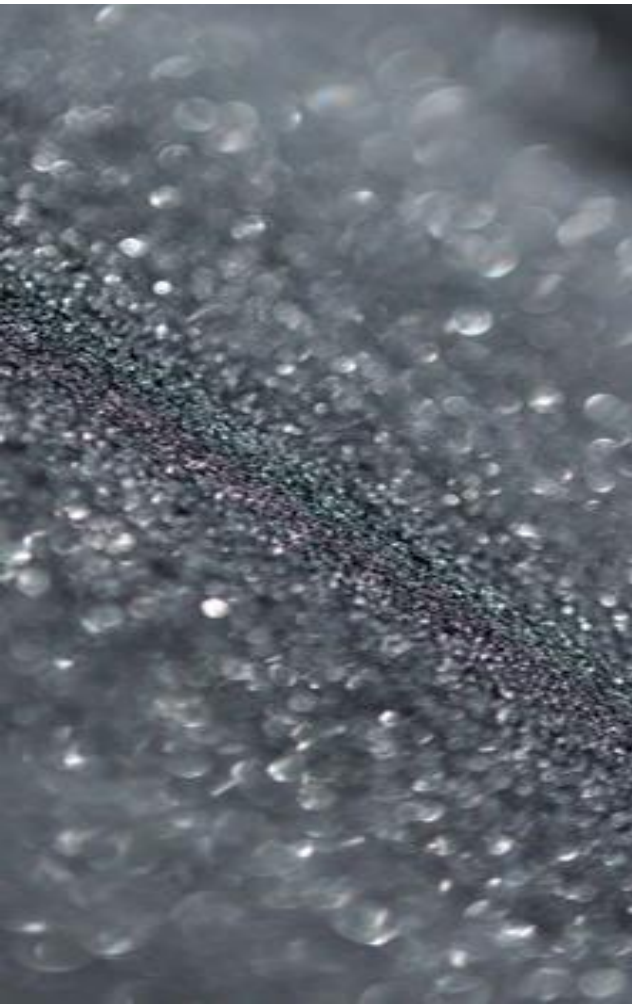


# tharisa

ANALYST VISIT

January 2018



# DISCLAIMER

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# WELCOME

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① Welcome

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② Introduction

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③ Mining

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④ Processing

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⑤ Markets

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⑥ Outlook

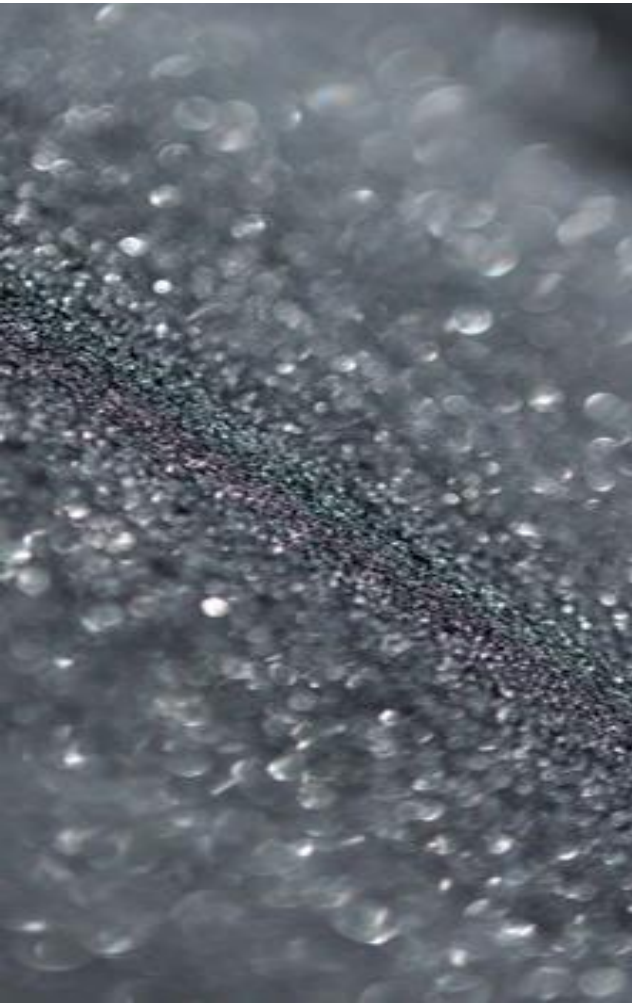
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⑦ Questions

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# tharisa

INTRODUCTION



# THARISA'S JOURNEY

## DISCOVERING

2004

PROSPECTING  
RIGHTS  
APPLICATIONS

2006

PROSPECTING  
RIGHTS  
GRANTED

2008

MINING  
RIGHTS  
GRANTED

## DEVELOPING

2009

FIRST  
CHROME  
CONCENTRATE  
PRODUCTION  
FROM PILOT  
PLANT

2011

GENESIS  
PLANT  
COMMISSIONED

2012

VOYAGER  
PLANT  
COMMISSIONED

2013

CHALLENGER  
PLANT  
COMMISSIONED

## DELIVERING

2014

LISTED ON JSE

2016

LISTED ON LSE  
DIVIDEND PAYMENT

2017

RECORD  
FINANCIAL AND  
OPERATIONAL  
YEAR

INCREASED  
DIVIDEND

### THARISA STATISTICS\*:

- Reef tonnes mined = 24.4 Mt
- Waste moved = 63.3 m<sup>3</sup>
- PGM concentrate produced = 576.6 koz
- Chrome concentrates produced = 6.8 Mt

\*Oct 2010 to Dec 2017

### FY2018 Guidance:

- PGM concentrate of 150 kozpa
- Chrome concentrates of 1.4 Mtpa  
(350 ktpa of which will be specialty grade)



# THE GROUP AT A GLANCE

## THARISA MINERALS

### RESOURCE

867.5 Mt resource  
97.0 Mt reserve of which 78.3 Mt open pit

### MINING

17 year open pit LOM  
40 year underground extension

### PROCESSING

400 ktpm nameplate capacity  
Genesis Plant (100 ktpm)  
Voyager Plant (300 ktpm)

### LARGE SCALE

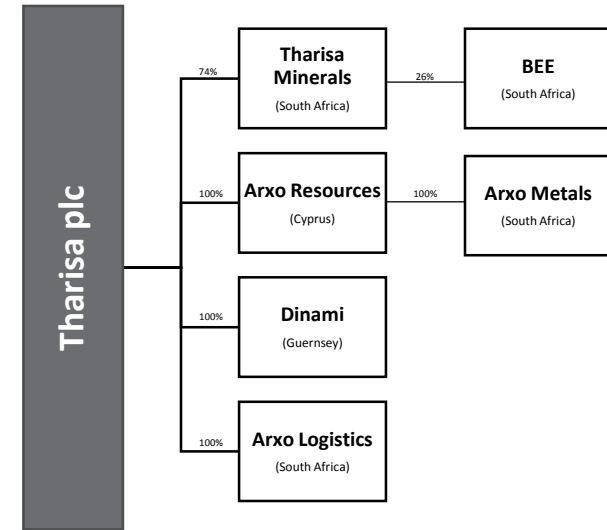
One of the world's largest single chrome resources

### MECHANISED

Mechanised open pit mining with a skilled and focused labour force  
Owner mining model

### DERISKED

In production, major capex complete  
FY2018 production of 150.0 koz PGMs and 1.4 Mt of chrome concentrates



## ARXO METALS

### BENEFICIATION

Production of specialty grade chrome concentrates

### THIRD PARTY

Plant operation

### R&D

New technology assessment  
1 MW PGM smelter

## ARXO RESOURCES/DINAMI

### MARKETING AND SALES

Significant trader of chrome concentrates  
Third party trading  
Global reach for specialty chrome concentrates

## ARXO LOGISTICS

### LOGISTICS

Road/rail transport, warehouse and port facilities for bulk chrome concentrates  
Road transport of PGMs

## CUSTOMERS

### AGREEMENTS

PGM offtake– Impala Platinum  
Sale and joint R&D - Lonmin  
Specialty offtake/agency – Rand York  
Metallurgical agency – Noble Group  
Strategic agreement – Tisco JV

# FY2017 HIGHLIGHTS

PGM basket price  
US\$786

Chrome concentrate  
price (42% CIF China)  
US\$200

## REEF MINED

↑3.9%

**5.0 Mt**

(2016: 4.8 Mt)

## PGM PRODUCTION

↑8.3%

**143.6 koz**

(2016: 132.6 koz)

## CHROME CONCENTRATE PRODUCTION

↑7.0%

**1.3 Mt**

(2016: 1.2 Mt)

## SPECIALTY GRADE CHROME PRODUCTION

↑19.9%

**323.1 kt**

(2016: 269.4 kt)

## REVENUE

↑59.1%

**US\$349.4m**

(2016: US\$219.6m)

## EBITDA

↑168.7%

**US\$115.6m**

(2016: US\$43.0m)

## HEPS

↑266.7%

**US\$ 22 cents**

(2016: US\$ 6 cent)

## DIVIDEND

↑400.0%

**US\$ 5 cents**

(2016: US\$ 1 cent)

# CORPORATE STRUCTURE

ONE YEAR INFORMATION (25 January 2018)	JSE PRIMARY LISTING	LSE STANDARD LISTING MAIN BOARD
Short name	THA	THS
Price	ZAR23.35	GBp136.00
High – 52 week	ZAR29.48	GBp157.66
Low – 52 week	ZAR11.60	GBp73.00
Market capitalisation	ZAR6.1 billion	GBP355 million
One year return	-2.38%	-0.24%
PE ratio	8.9	



## TOP SHAREHOLDINGS

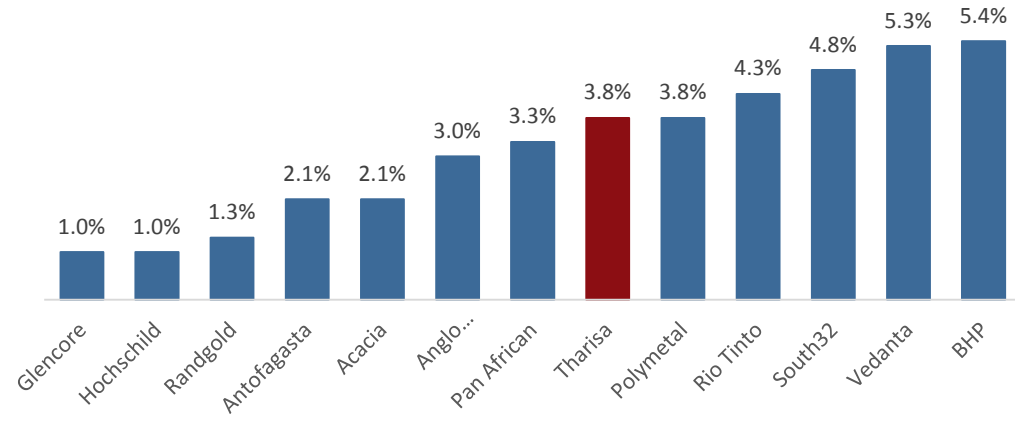
(29 January 2018)

