underground mine. Weathering will, however, be a factor for establishing the portal location and the upper sections of ventilation raises. Furthermore, weathering may be present along major faults and on the contacts of pegmatite dykes.

The following rock properties were estimated from the data obtained by logging the core from the infill drill program:

- Barton's rock quality index
- Q and Bieniawski's rock mass rating

- RMR

These classifications were used to estimate the stable spans for stopes and development as well as the ground control requirements. Safe development spans and support requirements can be estimated using Q. The stable hydraulic radius for determining safe stope spans can be estimated from a modified Q value (Q') using the modified Mathews stability method (Potvin, 1988). The results of the analyses are presented in Table 16-15.

TABLE 16-15 RANGE OF Q' AND RMR VALUES
Great Panther Mining Limited – Tucano Gold Mine

Zone/Location		Q'			RMR		
		Min.	Max.	Avg.	Min.	Max.	Avg.
Hanging Wall	North	3.58	16.67	12.4	63	82	74
	Central	2.78	96.71	33.04	63	84	74
	South	3.13	200.00	41.79	60	87	73
Backs	North	1.39	33.27	10.39	63	78	73
	Central	3.12	266.67	55.71	63	82	75
	South	1.39	100.00	25.79	72	87	80

The Q' values were used to estimate the modified Mathews stability number (N') and stable hydraulic radii (HR) for each of the stope zones (hanging wall and back). The stope design factors and hydraulic radii are presented in Table 16-16. The maximum stable unsupported span (MSUS), as well as the length of time it will be stable, are estimated with RMR. These values permit estimating the stability of stoping spans over a short period, ranging from a week to a month, assuming good quality mining practices. The analysis of the data indicates that there is little difference in rock mass condition between the hanging wall and backs of the stopes or between different locations in the orebody. The study uses the same rock mass classification for each zone and location.

TABLE 16-16 STOPE DESIGN FACTORS AND HYDRAULIC RADIUS
Great Panther Mining Limited – Tucano Gold Mine

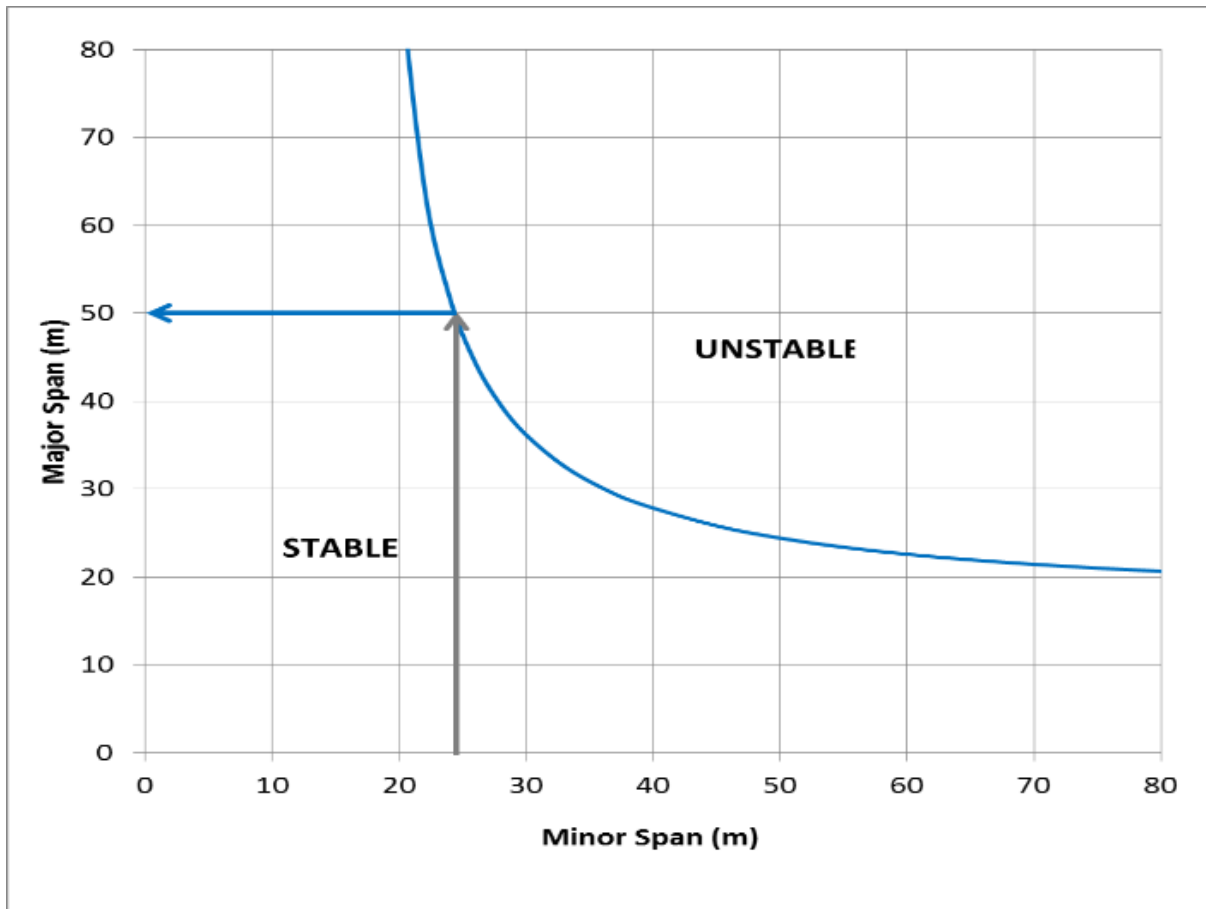
Q'	N'	Stable HR (m)	RMR	MSUS (m)	Lifespan (days)
12.5	28.1	8.2	76	22	153

In the case of stope hanging walls and backs, the term “stable” refers to stability on a large scale with consistent ground conditions. A zone classified as stable may, nevertheless,

experience small-scale falls or significant instability in the presence of large structures. Stopes that are accessible to personnel must be provided with an adequate amount of local support.

Figure 16-16 presents a graph of the maximum spans for maintaining stable stopes. As indicated on the graph, an unsupported span of 50 m with a 20 m sublevel interval (i.e., 24 m floor to roof) should remain stable for three weeks, provided there are no abnormal conditions.

FIGURE 16-16 MODIFIED MATHEWS SHORT-TERM STABILITY ESTIMATE



The maximum strike distance that can be left open will be satisfied with at 50 m spacing of the rib pillars.

The crown pillar separating the ultimate pit floor from the upper limit of underground stope excavations is critical to the safety of the mining operations. It must remain stable for the life of the mining operation, either by designing it with an adequate size or by ensuring that it is sufficiently confined to prevent its collapse. Ground support installed in the bottom of the pillar

may be required to maintain its stability. The effects of deep weathering adjacent to the pegmatite contacts on crown-pillar stability need to be investigated.

The required height of the crown pillar depends on the width of the stope beneath it. The minimum height to width ratio should be 3:1. The actual height can be optimized by controlling the profile of the pillar's base and by using ground control systems (e.g., cable bolts and shotcrete).

The crown pillar must be formed with the minimum height and situated in strong (fresh) rock. It must not be located within the weathered profile or colluvium horizons.

Sill pillars require a 2:1 minimum height to width ratio, but in any case, must not be less than 10 m in height. It may be necessary to increase the sill-pillar height to maintain this 2:1 ratio in places where stacked lenses occur, or in wider parts of the orebody.

Rib pillars between adjacent open stopes should be at least 5 m high and have a minimum height to width ratio of 1:1. Pillars between lenses, where stacked lenses exist, should have a minimum height of 10 m. For situations in which stacked lenses occur, the extraction sequence should advance from the hanging wall to the footwall. Stopes planned in the footwall of an existing stope should be limited in size. Alternatively, small rib pillars may be left in the ore to reduce the chances of inter-lens pillar failure.

GROUND CONTROL REQUIREMENTS

Ground control requirements should be light as ground conditions are expected to be good. Additional support may be needed where excavations cross pegmatite contacts as well as major fault zones. Additional support will be required in zones where poor ground conditions are encountered. This support should be designed by a competent person after inspecting the conditions.

The recommended ground support for long-term development drives consists of 2.4 m long rebar bolts installed on a 1.5 m by 1.5 m spacing. The bolting pattern in a typical drift heading consists of lines of bolts with three of them in the back and one in each shoulder. Welded mesh should be installed on the backs and shoulders of the drives if the heading heights impede adequate inspection and scaling. Additional spot bolts should be installed in locations where the joint orientation forms wedges or smaller blocks in the backs or sidewalls. Cable

bolts may be required at intersections. Each intersection should be inspected by a qualified person who will determine whether it needs cable bolting.

The recommended ground support for ore drives consists of friction bolts installed on a 1.5 m by 1.5 m spacing. Mesh will generally not be required in these drives except in locations with poor ground conditions.

GROUNDWATER HYDROLOGY

Minimal groundwater inflows are expected in the underground mine. Possible sources of groundwater could be major cross-cutting faults as well as the contact areas between the pegmatites and the country rock.

MINING METHODS

The following methods are proposed for mining the Urucum North orebody:

- Up-Hole Retreat: In the upper levels of the orebody.
- Conventional Avoca: For the remainder of the orebody.

UP-HOLE RETREAT MINING METHOD

Up-Hole Retreat is a top-down mining method in which the ore is drilled and blasted with up-holes and mining retreats to a centrally positioned crosscut on each sublevel (see Figures 16-17 and 16-18). Backfilling the mined-out void can be delayed by leaving rib pillars to support the sidewalls. In most cases, the large mined-out void will eventually be backfilled with uncemented rockfill to maintain regional ground stability.

FIGURE 16-17 3D SCHEMATIC OF UP-HOLE RETREAT MINING METHOD

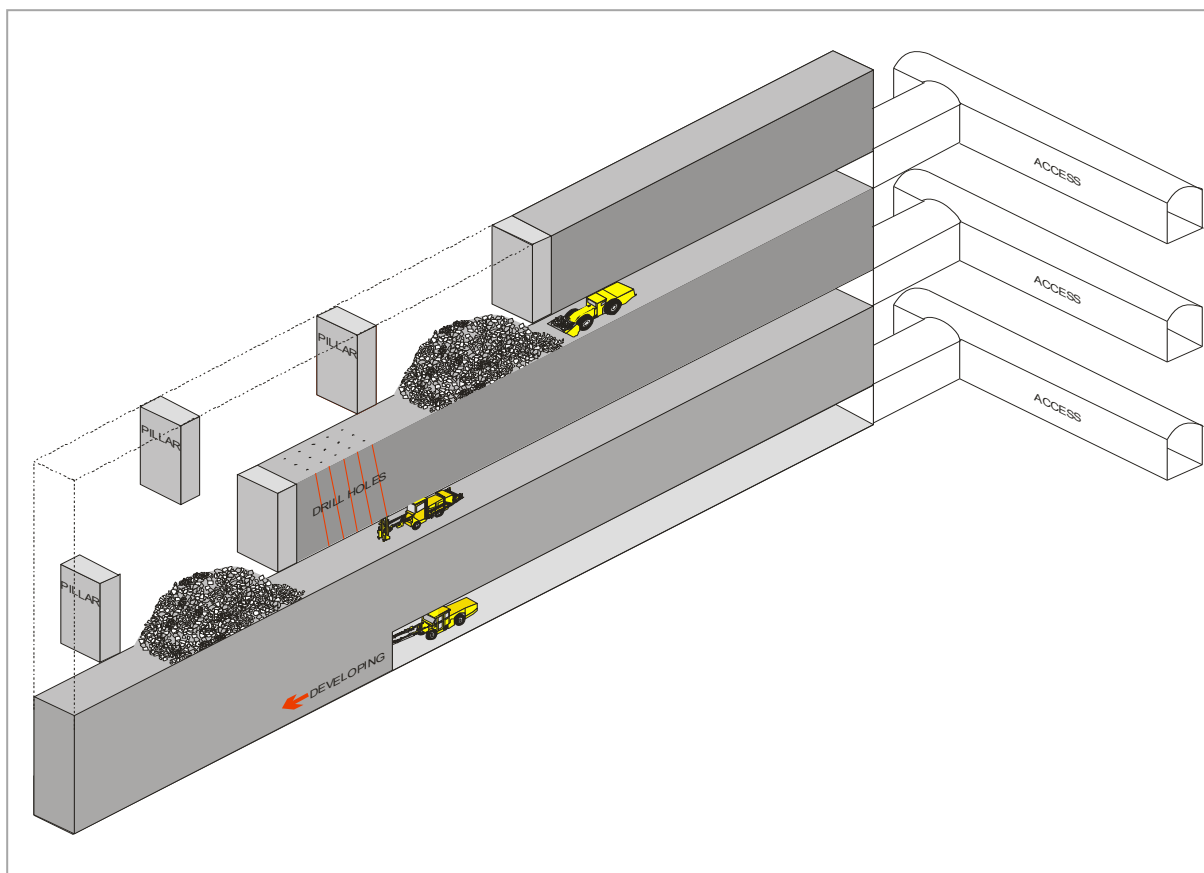
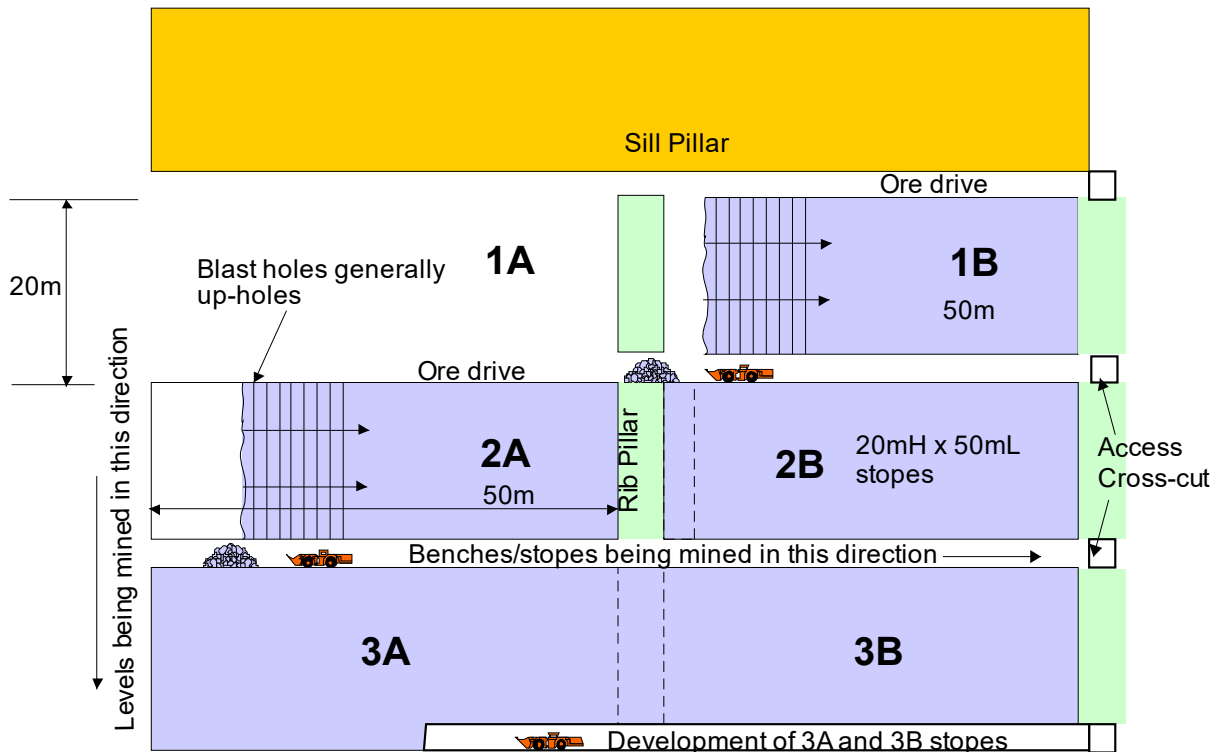


FIGURE 16-18 LONG PROJECTION INDICATING UP-HOLE RETREAT MINING SEQUENCE



CONVENTIONAL AVOCA METHOD

Conventional Avoca, also called longitudinal retreat longhole open stoping, is a bottom-up mining method that is suitable for steeply dipping vein-type orebodies. The orebody is mined from bottom to top in horizons, similar to cut-and-fill and sublevel open stoping. A bench is established at each end of the stope, which retreats along strike toward the centre of the stope. The mined-out part of the stope is progressively backfilled with rockfill such that the waste muck pile advances just behind the retreating bench face.

The sublevel interval can vary from 15 m to 30 m but typically is around 20 m. For each horizon that is mined, the upper sublevel crosscut provides access for longhole drill and charging on top of the bench. The bench between sublevel ore drives is usually drilled with downholes from the upper sublevel ore drive. Alternatively, it can be drilled with upholes from the lower sublevel ore drive. The stope is mined from two sides with benches that start out at opposite ends of the orebody. A slot raise extending between the lower and upper sublevels is required to initiate each bench. As it is drilled and blasted, each bench face retreats along strike towards the crosscut at the centre of the stope. For each horizon, the lower sublevel crosscut provides access to the ore drive for the load-haul-dump (LHD) to muck the blasted ore beneath the brow

of the bench. A portion of the blasted ore can be mucked with the operator running the LHD, and the remainder must be mucked by radio remote control. When mucking the ore, the operator has to minimize mucking the unconsolidated rockfill on the floor of the drive or from the waste muckpile.

The rockfill is usually unconsolidated but cemented rockfill (CRF) can be used to permit future recovery of the sill pillar below the base of an ore block. The stope is progressively backfilled as the bench advances toward the centre of the stope. In Conventional Avoca, a footwall drive is developed at each sublevel to provide access to the extreme ends of the stope. This access permits the LHD (or mine truck equipped with a Teletram dump box) to deliver rockfill into the stope and dump it at the advancing waste muck pile just behind the retreating bench. The waste muck pile is advanced just enough to leave a gap of open stope between it and the bench face that provides a void for blasting one or two longhole rings of the bench.

SILL PILLAR RECOVERY

To maximize production rates, the orebody is divided into blocks separated by sill pillars allowing ore production to proceed from multiple mining fronts. The sill pillars will be partially recovered after the stopes above and below them have been mined out and backfilled. The typical sill-pillar height will be 15.5 m, considering a 20 m sublevel interval. Alternatively, thinner sill pillars (e.g., 6 m to 10 m) can be left without making any attempt to recover them.

VENTILATION

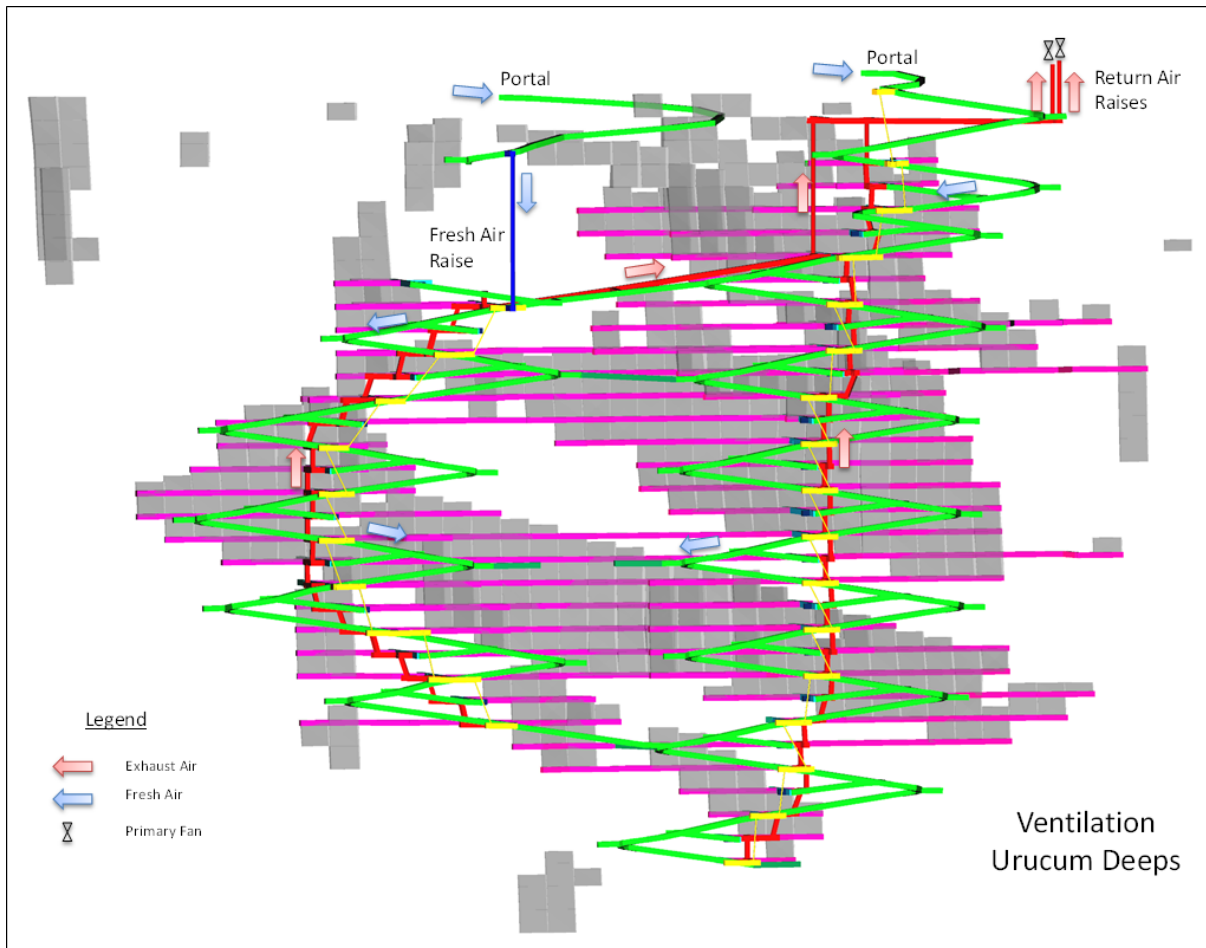
The mine's ventilation will be a pull-type (exhausting) system. The main ventilation fans will be installed at the collars of the primary exhaust raises. The fans were selected to ensure that all underground workplaces are supplied the required volume of fresh air. Contaminants are removed to the exhaust air system and expelled to surface.

Fresh air will enter the mine through the portal and main decline. It will split between the north and south declines that extend to the mine's lower levels. Fresh air also enters via an assess drive from the open pit, thereby lightening the volume flowing through the declines and ensuring that their air velocities are not excessive.

Two primary return air raises will be developed at the northern end of the mine, each one with an exhaust fan installed at its collar. Two exhausting fans provide a degree of redundancy in the ventilation system, which is beneficial in case one of them breaks down or requires

maintenance. Internal return raises will be developed while driving the two declines. A return air transfer drift will convey exhaust air from the southern internal return raises to the northern primary raises. The ventilation plan is illustrated schematically in Figure 16-19.

FIGURE 16-19 LONG PROJECTION INDICATION PRIMARY VENTILATION SYSTEM



The design of the ventilation system provides 350 m³/s of fresh air to the underground operation. This volume takes into account the requirements for diesel equipment, infrastructure, and personnel. Furthermore, it complies with the requirements of the Brazilian Regulatory Standards for Mining (Normas Reguladoras de Mineração) for a production rate of up to 700,000 tonnes per annum (tpa).

The main fans on surface will be controlled with VFD (variable frequency drives) so that air volumes can be adjusted during the life of the mine. The vent circuit has been modelled with ventilation network software to determine the peak primary fan duties.

Auxiliary ventilation on the levels will be provided by auxiliary vent fans and vent ducting, using the declines as the fresh-air source. The contaminated air will be exhausted via a return air raise that connects to the access drive of each level.

