ARM FERROUS

* *Machadodorp Works is currently recovering ferrochrome from historical slag dumps through the metal recovery plant.*

André Joubert
Chief executive – ARM Ferrous

Key features for F2019

Headline earnings of **R10.01 billion.**

Khumani Mine achieved the **lowest LTIFR in its history.**

Lumpy sales volumes increased to **60%.**

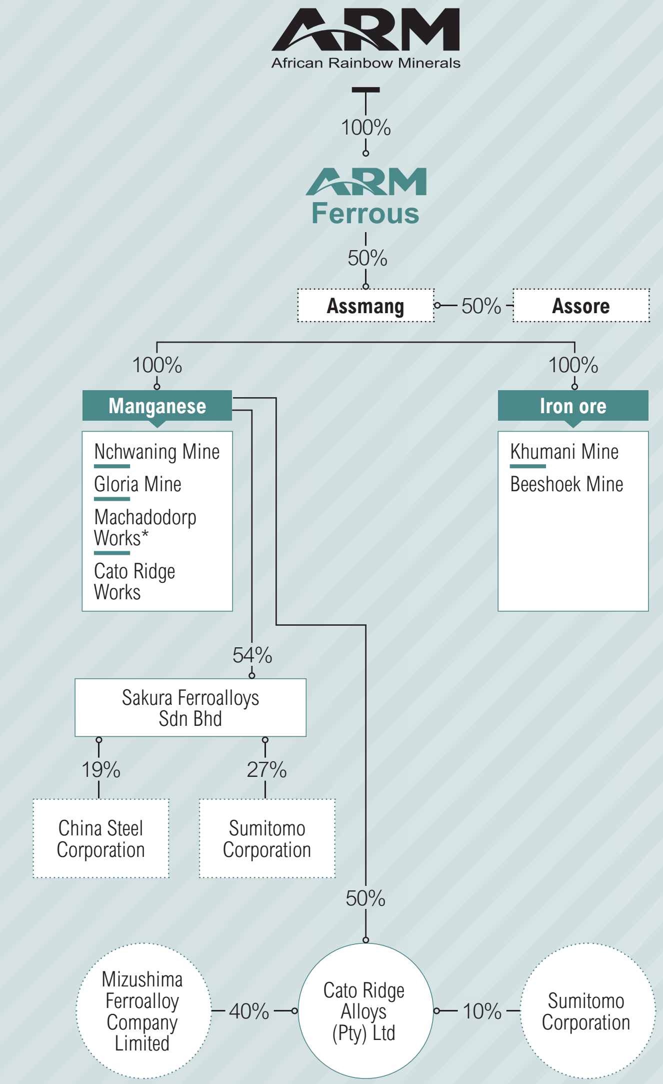
Impairment of Assmang's investment in Sakura Ferroalloys of **R507 million** (ARM attributable).

Black Rock Gloria Mine modernisation projects **progressed on schedule.**

Material matters

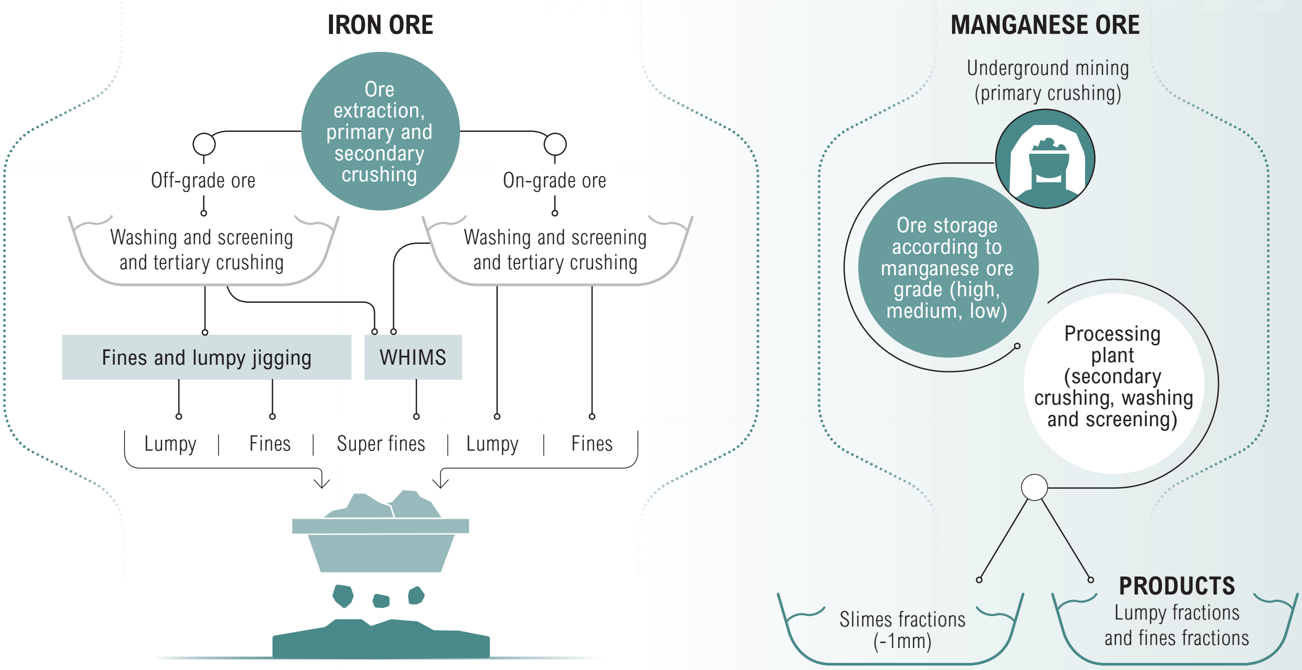
- Security of water supply for the Northern Cape operations
- Successful progress on Black Rock Mine and Gloria Mine modernisation.

- Increased water costs due to capital user charge to refurbish the Vaal Gamagara pipeline
- Profitability of Sakura Ferroalloys.