	%
Medway Developments	44.1
Rance Holdings	15.5
Fujian Wuhang Stainless Steel	10.8
Maaden Invest	5.7
Macquarie Capital	3.1
Friedshelf 1525	2.6
Altius Investment Holdings (Noble Group)	2.1
Hongkong Heyi Mining Resource	2.0
Blackrock Investment Management (UK)	1.9
BBH Aller (Fidelity Funds)	1.5
Fidelity Investments	1.1
SBSA ITF Old Mutual Mining Fund	0.4
Old Mutual PLC	0.4
Sanlam	0.3

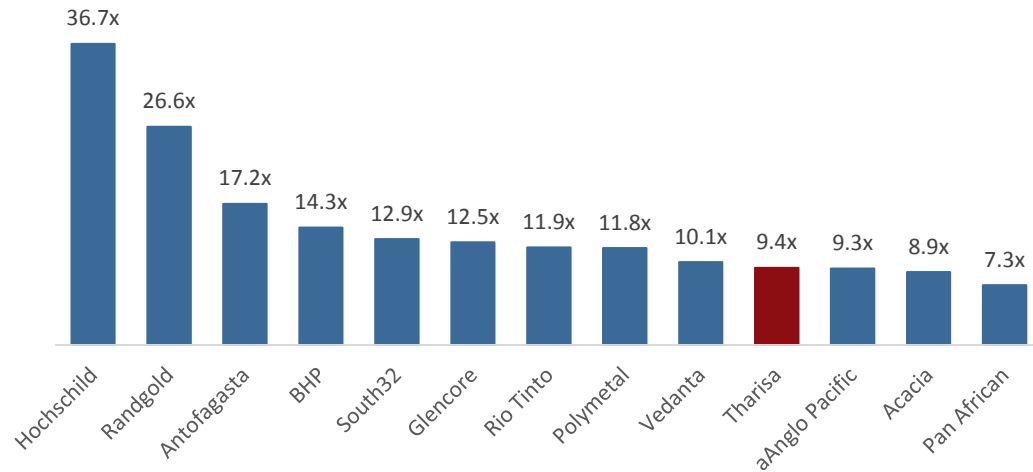


# INVESTMENT CASE

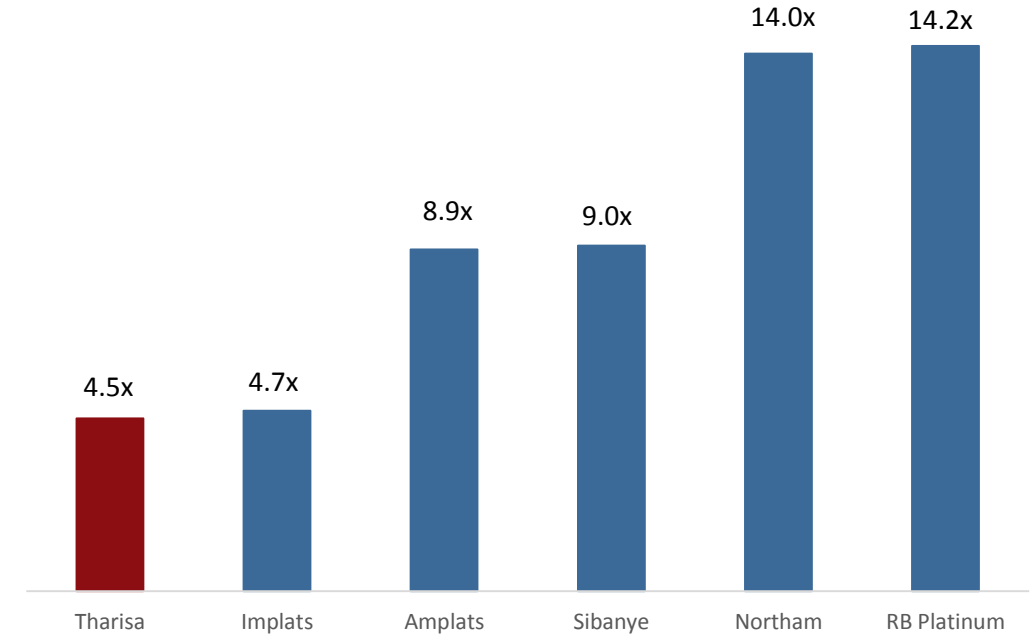
## DIVIDEND YIELD (2017A)



## PE RATIO (2018 E)



## EV/EBITDA (2018 E)



Enterprise Value  
(US\$ M)

EBITDA  
(US\$ M)

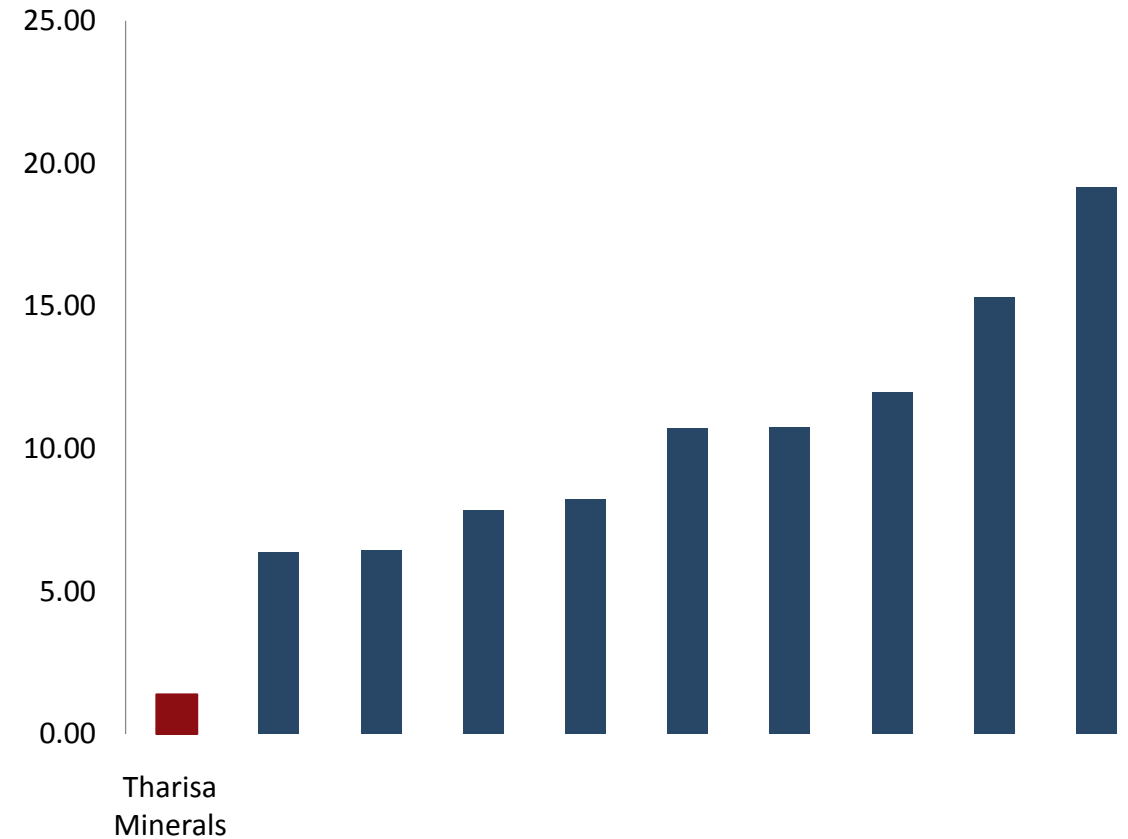
508	2 221	8 479	4 978	2 143	827
113	468	952	553	153	58

# SAFETY

## SAFETY AND HEALTH A PRIORITY

- Safety remains a priority of management and all employees – we strive for zero harm
- As at 31 December, Tharisa Minerals achieved 15 156 588 fatality free hours and 1 714 765 fatality free shifts
- During 2017 Tharisa Minerals was awarded the following awards:
  - MHSC Award for 2 000 Fatality Free Production Shifts
  - Mine Safe Award for Best Safety Performance in Class
  - Mine Safe Award for Best Improved Performance