UNDERGROUND INFRASTRUCTURE AND SERVICES

POWER SUPPLY AND DISTRIBUTION

Medium voltage electrical power (e.g., 4160 v) will be supplied to the underground mine via the two declines, using separate feeder circuits connected to the site's main substation. Each feeder will continue down its respective decline.

WATER SUPPLY AND DISTRIBUTION

Industrial water is already available at the site of the underground-mine project as a result of the existing services for the open pit and processing operations. Water usage is expected to peak at around 7.6 L/s during Stage 1 when the production rate attains 500 ktpa. The water will be delivered underground via 4" diameter steel pipe installed in the back of each decline. Pressure reducing valves will be installed along the water lines at pre-set vertical intervals.

DEWATERING

As groundwater inflows are expected to be low, a simple dewatering system will be adequate. It will consist of a series of sumps along the declines, spaced at an 80-m vertical interval, and each one will have a submersible pump. The water will be pumped from sump to sump and finally discharged into the dewatering system in the open pit. Intermediate sumps, spaced at a 20 m vertical interval, will drain water to the main sumps via drain-holes.

COMPRESSED AIR

Two portable electric compressors will supply compressed air to the mine. Compressed air will be required for pneumatically powered equipment, which may include ITH drill rigs, Alimak raise climber, and airleg drills.

EMERGENCY EGRESS

The mine's emergency egresses will be developed as raises extending from sublevel to sublevel and equipped with regulation-compliant ladderways.

REFUGE CHAMBERS

The mine will have four portable 12-person refuge chambers that will be used during the mine's development before the escapeway system is established. They will continue to be used once the mine is in production in situations where a second means of egress cannot be provided.

UNDERGROUND COMMUNICATIONS

The mine will have a leaky feeder system for communications. Two-way radios will be mounted on every piece of mobile equipment and provided at strategic locations.

UNDERGROUND SERVICE BAY

Underground service bays will be provided for the daily maintenance of the jumbos and production rigs. Most of the maintenance for the mobile equipment fleet, however, will be carried out at the existing maintenance shop on surface.

SURFACE INFRASTRUCTURE

The underground mine would use some of the existing infrastructure built for the open pit operations such as the explosives magazines and warehouse. Additional surface infrastructure will include the following:

- Two 560 kW radial fans will provide ventilation for the mine.
- Mine dry change rooms
- Lamp room with a capacity for 200 miners' lamps.
- Office facilities for technical services, Operations Control, Electrical and Mechanical Engineering, and Management and Supervision
- Surface Workshop including the following facilities:
 - 10 t bridge crane
 - Offices for maintenance supervision
 - Toilets and wash basins
 - Workshop area
 - Fuel station
 - Equipment washing area
- Mine rescue centre including:
 - First aid room
 - Mine rescue and training room
- The existing explosive magazines and warehouse facilities will be used for the underground project.

UNDERGROUND MOBILE EQUIPMENT AND MAINTENANCE

The underground mobile equipment has been selected according to the production rates and heading dimensions. Equipment will include:

- Epiroc Boomer 282 Two boom development jumbos
- Simba H1354 production drills
- Volvo A35 underground haulage truck
- Ten-tonne tramming capacity LHDs
- Epiroc Boltec M ground support rig
- A Scaletec UV 2 or a Normet Scaler 2000 mobile mechanized scaler
- Mobile rockbreaker
- Telehandler for installing services and transporting materials
- Caterpillar 12H Grader
- Charmec explosives charger
- 4WD pickup trucks and jeeps for technical staff and supervisors

LIFE OF MINE PLAN

The underground LOM is presented in Table 16-17. Approximately 2.1 Mt of ore at an average grade of 4.1 g/t Au will be mined and processed over the 6.5 mine life. An evaluation of the planned production rate and scheduling indicates that the deposit supports 450,000 tpa to 500,000 tpa. Production rates vary from year to year depending on the number of production fronts becoming available in different areas of the mine. The production rate could be further optimized as part of any future Feasibility Study (FS).

Major scheduling assumptions driving these production rates include: decline and crosscut advance of 140 m/month, ore drive advance of 60 m/month, production rate from stoping of 10,000 t/month for both Uphole retreat and Benching stopes, backfilling rate of 12,000 m³ per month, per stope, for Benching stopes. All scheduling assumptions are based on industry benchmarked data. Scheduling undertaken has been based on maintaining a near constant number of primary mobile equipment in both the North and South declines.

TABLE 16-17 UNDERGROUND LIFE OF MINE PLAN
Great Panther Mining Limited – Tucano Gold Mine

		Y1	Y2	Y3	Y4	Y5	Y6	Y7	Total
Stoping	Tonnes (000 t)	28.3	288.9	396.2	445.4	370.0	387.2	110.7	2,026.7
	Grade (g/t Au)	3.2	3.2	4.3	5.0	4.4	3.5	3.8	4.1
	Contained Metal (000 oz Au)	2.9	30.0	55.3	72.1	52.2	44.1	13.5	270.1
Ore Development	Tonnes (000 t)	1.4	10.3	8.7	33.5	21.1	27.6	4.8	107.5
	Grade (g/t Au)	2.7	2.8	3.0	5.2	3.3	2.8	3.7	3.7
	Contained Metal (000 oz Au)	0.1	0.9	0.8	5.6	2.3	2.5	0.6	12.8
Total Production	Tonnes (000 t)	29.7	299.3	404.9	478.9	391.1	414.8	115.5	2,134.3
	Grade (g/t Au)	3.2	3.2	4.3	5.0	4.3	3.5	3.8	4.1
	Contained Metal (000 oz Au)	5.6	32.8	58.3	77.2	55.5	46.9	17.2	282.9
Ore Development	Metres (m)	26	177	158	549	357	481	83	1,832
Waste Development									
Horizontal	Tonnes (000 t)	218	303	326	322	313	309	147	1,938
Eq Metres	m	3,452	4,805	4,797	4,810	4,797	4,797	2,128	29,584
Vertical	Tonnes (000 t)	5.9	9.4	6.5	6.9	5.1	6.3	2.9	43.2
Eq Metres	Metres (m)	97	157	103	101	78	96	43	675

MANPOWER

The underground workforce is presented in Table 16-18. Workforce size at full production is estimated to be 240 employees.

TABLE 16-18 UNDERGROUND WORKFORCE
Great Panther Mining Limited – Tucano Gold Mine

Description	Quantity
UG Mining Equipment Operators	100
UG Maintenance Personnel	55
Management and Supervision and Technical Services	52
Surface Maintenance	15
Underground Service Crews	18
Total	240

Employees working underground will work seven-hour shifts, but be paid for eight hours on site with the additional hour allowed for meal breaks, showering, etc. The working time “at the face” for underground workers is estimated to be five hours and 45 minutes. The underground workforce will consist of six crews working three eight-hour shifts per day:

- Continuous operations - 24 hours per day, 365 days per year, three shifts per day.
- 7 hours per shift plus 1 hour on surface, with a maximum of 5 hours 45 minutes working at the face.
- 19 days on, 9 days off basis.
- 28 days annual leave.

Expats will work the following four-panel, two-shift schedule:

- Continuous operations – 24 hours per day, 365 days per year, two shifts per day.
- 12 hours per shift.
- 14 days on, 14 days off basis.
- 14 days of annual leave.

The work schedule for the senior staff will be non-continuous, consisting of 5 x 12-hour shifts followed by two days off. They will be entitled to 20 days of annual leave.

Table 16-19 presents the break-down of the management, supervision, technical services, surface maintenance and underground service crew employees.

**TABLE 16-19 MINING DEPARTMENT EMPLOYEES - EXCLUDING
UNDERGROUND EQUIPMENT OPERATORS AND MAINTENANCE PERSONNEL
Great Panther Mining Limited – Tucano Gold Mine**

Position	Max Number
UG Manager	1
Senior Engineer	1
Mining Engineers	3
Sen Geotech Engineer	1
Technicians	12
UG Foreman	6
UG Workers	20
Senior Geologist	1
Geologists	2
UG Geology Technicians	12
Surveyor	3
UG Survey Technicians	9
Manager	1
Senior Engineer	1
Engineers/Planners	3
Artisans	12
Expert Trainers	6

17 RECOVERY METHODS

SUMMARY

The existing Tucano flowsheet consists of a primary jaw crusher feeding a SAG mill/ball mill (SAB) grinding circuit with no pebble crusher. The ground ore is then thickened prior to being treated in a “hybrid” CIL plant consisting of a new single pre-leach tank followed by the original six tank CIL and carbon elution circuit followed by detoxification of tailings.

The design is currently based upon mining and processing of 3.4 Mtpa of ore and treating a blend of ore which is predominantly (90%) of the harder sulphide ore type.

The Tucano Expansion Project which included a new ball mill, pre-leach thickener, additional single leach tank and oxygen plant was completed by November 2018. An additional oxygen plant was installed and commissioned in April 2019 to further increase DO levels and this equipment was designed to treat 3.6 Mtpa.

The description of the current expanded plant is described below and the simplified process flowsheet is illustrated in Figure 17-1.

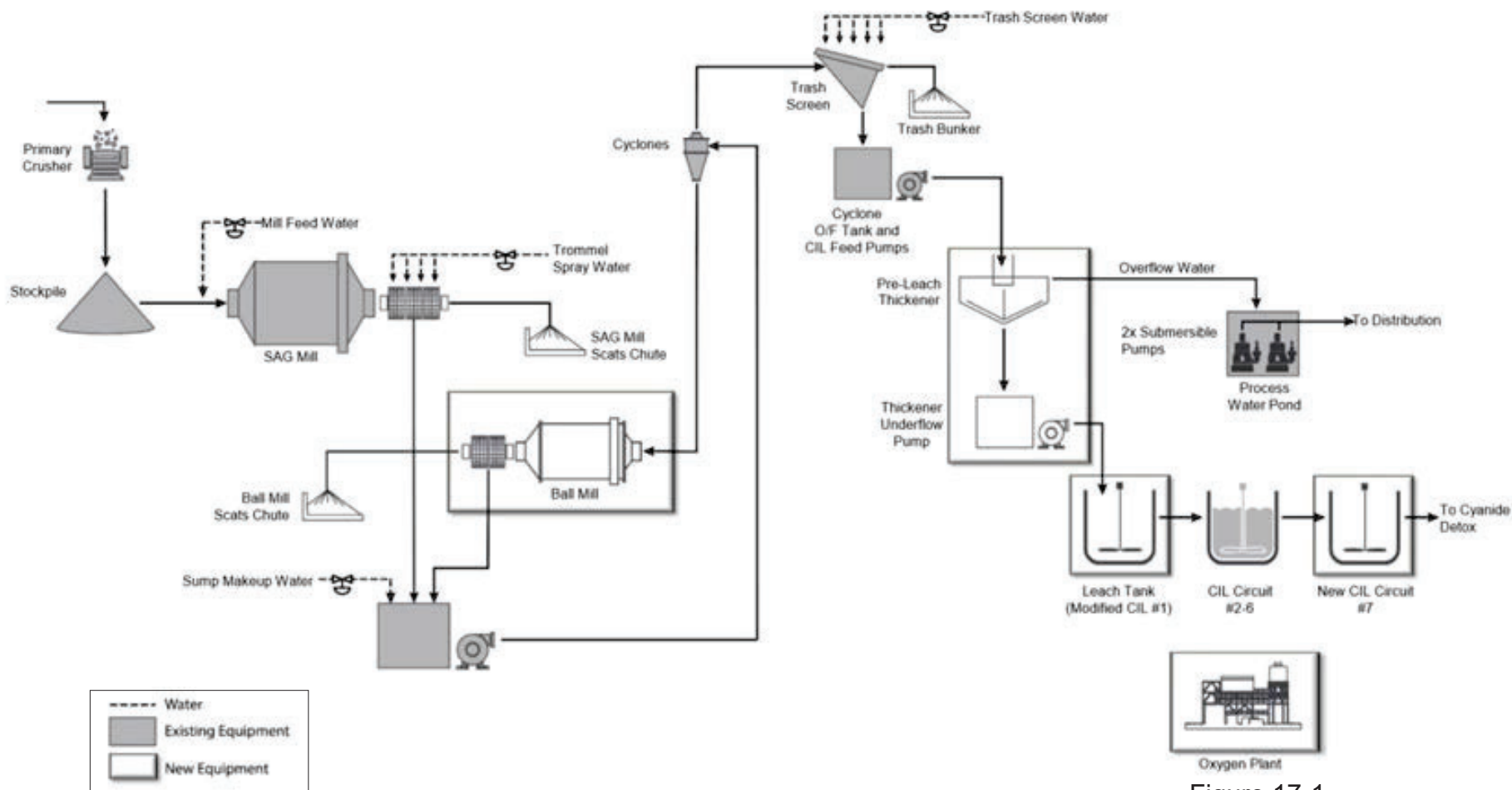


Figure 17-1

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Tucano Simplified
Process Flow Sheet**

CRUSHING AND ORE STOCKPILING

Ore is delivered to a ROM pad where oxide and sulphide ores are stockpiled separately depending on specified grade ranges. The ores are fed to the crusher hopper by means of a front-end loader to achieve the daily planned sulphide / oxide blend and grade.

A vibrating grizzly allows the finer, sticky oxide ore to bypass the crusher. Crushing is achieved using a 1,220 mm x 1,070 mm single toggle TEREX ST-48 jaw crusher with a closed side setting (CSS) of 125 mm. In addition to the jaw crusher, a separate Spent Ore Feeder is located in the emergency stockpile area to facilitate the feeding of spent ore direct to the SAG mill. A surge bin with 30 min residence time and a diversion chute to an emergency stockpile feeder is located halfway between the crusher and the SAG mill.

MILLING, CLASSIFICATION, AND PRE-LEACH THICKENING

Grinding is achieved with an Outotec SAG mill with a 7 MW single-pinion TECO drive, a diameter of 7.32 m and an effective grinding length (EGL) of 7.95 m in open circuit followed by an Outotec Ball mill fitted with a 6 MW motor. The ball mill operates in closed circuit with a battery of 10 hydrocyclones with a product size which is currently 80% < 75 µm. The plant has two Weir 490 HP cyclone feed pumps at the discharge of the ball mill and the cyclones have an apex of 210 mm with a 5 in. vortex.

The addition of the ball mill in 2018 allowed the mill feed tonnage to be maintained at 3.4 Mtpa on the harder sulphide ore types, while also reducing the hydrocyclone overflow P₈₀ size. Hydrocyclone overflow from the grinding circuit is screened to remove trash (i.e., wood chips, plastic, etc.) and is then pumped to the new 28 m diameter Outotec pre-leach thickener. The pre-leach thickener overflow is recycled as process water and recycled to the grinding circuit. The pre-leach thickener underflow is then pumped to the new pre-leach tank.

HYBRID CIL CIRCUIT

The Hybrid CIL circuit consists of one 2,650 m³ pre-leach tank followed by six 2,650 m³ (live volume) CIL tanks. There are two objectives in operating the pre-leach tank:

- Ensure that the majority of gold is in solution before coming into contact with the carbon, as this vastly increases the carbon adsorption kinetics; and

- Oxygen is blown into this first tank to ensure that the DO levels are as per the Ausenco recommendation of > 15ppm DO.

All seven tanks operate in series. Launderers connect the tanks to allow slurry to flow by gravity through the tank train. All tanks are fitted with bypass launders to allow any tank to be removed from service for agitator or screen maintenance.

Each tank is fitted with a 110 kW mechanical agitator to ensure uniform mixing. Oxygen is currently maintained in the pre-leach Tank 1 at > 15ppm via a dedicated pulp recycle system and oxygen injection system and the remaining oxygen is added to CIL Tanks 2, 3, and 4. Air is supplied to CIL Tanks 5, 6, and 7. The current system has been in operation since April 2019.

Each CIL tank is fitted with a single 12 m² mechanically swept, wedge-wire inter-tank screen to retain carbon. The style of inter-tank screen selected is known as a “pump screen”, which allows each of the CIL tanks to be installed at the same elevation, in contrast to the stepped arrangement used for conventional cascade carbon-in-pulp (CIP) plants. This arrangement simplified the civil engineering requirements of the CIL area. Barren carbon enters the adsorption circuit at the last tank, CIL Tank 6, and is advanced counter-currently to the slurry flow by moving slurry and carbon from CIL Tank 6 to CIL Tank 5 using recessed impeller carbon-transfer pumps. The inter-stage screen in CIL Tank 5 retains the carbon and the slurry flows by gravity back to CIL Tank 6. This counter-current process is repeated until the carbon reaches CIL Tank 1. A single recessed-impeller pump is used to transfer slurry to a loaded-carbon recovery screen. The carbon reporting as screen oversize flows to the carbon transfer column and the screen undersize returns to CIL Tank 1.

The elution circuit is the same elution circuit that was originally designed for the New Gold heap leach operation. The loaded carbon is washed with process water in the carbon transfer column to remove slimes prior to the elution circuit. An eductor, using raw water, transfers the washed carbon to the existing desorption circuit. Barren carbon returning to the adsorption circuit from the carbon regeneration kiln is screened over a vibrating screen to remove fine carbon which is then collected and stockpiled for processing off site. The sized and regenerated carbon reports directly to CIL Tank 6.

Sodium cyanide (NaCN) solution is metered into Leach Tank No. 1 and the design allows for additional cyanide to be metered to other tanks as required. Final pH adjustments are made by the addition of lime to the CIL Tank 1 feed box from a lime slurry ring main system. Tailings slurry from the last CIL tank flows to the vibrating carbon safety screen to recover any carbon that may be present due to damage, wear, or incorrect installation of the final stage inter-stage screen. Carbon recovered on the screen is delivered to a bulk bag for re-use. Tailings discharging from the carbon safety screen underflow are transferred via gravity to the cyanide detoxification circuit. The leach and adsorption area has three spillage pumps, which deliver any spillage in the area back to the process. Maintenance of the seven hybrid CIL tanks and agitators is achieved using an overhead crane.

The introduction of the pre-leach tank enhances the gold adsorption kinetics of carbon and maintains a leach residence time of 24 h at the planned 450 tph (i.e., 3.6 Mtpa) process capacity.

TAILINGS

Tailings are deposited in the tailings dam located at the north of the plant. The use of the West Pond involves pumping the tailings approximately 3.6 km and the return water initially to 2.7 km and later up to 5.5 km. An air / SO₂ cyanide destruction circuit, using sodium metabisulfite (SMBS), lime slurry, and copper sulphate (CuSO₄), consists of two tanks in series with a total residence time of 60 min. The circuit lowers the cyanide concentration of the tailings before discharge to the West Pond TSF.

The detoxified tailings will leave the circuit at approximately 38% solids. Water is recovered from the TSF and pumped back to the process plant for consumption or neutralization and discharge. Natural degradation and dilution in the dam reduce the cyanide level further in the return water to a concentration of approximately 10 ppm CN_{total}. The majority of this return water is re-used in the process plant.

However, as the site water balance is positive, a portion of this water needs to be discharged to William Creek.

ELUTION

The existing Pressure Zadra elution circuit and gold room were already in place when Beadell acquired the plant from the previous heap leach operation and the CIL plant was configured to use these facilities. The elution columns are primed with a solution of 0.1% cyanide and 1% caustic soda that is prepared in the electrowinning solution tank. This solution is recirculated through the elution columns at 135°C to promote the elution of gold ions that are adsorbed in the micro pores of the loaded carbon. The heating of the recirculating solution is provided by a 720 kW electrical elution heater. The current elution circuit is sized to treat 4.8 tonne of carbon per day. The elution circuit is currently treating 3 to 4 strips (14.4 – 19.2 tonnes/day) specifically to minimise gold inventory in circuit. The management of carbon in the circuit requires an optimisation study to evaluate the quantity of gold in inventory and soluble gold loss versus long term elution costs.

CARBON REGENERATION

Once the acid wash cycle is complete, the carbon is fed to the kiln feed hopper, where the carbon is screw-fed to the kiln dewatering screen, to dewater the carbon to 50% w/w solids. The undersize flow from the kiln dewatering screen is transferred and collected by the acid wash area sump pump. The kiln dewatering screen oversize reports to the kiln feed hopper. Carbon is withdrawn from the kiln feed hopper by a screw feeder and fed to the carbon regeneration kiln.

Carbon regeneration is achieved at a temperature of 700°C. After regeneration, the barren carbon is discharged into the carbon quench tank to reduce the temperature of the carbon to room temperature. The barren carbon is then transferred back to the CIL circuit. The carbon regeneration kiln acquired from the previous heap leach operation has been extensively refurbished by Beadell.

ELECTROWINNING AND GOLD RECOVERY

The solution leaving the elution columns passes through two heat exchangers, arranged in series, to reduce the solution temperature, then through a cyclone separator to the electrowinning feed tank. The solution flows from the electrowinning feed tank through a bank of two electrowinning cells, where the gold in the solution is deposited on the cathodes within

the cells. The barren solution leaves the electrowinning cells and returns to the electrowinning solution tank. This solution is then pumped back through the elution heater to the elution columns. The solution is recirculated through this closed circuit for 12 h, until the deposition of gold onto the cathodes is complete. At the end of the elution cycle, the carbon is transferred to the acid wash column. The barren eluate solution is pumped from the electrowinning solution tank back to the CIL circuit.

The acid wash cycle consists of a six-hour acid wash, in which 15% hydrochloric acid (HCl) is recirculated through the column, followed by a two-hour water wash. The HCl is delivered to the acid wash column by a dedicated acid wash HCl tank and pump set located in the desorption area.

A 15% HCl solution is prepared by diluting 33% HCl from the main acid storage tank with raw water. Wash water is added to the acid wash tank from the main raw water supply. The original design of the elution circuit included a four-hour neutralization cycle using sodium hydroxide (NaOH). However, this step was deemed to be unnecessary during the operation of the heap leach plant and was decommissioned.

The gold room was retained from the previous heap leach operation existing operation and consists of a bank of two electrowinning cells. During the electrowinning process, gold is deposited on the stainless-steel wool cathodes in the cells. Following electrowinning, the sludge containing the gold is dislodged from the cathodes using a high-pressure water spray. The sludge is dried in a drying oven before being combined with fluxes and smelted in a furnace.

There are two operating furnaces that were retained from the previous heap leach operation, a gas fired furnace and an electric furnace. In smelting, the doré metal and slag separate in the furnace, the molten slag is transferred to slag pots and the doré metal is cast into bars. Doré bars are cleaned, weighed, stamped, sampled, and then stored in a safe contained within a strong room, before dispatch.

18 PROJECT INFRASTRUCTURE

CONTEXT AND REGIONAL INFRASTRUCTURE

The Tucano site is located approximately 185 km from Macapá, the capital of Amapá State, in the Northern coast of Brazil.

The site is relatively remote and, for the development of the Tucano property, Great Panther and its predecessors took advantage of the existing infrastructure built in the late 1950s for the Serra do Navio manganese operations (15 km northwest from the Tucano site), and site upgrades established during the 1970s.

The main existing infrastructure in the vicinity of Tucano consists of the towns at Serra do Navio and Pedra Branca do Amapari, the road from Macapá to Serra do Navio, the hydropower facilities and transmission line from the Coaracy Nunes complex in the Araguari River (approximately 70 km to the West from the Tucano site), the railway from Macapá do Serra do Navio (currently inactive), and the port at Santana.

Macapá and the Santana port, approximately 10 km to the southwest of Macapá, are located in the North canal of the Amazon River. The Santana port can accommodate relatively large ships, as it was built for bulk materials handling and has been in use until recently to handle iron ore from the Zamin property, adjacent to the Tucano site, to the southeast.

Macapá is 330 km northwest from Belém, the capital of the state of Pará, in the South canal of the Amazon River. Belém has approximately 1.5 million inhabitants and has a fairly developed industry. It is well connected to the industrial regions in Brazil Southeast and the main region's hub.

Most of the industrial supplies and bulk materials required for Macapá and Tucano are sourced in Southeast Brazil, transported by truck to Belém, ferried to Macapá, and released at the Santana port.