* *ARM acquired 100% of Machadodorp Works effective from 28 February 2019. Machadodorp Works is currently being used to explore more efficient cost effective ways to smelting.*

Production process



ARM FERROUS continued

Scorecard

KHUMANI MINE
IRON ORE

F2019 Maintain the good safety performance achieved to date and ensure an LTIFR below the tolerance level of 0.20 per 200 000 man-hours.

Achieved

LTIFR for F2019 was 0.08 per 200 000 man-hours.

F2020 Maintain good safety performance and ensure an LTIFR below tolerance level of 0.20 per 200 000 man-hours.

F2019 Deliver production volumes of 14.0 million tonnes.

Achieved

14.2 million tonnes produced.

F2020 Sustain production volumes at 14.0 million tonnes.

F2019 Sustain ultra-fines production at 600 000 tonnes per annum.

Not achieved

Ultra fines production at 496 000 tonnes.

F2020 Deliver ultra-fines production at 600 000 tonnes per annum.

F2019 Deliver sales volumes of 14.0 million tonnes per annum.

Achieved

Sales volumes for F2019 were 14.4 million tonnes.

F2020 Maintain sales volumes at 14.0 million tonnes.

F2019 Recommend technology to recover low-grade feed material.

Achieved

F2020

F2019 Roll-out borehole extraction strategy and process implementation, once abstraction licence is approved.

Achieved

F2020

F2019 Contain on-mine unit production cost increases below inflation.

Not achieved

Unit production costs increased by 8% mainly due to high diesel cost increases.

F2020 Target unit production cost increases below inflation.

F2019 Introduce KM02 pit as tailings/ paste facility for the next 15 years.

Achieved

F2020

BEESHOEK MINE
IRON ORE

F2019 Complete feasibility investigations into retreatment of slimes and jig discard and make final recommendation for consideration.

Achieved

F2020

F2019 Maintain and improve, where possible, safety performance.

Achieved

LTIFR improved to 0.06 per 200 000 man-hours.

F2020 Ensure LTIFR below tolerance level of 0.20 per 200 000 man-hours.

F2019 Deliver production volumes of 3.5 million tonnes per annum.

Achieved

F2020 Maintain production at 3.5 million tonnes per annum.

F2019 Target iron ore sales volumes of 3.0 million tonnes to the local market and 350 000 tonnes to the export market.

Partially achieved

Local sales volumes were 3.1 million tonnes while export sales volumes were 300 000 tonnes.

F2020 Maintain sales volumes at steady state of 3.0 million tonnes to local markets and 350 000 tonnes to the export market.

F2019 Complete mining activities in East pit by December 2018.

Not achieved

The Beeshoek mining plan has been adjusted to include East pit until May 2020.

F2020

F2019 Contain on-mine unit production increases within inflation.

Achieved

Unit production increased by 5%.

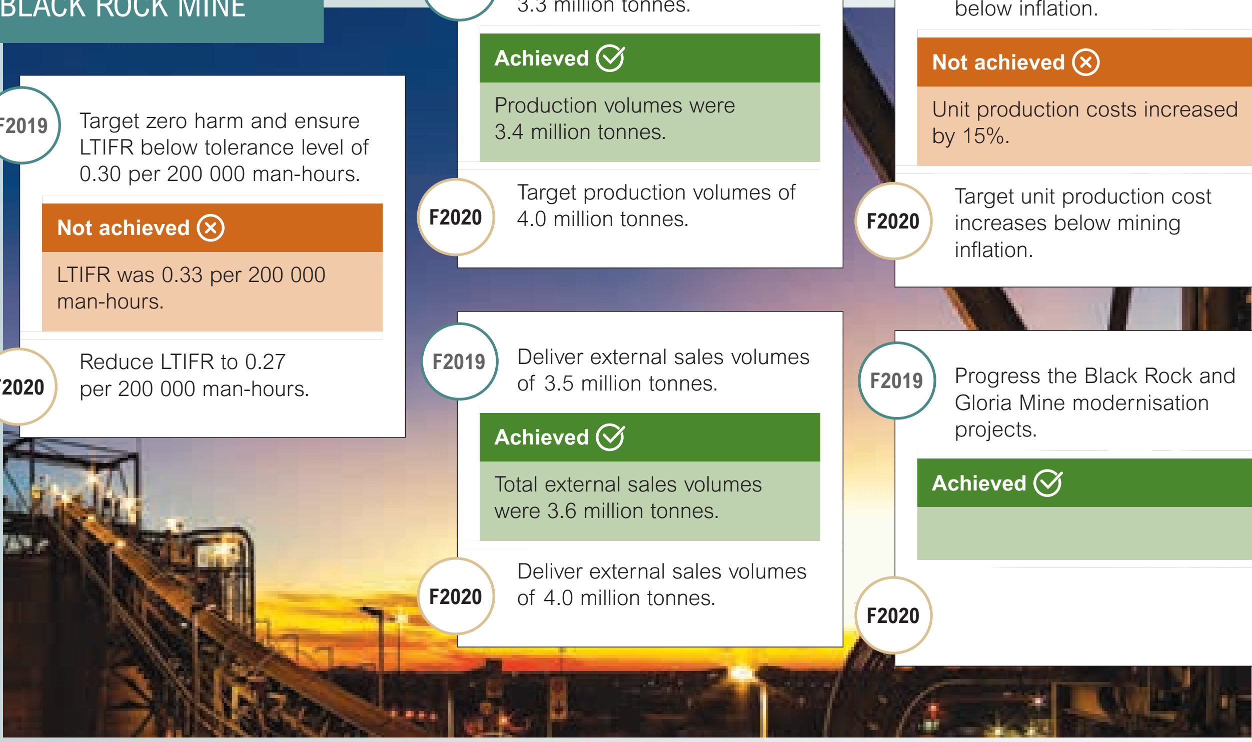
F2020 Maintain unit production cost increases below inflation.

F2019 Evaluate satellite orebody opportunities to increase resource base.