## COMPARATIVE LTIFR RATE



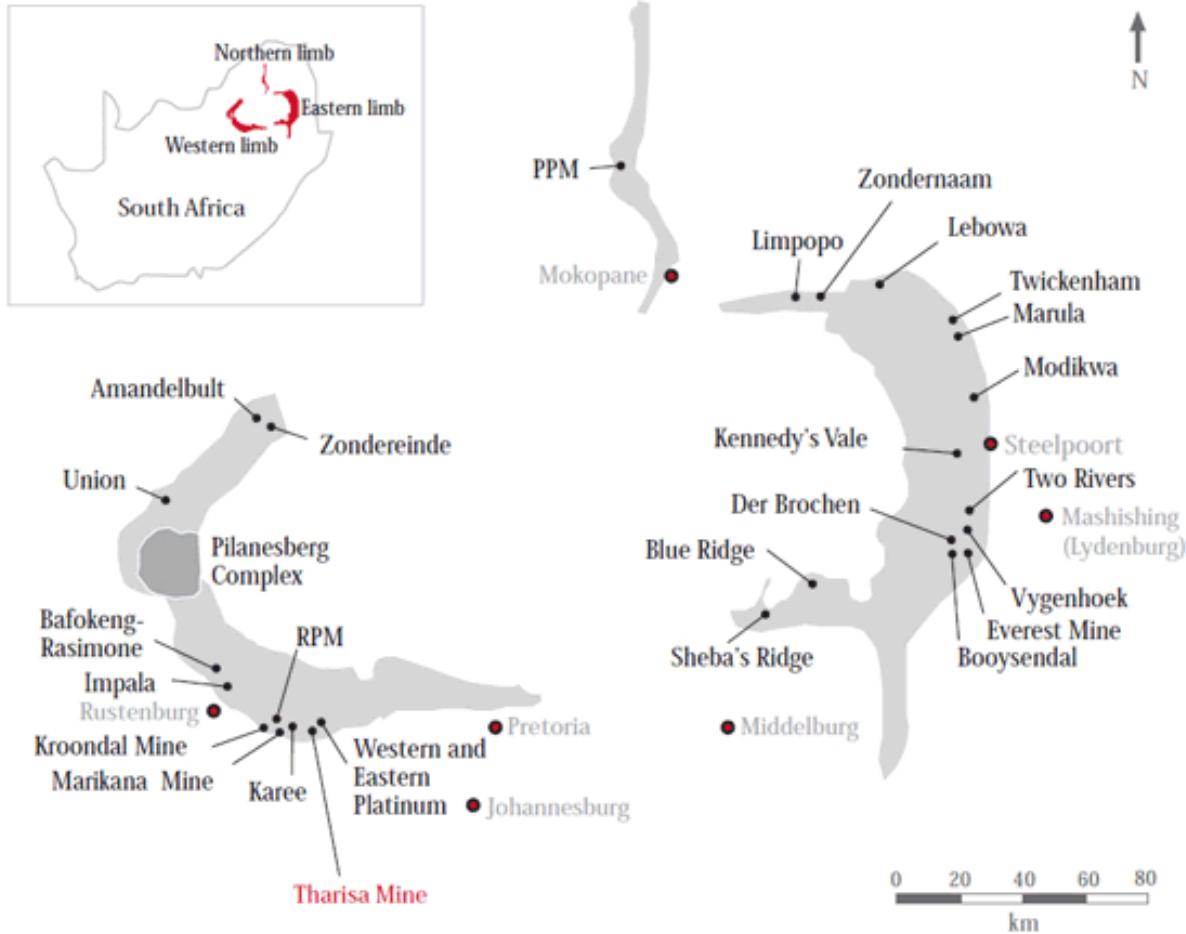
# tharisa

MINING

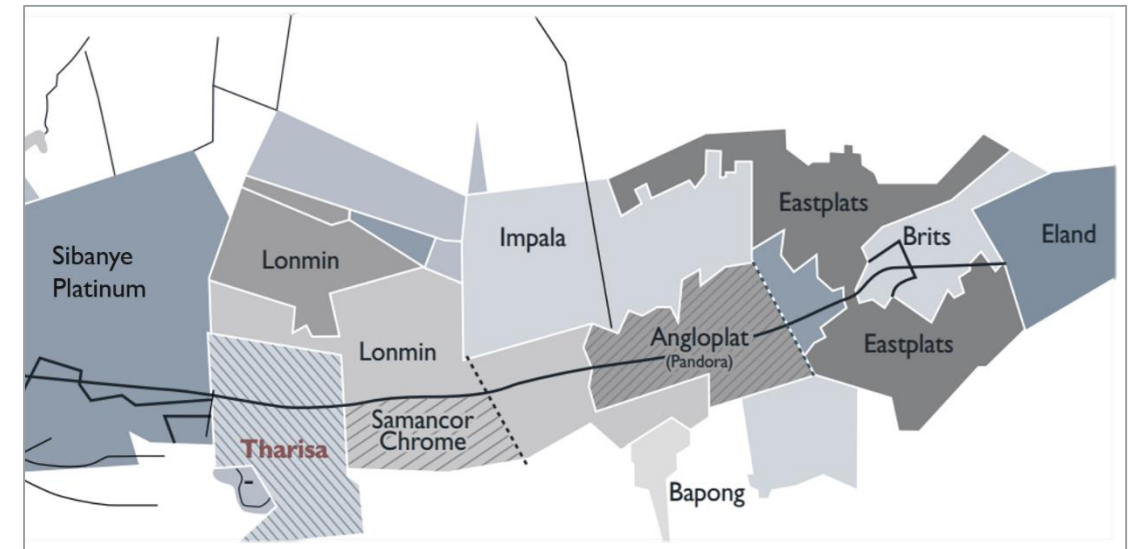


# MINING

## LOCATED IN THE MAIN PGM AND CHROME PRODUCING AREA IN SOUTH AFRICA



- Mining rights over 5 475 ha
- Adjacent to Sibanye Platinum, Lonmin, Impala Platinum, Samancor Chrome
- Well serviced by road, rail, power and other services
- Neighbouring towns are Brits (45 km) and Rustenburg (35 km)



# MINING

## RESOURCES AND RESERVES\*

Steady state mining rate of 5.0 Mtpa with an average stripping ratio of 9.6 (m<sup>3</sup>:m<sup>3</sup> basis)