Macapá has an estimated population of approximately 500,000 inhabitants. Amapá State, in the north margin of the Amazon River, is considerably less developed than the southernly Pará

State. Most of the industrial development of the state was first driven by mining and agro-industrial projects established in the late 1950s.

There are two small towns near the Tucano site that house most of Tucano employees and their families: Serra do Navio (established as a mine camp to accommodate personnel and their families from the manganese operations in the late 1950s and has approximately 5,100 inhabitants) and Pedra Branca do Amapari (located 30 km southeast of Tucano and has a population of approximately 13,000 people).

The Coaracy Nunes hydropower facilities at the Araguari River have a capacity up to 78 MW and are operated by the state-owned CEA, which is controlled by Centrais Elétricas do Norte do Brasil S.A. (Eletronorte). The facilities were developed in the mid 1970s to support the Serra do Navio and Jari projects and to provide a reliable and affordable alternative to diesel generated energy for Amapá State, which has no links to the remainder of the national grid in Brazil. The 69 kVA transmission line from the Coaracy Nunes complex to Serra do Navio is approximately 70 km long and was installed in the South margin of the Araguari River to its junction to the Amapari River and then follows the railway path to Serra do Navio in the South margin of the Amapari River.

SITE ACCESS AND LOGISTICS

The mine site is located approximately 200 km from Macapá. Road access to Serra do Navio is well established because of the implementation of the manganese operations in the late 1950s and construction of highway BR-210, Rodovia Perimetral Norte in the mid-1970s. Open pit mining operations at Tucano commenced in 2012, when a dedicated road was upgraded from Pedra Branca do Amapari to the mine. This road access comprises:

- A sealed road for approximately 100 km, from the port town of Macapá towards Porto Grande;
- An unsealed road from Porto Grande to Pedra Branca do Amapari for approximately 75 km.
- An unsealed road from Pedra Branca do Amapari to the site, developed specifically for Tucano for approximately 17 km.

The journey from Macapá takes approximately four hours by car during the dry season and up to six hours during the wet season, depending on the condition of the unsealed roads. The

unsealed roads are passable all year around and no blockages are expected, except during road maintenance.

The main concern for the transport of personnel, bulk materials, parts, and other supplies is the existence of various wooden bridges along the route with capacity limited to 45 t of total load (carriers plus deadweight). Most of the bridges have been upgraded, allowing for a reliable means of transport to the site. The load limitations have not been a problem for the mine operation or the plant upgrade, as most of the equipment parts were lighter than 25 t average deadweight transported per trip.

Diesel for the operation of the mining fleet and for power generation is the main bulk material transported to the Mine. Approximately three Megalitres were initially consumed per month (equivalent to approximately 80 tpd). This demand has decreased to approximately 1.5 Megalitres following the diesel generator power being substituted by hydropower from the transmission lines. Approximately 30 tpd of lime is consumed for neutralization and is sourced from São José da Lapa, Minas Gerais. Sodium cyanide in the form of briquettes is sourced from Bahia and is transported and hydrated at the mine site at a rate as of 250 tpm. In 2019, the average consumption of emulsion was 400 tpm. Emulsion has a lead-time of 12 days to 15 days and is sourced from Lorena in São Paulo state. Balls for milling are consumed at a rate of approximately 150 tpm and activated carbon for the CIL process is consumed at an rate of approximately 24 tpm. The average delivery time for general cargo via road from the Southeast of Brazil to the mine site is 12 days and is less than 20 days with consolidation. Dedicated cargo takes 12 days to 15 days to be delivered to Tucano.

A helipad was constructed near the CIL plant and is used to transport product and for emergency removal of personnel. The Tucano Gold Mine site is also serviced by a 1,100 m airstrip located approximately 800 m from the main gate. Charter flights from Macapá to the mine take approximately 50 min.

MINING AND SUPPORT FACILITIES

The following facilities are located in proximity to the Tucano CIL Gold Plant:

- Central administration building and medical facility;
- Geology, survey, mining engineering, supply, environment, and safety offices;
- Core shed and exploration sample preparation facility; and

- Nursery.

The heavy machinery and light vehicle workshops with adjacent warehouse storage facilities, tire shop, refuelling, and washing bays were constructed to high standards and were upgraded in 2012.

The mine planning, administrative, and messing facilities are also located in the workshop area together with the mine control and dispatch room.

An explosives magazine and accessories storage constructed to Brazil standards are located at a convenient distance from the other industrial installations. A storage facility for emulsion explosives was built and is operated by the explosive supplier. The installations are fenced and surveyed by armed guards and cameras permanently.

CONTRACTOR FACILITIES

U&M, the mine contractor, coordinates and undertakes all heavy machinery maintenance at the main workshop alongside the main supply warehouse. U&M erected a covered workshop area and stores warehouse nearby Urucum pits. Geosol Drilling, the geological drilling contractor, has a separate workshop (and storage sea container near the U&M workshop).

FIGURE 18-1 U&M WORKSHOP FACILITIES



PROCESS PLANT

The processing plant and administration facilities consist of:

- Plant administration buildings;
- Plant workshop area;
- Power supply and distribution;
- Sample preparation and assay laboratory;
- Storage area for plant supplies and consumables;
- Reagents preparation facilities; and
- Security.

WATER

RAW WATER

Raw water consists of fresh water that has not been used in the process and does not contain process reagents or salts. Raw water is consumed at an average rate as of 180 m³/h, while existing permits allow for up to 450 m³/h of consumption.

Raw water is drawn from the water collection dam and pumped to the lined raw water dam (also known as the ETA dam). The raw water flows from the ETA dam to the existing raw water treatment plant. Lime and aluminium sulphate is added to the raw water before it enters two primary water treatment filters. The raw water then flows to one of two locations: the plant raw water tanks for consumption in the plant or to potable water treatment.

From the total 180 m³/h of water flow extracted from William Creek, which is filtered and conditioned (primary treatment), 100 m³/h are directly used to cool the milling equipment. Part of this water evaporates, and the balance is diverted back to the river. The remaining 80 m³/h of water flow after primary treatment, is used at a rate of 72 m³/h for washing and industrial purposes at the various installations (including the mine workshops) and as seal water for the pumps at the plant. The remaining 8 m³/h of water flow are further treated to obtain potable water.

POTABLE WATER

Raw water that is used for human consumption is transferred from the primary treatment filters to three filtered water tanks at an average rate as of 8 m³/h. This water is pumped to the potable water treatment plant, where it is further filtered and chlorinated to produce drinking water. This water is transferred from the potable water treatment plant to two potable water tanks. Two pumps (one on duty and one on standby) are used for the distribution of potable water.

PROCESS WATER

Process water consists of recycled and other waste streams used in the process, including return water from the TSF.

The plant consumes 900 m³/h of process water (100 m³/h are used in the SAG mill feed, 750 m³/h are used at the mill discharge, and an additional 50 m³/h is used for the preparation of reagents).

Process water is stored and sourced from a dedicated process water dam. Water is pumped from the process water dam by four pumps (three on duty and one on standby).

Water from the overflow thickener is pumped by two pumps to:

- Grinding area water – mill trommel screens and trash screen; and
- CIL area water – screen spray water and carbon transfer column eductor water.

Overflow from the process water dam flows by gravity to the detoxification pond for cyanide destruction prior to discharge to the environment.

POWER

The Tucano Gold Mine power requirements are provided by two sources:

- a 69 kVA, 20 MVA power line via CEA and a local supply authority; and
- a 12 MW continuous rated Aggreko diesel-powered generation system.

The demand prior to the plant upgrade was approximately 12 MW. At the completion of the additional ball mill and plant upgrade to treat more fresh ore, there was an increase in demand to 17 MW for treating primarily fresh ore. This demand drops to about 15.5 MW when approximately 30% oxide ore is treated.

The Aggreko generator facilities have a nominal capacity of 12 MW (partially meeting the current demand), while the CEA line was expanded to meet the total power requirements.

The CEA line capacity is currently limited to 20 MVA due to CEA distribution transformer limitations from 138 kVA to 69 kVA. A progressive strategy for the upgrade of the power line and transformers of the CEA line from 1.8 MW (prior to 2017) to 12 MW (already contracted) and, possibly, 15 MW (the final demand after the plant upgrade) has been implemented since 2017. The 70 km long 69 kVA transmission line from the Coaracy Nunes facilities to the Mine has been continually upgraded and maintained and the capacity as of the fourth quarter of 2019 is 10 MW, resulting in substantial savings on diesel costs. A 30 MVA transformer from 138 kVA to 69 kVA to support the expansion of the capacity of the CEA line is in the late stages of procurement.

FIRE PROTECTION

There is a fire protection system next to the fuel storage and dispensing area and another one on the outdoor premises of the warehouse area. In both cases, the systems consist of a tank

and three fire pumps. Additional local fire protection equipment near the oxygen plant location has been provided.

COMMUNICATIONS

Mina Tucano has three rented interconnected PBXs. There are two Enterprise PCX services at the Tucano Gold Mine site with 300 extensions; one in the plant/administration area and the other at the residential camp. The third Enterprise PCX is at the Rio de Janeiro office and consists of one Embratel Link with 30 lines and up to 100 extensions.

- There is one internet radio connection to Macapá and one Fibre Optic connection;
- At Rio de Janeiro there are two redundant fibre optic links;
- Great Panther has three VPN site to site connections between the Rio de Janeiro office and the Tucano Gold Mine, using the two Rio links and the three Tucano links;
- Fibre optic links are available, with radio redundancy, between the mine areas, accommodation, and industrial areas of the mine; and
- Network equipment based on Fast Ethernet and Giga Ethernet LAN and WIFI.

Light vehicles and mine equipment are equipped with mobile radios, and there are portable radios for operations personnel. Mina Tucano currently has 182 vehicle and equipment mounted radios, 216 hand portable radios, and 10 repeaters on the site.

SECURITY

The main entrance security office is located at the Main Site access road. All visitors to the mine complex report to this security gate for authorization prior to entry. Additional fencing is provided for further safety and security within process plant areas, such as the gold room area, transformers, and substations. A closed-circuit television system is installed in the plant and gold room to monitor activities.

PERSONNEL AND PERSONNEL LOGISTICS

The mine currently employs a total of 381 staff on its books and 1,112 contractors.

The personnel living in Amapá account for approximately 80% of the workforce. Most of the workforce live in towns near the mine site with transport to Serra do Navio and Pedra Branca

do Amapari provided by Great Panther on a daily basis. Personnel from Macapá also have transport provided by buses on a weekly basis.

Managers and professional staff either commute from the state capital Macapá, or from other cities in Brazil on a FIFO basis.

Shift workers work a rotating eight hour shift over a 24-hour period with a roster in days of 6 on 1 off, 6 on 2 off, and 6 on 3 off basis. Managers and professional staff either work a roster in days of 19 on, 9 off or 5 on, 2 off.

ACCOMMODATION AND MEDICAL CARE

There is a 142-person accommodation camp located to the east of the old leach pads, near the access road to the site. Senior staff use the cabins in blocks of four in the upper part of the camp. Technical staff are accommodated in a longer barracks-style building downhill from the cabins. The rooms in the accommodation camp are air-conditioned and equipped with a refrigerator, writing desk, television, bed, bedside table and lamp, microwave oven, chair, ensuite shower and toilet, and cupboards for clothing.

Communications for personal purposes are provided at the lodging via telephone and Wi-Fi connections.

The camp also has a well-equipped gymnasium, games room, laundry, and restaurant area for ordering meals.

Medical facilities are close to the administrative offices and a medical doctor on business days from Monday to Thursday, and nurses are permanently at the mine site to provide first care and treatment to Great Panther employees and contractors. There is provision for emergency removal of personnel either by ambulance, a mobile intensive care unit, and helicopter or plane, if needed.

TAILINGS STORAGE FACILITIES

TAILINGS OPERATION

The Tucano plant produces an average of 3.9 Mtpa of tailings (dry basis) from the gold beneficiation process; the tailings slurry is delivered to the TSF via a fixed pipeline and is subaerially discharged into the various TSF as a slurry at around 36% solids concentration (w/w). Tailings settle out in the TSF to an average dry density of 1.2 t/m³, and supernatant water is removed from the pond via floating vertical pumps for recycle back into the plant circuit.

A water balance of the LOM facility prepared by SRK (project BDR020 Water Balance Update) was used to determine spillway capacity, water reclaim availability, and storm management controls. The conclusions of the SRK report indicated that on average, the plant water demand can be met (no deficits in water availability) throughout the LOM. It is expected that the facilities will spill for post-closure conditions.

The LOM tailings production remaining based on current reserves, from January 2020 until December 2021 is expected to be approximately 6.1 Mt, or a volume of 5.8 Mm³.

SRK has audited these facilities since commissioning of the TSF, with a focus on safety and operational capacity of the embankments, pond size, and ongoing construction of the facilities. The following audits and site visits have been undertaken by SRK:

- January 6, 2014 – January 7, 2014: Mr. Juan Moreno;
- November 16, 2014 – November 18, 2014: Mr. Juan Moreno and Mr. Nicholas Thompson;
- November 11, 2015 – November 16, 2015: Mr. Juan Moreno;
- October 19, 2016 – October 21, 2016: Mr. Juan Moreno;
- March 12, 2017 – March 15, 2017: Mr. Matheus Rocha; and
- April 18, 2018 – April 21, 2018: Mr. Rubens Rocha.

DESCRIPTION OF THE CONSTRUCTED TSF

The Tucano TSF system consists of three installations currently in operation: Tap D, North Mill Pond (NMP) and West Pond Phase 1 (WPP1), the latter two are separated by an elevation of 2 m (EL. 135.00 to EL.137.00) and called NMP only. A summary of the storage capacity of these facilities is provided in Table 18-1.

The remaining capacity of NMP is 1.9 Mm³ as of December 11, 2019, which covers storage for 6.0 months, or from December 2019 to June 2020.

Tucano Gold Mine plans to extend the tailings storage capacity by commissioning three new TSFs, East Dam, East-NW Extension and West Pond Phase 2 (WPP2).

**TABLE 18-1 SUMMARY OF TSF STORAGE CAPACITY – UPDATED ON
DECEMBER 11, 2019
Great Panther Mining Limited – Tucano Gold Mine**

Facility	Tailings volume stored (m ³)	Remaining storage capacity (m ³)
Tap D	6,200,000	Nil
NMP	6,992.627	807,373
WPP1	4,483.704	1,072,423
Total	17,676.331	1,879,796

TAP D TSF

The Tap D TSF integrates three embankments and a small saddle wall that close a small valley just east of the process plant. The TSF includes two pits within its basin; namely Tap D1 and D2. SRK designed and supervised the construction of this facility.

The walls were named Wall 1, Wall 2, Wall 3, and Wall 4; these are shown in Figure 18-2. The design of these walls was provided in the Design Report (SRK projects BDR001 and BDR008). All the embankments are built with homogenous fills of low permeable material. The borrow material for the walls is a silty sand to sandy silt residual soil. A typical cross section of these walls is shown in Figure 18-3.

Active deposition in the Tap D TSF ceased in 2014 and it is dormant. The facility has not yet reached capacity and Great Panther has strategically opted to retain it as a contingency for emergency deposition, as it is located downstream of the mill. The Tap D TSF has received intermittent tailings discharge on occasions, but it has been reported as minimal. The remaining capacity is not significant, however, some contingency for emergency deposition is available since the current freeboard is significantly larger than the required (+3 m) and floating pumps are still operating in the basin.

WEST POND PHASE 1 TSF

The construction of WPP1 TSF was completed in 2014 and was designed by SRK at RL 135m elevation and storage capacity of 5.7 Mm³. WPP1 TSF operating from 28 August 2014 to 28 September 2016.

The WPP1 TSF integrates five walls that close a small valley approximately 1.5 km north east of the process plant. SRK designed and provided partial supervision of the construction of this facility.

The walls were named Wall 11, Wall 12, Wall 13, Wall 14, and Wall 15; these are shown in Figure 18-4. The design of these walls was provided in the Design Report for SRK project BDR005.

The highest embankment is Wall 1, which is 33 m high, with the remaining walls being less than 15 m high.

All the embankments are designed as homogenous fills of low permeability material, with slope gradients at 2.5H:1V and 5 m wide crests. A downstream drainage and seepage collection system for long-term seepage control has been considered for Walls 11 and 12. A typical cross section for Wall 11 is presented in Figure 18-5 for reference.

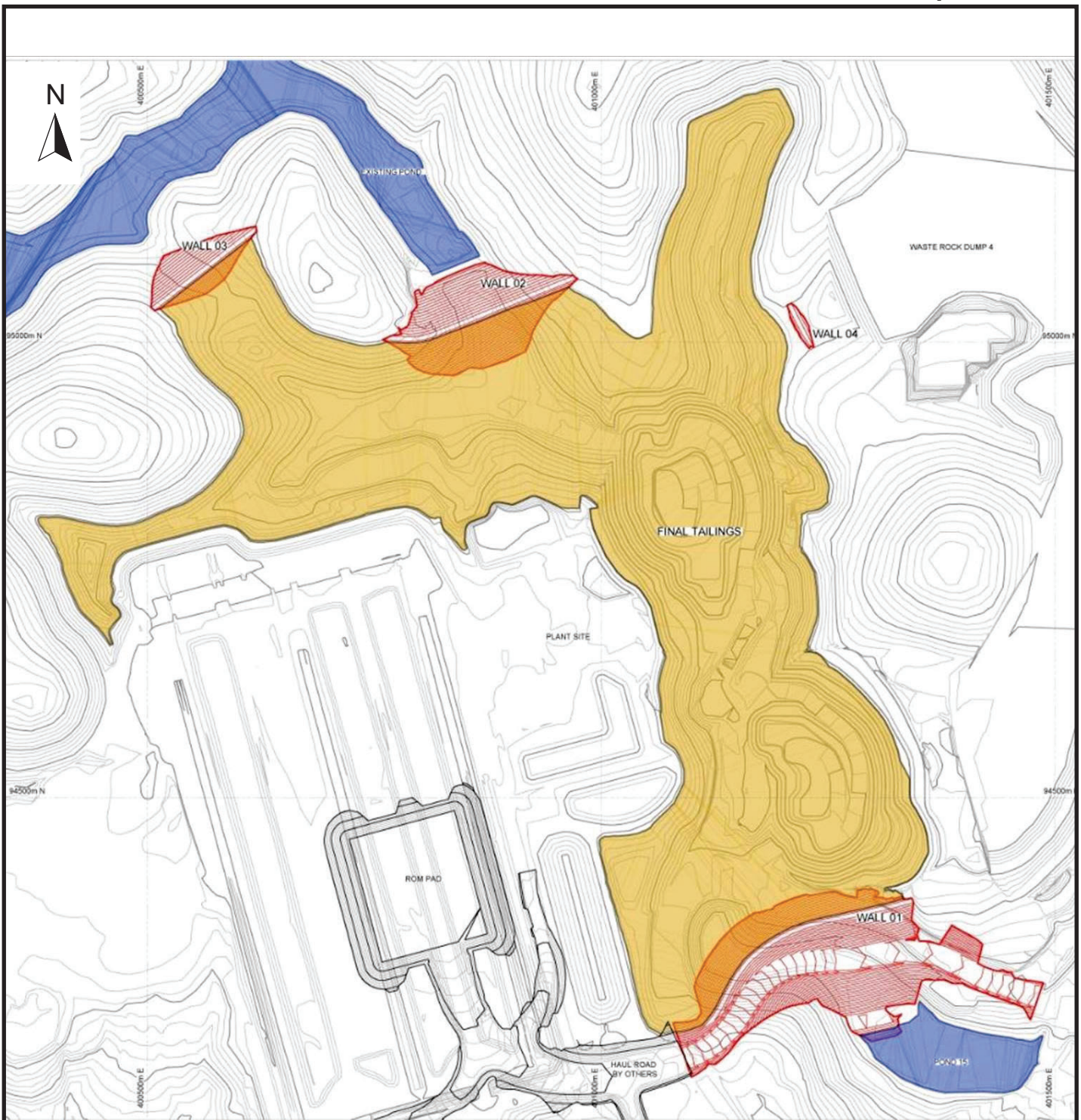


Figure 18-2

0 100 200 300 400 500
Metres

Great Panther Mining Limited

Tucano Gold Mine
Amapá State, Brazil

Tap D Embankments

March 2020

Source: SRK, 2014.

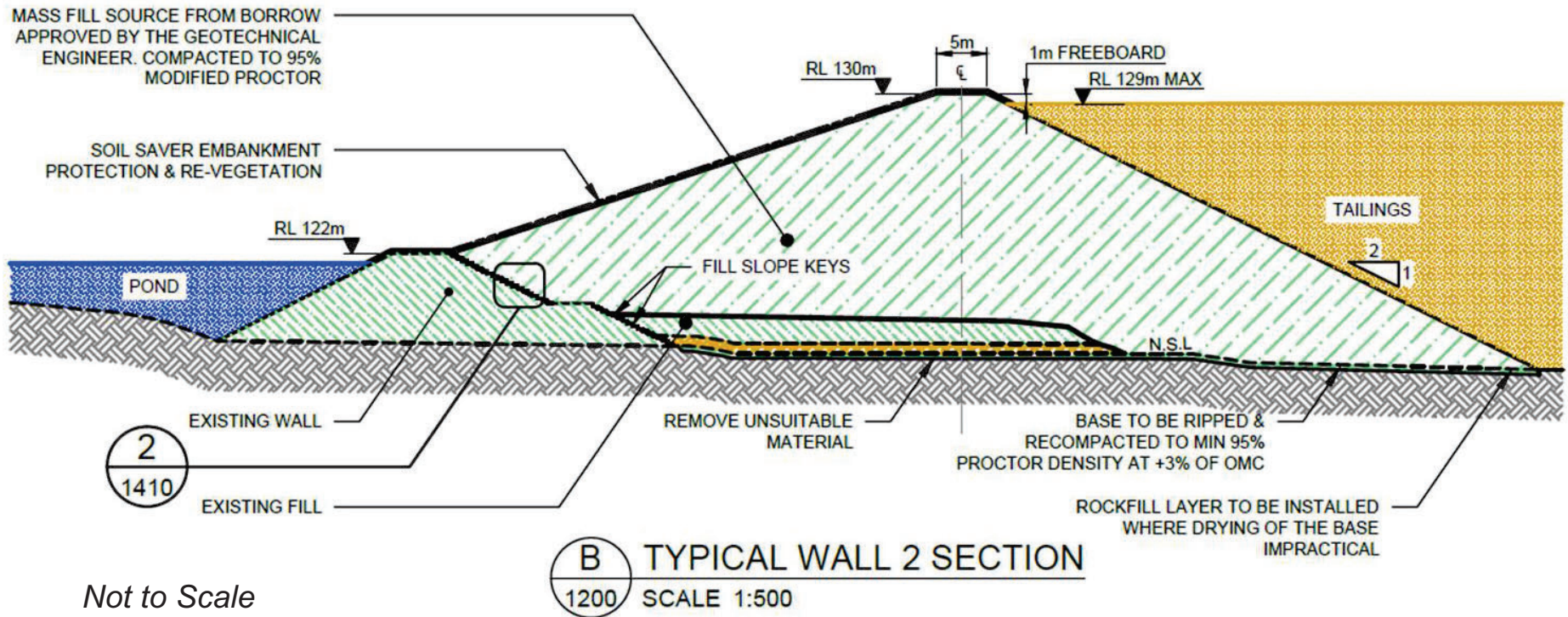


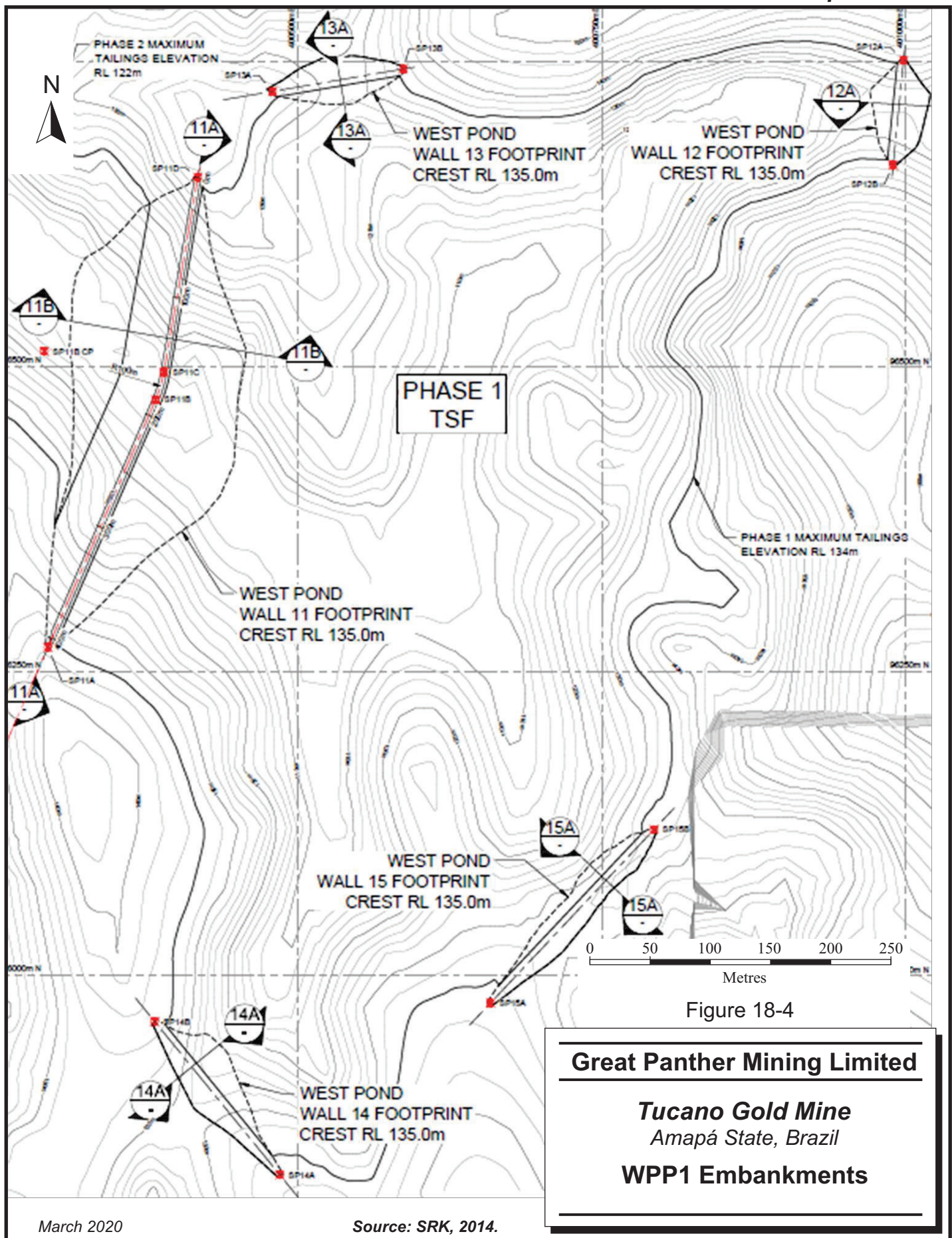
Figure 18-3

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Typical Wall Cross
Section Schematic**



March 2020

Source: SRK, 2014.