Achieved

F2020 Increase Beeshoek Mine's resources and extend life-of-mine.

MANGANESE ORE
BLACK ROCK MINE



F2019 Target zero harm and ensure LTIFR below tolerance level of 0.30 per 200 000 man-hours.

Not achieved

LTIFR was 0.33 per 200 000 man-hours.

F2020 Reduce LTIFR to 0.27 per 200 000 man-hours.

F2019 Deliver production volumes of 3.3 million tonnes.

Achieved

Production volumes were 3.4 million tonnes.

F2020 Target production volumes of 4.0 million tonnes.

F2019 Deliver external sales volumes of 3.5 million tonnes.

Achieved

Total external sales volumes were 3.6 million tonnes.

F2020 Deliver external sales volumes of 4.0 million tonnes.

F2019 Contain on-mine unit production cost escalations below inflation.

Not achieved

Unit production costs increased by 15%.

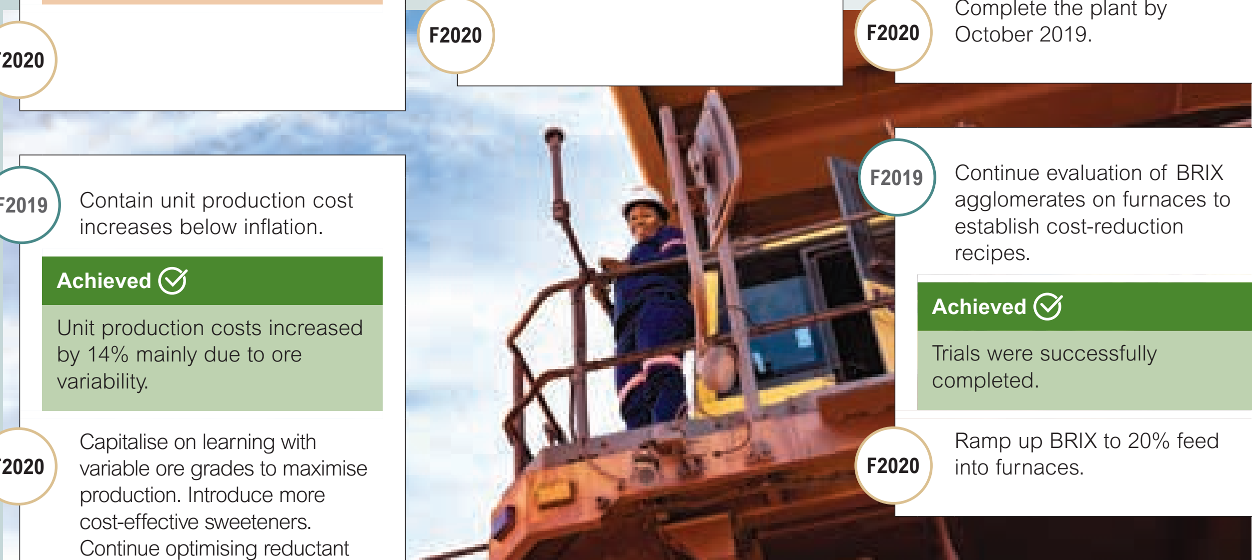
F2020 Target unit production cost increases below mining inflation.

F2019 Progress the Black Rock and Gloria Mine modernisation projects.

Achieved

F2020

MANGANESE ALLOY
CATO RIDGE WORKS



F2019 Maintain good safety performance.

Not achieved

Zero lost-time injuries maintained.

F2020

F2019 Contain unit production cost increases below inflation.

Achieved

Unit production costs increased by 14% mainly due to ore variability.

F2020 Capitalise on learning with variable ore grades to maximise production. Introduce more cost-effective sweeteners. Continue optimising reductant recipe. Optimise efficiency opportunities in furnace 2 rebuild.

F2019 Evaluate use of cost-effective sinter to reduce costs.

Achieved

Lab tests completed and successful.

F2020

F2019 Finalise the BRIX project development and recommend potential investment.

Achieved

F2020 Complete the plant by October 2019.

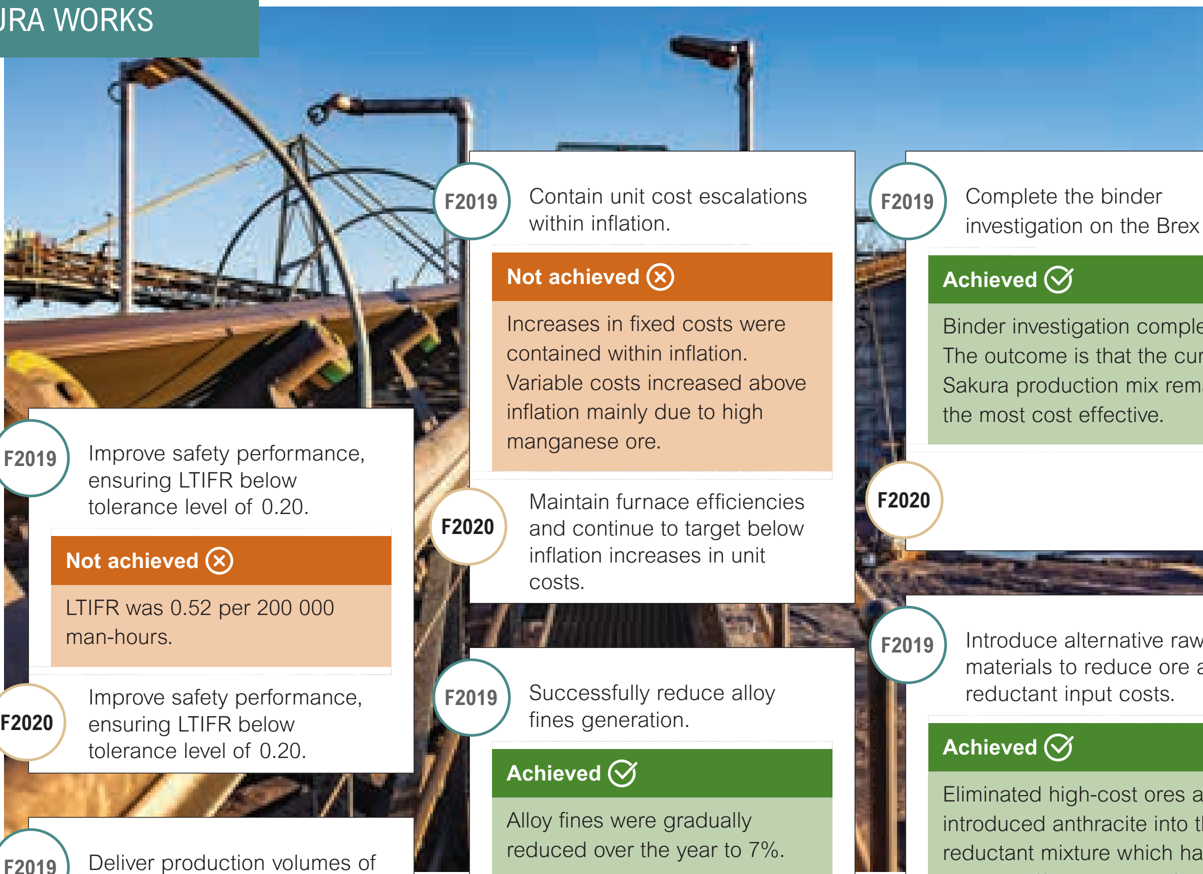
F2019 Continue evaluation of BRIX agglomerates on furnaces to establish cost-reduction recipes.