### MINERAL RESOURCE

- 867.5 Mt
- 1.59 g/t 6PGE+Au
- 20.7% Cr<sub>2</sub>O<sub>3</sub>

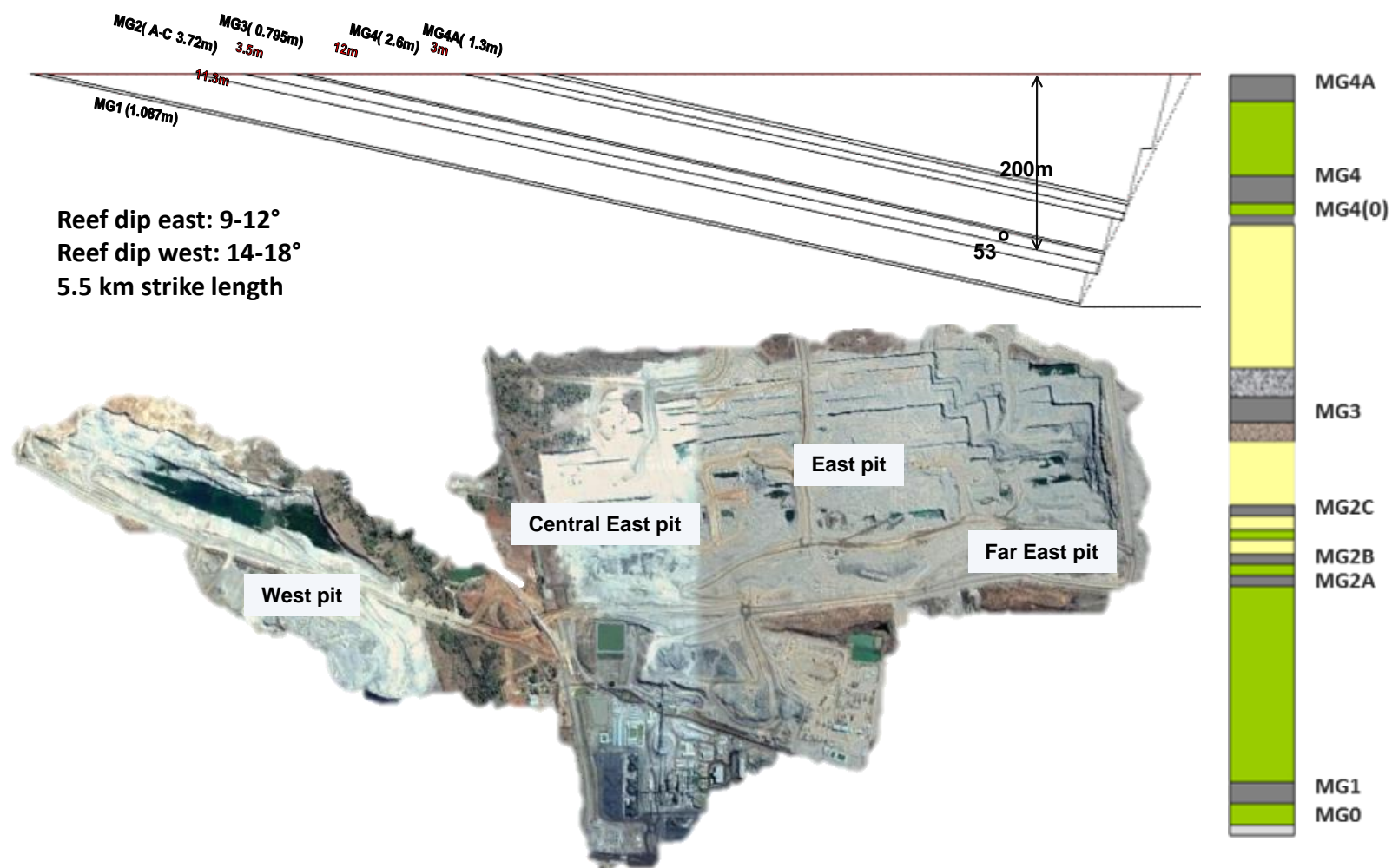
### MINERAL RESERVE

- 97.0 Mt
- 1.39 g/t 5PGE+Au
- 18.9% Cr<sub>2</sub>O<sub>3</sub>

### OPEN PIT MINERAL RESERVE

- 78.3 Mt
- 1.39 g/t 5PGE+Au
- 18.9% Cr<sub>2</sub>O<sub>3</sub>

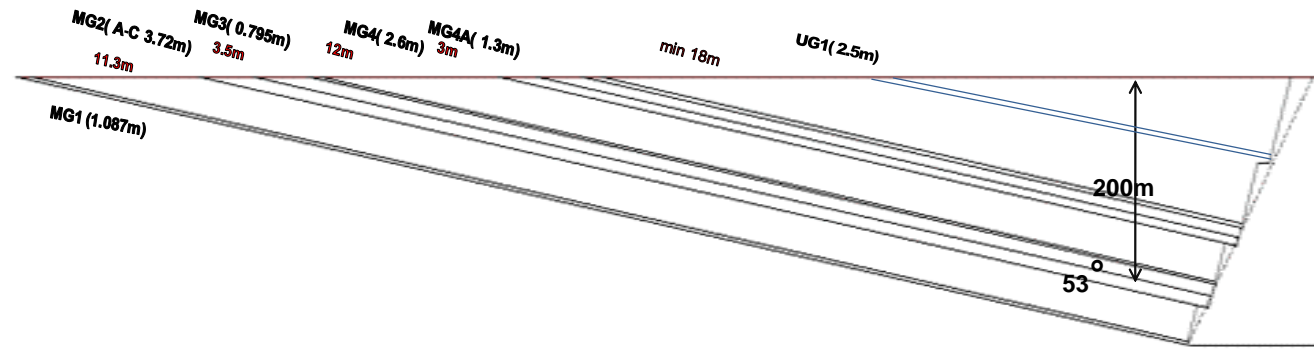
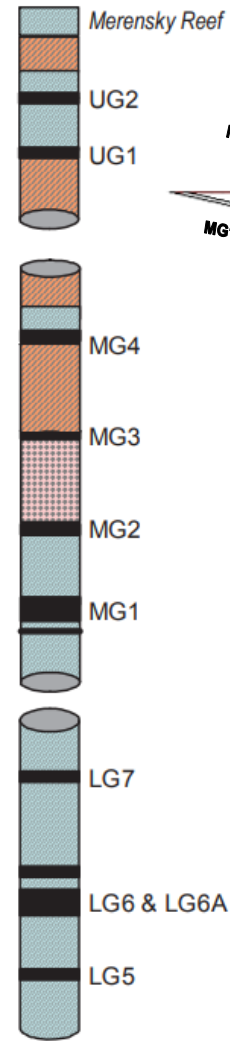
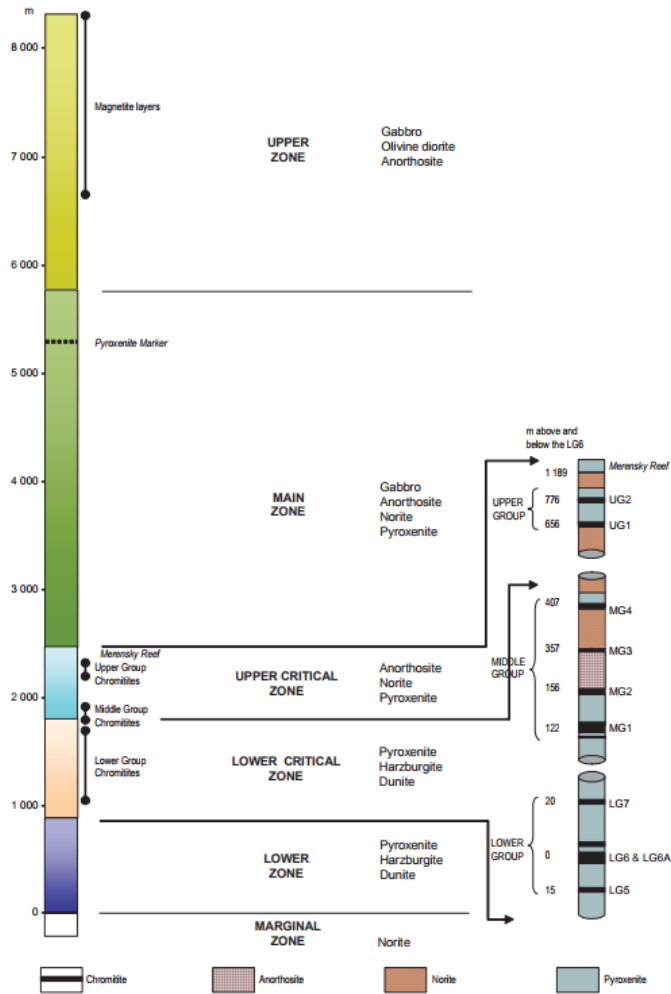
## GENERALISED CROSS SECTION SHOWING THE MG CHROMITITE LAYERS AT PLANNED DEPTH





# STRATIGRAPHY OF BUSHVELD COMPLEX

Generalised Stratigraphic Column of Rustenburg Layered Suite, Bushveld Complex  
(after Viljoen and Schürmann, 1998)





# OWNER MINING TRANSITION

## INHOUSE

### Mining Expertise

Mine management

Geologists

In-pit supervisors

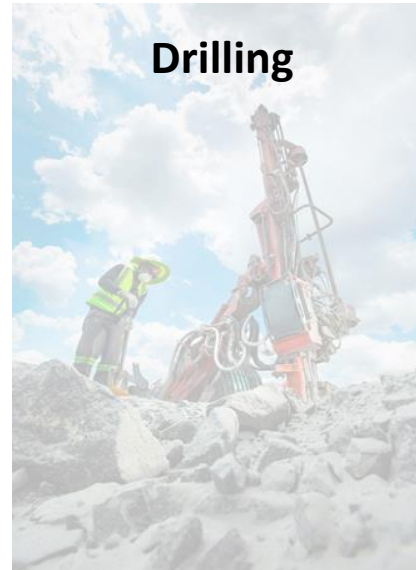
Surveyors

Engineers

Maintenance

## INSOURCING

effective 1 October 2017



### Optimised primary mining fleet

- 19 drill rigs
- 11 excavators
- 46 trucks
- Capable of moving 17 Mm<sup>3</sup> per annum
- ~85 support vehicles

*Blasting is outsourced*

### Benefits

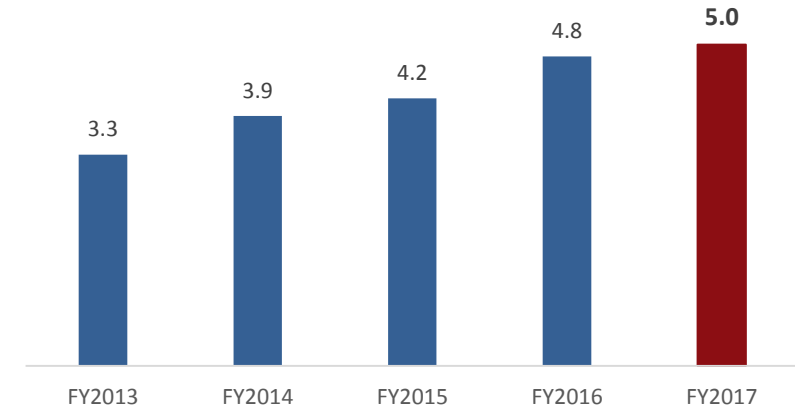
- Safety culture alignment
- Greater control over stripping rates
- Quality and grade control
- Unit cost reduction through efficiency
- Proactive preventative maintenance

## KEY OPERATIONAL METRICS

		Q1 FY2018	FY2017	FY2016
Reef mined	kt	1 245.3	5 025.1	4 837.2
Stripping ratio	m <sup>3</sup> :m <sup>3</sup>	7.8	7.5	7.3
PGM rougher feed grade	g/t	1.49	1.56	1.65
Chrome grade	%	18.1	17.8	18.0

## REEF MINED

Mtpa





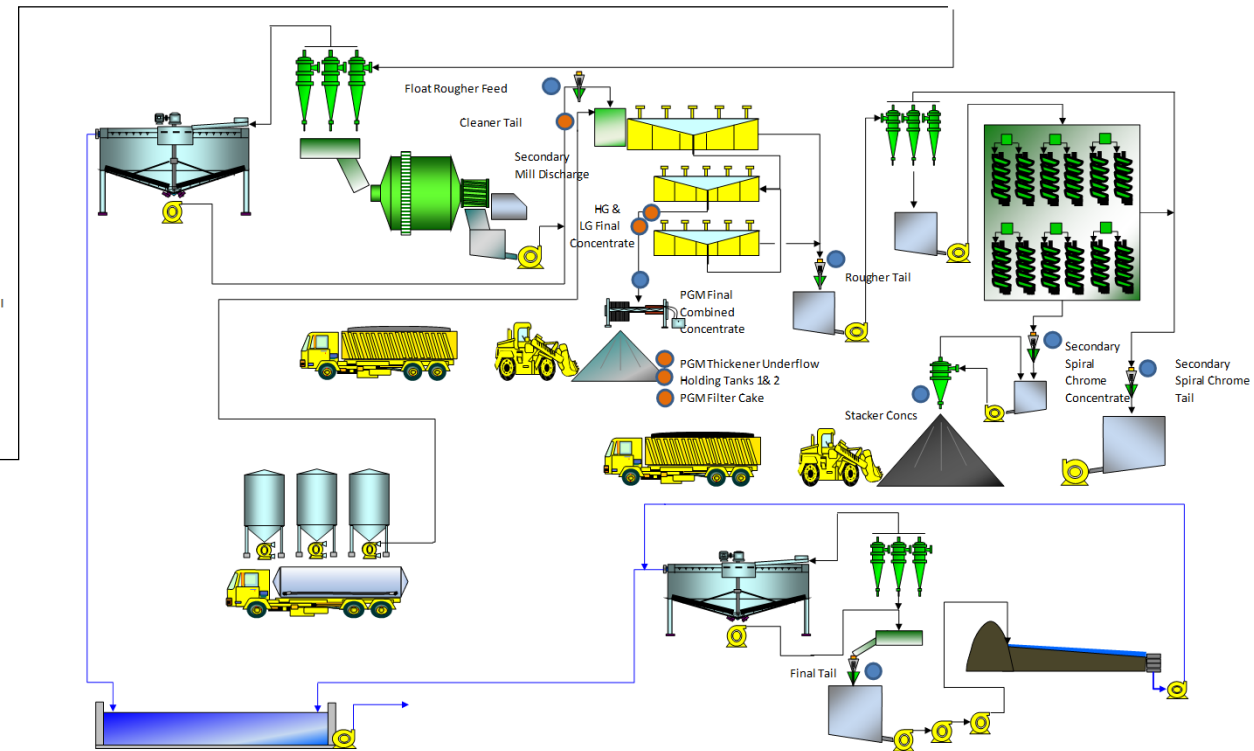
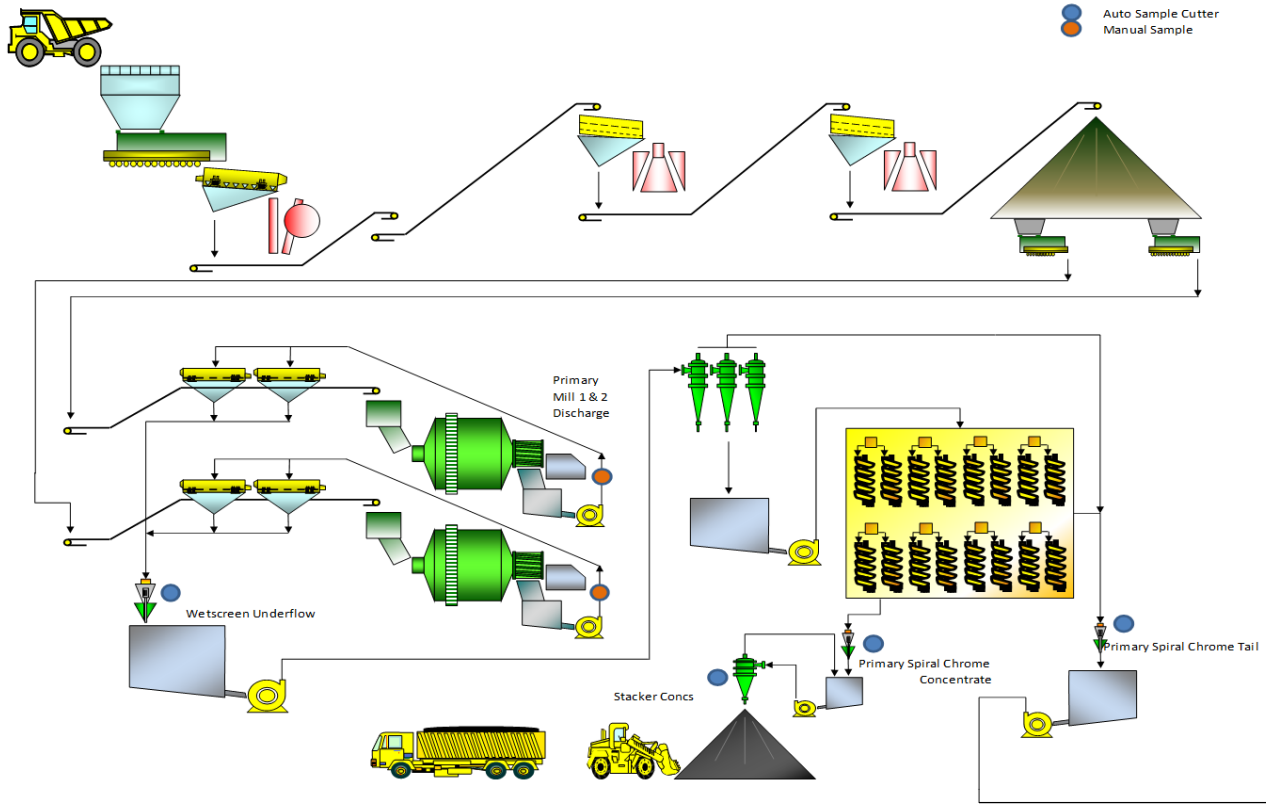
tharisa