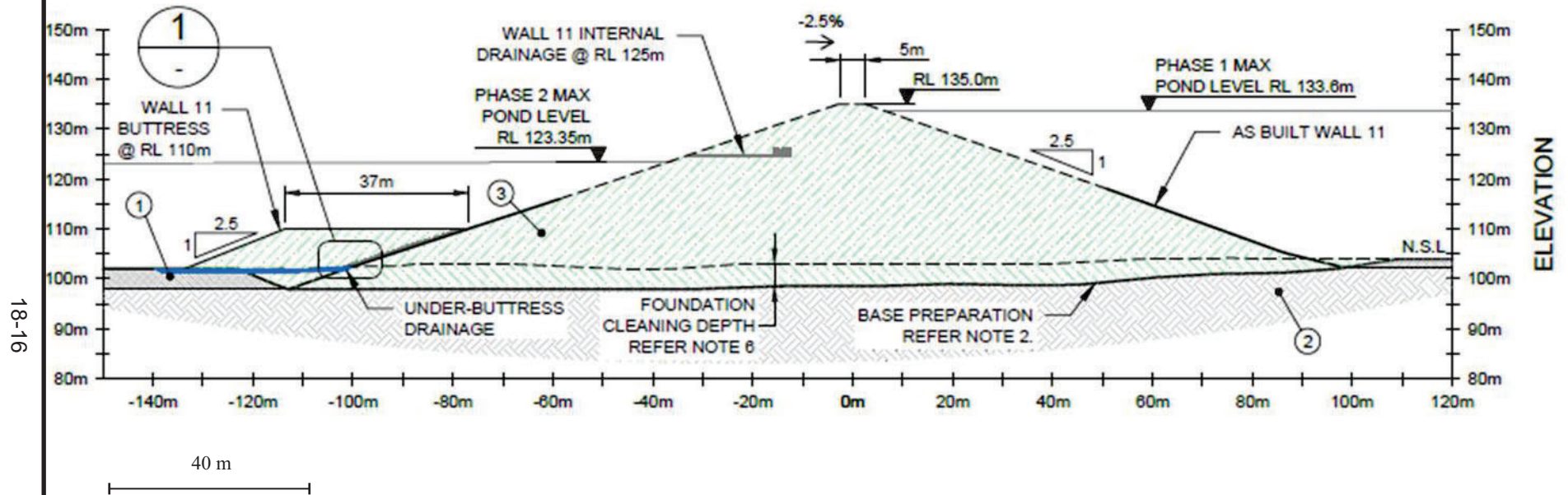


Figure 18-5

Great Panther Mining Limited

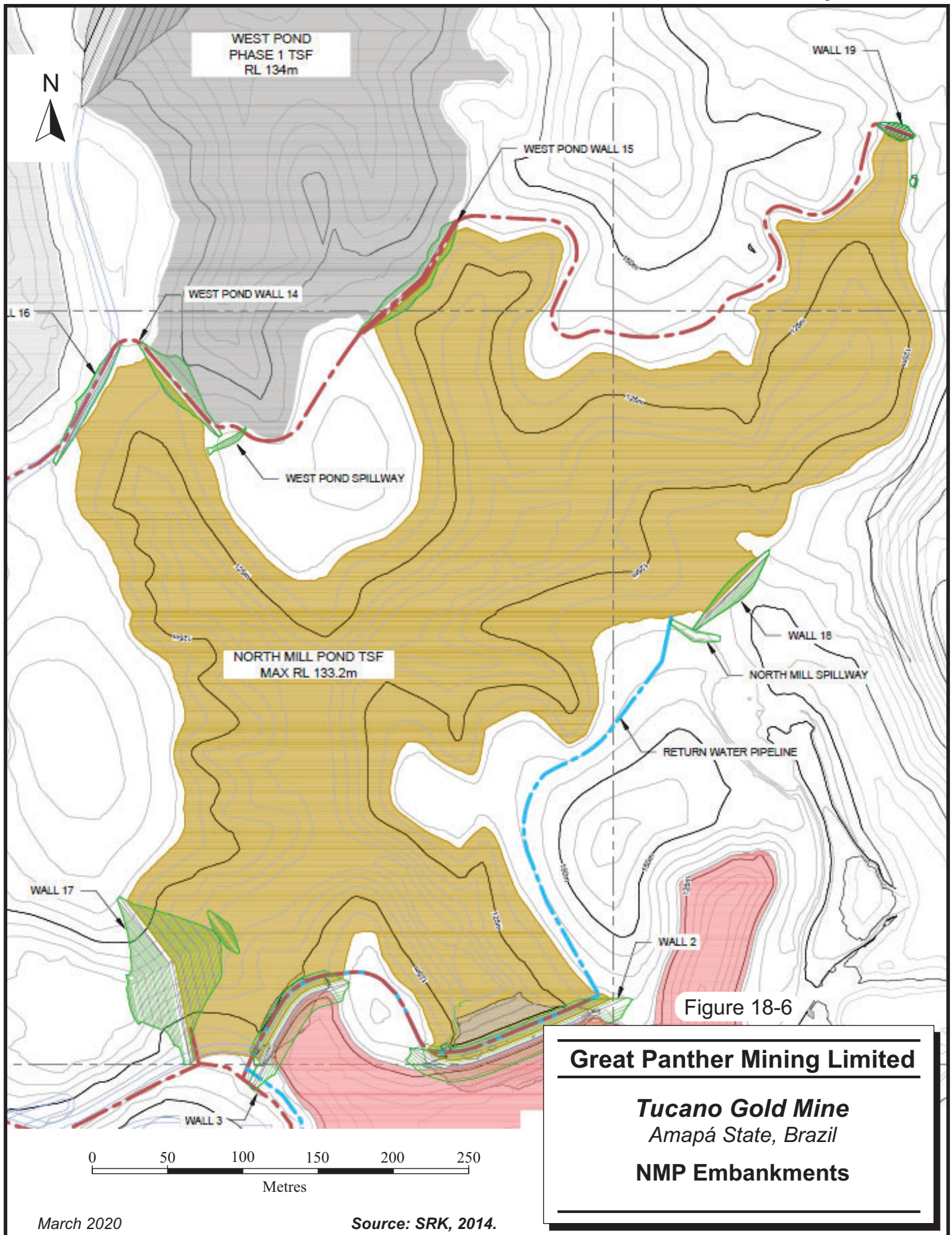
Tucano Gold Mine
Amapá State, Brazil

Wall 11 Cross Section Schematic

NORTH MILL POND TSF

The NMP TSF is a valley-type impoundment bounded by the WPP1 TSF to the north and Tap D TSF to the south. The NMP facility was intended to act as a temporary measure while alternative facilities are commissioned in order to service the remaining LOM. SRK designed and provided partial supervision of the construction of this facility.

NMP TSF is composed of Wall 17 to RL 135 m with three additional minor compacted fill embankments (Walls 16, 18, and 19) required to be built to RL 135 m in saddles to enclose the site. A layout of the NMP site is presented in Figure 18-6.

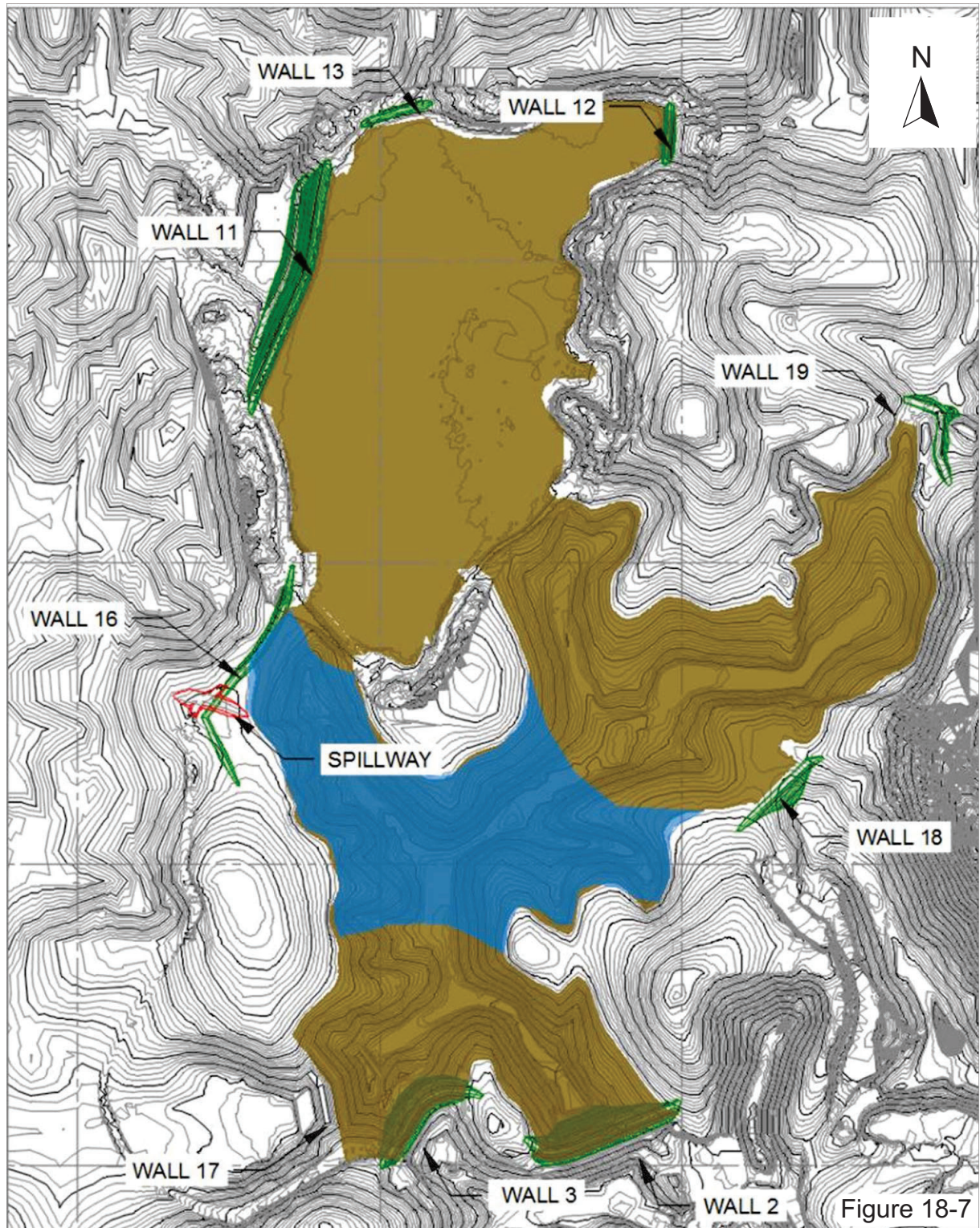


INTEGRATED WPP1 AND NMP TSF

The WPP1 and NMP facilities were raised to integrate them into a single facility, the corresponding embankments crests were initially at RL 135 m and RL 130 m, respectively. These embankments were downstream, raised using a combination of rockfill and lateritic borrow material to RL 137 m, which allowed to raise the tailings level to a maximum elevation of RL 136 m. The spillway for the facility was relocated to Wall 16, as shown in Figure 18-7. The integrated facility was designed by SRK.

The NMP TSF, initially designed to be built at the elevation RL 135 m, but immediately at the beginning of this construction, the project was revised, raising it to RL 137 m, as well as the walls of the WPP1 dam, unifying it in an integrated reservoir with a capacity of 14 Mm³. The design of the walls of the WPP1 dam (D11, D12 and D13), to integrate into the reservoir of the NMP dam, were reviewed by the SRK designer with the height upstream at 2.0 m high.

The NMP TSF, integrated in the RL 137 m, consists of the construction of dikes 16, 17, 18, and 19, by the elevation of 7 m of dikes 2 and 3 (Tap-D TSF); and the elevation of 2 m of dikes 11, 12, 13 (WPP1 TSF) (see Figure 18-7).



0 50 100 150 200 250
Metres

Great Panther Mining Limited

Tucano Gold Mine
Amapá State, Brazil

Integrated WPP1 and NMP TSFS

EXTENDED TAILINGS STORAGE CAPACITY

The current built TSF capacity is enough to store tailings up to September 2020. Additional tailings storage capacity is planned by commissioning two new facilities, East Dam, East Dam extension NW and WPP2, which would cover the tailings storage demand up to September 2025.

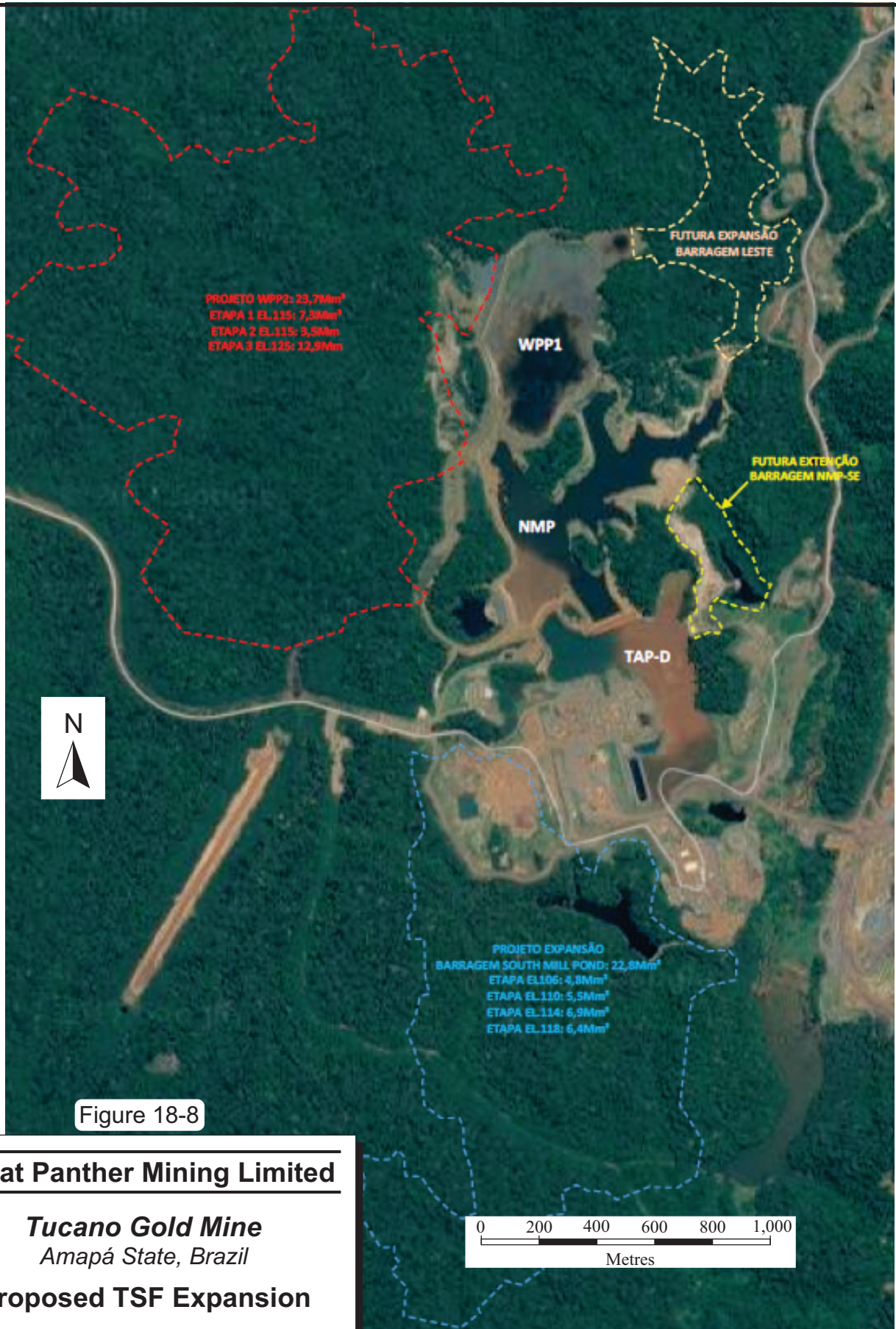
Great Panther is planning to first commission East Dam, while working on the development of the larger WPP2 facility. Figure 18-8 presents the proposed TSF expansion.

EAST DAM TSF

The East Dam TSF is composed of Walls 21 and 22 to a crest elevation of RL 137 m. Wall 22 will be constructed as a compacted low permeability homogeneous embankment. Wall 21 is a rockfill embankment with compacted low permeability material in front. A typical cross section of the planned walls is presented in Figure 18-9.

East TSF will be bounded by two dikes (D21 and D22), ridges at elevation El. 137.00 m and 2 existing dikes (D12 and D19) that have their crests also at elevation El. 137.00 m, and an overflow at RL 135 m. The East TSF D21 and D22 embankments are under construction and are currently (as of February 2020) at elevation RL 124 m.

The construction of the East TSF will be completed in December 2020, with a storage capacity of 4.93 Mm³ and 16 months of operational life. It is scheduled to start operations in July 2020 (Phase 1 with RL 124 m).



March 2020

Source: Beadell, 2019.

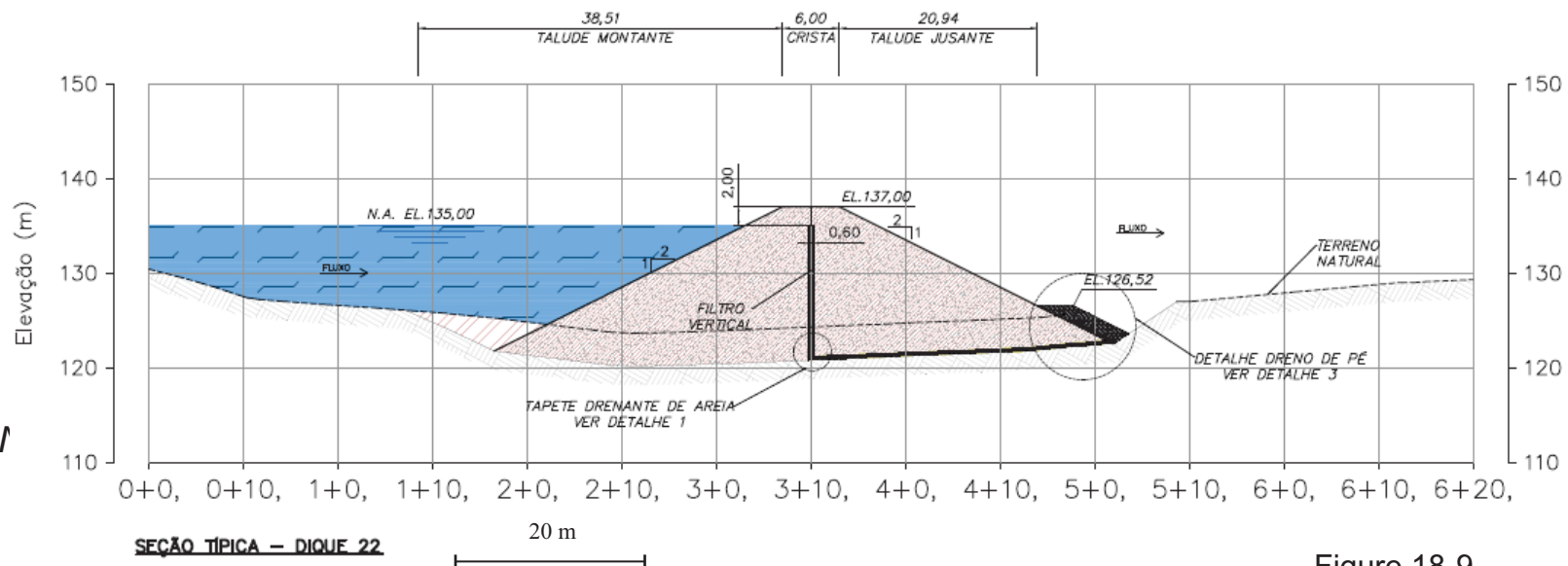
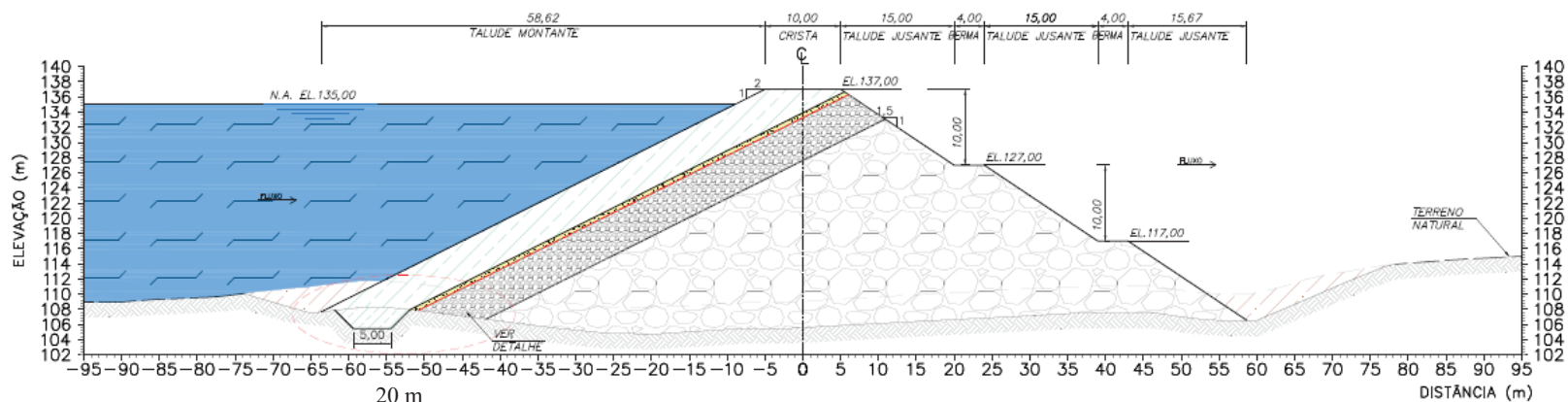


Figure 18-9

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Typical Cross Section of
Walls 21 and 22**

EAST - EXTENSION NW TSF

East – Extension NW TSF has a conceptual level project completed by GeoHydroTech Engenharia S/S (GeoHydroTech, 2019). It will have a storage capacity of 2.94 Mm³, with its reservoir bounded by three dikes (23, 24, and 21). Dikes 23 and 24 will be built with the crest at an elevation of 125 m and the dike 21 under construction (East dam) with the crest at an elevation of 137 m. Cross sections through these dams are shown in Figures 18-10 to 18-12.