Achieved

Trials were successfully completed.

F2020 Ramp up BRIX to 20% feed into furnaces.

MANGANESE ALLOY
SAKURA WORKS



F2019 Improve safety performance, ensuring LTIFR below tolerance level of 0.20.

Not achieved ⊗

LTIFR was 0.52 per 200 000 man-hours.

F2020 Improve safety performance, ensuring LTIFR below tolerance level of 0.20.

F2019 Deliver production volumes of 240 000 tonnes.

Achieved ✓

Production volumes were approximately 249 000 tonnes.

F2020 Target production volumes of 252 000 tonnes.

F2019 Deliver sales volumes of 240 000 tonnes.

Achieved ✓

Sales volumes were approximately 248 000 tonnes.

F2020 Target sales volumes of 245 000 tonnes.

F2019 Contain unit cost escalations within inflation.

Not achieved ⊗

Increases in fixed costs were contained within inflation. Variable costs increased above inflation mainly due to high manganese ore.

F2020 Maintain furnace efficiencies and continue to target below inflation increases in unit costs.

F2019 Successfully reduce alloy fines generation.

Achieved ✓

Alloy fines were gradually reduced over the year to 7%.

F2020 Maintain alloy fines generation.

F2019 Complete sinter production options and make final recommendation.

Not achieved ⊗

Basic engineering for the sinter plant is in progress and, once completed, a final decision will be made.

F2020 Complete basic engineering for sinter plant and make a final recommendation to the board.

F2019 Complete the binder investigation on the Brex plant.

Achieved ✓

Binder investigation completed. The outcome is that the current Sakura production mix remains the most cost effective.

F2020

F2019 Introduce alternative raw materials to reduce ore and reductant input costs.

Achieved ✓

Eliminated high-cost ores and introduced anthracite into the reductant mixture which had a positive effect on cost of production.

F2020 Investigate alternative raw material for the briquetting plant.

F2019 Extend the slag sales agreements and develop and implement slag re-use options.

Not achieved ⊗

A slag sale agreement was extended to one customer. Slag sales for aggregate are still in the approval phase with regular meetings with the local authorities.

F2020 Finalise approval process for slag sales for aggregate.

Market review

Steel demand in China remained strong on the back of economic stimulus and is expected to grow by 3% in C2019. China represents over half of the world's crude steel production and continues to report high crude steel production levels, almost reaching 89 million tonnes per month by May 2019, a new monthly record. For C2018, world crude steel production increased by 4.5% from the 2017 level.

Iron ore

Prices for iron ore (62% iron content, fines grade, delivered in China) rallied strongly in the review period, propelled by supply disruptions from major producers and better-than-expected steel production in China. Given the magnitude of the Vale tailings dam failure early in the year, normalisation of supply is expected to take at least two years although increased iron ore production from smaller and less conventional producers could accelerate rebalancing in the market.

Steel production growth of around 10% in China has been much stronger than anticipated, with both steel and iron ore inventory levels drawn down, implying even stronger steel consumption. However, the country's steel production growth is expected to soften in the second half of C2019, with private-sector demand already slowing. Chinese property demand is showing early signs of weakness while industrial production and fixed asset investment also appear to be slowing. Government stimulus for infrastructure and consumer spending is expected to remain intact, partially offsetting the potential slowdown in economic activity. Should US-China trade tensions continue to ease, the Chinese government could slow stimulus spending – with a corresponding slowdown in the steel production run rate.

The premium for lumpy-grade material was more volatile ranging between about US$20/t and US$30/t. The average premium for lumpy material for F2019 was US$21.40/t compared to F2018 of US$13.34/t.

Manganese ore

Manganese ore prices have trended down steadily since the beginning of C2019, off 35% from their peak in 2018. With firm steel production in China (discussed above) and stricter production standards, risk in this market remains on the supply side.

Capacity expansions have been announced by a number of producers which could displace high cost production.

The average index price in F2019 for 44% manganese ore was US$6.71/mtu, CIF Tianjin (F2018: US$6.88/mtu), while the 37% Manganese ore price was US$6.05/mtu, CIF Tianjin (F2018: US$6.22/mtu).

Manganese alloys

Manganese alloy prices have been negatively impacted by oversupply from early in C2019 year. This continued throughout F2019, resulting in continued price weakness and poor profitability for manganese alloy producers.

F2018 also saw several major ferroalloy producers announce production cuts to curb losses and accelerate the clearing of oversupply to restore some market balance. The uncertainty in the general economy continued to affect manganese alloy demand in markets outside China, with elevated input costs placing pressure on profit margins.