PROCESSING





# PROCESS FLOW DIAGRAM



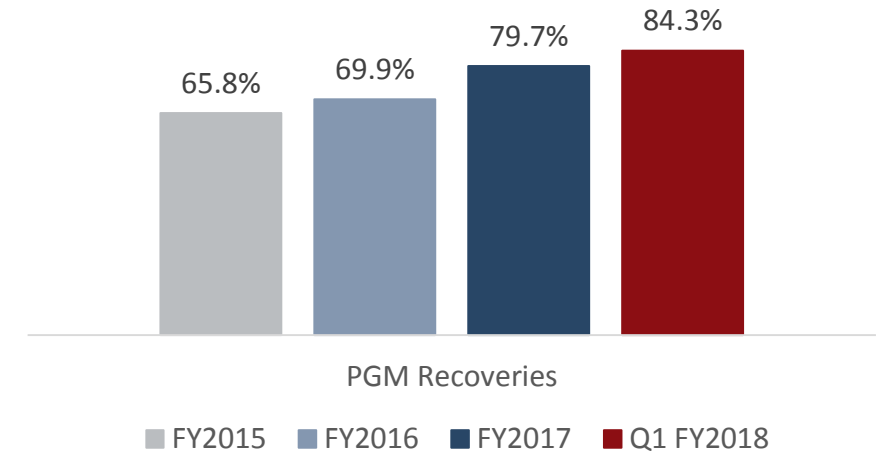
# PROCESSING PLANTS

## GENESIS PLANT

- Capacity: 100 ktpm ROM
- Processes reef layers with lower PGM and higher chromite grades
- Challenger Plant recovers high value foundry grade and chemical grade chrome concentrates

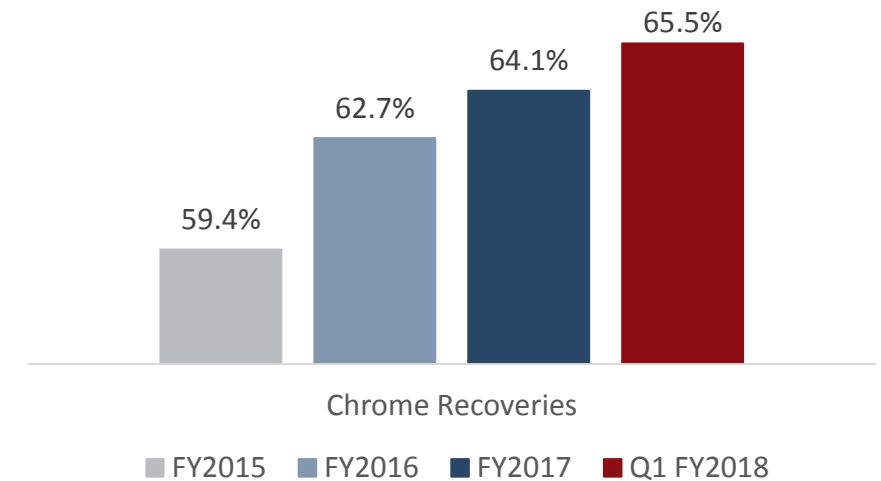


## EXTRACTING MORE OUT OF EACH TONNE



## VOYAGER PLANT

- Capacity: 300 ktpm ROM
- Processes reefs with higher PGM and lower chromite grades
- Produces both metallurgical and chemical grade products

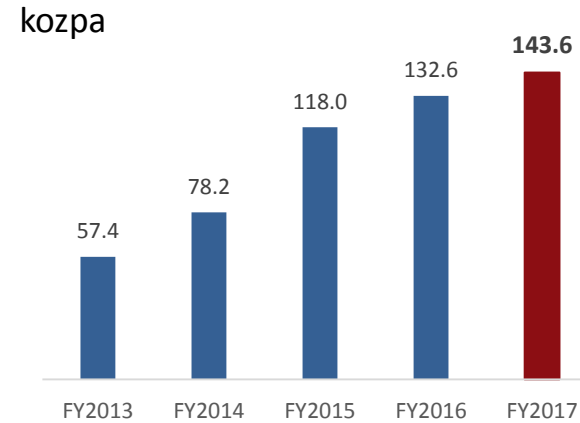


# PROCESSING HIGHLIGHTS

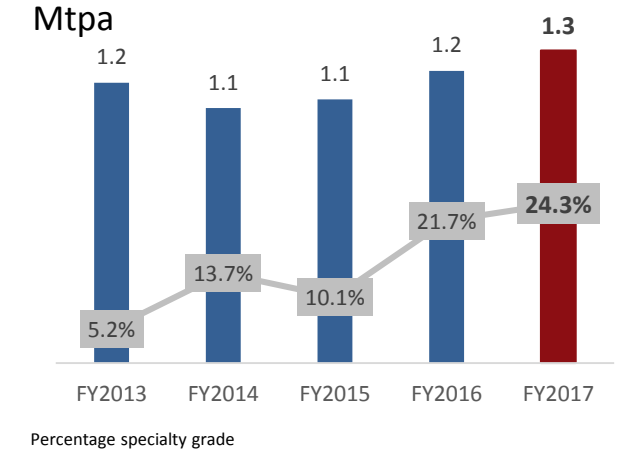
## KEY OPERATIONAL METRICS

		Q1 FY2018	FY2017	FY2016
ROM processed	kt	1 310.2	4 916.2	4 656.3
PGM recovery	%	84.3	79.7	69.9
PGM in concentrate produced	koz	38.8	143.6	132.6
Chrome recovery	%	65.5	64.1	62.7
Chrome concentrate produced	kt	365.8	1 331.2	1 243.7