The geometric characteristics of the East – Extension NW dam project are shown in Table 18-2.

**TABLE 18-2 GEOMETRIC CHARACTERISTICS OF THE EAST EXTENSION NW TSF
Great Panther Mining Limited – Tucano Gold Mine**

Characteristics	Units	Dike 23	Dike 24
Crest Elevation	m	125.0	125.0
Crest Length	m	10.0	6.0
Maximum Height	m	27.0	9.0
Upstream Slope	-	1V:2.5H	1V:2H
Downstream Slope	-	1V:2H	1V:2H
Height Between Downstream Berms	m	10.0	-
Width of Downstream Berms	m	4.0	-
Volume of Material	m ³	250,870.56	7,155.02
Total Area of Reservoir	M ²	157,451.46*	
Reservoir Capacity	m ³	2,944,968.405*	

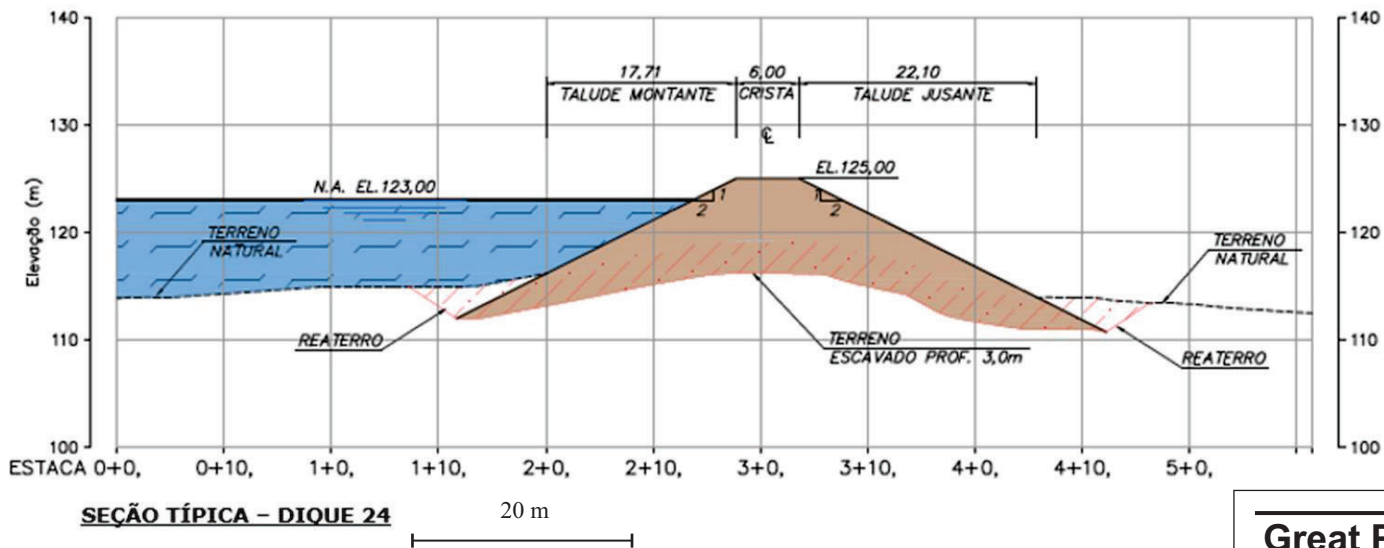
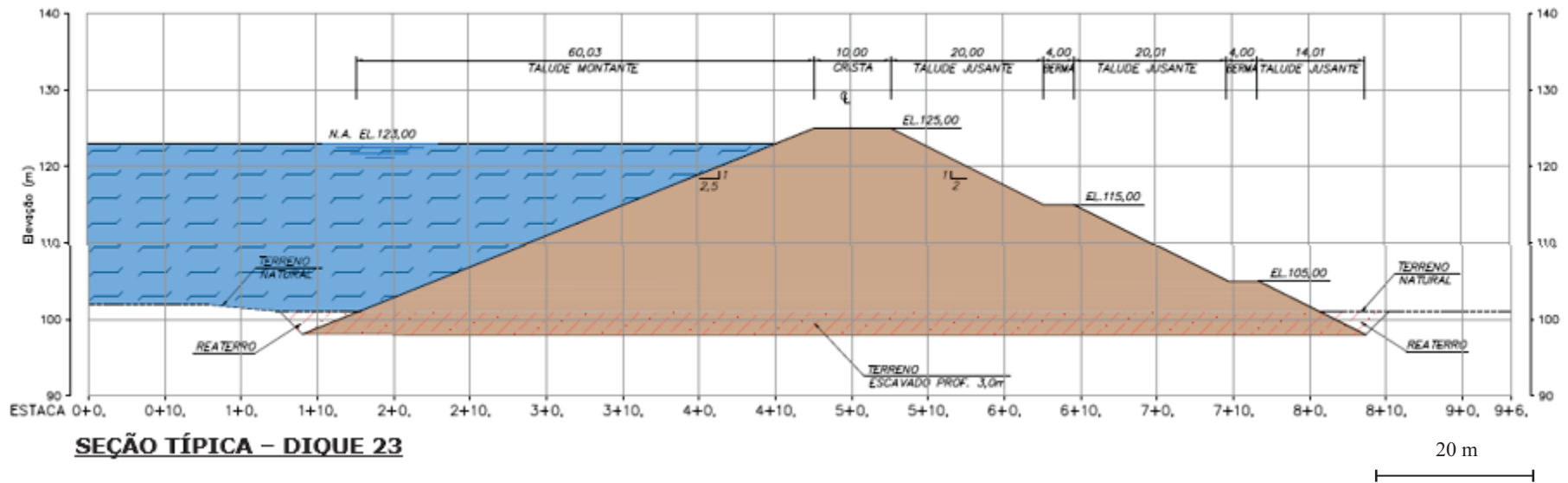


Figure 18-10

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Typical Cross Section of
Walls 23 and 24**

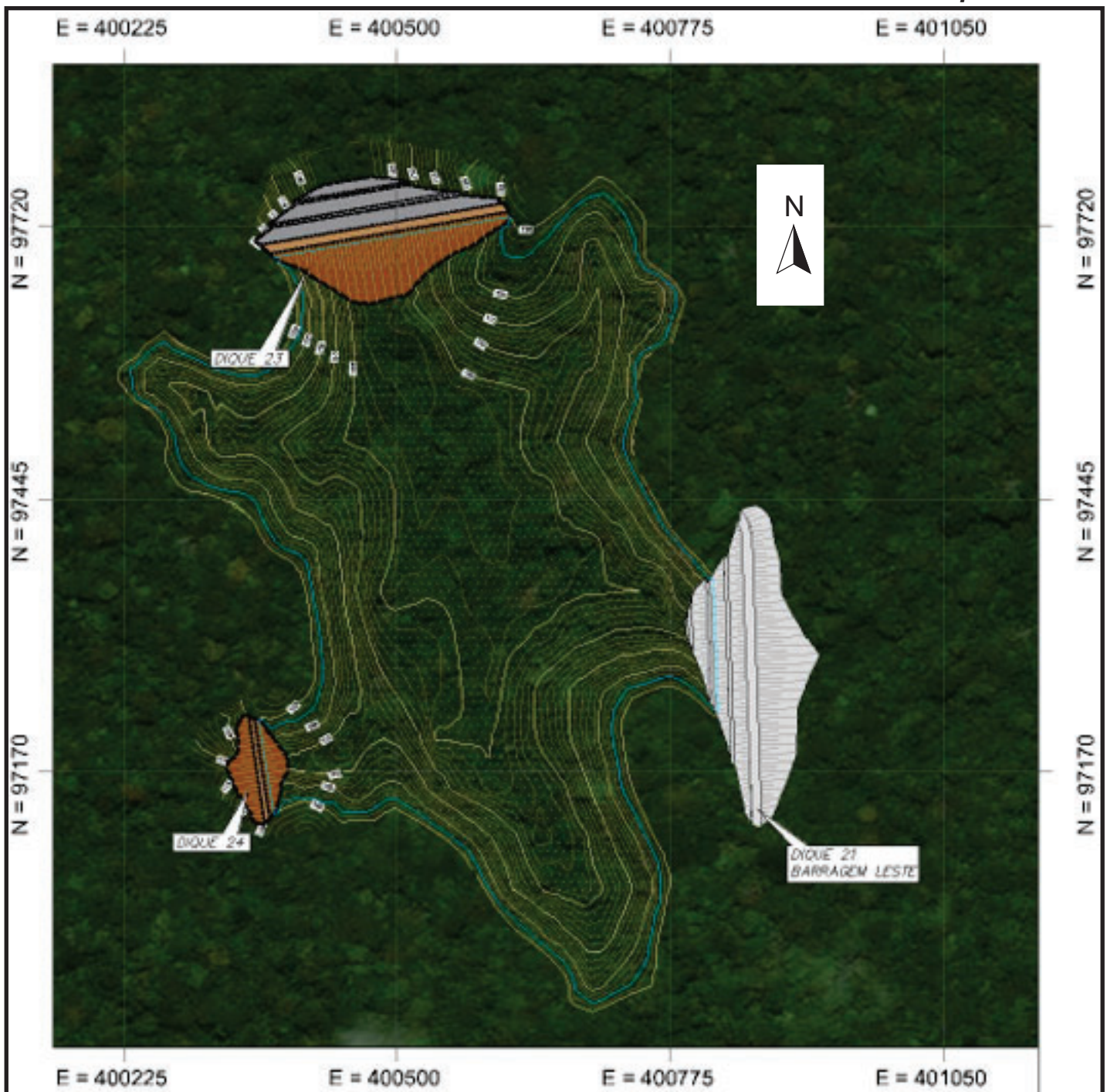


Figure 18-11

Great Panther Mining Limited

Tucano Gold Mine
Amapá State, Brazil

NW Dam - Extension East

0 50 100 150 200 250
Metres

March 2020

Source: Beadell, 2019.

WPP2 TSF

The WPP2 TSF is a valley-type impoundment that was designed to be developed in two phases, WPP1 (approximately 35 Ha) and WPP2 (approximately 167 Ha), located to the east and west of the valley, respectively. WPP1 has been constructed and is currently active. SRK has designed this facility to a detailed level.

In total, nine earth embankments (Wall 1 to Wall 9) were designed to isolate the WPP2 catchment and limit the spread of the tailings. A downstream drainage and seepage collection system for long-term seepage control was considered for Wall 1 to Wall 8. Wall 9 is a temporary structure that allows construction of WPP2 to be staged, if required. Figure 18-12 presents a layout of WPP1 and WPP2 TSF.

The storage capacity obtained after construction of the WPP2 is 23.7 Mm³, or 28.0 Mt. This TSF adds approximately seven years of operational TSF capacity.

PERMITTING OF THE TSF

Operation of TSF in Brazil requires a licence to operate issued by the Instituto de Meio Ambiente and Regulacion Territorial, and a deforestation authorization (ASV) to implement the construction of the facilities.

The current operating TSF have been granted licence to operate (Licença de Operação 0223/2015) from November 2015 to November 2021 (six years).

The integrated NMP and WPP1 has been permitted via Oficio 868/2017 by the Insitituto de Meio Ambiente and Regulacion Territorial and within the same operational licence.

Further IMAP licensing and ASV was issued to permit construction of Barragem Leste.

Construction and operation of the WPP2 TSF requires a renewal of the current ASV. This area was divided into 2 ASVs, one of 70 ha which is valid until November 9, 2020 in annex and another of 140 ha which is awaiting clearance by the Environmental Agency (with expectations before mid 2020).

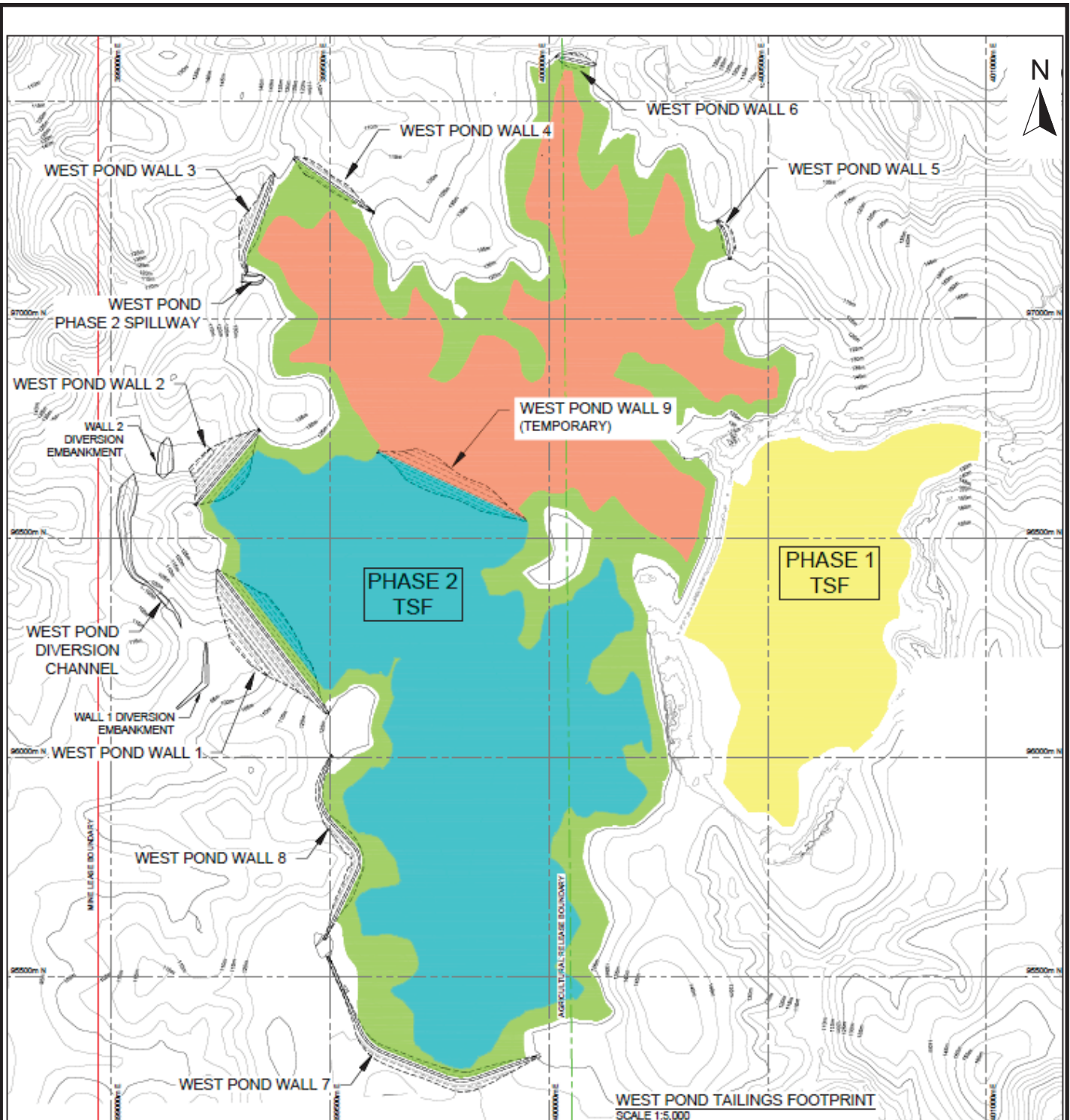


Figure 18-12

Great Panther Mining Limited

Tucano Gold Mine
Amapá State, Brazil

WPP1 and WPP2 TSF Layout

CONCLUSIONS

There are three TSF in operation at the Tucano Gold Mine, these are Tap D, NMP, and WPP1. The remaining storage capacity built for tailings is 1,879 Mm³, which covers storage for eight months (from December 2019 to June 2020). These facilities were designed and audited by SRK from 2014 to 2019.

Additional storage capacity should be implemented through the construction of three new TSFs, East Dam, East Dam – Extension NW and WPP2. These two facilities would provide 4.93 Mm³, 2.94 Mm³ and 23.7 Mm³ of tailings storage, respectively.

The East dam is designed and audited by GeoHydroTec. This designer is also developing a new expansion project which is the NW dam, with a storage capacity of 2.94 Mm³, with a reservoir bounded by three dikes (23, 24, and 21) and dikes 23 and 24 will be built with the crest on El. 125 m and dike 21 under construction with the crest on El. 137 m.

With these three future dams, there is sufficient tailings deposition capacity until 2027 to support an annual production of 3.9 Mtpa.

19 MARKET STUDIES AND CONTRACTS

MARKETS

Gold output from Tucano is in the form of doré bars containing approximately 76% gold and 15% silver, the remainder being copper, iron, and other minor metals. Silver credits are received from the refiner.

Approximately 70% of the doré is shipped to Asahi Refining Canada (Asahi) in Brampton, Canada and 30% to Metalor Technologies SA (Metalor) in Neuchâtel, Switzerland. The current refining contract with Asahi is valid until the end of December 2020. The refining contract with Metalor is managed through Samsung C&T U.K and is valid until the end of December 2021.

Brink'S – Segurança e Transporte de Valores Ltda (Brinks) is the designated company to transport the doré from Tucano to the refining facilities. The title change for each shipment occurs typically at the Brampton refinery with Asahi, and Sao Paulo airport for Samsung (Metalor). Based on actual contract agreements, the breakdown of costs is set out below:

- Refinery charge \$0.53/oz Au (\$0.50/oz doré).
- Transport, handling, and insurance \$22.00/oz Au.
- Total \$22.50/oz Au.

The costs above are subject to some variation depending on the number of ounces per shipment, however, they are representative of the average cost.

The refining process and sampling is supervised by an independent service provider, which includes the analysis of samples from the service provider's certified laboratory, to ensure quality standards and accuracy of information are met and maintained consistently.

Penalties are applied in the refining contract for any impurities, however, these are rare occurrences and the penalties are not excessive. The main impact comes from the delay in final payments due to higher sample analysis turnaround time, as a result of a higher number of samples required from the special melt shop.

The market for gold doré is well established. Market predictions and discussions for gold are beyond the scope of this document. The impacts of gold price volatility on Tucano plan and process operation are well understood.

CONTRACTS

As of March 15, 2020, the main contractors involved with the mine are:

- Mining load and haul: U&M Mineração e Construção S.A..
- Mining Additional Equipment Support:– F.J dos Santos Service EPP (rockbreaker).
- RC Drilling: Geosedna Perfurações Especiais S.A.
- Fuel supply: Ipiranga Produtos de Petróleo S.A.
- Power Generators: Aggreko Energia Locação de Geradores Ltda.
- Contract security staff: Segurpro Vigilancia Patrimonial S.A.
- Catering: JC Refeições Amapari Ltda.
- Offsite Laboratory: SGS Geosol Laboratórios Ltda
- Contract personnel transport: Costa Lima e Souza Empreendimentos Ltda & Raimundo Palmerin de Souza EPP
- Refining: Asahi and Metalor

The various contracts were awarded following a competitive bidding process, prices are within the industry range and comparable to other operations in Brazil.

20 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

Tucano is an active mining operation located in the dense tropical rain forest of Amapá State, Brazil, consisting of open pit operations, crushing, milling, and CIL processing that has a direct impact on the environment and the ecosystem of the region. The predominant anticipated environmental impacts are on biological resources, air quality, noise and vibration, archaeology, hydrology (ground and surface water), and community stakeholders.

PROJECT PERMITTING

All licences required for the operation of Tucano and mill and processing plant have been obtained or applications for renewals have been filed. The main licences for Tucano and their statuses are listed in Table 20-1. Figure 20-1 is a location map showing the field monitoring points.

TABLE 20-1 MAIN LICENCES AND STATUS
Great Panther Mining Limited – Tucano Gold Mine

Licence	Status	Activity	Process Number	Issue Date	Expire Date
Water permit	In process	Water intake	4001.181/2011	26/09/2018	22/01/2019
Operation Licence	Approved	Open pit mining and gold ore processing	320274/2004	08/11/2011	09/11/2021

A complete environmental study, permitting, and social or community impact assessment was completed by SRK Consultores do Brasil Ltda (SRK Brazil) in 2011 to satisfy the State Secretariat of Environment, Amapá (SEMA) requirements for obtaining a operating licence for a SAG Mill/CIL processing plant.

In 2011, SRK Brazil also produced an Environmental Control Plan (PCA) to implement environmental and social controls. The PCA covered the environmental aspects of mining, monitoring and management plans, and guidance on implementing various programs in the local community.

In 2018, Mr. Batelochi, was requested by AMC to assist in the preparation of Section 20 of the NI 43-101 report 2018 by AMC (AMC, 2018). Mr. Batelochi conducted a peer review on the PCA routine procedures, specifically on the monitoring of water management, as William Creek passes through Tucano area, flora, fauna, and the development of the native seedling nursery.

Air and noise monitoring is comprised of mobile equipment that collects data in compliance with local legal requirements and is performed by an independent company: “Análise Química Mineral, Ambiental e Industrial Mineral Ltda”. During monitoring, data collection was conducted in the areas of the administrative offices, geology laboratory, and carpentry workshop.

Flora and fauna monitoring was not validated, however the activities of the field team, an independent company “MRW Ambiental Ltda”, were observed.

Tucano has been active engaging with the local communities to create and maintain mutually beneficial relationships founded on understanding and optimizing the benefits Tucano can have on local development. Tucano’s community relations personnel implements wide stakeholder engagement and social investment programs that focus on three main areas: socio-economic development, public health and safety, and education. Some recent programs include:

- Family Farming: Striving to improve the quality of agricultural products and skills in rural communities.
- Education: Supporting local schools to strengthen access to quality education and complement formal education for children and youth in the region.
- Entrepreneurship: Focusing on optimizing opportunities for economic diversification of the region’s residents,
- Emergency Preparedness Training: Prioritizing the safety of the local communities in Tucano’s areas of influence, seeking to improve community preparedness and emergency prevention initiatives.