Financial review

Delivering financial returns to shareholders and other providers of capital

ARM Ferrous' headline earnings of R4 960 million were 41% higher compared to R3 528 million in F2018. This was mainly due to a 103% increase in the headline earnings of the iron ore division, driven by higher prices and a weaker average Rand/US Dollar exchange rate. Headline earnings for the manganese division were 15% lower, mainly as a result of lower manganese alloy prices and higher production input costs.

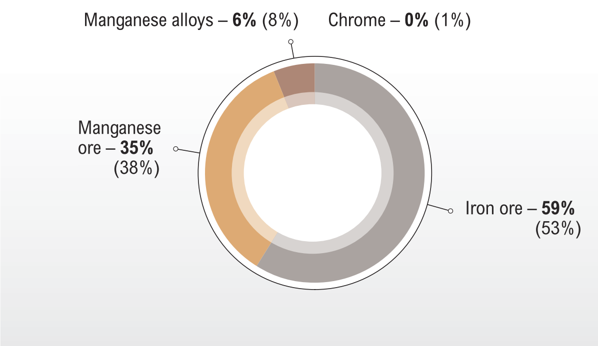
ARM FERROUS' HEADLINE EARNINGS/(LOSS) BY DIVISION

	12 months ended 30 June		
R million	**2019**	2018	% change
Iron ore division	**6 795**	3 343	103
Manganese division	**3 221**	3 808	(15)
Chrome division	**(5)**	(42)	88
Total – on a 100% basis	**10 011**	7 109	41
ARM share	**5 005**	3 555	41
Consolidation adjustments	**(45)**	(27)	(67)
Headline earnings attributable to ARM	**4 960**	3 528	41

ARM Ferrous average realised US Dollar prices for export iron ore were 34% higher – on an FOB equivalent basis – at US$87/t (F2018: US$65/t). The increase in realised prices was driven mainly by an increase in the 62% Fe fines index price, following the Vale tailings dam incident in Brazil at the end of January 2019, higher lump premiums as well as a higher lump to fines ratio in iron ore sales (60% compared to 54% in F2018).

The Platts index price for 44% manganese ore decreased from US$6.79/mtu to US$5.75/mtu while the index price for 37% manganese ore was 23% lower at US$4.59/mtu.

ARM FERROUS REVENUE PER COMMODITY – ON A 100% BASIS
(F2018 in brackets)



Investing in the current business

Assmang capital expenditure – on a 100% basis – increased by 43% to R4 407 million (F2018: R3 081 million).

Capital expenditure at the iron ore business – on a 100% basis – rose from R1 780 million to R2 098 million mainly due to:

» Fleet and mining equipment replacement at Khumani and Beeshoek mines as part of the life cycle of the machinery
» Increased capitalised waste stripping at the Khumani King pit and Beeshoek Village pit
» Onset of capitalised waste stripping at the Bruce pit of Khumani Mine.

The stripping ratio of Khumani Mine increased from 1.98 in F2018 to 2.2 in F2019, while the stripping ratio for Beeshoek Mine rose from 4.10 to 4.26 for the same periods.

The manganese division's capital expenditure increased by 80% to R2 310 million; R662 million of this related to the modernisation and optimisation of Gloria Mine within the Black Rock Mine as approved in F2018. The Gloria Mine decline shaft shutdown began in November 2018 and was commissioned in April 2019. The capital approved for Gloria Mine will give Black Rock Mine flexibility to produce different product specifications – from high to medium grade – for customers as this has become a key differentiator. In addition, production capacity at Black Rock Mine will increase to some 5 million tonnes per annum, with any ramp-up to be closely synchronised with Transnet rail availability.

Cato Ridge Works capital expenditure – on a 100% basis – was R89 million compared to R45 million in F2018.

ARM FERROUS CAPITAL EXPENDITURE

100% basis R million	12 months ended 30 June		
	2019	2018	% change
Iron ore	**2 097**	1 780	18
Manganese	**2 310**	1 285	80
Chrome	**–**	16	(100)
Total	**4 407**	3 081	43

Operational review

Continuously improving operational performance

Iron ore division

Total iron ore sales volumes were 2% lower at 17.5 million tonnes (F2018: 17.9 million). Of the 17.5 million tonnes sold, 14.4 million tonnes were exported (F2018: 14.3 million tonnes) and 3.1 million tonnes were sold locally (F2018: 3.6 million tonnes). Khumani Mine facilitated export of approximately 900 000 tonnes of iron ore by a junior iron ore producer through its rapid load-out facility.

Production volumes decreased by 4% mainly due to water supply challenges at Khumani Mine. Assmang continues to engage with the Sedibeng Water Board to address challenges experienced on the Vaal Gamagara water system and is part of a collaborative team effort to recapitalise and upgrade the water system to ensure sufficient capacity and the sustainability of the system. The Sedibeng Water Board has approved a capital raising levy of R17.58/kl to be charged effective from September 2019 for F2020 and F2021, pending the finalisation of the off-take agreements between Sedibeng Water and the respective mines and/or industries.

Production volumes at Khumani Mine during F2019 were achieved at the same on:off grade plant feed ratios of 35:65 as F2018. There was a marginal change in the King:Bruce ore mined ratio to 62:38 (F2018: 60:40). The better quality ore mined at Khumani Mine during F2019 resulted in the increased lump production ratio of 58% lump product (F2018: 55%).

On-mine unit production costs at Khumani Mine increased to R226/t compared to R207/t in F2018 mainly due to the 4% decline in production volumes and high increases in diesel and labour costs. On-mine unit production costs at Beeshoek Mine increased to R234/t compared to R223/t in F2018 mainly due to a decline in production volumes. Unit cost of sales for the iron ore operations were 20% higher driven mainly by:

» A 20% increase in CIF shipments as well as an increase in US Dollar freight rates
» An increase in sales and marketing costs as a result of higher US Dollar iron ore prices
» A weaker Rand versus the US Dollar exchange rate which impacted both freight and sales and marketing costs.