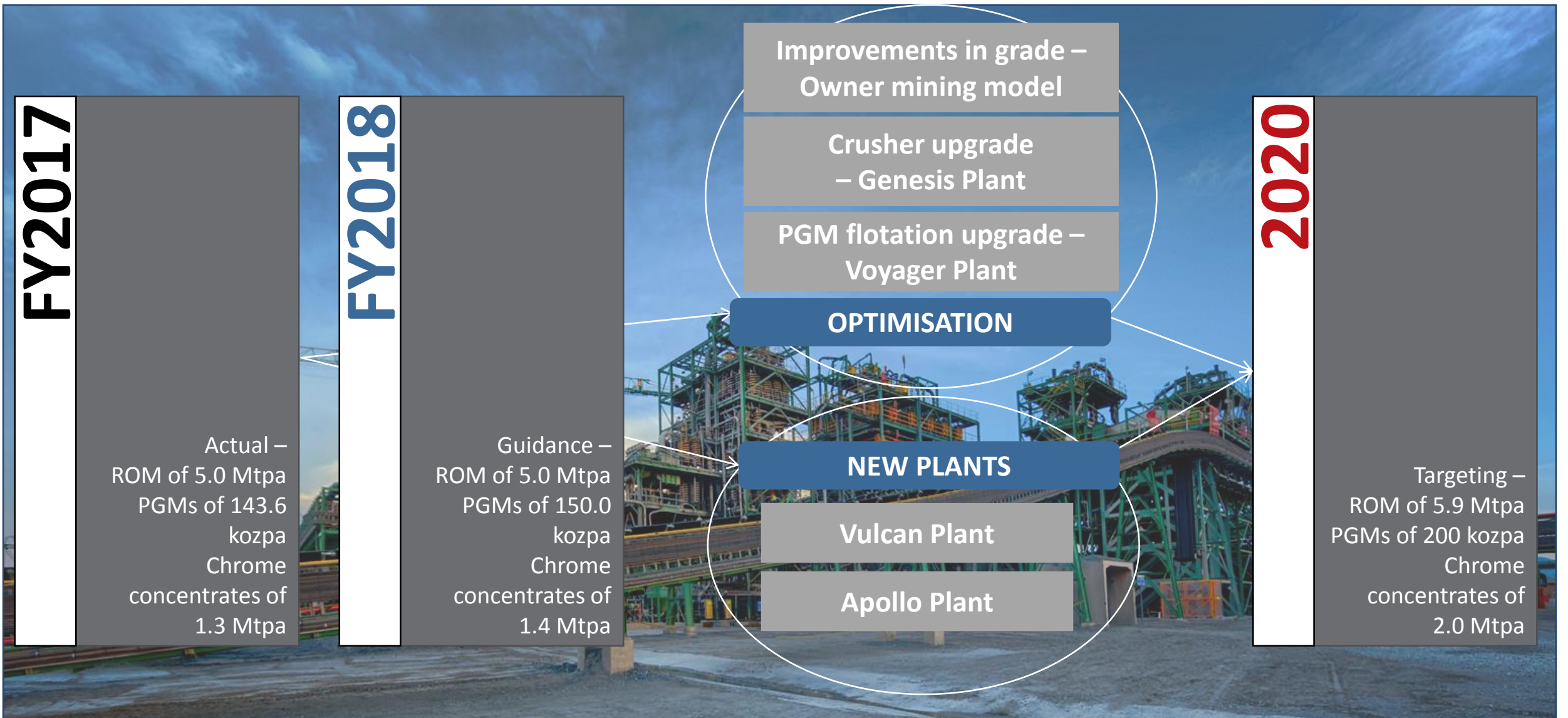
## PGM PRODUCTION



## CHROME PRODUCTION



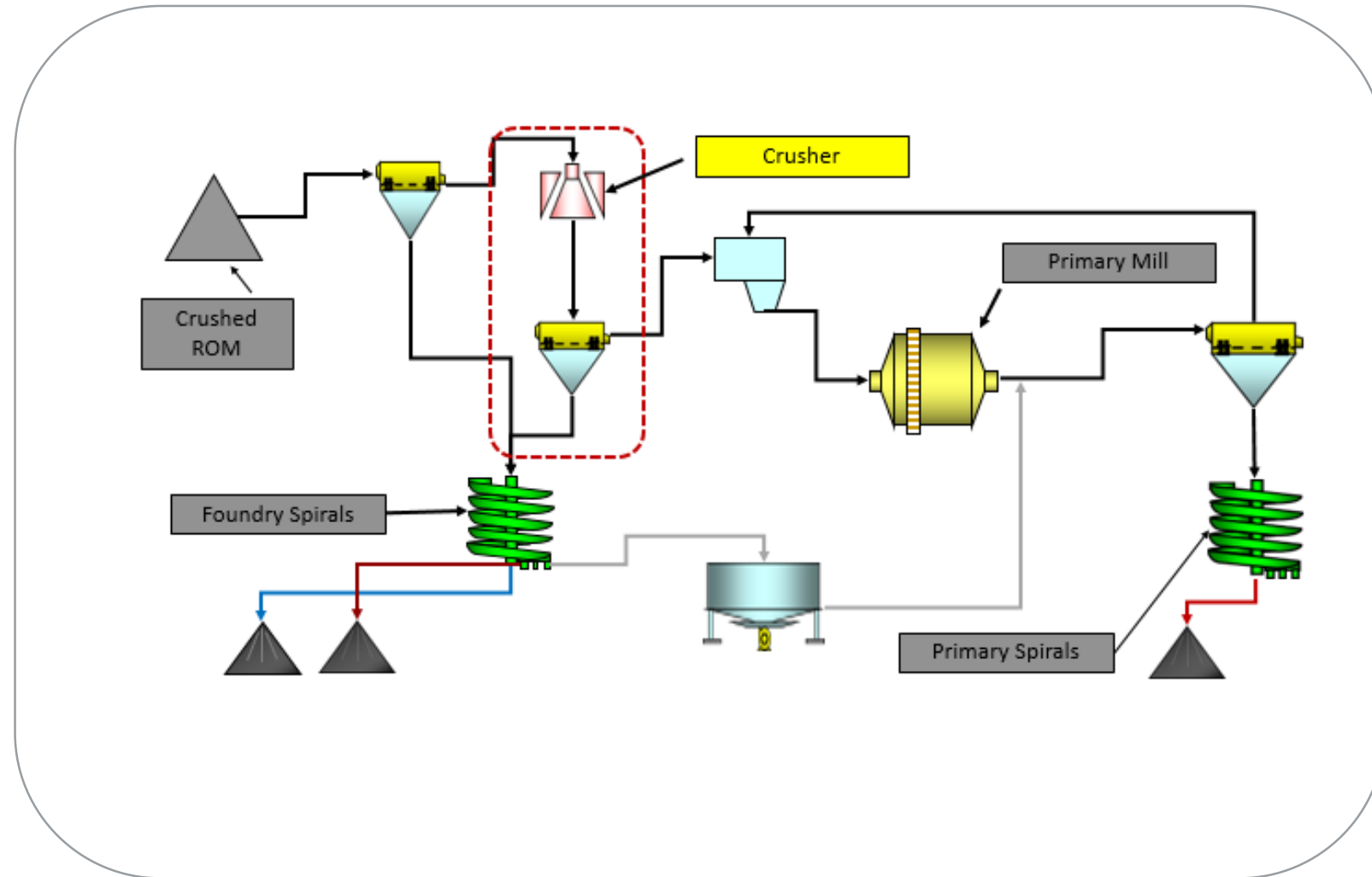
# VISION 2020





## CRUSHER UPGRADE – GENESIS

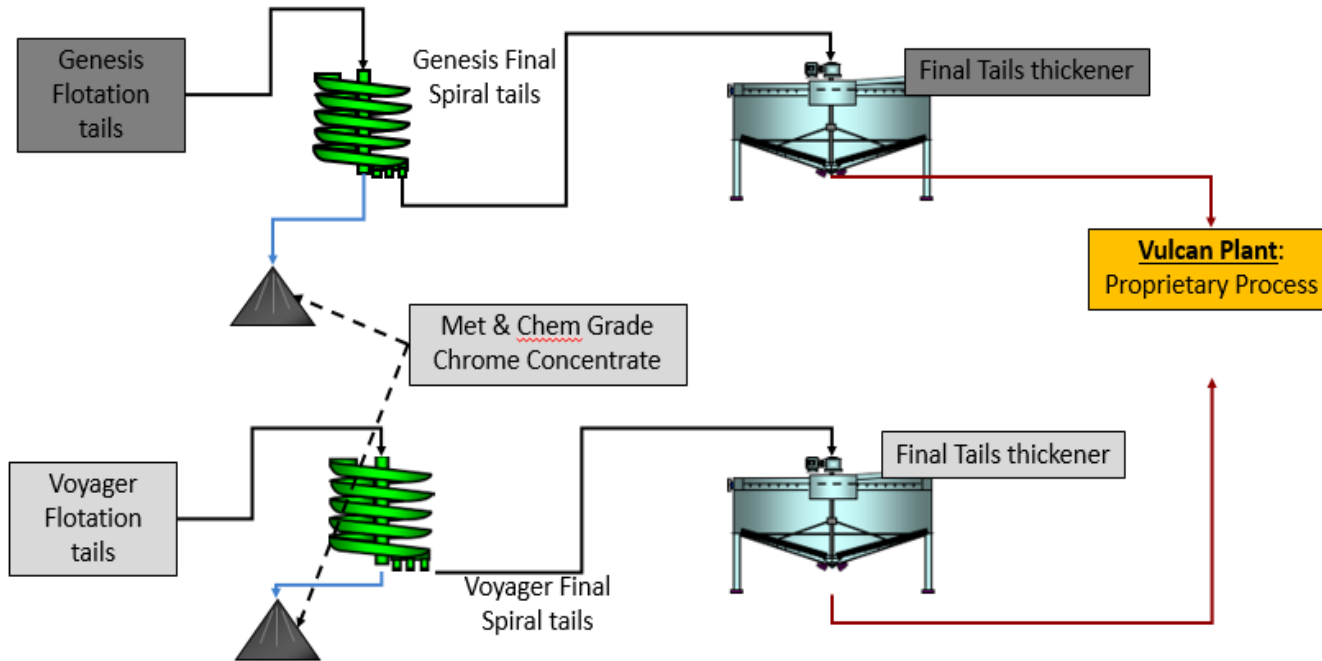
- Upgrade of crushing stage at Genesis Plant
- Increase Genesis Plant throughput by 15%, ~180 ktpa
- Potential to increase chemical grade chrome production by ~24 ktpa and ~18 ktpa foundry grade chrome production
- Planned commissioning in July 2018
- Capex of ~ZAR90M
- Opex = R10/t
- Payback of less than 12 months







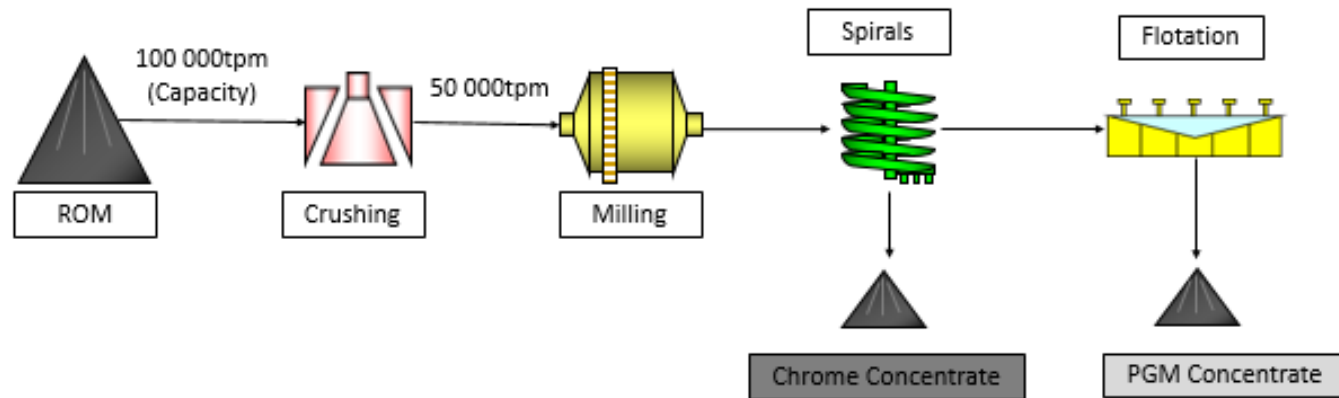
# NEW PLANTS



## VULCAN FINE CHROME RECOVERY PLANT

- Additional recovery of fine chrome from tailings streams
- Proprietary process developed by Tharisa
- Demonstration scale plant to be constructed in FY2018
- Feasibility study and process design will be undertaken in conjunction with the operation of the demonstration plant
- Estimated production of 380 ktpa of chrome concentrates
- Planned commissioning October 2019
- Capex of ~ ZAR300M
- Opex = R50/t

# APOLLO PLANT



## APOLLO CHROME AND PGM PLANT

- Design and build an independent chrome plant with PGM flotation plant aimed at production of chrome concentrate from UG1 ore and additional MG reef horizons
- Designed in two phases, the first phase treating 50 ktpm and the second phase to double capacity
- UG1 reef in west pit is easily accessible
- Feasibility study being conducted, test work and resource estimation in progress
- Plant construction to take approximately 12 months
- Estimated production of 6 kozpa PGMs and 180 ktpa chrome concentrates
- Planned commissioning March 2020
- Capex of ~ ZAR300M
- Opex (including mining) = R225/t

# VISION 2020

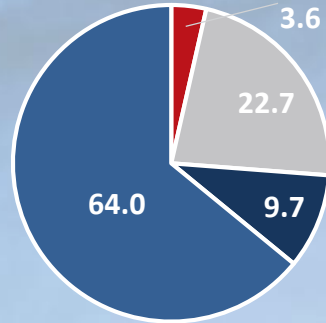
**FY2017**

Actual –  
ROM of  
5.0 Mtpa  
PGMs of  
143.6 kozpa  
Chrome  
concentrates  
of 1.3 Mtpa