GROUNDWATER AND SURFACE WATER MONITORING

Groundwater and surface water monitoring is performed through daily field checks of monitoring activities and sample collection for chemical analysis at Great Panther facilities. Monthly, quarterly, and semi annual sample collections are performed, with samples sent to certified external laboratories, to satisfy all regulatory requirements.

During the field visit of M. Batelochi, eight monitoring points were visited as shown in Figure 20-1.

The first monitoring point was a solids containment dam at Urucum North pit. It was visually verified that the dam efficiently traps the solids upstream, with clean and clarified water flowing downstream. The remaining monitoring points visited represented piezometers at the pit, tailings dam, and industrial area in compliance with approved environmental plans.

The surface water monitoring points visited were selected downstream of the Tap pit complex to check the quality of water returning to the environment. The QP visually checked that the water appeared clean with low turbidity and normal temperature, about 25°C.



Figure 20-1

Great Panther Mining Limited

Tucano Gold Mine

Amapá State, Brazil

**Location Map of Field Visit
Monitoring Points**

FAUNA AND FLORA

Tucano flora is typical of an Amazon biome, identified as an area of dense rain forest. The vast biodiversity existing in this Amazonian ecosystem is favoured by the high structural complexity of the environment, with great vertical stratification, diversity of niches and microhabitats, providing a great number of species of flora and fauna. The Tucano area is not recognized as a priority for conservation; however, it should be noted that Tucano is surrounded by areas of conservational interest. To the east and west of Tucano is the Amapá State Forest, along the northern limits is the National Forest of Amapá, and to the southern extent is the priority area for conservation of biodiversity denominated Pedra Branca. This area has a biological importance rating of Very High, due to the presence of certain sensitive areas in the ecosystem that include:

- Preservation of species of economic importance.
- Maintenance of animal species (spider monkey).
- Wildlife Maintenance (MMA).

FLORA

Vegetation in the Tucano area is well conserved, with reduced stretches in regeneration corresponding to the areas of old gold panning sites. In the regional analysis of Tucano, a secondary vegetation strip is observed to correspond to the headquarters of the municipalities of Serra do Navio and Pedra Branca do Amapari, which creates a geographic barrier to the flow of fauna throughout the western area of Tucano.

The Great Panther flora conservation program is the case of germplasm collection in which the collector operates in areas under anthropic impact (Walter & Cavalcanti, 2005). In Brazilian Legislative Decree No. 02 of 08/02/94, genetic resources are defined as “*genetic material of real or potential value for human being*”, and genetic material refers to all material of plant, animal, or microbial origin, or other, containing functional units of heredity. Therefore, genetic resources represent a small share of biological resources, which in turn are components of biodiversity.

Based on these definitions, Tucano has been involved with biodiversity conservation working primarily at a community and ecosystem level, while in the conservation of genetic resources, research is conducted at a species level.

The suppression of primary dense rain forest vegetation contributes to the reduction of the genetic variability of locally occurring populations of the species. This program uses the premise that the populations and or species affected by the anthropization contain genotypes not found in the remaining populations or elsewhere in their distribution areas, so that there will be loss of genetic variability (Walter & Cavalcanti, 2005).

The preservation of the germplasm is based on information constructed with the data of the floristic and phytosociological inventory already carried out, and the evaluation of the biological value of the species, germplasm recovery, and conservation of plant genetic resources. Rehabilitation is completed through the implementation of the re-vegetation sub-program on degraded areas or of future rehabilitation with planting or re-seeding, as well as the provision of genetic material for rehabilitation of the Tucano area.

FAUNA

The fauna associated with the surroundings of Tucano is diverse and presents typical and endemic elements of dense ombrophilous forest, as well as species of conservation interest such as the Harpy Eagle (*Harpia harpyja*), Giant Anteater (*Myrmecophaga tridactyla*), and Jaguar (*Panthera onca*).

The Great Panther fauna conservation program is based on the Normative Instruction (NI) 146/2007 of Brazilian Environmental Agency (IBAMA). The NI serves as a guide instrument composed of procedures and regulations of field and laboratory activities that undertake studies on the fauna of regions under the influence of anthropization. The NI provides accurate data to detect adverse effects and facilitate action to protect the environment.

The Great Panther fauna monitoring program has provided to the stakeholders, governmental agencies, and scientific community the composition and structure of faunal communities occurring in the region of Tucano, and the means to evaluate these populations in relation to the future activities of Great Panther.

In summary, the monitoring program consists of:

- Logging the occurrences of species of mammals, amphibians, reptiles, birds, and fish on extended areas of Tucano's influence.
- Obtaining data on the composition, wealth, and abundance of communities.
- Detection and evaluation of the interferences on faunistic communities.

- Development and continuous improvement of controls and management to mitigate impacts on the faunal communities.

This continuous faunal monitoring has been carried out by MRW Ambiental, an independent consultancy company, which has been reporting the behaviour of the fauna in the seasons of intense rains and drier periods, periodically, to the legislated governmental agency.

THREATENED AND SPECIAL STATUS SPECIES

In order to reassess the conservation status of the fauna described for Tucano, the list of endangered species contained in Article L. 411-1 of the Brazil Environmental Code (FR197/2010) strictly protects wild species of plants and animals listed by Ministerial Order. These species cannot be captured, transported, intentionally disturbed, or commercially exploited. These prohibitions can extend to the destruction, degradation, and alteration of the habitats of these protected species. A total of 110 nationally protected species were recorded at Tucano. Of these protected species, 100 were bird species, including three species with protected habitat, seven were mammalian species, and three were plant species.

Tucano also hosts five new plant species and seven other plants of interest (rare or endemic), as well as two rare and endemic fish species, present in first and second order creeks.

AIR QUALITY

Control of air quality in Amapá State is managed by Brazilian laws (CONAMA No. 08/90) establishing national emission limits for external combustion power up to 70 MW, Ordinance MINTER-100/80, which provides for the emission of smoke by diesel-powered vehicles, CONAMA No 01/90 and 03/90, ABNT/NBR 10151, CONAMA No. 436/2011-NBR 9547, 12019, and NBR 12827. This set of regulations manages the emission control of gaseous effluents, airborne particulates, noise, and vibration. There is systematic monitoring of concentrations of pollutants to be discharged into the environment (atmosphere) and the degree of risk caused in the environment is minimized by keeping concentrations below the legal limits. Great Panther periodically submits the monitoring reports to the governmental agency and is regularly audited.

The air quality for Tucano is monitored through the measurement of gaseous effluents from the exhaust discharge of the generator sets of the Thermoelectric Plant (UTE), smoke indices from the diesel-powered heavy equipment and through control of total suspended particles. These effluents have come from the UTE, the processing plant, the administrative area, and the explosives magazine.

The main air pollutants emitted by the UTE are nitrogen oxides composed of nitric oxide (NO), nitrogen dioxide (NO₂), and carbon dioxide (CO₂). In smaller amounts, carbon monoxide (CO), hydrocarbons, smoke, and sulphur dioxide (SO₂) are also expelled.

In a sample analysis of reports submitted to government agencies, the concentrations of NO, NO₂, CO, CO₂, O₂, and SO₂ show satisfactory indices below the reference limits of the equipment. Suspended total particle concentrations have higher concentration indices for periods of low rainfall, but are well below the acceptable maximum limit.

Smoke ratings on off-road mobile equipment and light vehicles have satisfactory rates of 20% or less (RINGELMANN comparative scale No.1).

NOISE QUALITY AND VIBRATIONS

The main noise and vibration issues pertain to haulage vehicles, blasting, and heavy equipment (fixed and mobile):

- Vibrations and noise caused by traffic and use of heavy equipment are relatively minor and can be considered negligible.
- The crushing system and beneficiation plant generates high noise/vibration levels that have been monitored in order to ensure that maximum levels acceptable within the legal limits are not exceeded. Several items of equipment have enclosed, or acoustic barriers installed in order to guarantee the noise levels remain below the limits of the legislation. In addition, periodic and corrective maintenance is conducted to keep noise within the limits set by manufacturers and specific legislation.
- Blasting has been limited to a scheduled time and blasting schedules must be pre-defined and marked on visible notices at the entrance to the Tucano areas. Tucano does not have communities in its immediate surroundings and the noise and vibration of blasting is negligible to its closest communities.

Noise is routinely monitored in these areas and shows levels below 70 dBA. On site, the compulsory use of individual hearing protection is enforced.

GEOTECHNICAL

The geotechnical control and monitoring implemented at Tucano consists of designing a set of sediment retention structures and slopes in the pit and surrounding hills inside the Tucano area. Slopes are controlled by the Mine Planning and Mine Operation departments with specific controls developed by specialists in geotechnical engineering and monitoring of soil/rock potential displacement points. Sediments are controlled by collecting water run-off and directing it through surface drainage systems and internal drainage systems (in the case of waste and pits), thus allowing for the reduction of solid material suspension in the water that is carried to existing waterways, primarily William Creek.

The main objective of these geotechnical controls is to ensure efficient prevention of erosion and prevent solids in the form of sediments flowing into the environment via waterways and, consequently, to minimize the impact on the surrounding non-anthropized areas.

HYDROGEOLOGY AND HYDROLOGY

Hydrogeology and hydrology are critically related to the equatorial regions, where rainfall levels exceed 2,000 mm per year, and it is the most relevant element of the physical environment that impacts the ecosystem. For this reason, the characterization and constant monitoring of groundwater, surface water, and rainwater is essential to minimize the impact of Tucano's operations.

Tucano implemented monitoring of the hydrogeology and hydrology system in 1999, where surface sampling points and piezometers were geo-referenced and flagged. Routine sampling has collected quality base data (CONAMA 20/86 standard), with which current water quality sampling is compared (CONAMA 357/05). Sampling includes physical parameters of acidity, conductivity, temperature, DO, and turbidity. Samples are sent to SGS Laboratories for metal content (anions and solids levels) analysis.

In 2005, before beginning operations, the hydrogeology a hydrology monitoring system was extended to cover the area considered under the FS including the waste dump, tailings, industrial plant, and buildings.

Currently, the underground and surface water-monitoring system consists of 29 points:

- 11 points of piezometers.
- 11 surface water points (river).
- seven monitoring points in the maintenance area and Gas Station to check the separation the water and oil in the waste boxes.

Due to adjustments in the Tucano infrastructure as a result of the dynamics of the operation, several piezometers and water surface points were abandoned, and others were installed in the area of coverage.

In compliance with the CONAMA (Brazilian Environment Council) regulations: 357/2005, 396/2008, and 430/2011 that define the minimum standards quality of surface, underground and effluent water according to the predominant uses. These standards must be maintained, in order to respect the water distribution and the needs of the entire local community. The results have been submitted to SEMA that indicate the results of the quality of water and drainages due to Great Panther's activities.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The archaeological studies carried out by Great Panther at Tucano are in full compliance with a series of the Brazilian regulations, which are as follows:

- regulations articles 20, 23, 215, and 216 of the Federal Constitution; Laws No 3.924, 26 July 1961;
- Ordinance SPHAN No 07, 10 December 1988;
- Ordinance IPHAN No 230, 17 December 2002;
- Normative Instruction IPHAN, No 001, 25 March 2015.

REGIONAL ARCHAEOLOGICAL CONTEXT

Amapá State has known archaeological evidences dating to the sixteenth century, from scientific expeditions by naturalists, travellers, and ethnologists. There are contributions on archaeological ceramics from noted individuals such as Crevaux, Coudreau, P Curt Nimuendajú, and Emilio Goeldi.

In the Tucano area, specifically in the municipalities of Pedra Branca do Amapari, Serra do Navio, and Porto Grande, there are 68 identified archaeological sites, most of them associated with historical and pre-colonial sites.

ARCHAEOLOGICAL STUDIES

Archaeological research was initiated in 2005 by Nunes Filho (2007 and 2009) and was carried out in accordance with the Archaeological Program defined in the environmental impact study, approved by SEMA.

During 2006 and 2007, several surveying, prospecting (with sample collection of artefacts), elaboration of surface diagnostics (for preliminary cultural characterization of each archaeological site), archaeological excavation, and laboratory studies were carried out, with the main objective of training a local team in archaeology and patrimonial education.

All archaeological material collected during these activities was duly packed and transported to the Archaeological Laboratory of the Archaeological Studies and Research Centre of Amapá-Cepap (UNIFAP), where they underwent the processes of cleaning, cataloguing, analysis, and restoration.

The result of the archaeological studies completed during 2006 and 2007 identified 11 archaeological sites, all of them prehistoric, among which three were excavated and studied. In 2008, the archaeological survey identified seven archaeological sites, once again all prehistoric, these were excavated and studied, and the material, as in previous years, was duly sent to UNIFAP. Also, in 2008, five carbon samples were sent to the Beta laboratory, Miami Florida, United States for carbon dating. In 2009, in the municipality of Pedra Branca do Amapari, four other archaeological sites were identified, with the excavation of three sites and surface collection of one site. Currently, this area belongs to Zamin Resources Ltd. The results of the archaeological studies from 2005 to 2009 subsidized the Beadell Operation Licensing for the current operation at Tucano.

After 2012, when operations restarted, archaeological studies became part of the routine activities of the company concurrently conducting exploration activities while monitoring, mapping, and identifying archaeological sites, and restoring artefacts such as those shown in Figure 20-2.

FIGURE 20-2 CERAMICS FRAGMENTS FOUND IN “SITIO 1” OF MUTUM AREA



SOCIAL OR COMMUNITY REQUIREMENTS

An area of approximately 4,000 km² is socially affected by Tucano and partially includes the municipalities of Serra do Navio and Pedra Branca do Amapari (the population is distributed at the town and in small communities).

The municipality of Pedra Branca do Amapari, based on the last census of 2010 has a population of 10,773 inhabitants with a population density of 0.50 inhabitants/km². The entire population is considered a stakeholder of Tucano within the scope activities and a total of 21 communities are dispersed along the unpaved highway BR-210.

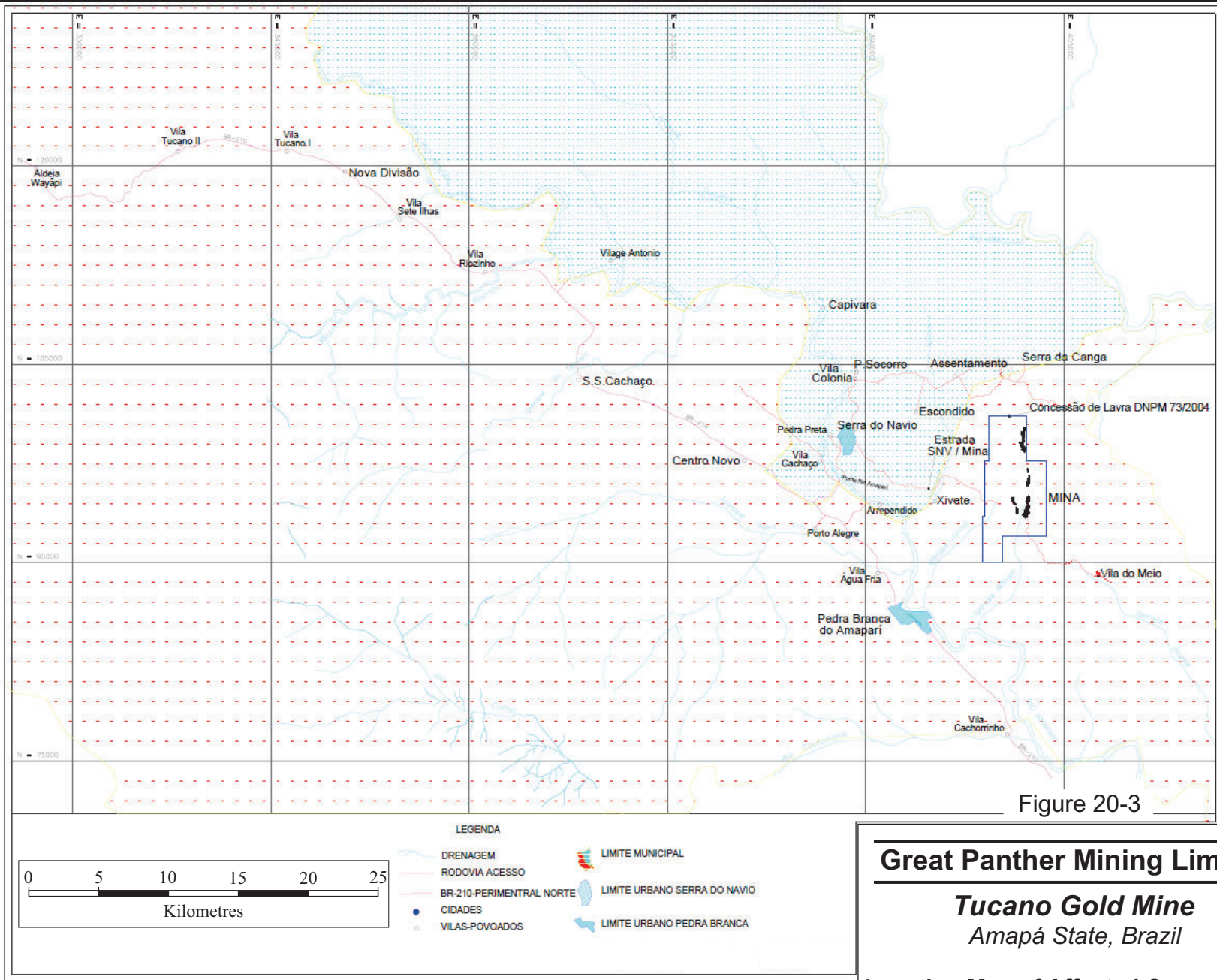
The municipality of Serra do Navio, has a population of 5,111 inhabitants with a population density of 0.66 inhabitants/km², where practically the entire population is included within Tucano's coverage area (both in the town and the ten small communities surrounding the western part of Tucano).

Figure 20-3 shows the communities affected by Tucano (Stakeholders).

Tucano, as part of the requirements of its Operation Licence, annually contributes capital to the Social and Environmental Compensation Funds of the local municipalities of Pedra Branca and Serra do Navio. A council formed by representatives of the communities, City Hall, City Council, and Great Panther, reviews and analyzes the programs that will be executed under these agreements in their respective communities. Initiatives are implemented by working collaboratively with the following stakeholders:

- State Environmental Resources Fund (FERMA).
- Community Development Fund (FDC).
- Social Development Fund (SDS).

In addition to these social and environmental commitments, Tucano implements wide stakeholder engagement and social investment programs focused in three main areas: socio-economic development, public health and safety, and education.



MINE CLOSURE

In December 2019 a specialized company, Mineral Engenharia e Meio Ambiente Ltda (MEMA) updated the Tucano closure plan and provided a cost estimate closure plan for the mining and processing operations at Tucano.

The MEMA Asset Retirement Obligation Report (MEMA, 2019) describes the costs associated with closing Tucano considering the current situation of the pits, waste dumps and tailings dam. These costs are to be updated as mining progresses.

The document complies with NBR 13030 norms regarding rehabilitation and vegetation of areas degraded by mining activities using recovery and revegetation techniques described in IBAMA (Brazilian Institute of the Environment and Renewable Natural Resources and Mining Regulatory Norms (MRN), 19, 20 and 21).

The total estimated closure costs for Tucano are summarized in Table 20-2.

TABLE 20-2 CLOSURE PLAN TOTAL COST
Great Panther Mining Limited – Tucano Gold Mine

Item	Total (R\$ 000)	Total (US\$ 000)
Management	2,543.40	669.32
Dismantling and Demolition	30,315.01	7,977.63
Pit Closure	3,203.52	843.03
Waste Piles Recovery	12,105.75	3,185.72
Dams Recovery	15,825.06	4,164.49
Accesses Recovery	1,630.45	429.06
Industrial and Civil Areas Recovery	2,608.49	686.45
Old Mining Site and Ore Pile Recovery	3,253.96	856.31
Anthropic Area Recovery	5,224.61	1,374.90
Loan Areas Recovery	1,196.60	314.89
Environmental Monitoring	1,572.80	413.89
Community Relations Program	50.00	13.16
Total	79,529.66	20,928.86

Notes:

1. US\$/R\$ exchange rate of 1:3.8
2. The following revenues are estimated to be obtained in the deactivation phase.
3. Sale of scrap metal is expected to generate R\$2,439,008 (US\$641,844)

21 CAPITAL AND OPERATING COSTS

CAPITAL COSTS

The Mine capital cost for the LOM totals \$59.8 million. The open pit capital is \$9.5 million, and the underground capital is \$50.3 million. The LOM capital costs are summarized in Table 21-1.

TABLE 21-1 PROJECT CAPITAL COST
Great Panther Mining Limited – Tucano Gold Mine

Area	Unit	Total	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
Tailings Dam Expansions	US\$ 000	5,636	4,321	1,316	-	-	-	-	-	-
New Primary Crusher	US\$ 000	672	672	-	-	-	-	-	-	-
Contractor Shop Improvements	US\$ 000	421	421	-	-	-	-	-	-	-
Environmental improvements	US\$ 000	619	619	-	-	-	-	-	-	-
Power Line	US\$ 000	605	605	-	-	-	-	-	-	-
Plant Improvements	US\$ 000	661	661	-	-	-	-	-	-	-
Fire Safety System Retrofit	US\$ 000	342	342	-	-	-	-	-	-	-
Others	US\$ 000	329	329	-	-	-	-	-	-	-
Closure Activities	US\$ 000	197	20	178	-	-	-	-	-	-
Total Open Pit Capital Cost	US\$ 000	9,483	7,989	1,493	-	-	-	-	-	-
UG Infrastructure	US\$ 000	25,040	-	9,810	7,490	4,360	2,940	440	-	-
Jumbo Development	US\$ 000	25,290	-	1,990	6,280	6,280	6,270	4,280	190	-
Total Underground Capital Cost	US\$ 000	50,330	-	11,800	13,770	10,640	9,210	4,720	190	-
Total	US\$ 000	59,813	7,989	13,293	13,770	10,640	9,210	4,720	190	-

OPEN PIT CAPITAL COST

The total open pit capital cost estimated for the Mine over the LOM totals US\$9.5 million as summarized in Table 21-1. The cost includes tailings dam expansion, new primary crusher, contractor shop improvements, power line, plant improvements, environmental improvements, closure cost, fire safety system, and others.

UNDERGROUND CAPITAL COST

The underground capital costs are summarized in Table 21-2.

TABLE 21-2 UNDERGROUND CAPITAL COST
Great Panther Mining Limited – Tucano Gold Mine

Area	Unit	Total	Y1	Y2	Y3	Y4	Y5	Y6	Y7
UG Lateral Development	US\$ 000	25,290	1,990	6,280	6,280	6,270	4,280	190	-
Egress Ladderway	US\$ 000	490	-	160	220	110	-	-	-
High/Medium voltage switch	US\$ 000	570	570	-	-	-	-	-	-
Power Supply and Distribution	US\$ 000	4,730	510	1,550	1,580	1,040	50	-	-
Mine Dewatering & Water Supply	US\$ 000	4,080	460	1,330	1,360	890	40	-	-
Compressed Air - Portable Compressors	US\$ 000	300	200	100	-	-	-	-	-
Refuge Chambers	US\$ 000	320	210	110	-	-	-	-	-
Fire Detection & Suppression	US\$ 000	260	180	80	-	-	-	-	-
Leaky Feeder Communications System	US\$ 000	280	120	60	60	40	-	-	-
Mine Rescue Equipment	US\$ 000	200	150	50	-	-	-	-	-
Auxiliary Ventilation Fans & Regulators	US\$ 000	480	130	130	130	90	-	-	-
UG Workshops – UG Fit out	US\$ 000	300	200	100	-	-	-	-	-
UG Infrastructure	US\$ 000	12,010	2,730	3,670	3,350	2,170	90	-	-
Portal Preparation	US\$ 000	300	300	-	-	-	-	-	-
Surface Exhaust Fan (2 x 560 kW parallel fans)	US\$ 000	2,720	1,410	1,310	-	-	-	-	-
Change Rooms/Lamp room/Lamps +SRs	US\$ 000	900	260	160	160	160	160	-	-
Underground Mining Offices	US\$ 000	700	220	120	120	120	120	-	-
Surface Workshop	US\$ 000	400	400	-	-	-	-	-	-
Water Supply (PRV, tanks)	US\$ 000	340	340	-	-	-	-	-	-
Fuel Storage and Bowser	US\$ 000	250	250	-	-	-	-	-	-
Surveying and Eng. Equipment	US\$ 000	300	300	-	-	-	-	-	-
First Fills	US\$ 000	1,100	1,100	-	-	-	-	-	-
Raiseboring	US\$ 000	2,180	1,200	980	-	-	-	-	-
Infrastructure Contingency	US\$ 000	3,840	1,300	1,250	730	490	70	-	-
Surface Infrastructure	US\$ 000	13,030	7,080	3,820	1,010	770	350	-	-
UG Capital Cost, Total	US\$ 000	50,330	11,800	13,770	10,640	9,210	4,720	190	-

Note:

1. Numbers may not add due to rounding.

UNDERGROUND LATERAL DEVELOPMENT CAPITAL COSTS

Capital lateral development is expected to cost approximately \$25.3 million over the LOM. This cost excludes material handling costs, power, and diesel costs which have been allocated to operating costs.