ARM FERROUS continued

Manganese ore

Production volumes at Black Rock Mine decreased by 8% from 3.7 million tonnes in F2018 to 3.4 million tonnes in F2019 due to the planned shutdown of the Gloria Mine conveyor together with the commissioning of new infrastructure at the mine as part of the Black Rock project.

The Black Rock Mine sold 3.65 million tonnes of manganese ore (F2018: 3.41 million tonnes) including intra-group sales. 3.32 million tonnes of manganese ore were exported (F2018: 3.08 million tonnes) while 323 853 tonnes (F2018: 335 512 tonnes) were sold locally using a combination of rail and road-hauling, with approximately 150 000 tonnes transported via road-hauling.

To secure the ramp-up in volume from Black Rock Mine, rail and port capacities through the ports of Port Elizabeth and Saldanha were secured until F2021. Engagements with Transnet to synchronise the production ramp-up at Black Rock Mine with Transnet's rail and port capacity expansions from F2022 and beyond are ongoing.

On-mine unit production costs increased by 15% from R525/t in F2018 to R605/t in F2019 mainly due to lower production volumes and high increases in labour and diesel costs. Unit cost of sales were 17% higher mainly as a result of:

» A 22% increase in CIF shipments and an increase in US Dollar freight rates
» A weaker Rand versus the US Dollar; and higher logistics costs as a result of approximately 150 000 tonnes of manganese ore being road hauled – road haulage is at a higher cost than rail transportation.

Manganese alloys

Cato Ridge Works and Cato Ridge Alloys: Total production volumes increased by 9% from 138 000 tonnes to 150 000 tonnes. This was primarily as a result of ore variability, load shedding and converter lining failures. Total sales volumes increased by 6% from 206 000 tonnes in F2018 to 218 000 tonnes in F2019. Unit production costs of Cato Ridge Works increased by 14% primarily due to the purchase of more expensive sinter to meet grade requirements, which was impacted by ore variability. Unit production costs of Cato Ridge Alloys increased by 9% primarily due to higher molten metal costs. Realised high-carbon ferromanganese prices decreased by 5%. Realised medium-carbon ferromanganese prices decreased by 1%.

Sakura Ferroalloys: Assmang's losses from Sakura Ferroalloys were R556 million (F2018: R162 million) before impairment charges. Despite an increase in sales volumes, Sakura Ferroalloys reported a headline loss mainly due to subdued manganese alloy prices and an increase in unit production costs – as a higher ratio of lump product versus fines was processed to improve efficiencies in the furnace. In addition to operational losses, Assmang recognised R186 million (F2018: Rnil) of expected credit losses on loans, receivables and guarantees in favour of Sakura Ferroalloys as well as a R224 million write down in inventory to net realisable value. Production volumes increased by 2% from 244 000 tonnes to 249 000 tonnes while sales volumes increased by 3% from 240 000 tonnes in F2018 to 248 000 tonnes in F2019.

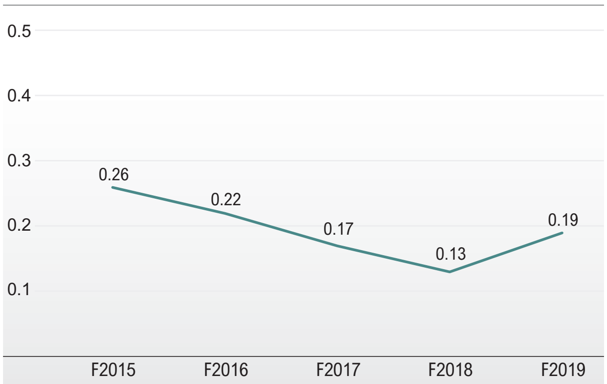
Sustainability review

Ensuring a safe, healthy and appropriately skilled workforce

Safety

The ARM Ferrous managed operations have been fatality-free since 2015. A total of 17 LTIs were recorded in F2019 (F2018: 11), 14 of which at Black Rock Mine (F2018: 7). The expansion project underway at this mine involves a large number of contractors, a significant increase in non-routine activities, redeploying employees to new work areas and introducing new tasks. While Khumani Mine and Beeshoek Mine improved their LTIFR in F2019 and Cato Ridge Works again reported no LTIs, the ARM Ferrous LTIFR increased to 0.19 (F2018: 0.13) mainly due to the increased LTIs and hours worked at Black Rock Mine. A focused strategic safety intervention was launched at Black Rock Mine to improve safety performance.

LTIFR
(per 200 000 man-hours)



Operations are implementing the critical control management (CCM) process as part of our commitment to continued improvement and prevention of major unwanted events. Full implementation is on track for F2020, after which an external audit of the process will be conducted.

Safety days were held at all operations in line with the Mining Council South Africa's National Safety Day.

Safety achievements at the Ferrous operations included:

» At 30 June 2019, Cato Ridge Works completed two years and 11 months without an LTI
» At year end, Machadodorp Works completed three years and four months without an LTI
» Beeshoek Mine was awarded first prize for most-improved safety performance and second prize for safety performance in its class at the 2018 MineSAFE Conference
» Khumani Mine achieved the lowest LTIFR in its history (0.08)
» Beeshoek Mine recorded 17 000 fatality-free production shifts on 18 September 2018, an accomplishment that took 15 years and six months to achieve. It was among the top three best-performing surface mines in the annual Northern Cape Mine Managers' Association convention in November 2018

- Black Rock Mine achieved 7 million fatality-free shifts on 7 March 2019, an achievement that took ten years to complete. It was among the top three best-performing underground mines at the annual Northern Cape Mine Managers' Association convention in November 2018.

Operation	Total fatality-free shifts worked	Last fatality
Beeshoek Mine	**4 163 581**	March 2003
Black Rock Mine	**7 282 943**	April 2009
Khumani Mine	**2 733 621**	April 2015
Cato Ridge Works	**2 442 821**	February 2008
Machadodorp Works	**1 103 713**	February 2011

One Section 54 Notice and one Section 55 Notice were issued at ARM Ferrous operations in F2019 (F2018: two Section 54 Notices and one Section 55 Notice), both at Black Rock Mine. No shifts were affected.