**FY2018**

Guidance -  
ROM of  
5.0 Mtpa  
PGMs of  
150.0 kozpa  
Chrome  
concentrates  
of 1.4 Mtpa

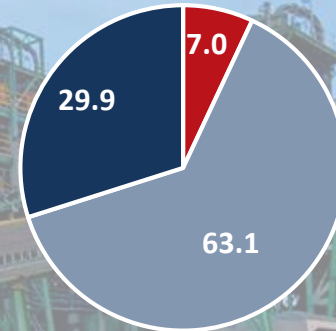
PGM % contribution



Adding  
61.8 kozpa

- Crusher Upgrade
- PGM Optimization
- Apollo Plant
- Improved Mining Grades

Chrome % contribution



Adding  
602.0 ktpa

- Crusher Upgrade
- Vulcan Fine Chrome Plant
- Apollo Plant

**2020**

Targeting -  
ROM of  
5.9 Mtpa  
PGMs of 200  
kozpa  
Chrome  
concentrates  
of 2.0 Mtpa



tharisa

MARKETS

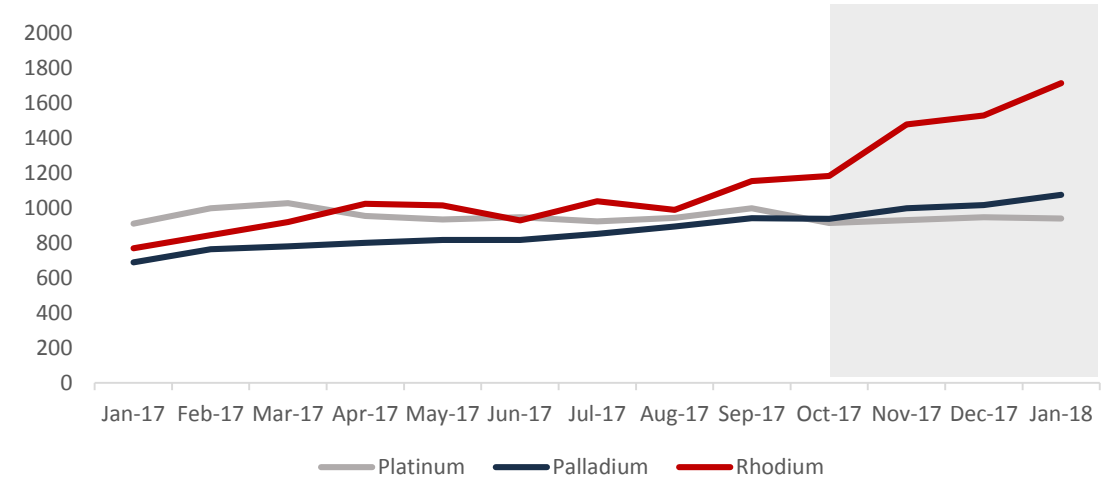


# PGM MARKET

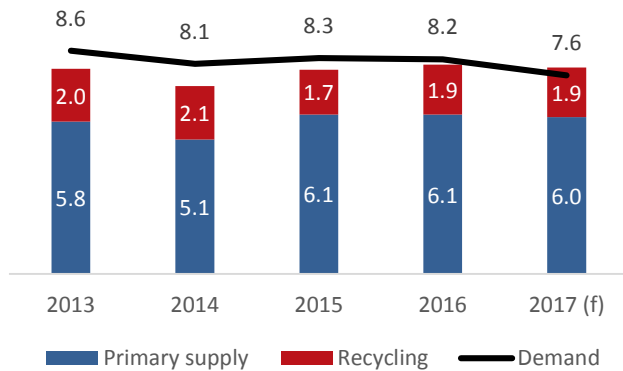
## PLATINUM DEMAND AND SUPPLY

- Demand driven by the auto catalyst, jewellery, industrial and investment sectors
- Both primary and secondary sources of supply seen decreasing
- Primary supply weaker in 2017 due to suppressed average prices, with lower capital investment and cost increases
- In 2017 platinum market expected to be close to balance
- WPIC forecast deficit in 2018 of 250 koz

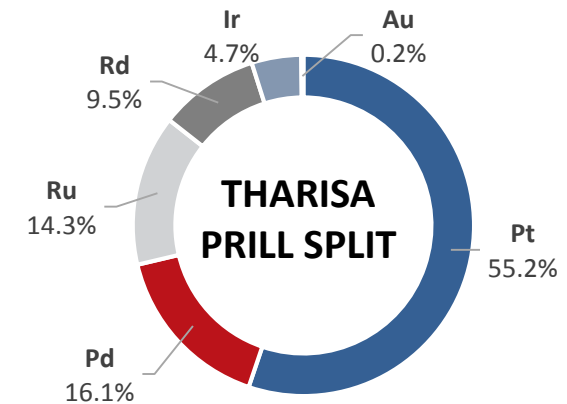
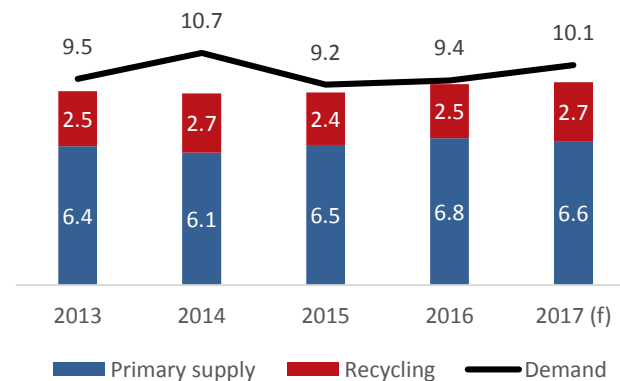
## PLATINUM, PALLADIUM AND RHODIUM MARKET PRICES [US\$/oz]



## PLATINUM DEMAND AND SUPPLY [Moz]



## PALLADIUM DEMAND AND SUPPLY [Moz]



## DEMAND AND SUPPLY

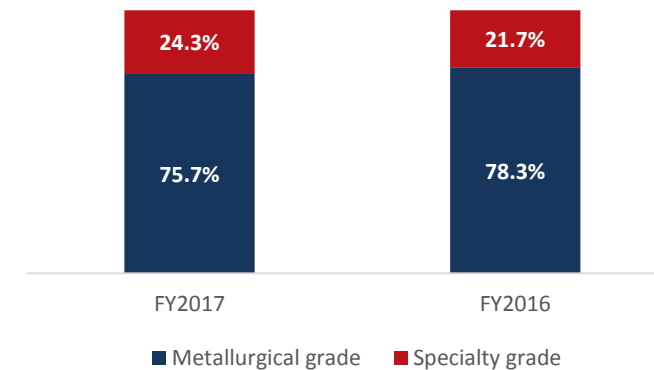
- Demand for metallurgical grade chrome concentrate is driven by its use in the manufacture of stainless steel, the production of which is estimated to grow at between 3% to 5% in 2018
- China is wholly dependent on imports of chrome ore
- Chrome prices were volatile during 2017, peaking at US\$390 and dipping to US\$130
- Metallurgical chrome currently trading above a spot price of US\$215/t
- Chrome stocks at Chinese ports are at 2.14 Mt – just over two month’s supply to the ferrochrome and stainless steel industry

CHEMICAL GRADE	FOUNDRY GRADE
Cr <sub>2</sub> O <sub>3</sub> – 45% to 47% SiO <sub>2</sub> - <1.2%	Cr <sub>2</sub> O <sub>3</sub> - >46% SiO <sub>2</sub> - <1.0%
Used to produce sodium dichromate used in leather tanning, pigments, plating	Used in moulds for metal castings and nozzle sands