UNDERGROUND VERTICAL DEVELOPMENT CAPITAL COSTS

Capital raiseboring is expected to cost approximately \$2.18 million during the first 18 months of the Project. Additional longhole raising for both the airway extensions and emergency egress has been costed as an operating cost (apart from purchasing of the emergency ladderway at a cost of \$0.50 million).

UNDERGROUND MOBILE EQUIPMENT CAPITAL COSTS

The Project is assumed to use a contractor for all development and production throughout the LOM. The equipment costs are included in the contractor's development and production mining rates. The estimate for the contractor provided equipment includes the following (based on maximum requirements):

- Longhole production drill (1)
- Jumbos – double-boom (6)
- 10 t LHDs (5)
- Articulated trucks – 32.5 t (5)
- Cable bolters and shotcrete machines (4)
- Ancillary equipment

UNDERGROUND INFRASTRUCTURE CAPITAL COSTS

The underground infrastructure capital cost estimate is \$12.00 million as summarized in Table 21-2. Costs are based on supplier quotations and unit rates from past experience with similar projects. The underground infrastructure costs largely consist of electrical reticulation, ventilation, and dewatering system costs.

SURFACE INFRASTRUCTURE CAPITAL COSTS

Table 21-2 presents a breakdown of the direct capital costs estimated for the surface infrastructure required to support underground mining.

EXCLUSIONS FROM THE UNDERGROUND COST ESTIMATE

The following costs have not been included in the underground capital cost estimate:

- Mine closure costs (to be captured as part of open pit costs).
- Mill modification costs.
- Surface road costs to the Urucum North Underground Mine site.
- Additional explosives magazine facilities.
- Additional stores / warehousing facilities.

Existing facilities and infrastructure such as the surface road, explosives magazine, and stores/warehouse can be used.

INDIRECT CAPITAL COSTS

Indirect costs defined as those pertaining to engineering, procurement, and construction management (EPCM), the costs associated with servicing and maintaining the Project during the construction period, and operating costs incurred prior to first concentrate production. No Owners' costs or EPCM have been considered in the cost estimate.

CAPITAL CONTINGENCY

Capital contingency totals \$3.90 million and average approximately 10% of the direct capital cost.

OPERATING COSTS

Operating cost estimates in this section include on-site and off-site costs. On-site operating costs comprise the mining cost, process plant operating and maintenance cost and G&A costs. Off-site operating costs include doré bullion transport and refining charges, and the federal and state royalties and other royalty agreements in relation to mineral product sales from the Tucano Gold Mine. The operating cost estimate for the Tucano Project is expressed in Q4 2019 R\$.

The mine operating cost history is summarized in Table 21-3. All the costs reflect open pit mining.

TABLE 21-3 OPERATING COST 2016 TO 2019
Great Panther Mining Limited – Tucano Gold Mine

	Mine R\$/t mined	Mine R\$/t ore	Plant R\$/t ore	G&A R\$/t ore	Total R\$/t ore
2016	14.97	81.58	51.31	11.53	150.82
2017	14.50	82.93	47.15	11.71	146.74
2018	13.76	81.14	52.52	13.12	150.26
2019	12.91	95.01	74.01	14.37	186.5

The LOM pit operating costs are summarized in Table 21-4. Pit operating costs were determined quarterly for the LOM. The costs are based on material quantities and unit costs supplied from existing operations comprised of actual 2019 operating costs, projected operating costs, and the current mining contracted rates. The operating costs do not include Great Panther corporate G&A costs.

TABLE 21-4 LOM OPEN PIT OPERATING COST
Great Panther Mining Limited – Tucano Gold Mine

		LOM	2019Q1	2020Q1	2020Q2	2020Q3	2020Q4	2021Q1	2021Q2	2021Q3	2021Q4
Mining (OP)	R\$/t moved	13.35	13.64	13.23	12.90	12.06	12.10	14.80	13.75	15.56	16.02
Mining (OP)	R\$/t feed	93.84	104.72	94.96	98.66	100.65	100.94	113.05	101.09	59.93	25.55
Processing	US\$/t feed	62.77	66.42	68.87	66.04	54.84	53.01	57.75	64.06	69.30	69.66
G&A	US\$ feed	23.38	23.38	23.38	23.38	23.38	23.38	23.38	23.38	23.38	23.38
Total	US\$/t feed	179.99	193.19	187.21	188.08	178.87	177.33	194.19	188.53	152.61	118.59
Mining (OP)	R\$000	652,664	89,451	76,800	81,106	86,721	86,355	91,432	83,109	51,633	6,617
Processing	R\$000	436,530	56,824	55,697	54,294	47,252	45,347	46,707	52,662	59,708	18,039
G&A	00	162,605	20,002	18,909	19,221	20,144	20,002	18,909	19,221	20,144	6,054
Total Operating Cost	R\$000	1,251,800	165,276	151,406	154,558	154,117	151,704	157,047	154,992	131,485	30,710

OPEN PIT MINING COST

The open pit mining cost is sourced from the actual 2019 operating costs and the unit mining costs defined in the mining contracts. The pit on-site operating cost is based on operating the equipment, the labour associated with operating the mine, the cost for explosives and diesel, as well as pit dewatering, road maintenance, and other activities. Open pit operating costs are summarized in Table 21-4 and average R\$13.35/t moved (\$3.51/t moved at an R\$/US\$ exchange rate of 3.8:1). Key mine operating cost parameters include:

- Mine operating cost extend from October 1, 2019 to the end of mine life in 2021.
- Continuous 24 hour per day mining operation for 365 days per year.
- Tucano fixed unit cost of R\$7.30/t for oxide ore mining, comprised of unit costs for production drilling, loading, hauling, de-watering, U&M contractor ancillary equipment and extra works, mine geology, and grade control drilling.
- Tucano fixed unit cost of R\$8.92/t for fresh ore mining, that includes production drilling, blasting, loading, hauling, de-watering, U&M contractor ancillary equipment and extra works, mine geology, and grade control drilling.
- Tucano fixed unit cost of R\$4.07/t for oxide waste mining that includes production drilling, loading, hauling, de-watering and U&M contractor ancillary equipment and extra works.
- Tucano fixed unit cost of R\$5.69/t for fresh waste rock mining that includes production drilling, blasting, loading, hauling, de-watering and U&M contractor ancillary equipment and extra works.
- U&M contractor fixed mining cost of R\$0.91/m³ for pre-split drilling (applicable to fresh rock only).
- U&M contractor variable unit mining cost for oxide, transitional, and fresh ore, contingent on the haulage distance, as defined in the mining contract and summarized in Table 21-5.
- U&M contractor variable unit mining cost for oxide, transitional and fresh ore, contingent on the haulage distance, as defined in the mining contract and summarized in Table 21-6.
- U&M contractor variable ore re-handle cost, contingent on the haulage distance, as defined in the mining contract and summarized in Table 21-7. Swell factor 1.3 is used to convert bank cubic meters to loose cubic metres.
- U&M contractor fixed crusher feed cost of R\$2.58/t.
- Contractor labour costs are included in the unit mining costs.
- Owner labour costs are included in Tucano mining and processing costs.
- Drilling utilizing 152 mm and 114 mm drills. Drill consumables are covered in U&M contract mining costs.
- Blasting waste rock at an explosive powder factor of 0.79 kg/m³ and mineralized rock at a powder factor of 1.26 kg/m³ using 100% emulsion explosives. Explosives supplied under full-service contract with explosives supplier. Explosives prices:

R\$3.15/kg ANFO; R\$4.56/kg emulsion. Accessories are estimated at R\$51.72/blasthole. Monthly service charge R\$121,600/month.

- Diesel fuel included in mine operating costs at R\$3.701/L.
- No blasthole assaying costs are included in mine operating costs. Blasthole assaying is done at the process plant laboratory.
- Mine operating cost estimates are based on a US\$/R\$ exchange rate of 1:3.8.
- No VAT or import duties are included in mining costs.

TABLE 21-5 U&M UNIT MINING COST - ORE
Great Panther Mining Limited – Tucano Gold Mine

Haul Distance (m)	Oxide Ore (R\$/m ³)	Transitional Ore (R\$/m ³)	Fresh Ore (R\$/m ³)
1000-1500	9.40	17.99	21.45
1500-2000	10.41	19.68	23.14
2000-2500	10.53	19.93	23.37
2500-3000	10.63	21.69	23.45
3000-3500	11.27	21.76	24.55
3500-4000	11.63	22.86	25.14
4000-4500	12.59	23.10	26.63
4500-5000	13.35	23.69	28.19
5000-5500	14.09	24.97	28.70
5500-6000	14.29	25.59	29.05
6000-6500	15.08	25.59	29.05
6500-7000	15.90	25.59	29.05

TABLE 21-6 U&M UNIT MINING COST – WASTE ROCK
Great Panther Mining Limited – Tucano Gold Mine

Haul Distance (m)	Oxide Ore (R\$/m ³)	Transitional Ore (R\$/m ³)	Fresh Ore (R\$/m ³)
1000-1500	10.31	18.80	21.62
1500-2000	11.31	20.49	23.31
2000-2500	11.44	20.74	23.53
2500-3000	11.54	22.51	23.62
3000-3500	12.15	22.56	24.72
3500-4000	12.56	23.66	25.31
4000-4500	13.49	23.90	26.80
4500-5000	14.26	24.50	28.35
5000-5500	14.26	24.50	28.35
5500-6000	14.26	24.50	28.35
6000-6500	14.26	24.50	28.35
6500-7000	14.26	24.50	28.35

TABLE 21-7 U&M ORE REHANDLE COST
Great Panther Mining Limited – Tucano Gold Mine

Haul Distance (m)	Unit Cost (R\$/m³)
1000	10.53
2000	11.91
3000	14.48
4000	16.62
5000	17.12
6000	19.06
7000	21.59

UNDERGROUND MINING COST

LOM underground total operating costs, by major area, are shown in Table 21-8. Annual operation totals are shown in Table 21-9.

TABLE 21-8 LOM UNDERGROUND TOTAL OPERATING COSTS BY MAJOR AREA
Great Panther Mining Limited – Tucano Gold Mine

Department	Operating Cost (\$M)
Mine	160.7
Surface Handling	2.8
Process plant	39.1
G&A	13.1
Total	161.8

TABLE 21-9 LOM UNDERGROUND TOTAL OPERATING COSTS BY YEAR
Great Panther Mining Limited – Tucano Gold Mine

Year	Operating Cost (\$M)
Year 1	2.3
Year 2	22.7
Year 3	30.7
Year 4	36.3
Year 5	29.6
Year 6	31.4
Year 7	8.8
Total	161.8

LOM Mining costs are estimated to be \$50.00/t of ore milled and total operating costs, inclusive of processing and G&A, are estimated to be \$75.80/t of ore milled. The cost breakdown by major area is shown in Table 21-10.

TABLE 21-10 LOM AVERAGE UNDERGROUND TOTAL OPERATING COSTS
Great Panther Mining Limited – Tucano Gold Mine

Department	Operating Cost (\$/t milled)
Mine	50.00
Surface Handling	1.32
Process plant	18.33
G&A	6.15
Total	75.80

PLANT OPERATING COST

The process plant operating costs are summarized in Table 21-11 by cost type.

TABLE 21-11 PROCESS PLANT OPERATING COST
Great Panther Mining Limited – Tucano Gold Mine

Cost Type	Unit	Oxide Ore	Fresh Ore
Crushing	R\$/t	2.79	2.79
Grinding	R\$/t	4.33	10.18
CIL	R\$/t	12.42	18.28
Power Supply	R\$/t	19.52	32.13
Reagents	R\$/t	0.20	0.20
Tailings Disposal	R\$/t	0.50	0.50
Chemical Preparation	R\$/t	0.70	0.70
Desorption	R\$/t	1.53	1.53
Carbon Regeneration	R\$/t	0.24	0.24
Electrolysis and Fusion	R\$/t	0.27	0.27
Thickening	R\$/t	0.12	0.12
Plant Laboratory	R\$/t	0.06	0.06
Portable Water	R\$/t	0.22	0.22
Detox	R\$/t	2.44	2.44
Total	R\$/t	45.34	69.67
	US\$/t	11.93	18.33

GENERAL & ADMINISTRATIVE COST

The operating costs for the G&A areas were determined and summarized in Table 21-12 by cost areas of mine, plant, general and overheads. The total unit G&A cost was estimated to be R\$23.38/t feed. Other G&A operating cost parameters include:

- Camp costs (catering, etc.), bussing for local employees, and travel costs for professional staff that commute from either Macapá or other cities in Brazil on a fly-in-fly-out (FIFO) basis included in G&A cost estimates
- Tucano maintenance of production equipment is covered in G&A cost estimates
- Tucano maintenance of light vehicles and miscellaneous equipment is covered in G&A cost estimates

G&A operating cost excludes the costs associated with Great Panther's Vancouver office (Table 21-13).

TABLE 21-12 GENERAL AND ADMINISTRATION COST
Great Panther Mining Limited – Tucano Gold Mine

Cost Area	Unit	Value
Fixed Costs Mine		
Mine Planning	R\$/t	0.98
Mine Geology	R\$/t	0.15
Grade Control Drilling	R\$/t	1.07
Mine Laboratory	R\$/t	0.37
Mine Management	R\$/t	1.39
De-watering	R\$/t	0.57
Production Drilling	R\$/t	0.10
Blasting	R\$/t	0.59
Loading	R\$/t	0.14
Hauling	R\$/t	0.39
U&M Ancillary Equipment & Extra Work	R\$/t	0.06
Fixed Costs Mine Total	R\$/t	5.85
	US\$/t	1.54
Fixed Costs Plant		
Plant Management	R\$/t	1.31
Crushing	R\$/t	0.14
Grinding	R\$/t	0.22
Desorption	R\$/t	0.16
Electrolysis and Fusion	R\$/t	0.06
Reagents	R\$/t	0.11
CIL	R\$/t	0.23
Detox	R\$/t	0.0002
Tailing Disposal	R\$/t	0.14

Cost Area	Unit	Value
Chemical Preparation	R\$/t	0.47
Plant Laboratory	R\$/t	0.03
Water Treatment	R\$/t	0.00003
Power Supply	R\$/t	0.01
Plant Ancillary Vehicles	R\$/t	0.09
Plant Maintenance Management	R\$/t	0.71
Electrical Maintenance	R\$/t	1.05
Mechanical Maintenance	R\$/t	1.44
Fixed Costs Plant Total	R\$/t	6.16
	US\$/t	1.62
Fixed Costs G&A		
Administration Manager	R\$/t	0.32
General Services	R\$/t	1.37
Security	R\$/t	1.92
Safety	R\$/t	0.50
Health	R\$/t	0.34
Environmental	R\$/t	1.16
SHE Management	R\$/t	0.21
Purchasing	R\$/t	0.53
Warehouse	R\$/t	0.53
Fixed Costs G&A Total	R\$/t	6.89
	US\$/t	1.81

TABLE 21-13 HEAD OFFICE ADMINISTRATION COST
Great Panther Mining Limited – Tucano Gold Mine

Cost Type	Unit	Value
Fixed Costs Overhead		
General Management	R\$/t	0.69
Legal RJ	R\$/t	0.75
Human Resources	R\$/t	0.46
Mine Finance	R\$/t	0.31
Communities	R\$/t	0.20
Archaeology	R\$/t	0.07
Information and Technology	R\$/t	0.97
Finance Director	R\$/t	0.52
General Services Rio	R\$/t	0.11
Treasury	R\$/t	0.24
Rio Finance	R\$/t	0.15
Fixed Costs Overhead Total	R\$/t	4.48
	US\$/t	1.18

OFF-SITE OPERATING COST

Gold doré is shipped from the site to the refining company. The current transport costs are estimated at \$R20.94/oz Au and the refining treatment charges are R\$73.99/oz Au.

22 ECONOMIC ANALYSIS

This section is not required as Great Panther is a producing issuer, and Tucano is currently in production and there is no material expansion of current production.

23 ADJACENT PROPERTIES

There are no relevant adjacent properties to Tucano.

24 OTHER RELEVANT DATA AND INFORMATION

No additional information or explanation is necessary to make this Technical Report understandable and not misleading.

25 INTERPRETATION AND CONCLUSIONS

Based on the site visit, discussions with Project personnel, and available information, RPA and Great Panther offer the following conclusions:

GEOLOGY AND MINERAL RESOURCES

- The gold mineralization at the Urucum and Tap AB deposits is observed to be related to elevated abundances of pyrrhotite that occurs in both stratiform and cross-cutting relationships with the host rocks. The primary host rock has been a BIF, with other host rocks containing lesser quantities of gold.
- Digital interpretations of the distribution of the gold mineralization for the Urucum and Tap AB deposits were prepared by RPA using Seequent Limited's Leapfrog software package. The mineralization wireframes were created using a nominal cut-off grade of 0.5 g/t Au across a minimum width of three metres to align with the cut-off grade and minimum width criteria that are currently being employed by the Mine staff for establishing the ore/waste dig packets at the Urucum deposit.
- Review of the resulting contoured grade longitudinal sections for the selected lodes at the Urucum deposit suggests that, in general, the higher gold grades occur as small pockets up to a few tens of metres in size. In places, these higher grade pockets are contained within broader, lower grade zones which locally exhibit shallow northerly plunges. Flat-lying plunges, and steep southerly plunges are also suggested on a more local scale.
- The down-plunge limits of many of the higher grade mineralized shoots at Urucum do not appear to be defined by drilling in the wireframes examined.
- Examination of the grade distribution for wireframe S03 of the Tap AB deposit reveals that this wireframe has been systematically evaluated by diamond drilling at a spacing of approximately 50 m x 50 m to a depth of approximately 200 m below the current mining surface. The density of drill hole and sample information increases at shallow levels where information from grade control drilling programs is available. The drilling has identified several zones of elevated gold grades. In general, these higher grade zones appear to be oriented along a moderate to steep north plunge. The higher grade zones located immediately below the mining surface in the AB 1 portions of the zone occur as pods approximately 25 m to 50 m in size.
- The down-plunge limits of many of the higher grade mineralized shoots within the S03 wireframe of the Tap AB deposit do not appear to be defined by drilling in the wireframes examined.
- The 2019 Tucano Mineral Resource estimate resulted in a 51% reduction in Measured and Indicated gold ounces, relative to the previous (June 30, 2017) estimate, after accounting for a 62% reduction in ore tonnage and a 27% increase in gold grades.
 - The 2019 geological interpretation of the mineralized zones is the most significant factor explaining the reduction in resource tonnage. RPA and Great Panther interpreted mineralized zones as discrete lodes, which in turn were used to

constrain the block grade estimates. The 2017 resource model used a geostatistical approach with limited manual interpretation.

MINING AND MINERAL RESERVES

- The 2019 Mineral Reserve estimate resulted in a 43% reduction in gold ounces compared to the previous (June 30, 2017) estimate as the 51% reduction in ore tonnes is partly offset by a 17% improvement in average gold grades.
 - The decrease is primarily due to the change in the underlying Mineral Resources, as well as an increase in cut-off grades to reflect current operating parameters.

OPEN PIT MINING

- The Mine is a mature open pit mining operation in a steady state of mining production. The operations are sufficiently established to provide the basis of much of the technical and economic inputs required for this study.
- Economic analysis confirms the economic viability of the open pit Mineral Reserves at the base gold price of US\$1.250/oz.
- Pit optimizations were carried out on Measured and Indicated Mineral Resources using a block net value (block value = block revenue – block total operating cost), including allowances for dilution and mining loss, and preliminary estimates for pit OSA.
- Individual pit shell selection was made based on a gold price of US\$1,250/oz Au for Urucum Central South and Urucum Central North, US\$1,350/oz Au for Tap AB 1, Tap AB 3 and Duckhead, US\$1,450/oz Au for Urucum North and Urucum East, and US\$1,500/oz Au for Urucum South. These pit shells were used to guide the ultimate pit design.
- In order to determine if material within the open pit should be sent to the mill for processing or to the waste rock dump, a marginal cut-off grade has been calculated. The marginal cut-off grade, which is referred to as the “Open Pit Discard Cut-off” in the CIM Estimation of Mineral Resource and Mineral Reserves Best Practice Guidelines, differs from the breakeven cut-off-grade since mining costs are excluded from the calculation. The reason for excluding the mining costs is that material already defined to be within the limits of the open pit must be mined regardless if it is classified as ore or waste in order to access the bench below.
- The mine planning block model is based on the resource model regularized to the minimum practical size dig block (i.e., selective mining unit), that can be selectively excavated by mining equipment currently employed on site. Each block in the regularized model contains the quantities of diluted mineralized tonnes and grades including the tonnages of mining dilution and ore loss, where ore loss (%) = 100% - mining recovery (%). Mining dilution comprises internal dilution inherited during the model regularization and external (contact) dilution resulting from geological/geometric contacts with waste rock.
- Geotechnical and pit design parameters are based on data, information, and results from previous geotechnical studies and incorporate the pre-split drilling and controlled blasting. There is a risk that the failure to attain the design pit slopes could result in pit wall instability and the loss of ore at the pit bottom.
- The west wall of the Urucum Central South pit underwent slope displacement on October 6, 2019. Since then, the pit has been closed to mining while Great Panther works toward a remediation plan with the assistance of the independent consulting firm

Knight Piésold & Co. This pit remains in Mineral Reserves, however, the pit design may be subject to revision once the results of the remediation plan are available.