Human capital

Total employees and contractors at ARM Ferrous decreased to 11 505 (F2018: 11 821), broken down as 48% full-time employees and 52% contractors. ARM Ferrous invested R154 million in training initiatives (F2018: R156 million). Improving diversity and transformation in our workforce remains a priority and representation of historically disadvantaged people at management level improved to 64% (F2018: 63%).

Eight man days were lost to a strike at Khumani Mine during the year (F2018: four).

Health

The risk-based occupational medical surveillance programmes identify and address specific health risks in each workplace and occupation, particularly pulmonary tuberculosis (PTB), HIV and Aids, and noise-induced hearing loss (NIHL).

Beeshoek, Black Rock and Khumani mines partner with the Northern Cape Department of Health to support implementation of provincial strategies for PTB, HIV and Aids, sexually transmitted infections and chronic diseases, and to improve health services for employees and local communities:

- Our hearing conservation programme aligns with the Mining Industry Occupational Safety and Health (MOSH) leading practice on noise. 17 955 audiometric tests were conducted on employees and contractors in F2019 and six cases were submitted for compensation for NIHL (F2018: two)
- 33 587 employees and contractors were screened for PTB in C2018, with 13 new cases identified (C2017: 17) and eight cases cured in C2018. One case of multi-drug resistant PTB was recorded during C2018 (C2017: 0)
- 18 078 employees and contractors received counselling for HIV and Aids in F2019 (F2018: 11 199) and 5 802 were tested (F2018: 3 438). Employees and contractors on disease management programmes as well as those receiving antiretroviral treatment (ART) each increased to 1 715 (F2018: 1 172).

Chronic conditions are monitored by specific occupational exposure profiles for high-risk roles. The incidence of hypertension has increased at Beeshoek Mine and initiatives are in place to promote physical activity and create awareness on diet and lifestyle choices.

Ensuring responsible stewardship of natural resources

Tailings storage facilities (TSFs)

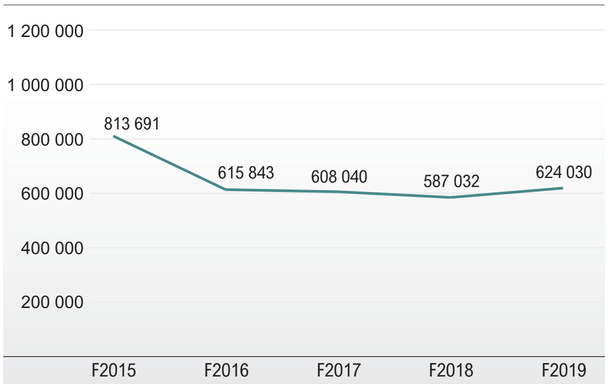
Ensuring safe and stable operation of TSFs is a priority and a professional engineer is appointed to assist with this specialised function at each facility.

During the year, operations commissioned revisions of legal compliance, risk assessment, zones of influence (in the event of failure at final capacity) and appropriate tailings-specific emergency response plans. The ARM CEO and divisional chief executives hosted a tailings workshop where each operation presented progress on these aspects. In line with global best practice, independent external review of the TSFs has been commissioned to enhance our associated management systems. Dam-break analyses of TSFs has been commissioned to inform enhanced emergency response planning.

Emissions

The ARM Ferrous division's estimated Scope 1 and 2 carbon emissions increased by 6% to 624 030 equivalent tonnes of CO_2 (tCO_2e) (F2018: 587 032 tCO_2e) on an attributable basis, representing 56% of ARM's total for the year. Cato Ridge Works accounted for 54% of the division's emissions and carbon emissions for Cato Ridge Works increased by 4% from F2018. This was mainly due to the increase in the applied electricity grid factor for South African coal-fired power stations which has increased from 0.97 to 1.06 kg CO_2e per kWh of electricity consumed in F2019.

SCOPE 1 AND 2 CARBON EMISSIONS – ON AN ATTRIBUTABLE BASIS
(tCO_2e)

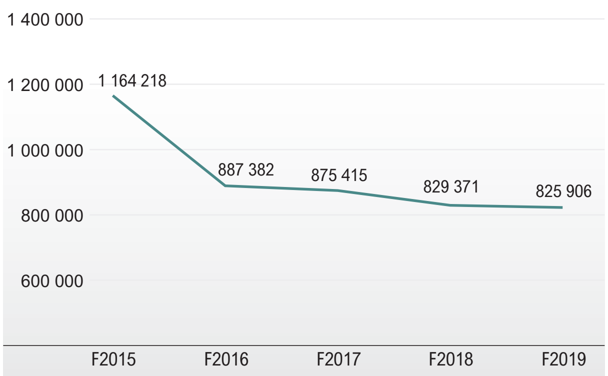


ARM FERROUS continued

Energy use

Electricity consumed by the division accounted for 70% of its total emissions and decreased marginally by less than 1% to 825 906 MWh (F2018: 829 371 MWh). ARM Ferrous is a member of the Energy Intensive Users Association and has an energy-efficiency charter to map its development and implementation of energy-efficient practices.

ELECTRICITY CONSUMPTION – ON A 100% BASIS
(MWh)



Water use

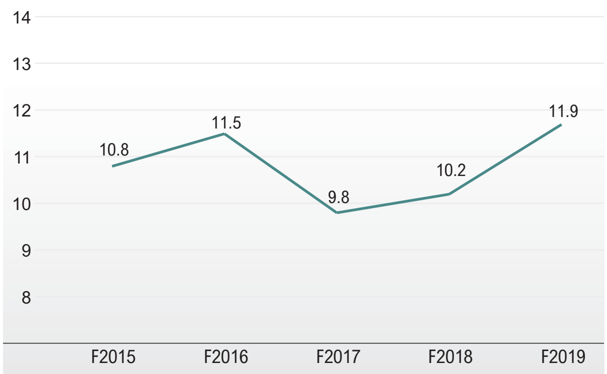
Continuity of water supply and the cost of water are risks and potential constraints to growth for the ARM Ferrous mines, located in the arid Northern Cape. Load shedding affects water distribution, competition for water is increasing and the poor state of infrastructure in the region remains a concern. Production at Khumani Mine was affected by water-supply interruptions and firewater systems were impaired at Black Rock Mine in the period.