## METALLURGICAL GRADE CHROME PRICE / PORT STOCK



## THARISA PRODUCT MIX



# STAINLESS STEEL

## TO PRODUCE ONE TONNE OF FERROCHROME

CHROME ORE  
2.5 tonnes



FERROCHROME  
1 tonne



STAINLESS STEEL  
4 tonnes

## TO PRODUCE ONE TONNE OF STAINLESS STEEL

CHROME ORE  
0.6 tonnes

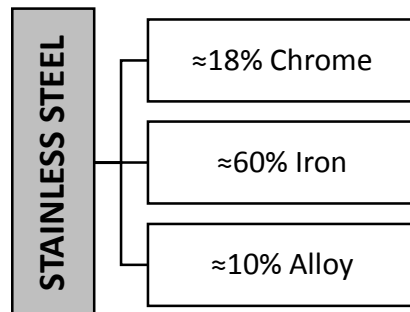


FERROCHROME  
0.25 tonne

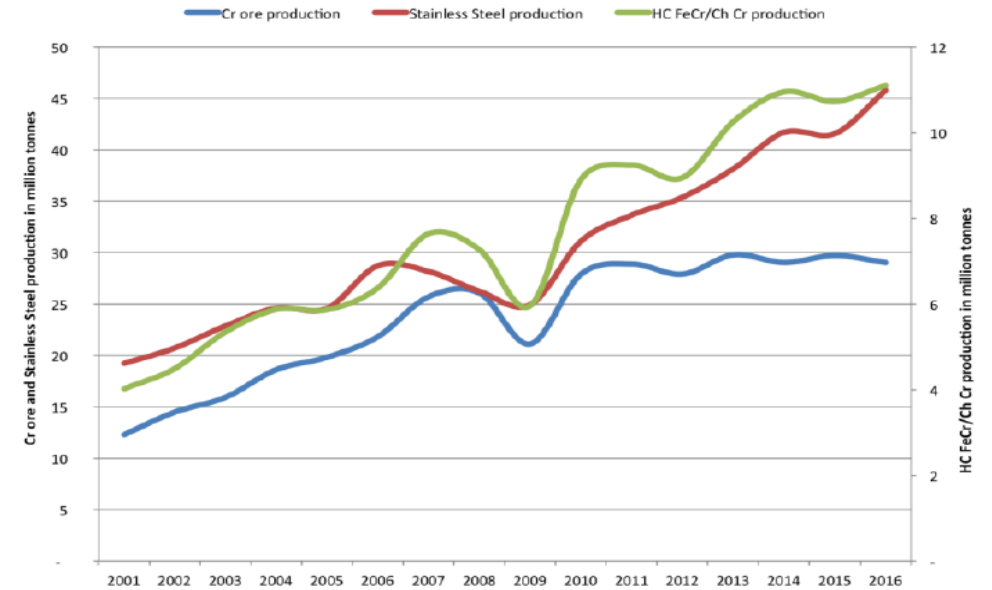


STAINLESS  
STEEL  
1 tonne

## TYPICAL STAINLESS STEEL COMPOSITION



## DEMAND CORRELATION

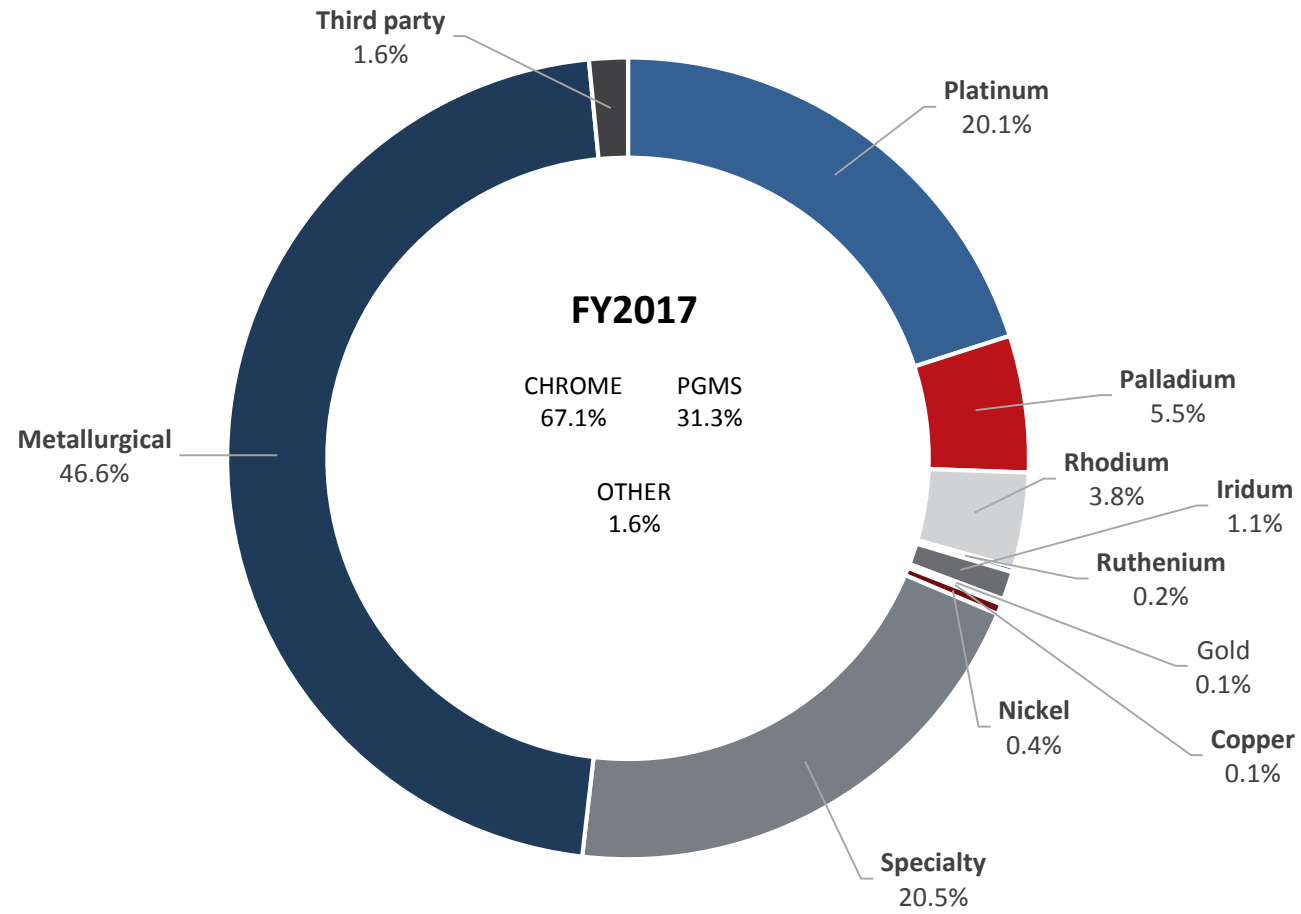


## USES OF STAINLESS STEEL

- 29% - consumer goods and medical
- 18% - food and catering
- 16% - chemical, petrochem and energy
- 15% - ABC and infrastructure
- 8% - Industrial
- 7% - Light automotive
- 4% - Other



## REVENUE CONTRIBUTION PER COMMODITY (EX WORKS)



# tharisa

OUTLOOK



# VALUE ADD INITIATIVES FY2017

## SUPPLYING TISCO JV

- One of the largest stainless steel producers
- Five year strategic cooperation agreement
- Minimum of 240 ktpa chrome concentrate at market prices
- Represents ~25% of Tharisa's metallurgical grade chrome concentrate
- Effective September 2017



## THIRD PARTY CHROME

- Arxo Metals entered into an agreement with Western Platinum
- Operates the K3 UG2 plant and markets and sells UG2 chrome produced
- Approximately 200 ktpa of chrome concentrates



## PGM RICH ALLOY

- Commissioned 1 MW DC furnace to produce PGM rich alloy on a pilot scale
- Further beneficiation capability
- On sale and further beneficiation of PGM rich alloy with Lonmin under PGM research and development co-operation agreement



# OUR STRATEGIC PLAN

Short  
term

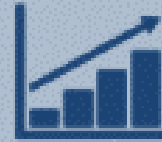


Improved quality mining  
volumes and grades

Maintaining and increasing  
PGM and chrome recoveries

Automation of control  
systems

Medium  
term



Grow production profile

Vision 2020 =  
200 kozpa of PGMs +  
2 Mtpa of chrome  
concentrates

Longer  
term



Greenfields opportunities

Value-accretive  
acquisitions

Seek value across  
commodities and  
geographies

A globally significant low cost producer of strategic commodities



# DELIVERING ON OUR STRATEGY

## LEADING NATURAL RESOURCES GROUP

Globally significant diversified low cost operations

## INNOVATION

Growth through innovative research and development

## OPTIMISATION INITIATIVES

Maximise value extraction  
2 new projects  
2 new plant

## LEVERAGING MARKETING AND LOGISTICS PLATFORM

Marketing, sales and logistics platform  
Expansion into multi-commodities  
Geographic diversity

## CAPITAL DISCIPLINE

Dividend policy of 15% NPAT minimum  
Capital allocation to low risk projects

**Record financial and operational year in FY2017**

**Organic growth and R&D  
Vision 2020**

**Improved recoveries**

**Initiated third party agency and logistics**

**Dividend of US\$ 5 cents per share  
Introducing interim dividend from 2018**

# tharisa

BACKGROUND



# COST ANALYSIS

## UNIT COSTS

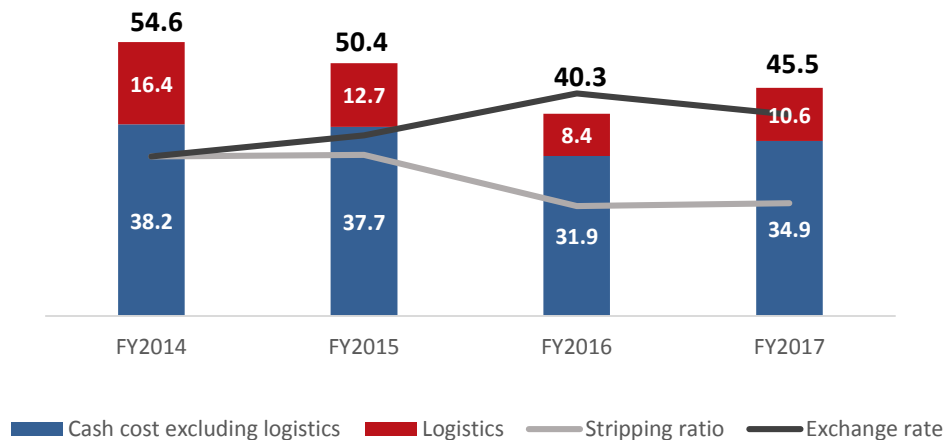
By product basis		FY2017	FY2016
All in cost per Pt ounce sold	US\$/oz	(296.1)	437.8
All in cost per 42% chrome tonne sold	US\$/t	114.0	85.2

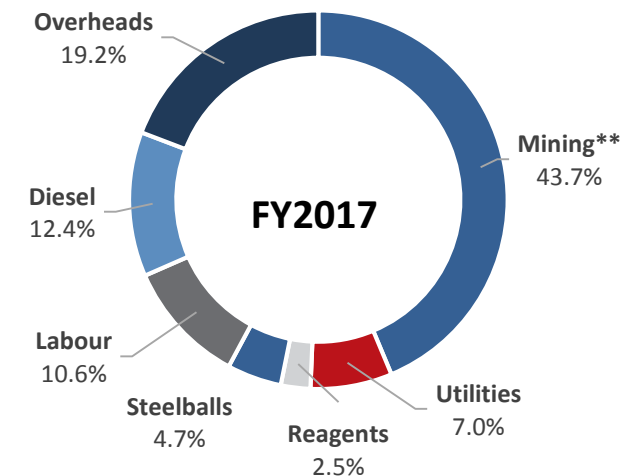
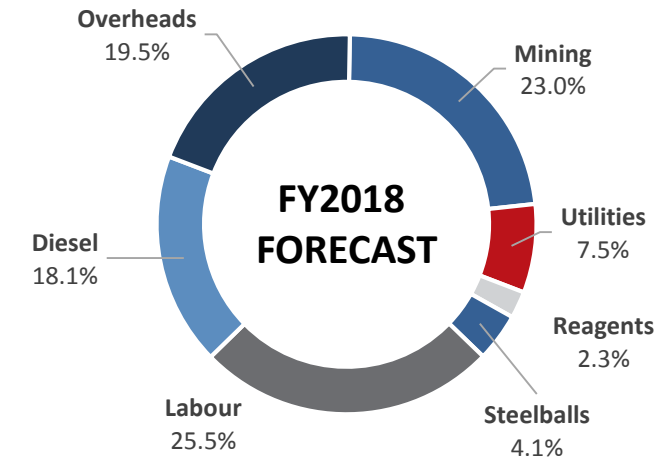
<i>All in cost includes operating costs, administration costs and capital</i>		FY2017 at LOM stripping*
<b>Mining costs</b>		
Mining cost per reef tonne	US\$/t	18.8
Mining cost per cube	US\$/m <sup>3</sup>	7.8

## CONSOLIDATED CASH COST PER TONNE MILLED

US\$/tonne milled



## OPERATING COST ANALYSIS – EX WORKS



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