- All pits have been designed with 4 m operating bench heights. To maximize ore selectivity and minimize dilution, it is expected that ore will be mined on 4 m benches.
- The catch-berms in fresh rock are stacked at 24 m intervals (Urucum) and 20 m intervals (other pits). It is believed that it may be possible in some higher elevation areas to mine fresh waste rock on 8 m or 12 m high benches, which is more cost effective and may facilitate higher pit sinking rates in terms of vertical metres per year. This is considered a future opportunity that has not been incorporated into the base case mine plan.
- The ultimate pit designs contain sufficient ROM quantities to support a 10,000 tpd processing rate through to late 2021. The open pit Mineral Reserves are included in eight pits, with two largest pits, Urucum and Tap AB containing 95% of the total open pit Mineral Reserves. Oxide ore contributes 22% of the total open pit ore mined. The LOM average strip ratio is 6:1.
- Mine waste dumps are located adjacent to the pits, to minimize hauling requirements. Waste dumping platforms are laid out to facilitate dump re-sloping at mine closure.
- The LOM production schedule has been prepared quarterly based on the mining activities commencing in Q4 2019. The pit production is founded on mining the ultimate pit bench-by-bench without phases or subdivisions. The LOM pit mining rate averages approximately 66,000 tpd and includes both mineralization and waste material.
- The plant feed comprises the ROM ore from the pit and from the stockpiles. The pit ROM production is projected to be a direct feed to the crusher, complemented with the ROM from the stockpiles re-handled on as needed basis.
- Contractor mining is carried out by U&M, one of the largest mining contractors in Brazil, using conventional open pit methods, consisting of the following activities:
 - Drilling performed by conventional production drills.
 - Blasting using emulsion explosives and a downhole delay initiation system.
 - Loading and hauling operations performed with hydraulic shovel, front-end loader, and rigid frame and articulated haulage trucks.
- The owner's personnel monitor the mining contractor and provide engineering support including survey and grade control. Operations run 24 hours per day, seven days a week, on an eight-hour shift rotation.
- The open pit is scheduled to operate 365 days per year, 24 hours per day. The U&M work schedule utilizes four crews working eight-hour shifts.
- Equipment productivity and utilization factors and equipment operating hour estimates are based on seasonal conditions (dry, transitional, or wet season during the calendar year), rock type, and various mining conditions including different bench mining width and ramp width.
- The mine manpower at the end of September 2019 is estimated at approximately 1,493 employees. This includes owner's and contractor's workforce. The ongoing pit operations will require this level of manpower for most of the next two years.
- Open pit operating costs are estimated to average R\$13.35/t mined (\$3.51/t moved at a R\$/US\$ exchange rate 3.8:1) and includes owner and contract mining operating costs.

The cost is estimated based on material quantities and unit costs supplied from existing operations comprised of actual 2019 operating costs, projected operating costs, and the current mining contracted rates. The pit operating cost estimate was developed based on cost for drilling, blasting, loading, and hauling and includes labour costs and costs for consumables (diesel, explosive, parts, etc.).

UNDERGROUND MINING

- Underground Mineral Reserves are based on a 2016 Pre-Feasibility Study (PFS) carried out by AMC. RPA reviewed the AMC PFS, and made the following adjustments:
 - Updated the cost estimates to reflect current inputs and a stand-alone underground mining scenario.
 - Updated cut-off grades.
 - Filtered out stopes that no longer met updated cut-off grades.
 - Rebalanced the production schedule.
- Modern trackless mobile equipment is proposed for the development and stoping operations.
- The mine will be accessed by a single portal located at the northern end of Urucum North and twin declines (north and south) based on an orebody strike length of >800 m.
- Level intervals will be 20 m (based on 15 m production blastholes and the narrow width of some lodes) with crosscuts between the decline and the mineralization, every 20 m.
- Declines have been designed to allow equipment access to each production level. On each level a crosscut will be developed from the decline to the ore lode/lodes. Decline and crosscut development have been designed at 5.0 m wide x 5.0 m high, sufficient to accommodate 30 t to 40 t trucks.
- Ore drives have been designed to be 5.0 m high x 4.0 m wide to accommodate production drills and 10 t load-haul-dump (LHD) units. Trucks will not enter the ore drives.
- All waste will be tipped directly into stopes or trucked to surface.
- Approximately 2.1 million tonnes (Mt) of ore at an average grade of 4.1 g/t Au will be mined and processed over the 6.5 mine life.
- All ore production and mine development is proposed to be done by contractors; this includes all waste rock filling.
- Ventilation will be provided via a pull-type (exhausting) system with primary fans located on surface at the top of each of two primary exhaust raises.
- With the infrastructure airflow and leakage and balancing allowances, the total airflow determination based on the diesel fleet size is 350 m³/s.
- Evaluation of the planned production rate and scheduling indicates that the deposit supports 450,000 tpa to 500,000 tpa. Production rates vary from year to year depending on the number of production fronts becoming available in different areas of the mine.

- There are opportunities for further optimization of the production rate in future studies, particularly if additional areas are considered for underground mining (e.g., Urucum Central).
- Major scheduling assumptions driving these production rates include: decline and crosscut advance of 140 m/month, ore drive advance of 60 m/month, production rate from stoping of 10,000 t/month for both Uphole retreat and Benching stopes, backfilling rate of 12,000 m³ per month, per stope, for Benching stopes. All scheduling assumptions are based on industry benchmarked data.
- Scheduling has been based on maintaining a nearly constant number of primary mobile equipment in both the North and South declines.
- Workforce size at full production is estimated to be 240 employees, based on three eight-hour shifts.
- The underground mine would use some of the existing infrastructure built for the open pit operations such as the explosives magazines and warehouse.
- Mining costs are estimated to be \$50.00/t of ore milled and total operating costs, inclusive of processing and G&A, are estimated to be \$75.80/t of ore milled.
- An economic assessment of the Underground Mineral Reserves confirms that they are economically viable at the base gold price of \$1,250/oz.

MINERAL PROCESSING

- A new grinding configuration (semi-autogenous grinding + ball mill) has allowed Tucano to increase the percentage of sulphide ore in the overall plant blend without substantially affecting their target throughput. This was done while maintaining the % passing at 75 µm to 85 µm.
- The plant was originally designed to run at 3.4 million tonnes per annum (Mtpa) considering 90% Sulphide in the blend. The plant blend from May to September 2019 was close to 95% sulphide ore and 5% oxide material and the average annual plant throughput was 3.1 Mtpa, however, this annual figure was affected by lower plant availabilities (i.e., 89%) due to other issues experienced in the plant such as mill grade breakages, power issues and also, issues with the old primary crusher.
- The increasing percentage of sulphide ore has not adversely affected plant gold recoveries. On the contrary, the new oxygen plant commissioned in April 2019 has contributed to higher metal recoveries, which resulted in an average gold recovery of 93% from May to December 2019.

INFRASTRUCTURE

- The Mine is currently operating and has all of the required infrastructure to carry on operations. Additional surface infrastructure will be required to support the underground operation.
- The remaining tailings storage facility (TSF) capacity is 1,879 Mm³, which is sufficient for eight months, from December 2019 to June 2020.

- The Mine plans to extend the tailings storage capacity by commissioning three new TSFs, East Dam, East-NW Extension, and West Pond Phase 2 (WPP2), which together will provide approximately 32 Mm³ of tailings storage.

ENVIRONMENT, PERMITTING, AND SOCIAL ASPECTS

- The Tucano Gold Mine is in possession of all licences required for the operation of the mine, mill, processing plant, and TSFs in compliance with Brazilian regulations. There is currently one licence that is in the process of being renewed and is expected by the third quarter of 2020. While in the process of renewal the current licence remains valid.
- Continuous monitoring programs are carried out at the Project, which confirm that there are no material concerns pertaining to non-compliance.
- The Mine implements stakeholder engagement and social investment programs focused in three main areas: socio-economic development, public health and safety, and education. The social performance practices at the Project are effective and enable the Mine to maintain a good level of social acceptance. No significant issues with the local communities have been identified since production re-started in 2012.

26 RECOMMENDATIONS

Based on the site visit and subsequent review of the available documentation, the following recommendations are offered:

GEOLOGY AND MINERAL RESOURCES

- Evaluate the potential for adjacent lithologies to the BIF and carbonate units for their potential of hosting significant quantities of gold mineralization.
- Carry out a program of assay-to-extinction to more fully understand the nature of the gold distribution of the mineralized samples.
- Determine the genetic and temporal relationships between the gold mineralization and the pegmatite units.
- Prepare a separate series of underground wireframe interpretations for the Urucum deposit using cut-off grade and minimum width criteria that are reflective of the envisioned operational scenario for an underground mining operation.
- Review the capping value applied to the short term grade control block model in consideration of all available drill hole and sample information, as well as all information collected from the plant reconciliation studies.
- Carry out additional drill testing to define and outline the extents of the higher grade mineralized shoots found at the Urucum deposit.
- Continue contouring exercises for the remainder of the mineralized wireframes present at the Urucum deposit as aids in conducting future variogram analyses as well as aids for developing exploration targets. These contouring exercises should examine not only the distribution of the gold grades alone, but also examine the grade times thickness product.
- For future updates to the Urucum long term Mineral Resource block models, use common origins with the short term grade control block models.
- Prepare future long term block models for the Urucum deposit using more stringent search strategies that are designed to improve the accuracy of the estimated grades at the local level.
- Carry out future updates to the Urucum long term Mineral Resource block models using a sub-blocked block model framework so that the volumes and grades of the mineralized wireframed can be easily modelled with a high degree of accuracy.
- Ensure that the estimation parameters and workflows are harmonized between the long term Mineral Resource block model and the short term grade control block model for the Urucum deposit.
- Prepare a separate series of underground wireframe interpretations for the Tap AB deposit using cut-off grade and minimum width criteria that are reflective of the envisioned operational scenario for an underground mining operation.
- Determine the location of the oxidized to fresh rock transition at the Tap AB deposit to a higher degree of accuracy, particularly in the area of the AB 1 deposit.

- Carry out additional drill testing to define and outline the extents of the higher grade mineralized shoots found at the Tap AB deposit.
- Evaluate the down-dip projections of the BIF and carbonate units for the Tap C sector for their potential of hosting significant quantities of gold mineralization.

MINING AND MINERAL RESERVES

OPEN PIT MINING

- Geotechnical monitoring of open pit stability is imperative to follow best practices for both production and safety reasons. Standard open pit slope monitoring using a prism network should be established and developed continuously as open pit mining progresses.
- Review pit design for Urucum Central South once the results of the geotechnical remediation plan are available.
- Mining dilution should be controlled as it is a critical modifying factor when estimating Mineral Reserves, since there is an added cost associated with the processing of the waste dilution material.
- A full reconciliation of actual plant feed and gold production versus mine plan prediction should be carried out on an ongoing basis in order to more accurately determine the mining dilution and ore loss parameters.
- Additional resources in the mine proximity may extend the open pit mine life. While such resources have not yet been identified, RPA is aware that brownfield exploration is underway to see if such opportunities may exist for the near term.

UNDERGROUND MINING

- Complete further drilling and investigation work aimed at upgrading Inferred Mineral Resources and increasing the geotechnical and hydrogeological understanding of the deposit at depth, in order to consolidate the design basis for the underground project.
- Advance the Underground Project to the FS stage. Opportunity exists to stage the Project such that the second ramp is delayed until production from the first ramp proves successful and mining costs are better understood.
- Develop and operate the underground mine with contractors; this resolves any issues regarding supply of an experienced underground work force and allows for a reduction in upfront capital expenditure for mobile equipment.
- Consider using truck haulage for all material movement in the underground mine.
- Carry out further geotechnical analysis to facilitate design and the efficient recovery of pillars. Detailed geotechnical modelling is recommended during the FS stage. This will also assist with understanding of the potential dilution, particularly in the narrower veins.
- Complete further metallurgical test work particularly on the primary sulphide material that will be extracted from underground. There is a risk that unexpected changes to metallurgical performance and gold recovery may occur.
- Complete further environmental work during the FS stage to ensure that the underground operations do not present any issues in terms of environmental

compliance. Any compliance issues could inadvertently delay the project or add additional unplanned costs to the project.

- Opportunities exist to reduce capital costs for the underground project through locally constructed surface change rooms and offices rather than rental and may be an inexpensive alternative. The use of less expensive Scania P420 trucks for underground haulage once the decline roadway (floor) has been prepared and graded is also an opportunity. These options should be evaluated during the FS.

MINERAL PROCESSING

- Tucano will start a program to improve the understanding of the ore hardness distribution in some of the major deposits. With special consideration to ores potentially extracted from a future underground mine.
- The plant currently has dated equipment in need of replacement such as the Primary Crusher.
- Further investigation and test work is required to optimize the current cyanide consumption rates, which averaged 1.4 kg/t ore from May to September 2019, which is much higher than the average consumption rates reported in past metallurgical test work.
- Further testing to optimize oxygen consumption is also required.
- Improving process control tools, especially for the grinding and CIL unit operations, may result in performance gains.
- Mineralogical characterization should be undertaken to better understand the influence of other contaminants in plant performance and cyanide consumption.

ENVIRONMENT

- Environmental aspects in the Amazon region is a global theme, and many efforts have been carried out to preserve this world heritage. Therefore, Great Panther should continue following high environmental standards and updating its best practices procedures in accordance with the regulations in force for the area of the Tucano Gold Mine.

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28 DATE AND SIGNATURE PAGE

This report titled “Technical Report on the 2019 Mineral Resources and Mineral Reserves of the Tucano Gold Mine, Amapá State, Brazil”, dated March 25, 2020, with an effective date of December 31, 2019, was prepared and signed by the following authors:

(Signed and Sealed) *Reno Pressacco*

Dated at Toronto, ON
March 25, 2020

Reno Pressacco, M.Sc.(A), P.Geo.
Principal Geologist

(Signed and Sealed) *Jason J. Cox*

Dated at Toronto, ON
March 25, 2020

Jason J. Cox, P.Eng.
Technical Director – Canada Mining Advisory

(Signed and Sealed) *Goran Andric*

Dated at Toronto, ON
March 25, 2020

Goran Andric, P.Eng.
Principal Mining Engineer

(Signed and Sealed) *Fernando A. Cornejo*

Dated at Vancouver, BC
March 25, 2020

Fernando A. Cornejo, M.Eng., P.Eng.
Vice-President, Projects & Technical Services
Great Panther

(Signed and Sealed) *Neil Hepworth*

Dated at Vancouver, BC
March 25, 2020

Neil Hepworth, M.Sc., CEng MIMMM
Chief Operating Officer, Great Panther

(Signed and Sealed) *Marcelo Antonio Batelochi*

Dated at Vancouver, BC
March 25, 2020

Marcelo Antonio Batelochi, MAusIMM
Director of Geology, Tucano Gold Mine

29 CERTIFICATE OF QUALIFIED PERSON

RENO PRESSACCO

I, Reno Pressacco, M.Sc.(A), P.Geo., as an author of this report entitled "Technical Report on the 2019 Mineral Resources and Mineral Reserves of the Tucano Gold Mine, Amapá State, Brazil", prepared for Great Panther Mining Limited and dated March 25, 2020, with an effective date of December 31, 2019, do hereby certify that:

1. I am Principal Geologist with Roscoe Postle Associates Inc., now part of SLR Consulting Ltd, of Suite 501, 55 University Ave., Toronto, ON M5J 2H7.
2. I am a graduate of Cambrian College of Applied Arts and Technology, Sudbury, Ontario, in 1982 with a CET Diploma in Geological Technology; Lake Superior State College, Sault Ste. Marie, Michigan, in 1984, with a B.Sc. degree in Geology; and McGill University, Montreal, Québec, in 1986 with a M.Sc.(A) degree in Mineral Exploration.
3. I am registered as a Professional Geologist in the Province of Ontario (Reg. #939). I have worked as a geologist for a total of 34 years since my graduation. My relevant experience for the purpose of the Technical Report is:
 - Review and report as a consultant on numerous exploration and mining projects around the world for due diligence and regulatory requirements, including preparation of Mineral Resource estimates and NI 43-101 Technical Reports.
 - Numerous assignments in North, Central and South America, Europe, Russia, Armenia and China for a variety of deposit types and in a variety of geological environments; commodities including Au, Ag, Cu, Zn, Pb, Ni, Mo, U, PGM, REE, and industrial minerals.
 - A senior position with an international consulting firm.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I visited the Tucano Gold Mine from September 15 to 21, 2019.
6. I am responsible for Sections 3 to 12, and 14 and relevant disclosure in Sections 1, 2, 25, 26, and 27 of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

-
10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 25th day of March 2020

(Signed and Sealed) Reno Pressacco

Reno Pressacco, M.Sc.(A), P.Geo.

JASON J. COX

I, Jason J. Cox, P.Eng., as an author of this report entitled "Technical Report on the 2019 Mineral Resources and Mineral Reserves of the Tucano Gold Mine, Amapá State, Brazil", prepared for Great Panther Mining Limited and dated March 25, 2020, with an effective date of December 31, 2019, do hereby certify that:

1. I am Technical Director – Canada Mining Advisory with Roscoe Postle Associates Inc., now part of SLR Consulting Ltd, of Suite 501, 55 University Ave., Toronto, ON M5J 2H7.
2. I am a graduate of the Queen's University, Kingston, Ontario, Canada, in 1996 with a Bachelor of Science degree in Mining Engineering.
3. I am registered as a Professional Engineer in the Province of Ontario (Reg. #90487158). I have worked as a mining engineer for more than 21 years since my graduation. My relevant experience for the purpose of the Technical Report is:
 - Review and reporting as a consultant on many mining operations and projects around the world for due diligence and regulatory requirements
 - Engineering study work (PEA, PFS, and FS) on many mining projects around the world, including commodities such as precious metals, base metals, bulk commodities, industrial minerals, and rare earths
 - Operational experience as Planning Engineer and Senior Mine Engineer at three North American mines
 - Contract Co-ordinator for underground construction at an American mine
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I have not visited the Tucano Gold Mine.
6. I am responsible for the underground mining portions of Sections 15, 16, 21, and 22 and related disclosure in Sections 1, 2, 25, 26, and 27 of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 25th day of March 2020

(Signed and Sealed) Jason J. Cox

Jason J. Cox, P.Eng.

GORAN ANDRIC

I, Goran Andric, P.Eng., as an author of this report entitled "Technical Report on the 2019 Mineral Resources and Mineral Reserves of the Tucano Gold Mine, Amapá State, Brazil", prepared for Great Panther Mining Limited and dated March 25, 2020, with an effective date of December 31, 2019, do hereby certify that:

1. I am Principal Mining Engineer with Roscoe Postle Associates Inc., now part of SLR Consulting Ltd, of Suite 501, 55 University Ave., Toronto, ON M5J 2H7.
2. I am a graduate of the University of Belgrade, Serbia, in 1988 with a B.Sc. degree in Mining and Mineral Engineering.
3. I am registered as a Professional Engineer in the Province of Ontario (Reg. #100103151). I have worked as a mining engineer for more than 25 years since my graduation. My relevant experience for the purpose of the Technical Report is:
 - Operational and consulting experience in coal, base metal, and precious metal projects in North and South America, Europe, Asia, and Africa.
 - Principal Mining Engineer with an international consulting firm, with responsibilities including conceptual and feasibility studies, project management, open pit mine design and planning, equipment selection and costing, economic analysis, practical solutions for operational improvements, and preparation of NI 43-101 and Competent Person's reports.
 - Mine Superintendent at a coal mine in British Columbia.
 - Shift Production Engineer to Assistant Mine Manager at a large-scale coal mine in Europe.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I visited the Tucano Gold Mine from October 20 to 26, 2019.
6. I am responsible for the open pit mining portions of Sections 15, 16, 21, and 22 and related disclosure in Sections 1, 2, 25, 26, and 27 of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

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10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 25th day of March 2020

(Signed and Sealed) Goran Andric

Goran Andric, P.Eng.

FERNANDO A. CORNEJO

I, Fernando A. Cornejo, M.Eng., P.Eng., as an author of this report entitled “Technical Report on the 2019 Mineral Resources and Mineral Reserves of the Tucano Gold Mine, Amapá State, Brazil”, prepared for Great Panther Mining Limited and dated March 25, 2020, with an effective date of December 31, 2019, do hereby certify that:

1. I am Vice-President, Projects & Technical Services with Great Panther Mining Limited, of 1330-200 Granville St., Vancouver, Canada, V6C 1S4.
2. I graduated with a Bachelor Degree in Chemical Engineering, from Universidad Nacional de San Agustín, Arequipa, Peru in 2001 and a Masters Degree in Chemical Engineering from Ecole Polytechnique de Montreal, Canada in 2005.
3. I am registered as a Professional Engineer in the Province of Ontario (Reg.# 100170042). I have practiced my profession since 2001 in a range of operational, technical, and mineral processing consulting roles in Canada, Brazil, Mexico, and Peru. My relevant experience for the purpose of the Technical Report is eighteen years’ experience in operational and processing consulting roles in four continents, with a strong focus in Brazil and Mexico over the last eight years.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I visited the Tucano Gold Mine multiple times throughout 2019 and 2020.
6. I am responsible for Sections 13 and 17 and related disclosure in Sections 1, 2, 25, 26, and 27 of the Technical Report.
7. I am not independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had been involved with the property that is the subject of the Technical Report since July 2019.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 25th day of March 2020

(Signed and Sealed) Fernando A. Cornejo

Fernando A. Cornejo, M.Eng., P.Eng.

NEIL HEPWORTH

I, Neil Hepworth, M.Sc., CEng MIMMM, as an author of this report entitled “Technical Report on the 2019 Mineral Resources and Mineral Reserves of the Tucano Gold Mine, Amapá State, Brazil”, prepared for Great Panther Mining Limited and dated March 25, 2020, with an effective date of December 31, 2019, do hereby certify that:

1. I am Chief Operating Officer with Great Panther Mining Limited of 1330-200 Granville Street Vancouver, Canada, V6C 1S4.
2. I am a graduate of Witwatersrand University, in 1979 with a Bachelor of Science Honours degree in Geology and in 1985 with a Master of Science degree in Mining Engineering.
3. I am registered as a Chartered Engineer in UK (Engineering Council ID 467020). I have worked as a Mining Engineer for over 30 years since my graduation. My relevant experience for the purpose of the Technical Report is:
 - Operational and technical experience in numerous mining operations around the world.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I have visited the Tucano Gold Mine on a regular basis since November 2019.
6. I am responsible for Sections 18 and 19, and related disclosure in Sections 1, 2, 25, 26, and 27 of the Technical Report.
7. I am not independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have been involved with the property that is the subject of the Technical Report since November 2019.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 25th day of March 2020

(Signed and Sealed) Neil Hepworth

Neil Hepworth, M.Sc., CEng MIMMM

MARCELO ANTONIO BATELOCHI

I, Marcelo Antonio Batelochi, MAusIMM, as an author of this report entitled “Technical Report on the 2019 Mineral Resources and Mineral Reserves of the Tucano Gold Mine, Amapá State, Brazil”, prepared for Great Panther Mining Limited and dated March 25, 2020, with an effective date of December 31, 2019, do hereby certify that:

1. I am Director of Geology of the Tucano Gold Mine of Estrada do Taperebá, SN, Pedra, Branca do Amapari – AP, Brasil.
2. I am a graduate of the School of Geology at UNESP - São Paulo State University, Brazil, in 1991 with a Bachelor of Honors degree.
3. I am a practicing geologist registered with the AusIMM - The Australasian Institute of Mining and Metallurgy (Membership No. 205477). I have practiced my profession continuously for 28 years since my graduation. My relevant experience for the purpose of the Technical Report is:
 - More than 20 years of experience in the mineral resource evaluation of Iron, Copper / Gold, Nickel, Bauxite, REE, and PGE Deposits, as employee of Rio Tinto (12 years), Vale (4 years), Ferrous Resources (6 years), Independent Consultant (8 years) and since July 2019 as Director of Geology of Tucano Gold Mine.
 - I have worked on the Tucano deposits since 2012 carrying out Mineral Resources Estimates as an independent consultant for Urucum, Urucum Underground, Tap-AB and Tap C + Gap, and Duckhead. Also, Tartarugalzinho Project.
 - My previous experience on gold deposits included: Yamana Gold (included Brio Gold), Aura Minerals, Baixada Cuiabana Garimpos and PA-Gold (Mato Grosso State) as a Consultant and Qualified Person. Also “Morro do Ouro” Mine, where I worked for 10 years as manager of geology and mining planning (when the Mine belonged to Rio Tinto).
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I have visited the Tucano Gold Mine multiple times.
6. I am responsible for Sections 20, 23, and 24, and related disclosure in Sections 1, 2, 25, 26, and 27 of the Technical Report.
7. I am not independent of the Tucano Gold Mine pursuant to Section 1.5 of the Instrument.
8. I have been involved with the property that is the subject of the Technical Report as a consultant from 2012 to 2019 and currently as Director of Geology since July 2019.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

-
10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 25th day of March 2020

(Signed and Sealed) *Marcelo Antonio Batelochi*

Marcelo Antonio Batelochi, MAusIMM