Khumani Mine is increasing water-storage capacity and the division is assessing options for broader industry collaboration to address water challenges. Along with other users in the Northern Cape, ARM Ferrous plays a strategic role in the Vaal Gamagara water-supply scheme project, to develop a collaborative response to the requirements for bulk-water supply and pricing over the next 25 years.

ARM implemented phase 2 of the ICMM's water accounting framework during the year. Workshops were held at operations and revised flowcharts and reporting templates were introduced to improve the accuracy of water accounting.

Total water withdrawn increased by 17% to 11.9 million m^3 in F2019 (F2018: 10.2 million m^3). This was mainly due to stringent water accounting definitions being applied which resulted in improved accounting for harvesting of rainfall and runoff from mining areas as well as additional flow meters which have been installed, resulting in more accurate measurement. At Beeshoek Mine, an additional 1.2 million m^3 of water withdrawal was reported due to dewatering of the open-pit to ensure safe mining. ARM Ferrous operations accounted for 55% of the group's total water withdrawal. Khumani Mine accounted for 38% of the division's total water withdrawal, Beeshoek Mine 45% and Black Rock Mine 14%.

WATER WITHDRAWN – ON A 100% BASIS
(million m^3)



Maintaining our social licence to operate

ARM Ferrous participates in the shared-value working committee with other manganese producers in the Northern Cape and the Minerals Council South Africa in creating innovative projects with a meaningful benefit for communities.

The risk of community unrest disrupting operations remains real. In addition, Cato Ridge Works faces ongoing challenges from illegal sand mining on its premises, while Black Rock Mine has implemented measures to combat the theft of copper cables after an incident during the year.

ARM operations promote economic development and job creation in local communities by providing training, mentoring, coaching and some financial support to local black-owned and black women-owned small, medium and micro enterprises through their enterprise and supplier development initiatives. Where viable, businesses are promoted into the mining supply chain and participate in the ARM Ferrous procurement system.

The Ferrous division invested R111 million in local economic development (LED) in terms of its social and labour plans (SLPs), 17% more than last year (F2018: R95 million). Corporate social investment (CSI) expenditure increased to R9 million (F2018: R7 million) and the total investment in corporate social responsibility (CSR) increased to R120 million.

Significant LED projects during F2019 included:

» Khumani Mine (R19 million) and Black Rock Mine (R18 million) are participating in the construction of the Kuruman bulk-water reservoir to help address the bulk-water storage challenges in the area. The project serves the Ga-Segonyana local municipality in the John Taolo Gaetswe district

» Khumani Mine contributed R14.5 million to provide water and sanitation services for 321 stands in the Olifantshoek community and R8.2 million to upgrade 16 sewerage pump stations in Kathu

» Black Rock Mine invested R2 million in the Magobing water project

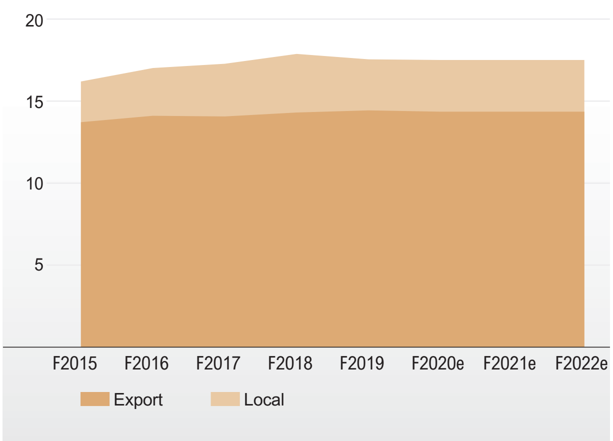
» Khumani Mine invested R6 million in the wastewater treatment works serving the Dibeng community, upgrading it from 0.3ML per day to 1.5ML per day in partnership with the Gamagara local municipality

» Khumani Mine invested R5.7 million in refurbishing sewerage pump stations serving the Mapoteng/Sishen community and donated a sewerage jet truck to provide ongoing maintenance to the pump stations
» Khumani Mine invested R1 million in a 12-month leadership programme for ten schools in the Gamagara Municipality, which paired school principals with local business leaders to improve leadership skills and motivation as well as to increase understanding about the local education environment
» Black Rock Mine invested R4 million to complete the Deurham road, serving the 260 households of the Deurham community and creating 23 temporary jobs
» Beeshoek Mine invested R1.4 million in improving water reticulation at the local public hospital in the Tsantsabane community. The project improved water availability to the hospital and included the renovation of 14 toilet facilities that will enhance the hygiene and wellbeing of patients at the hospital.

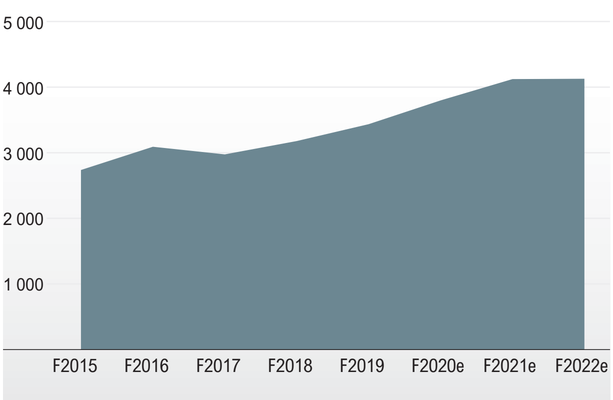
Outlook

Sales volumes – on a 100% basis

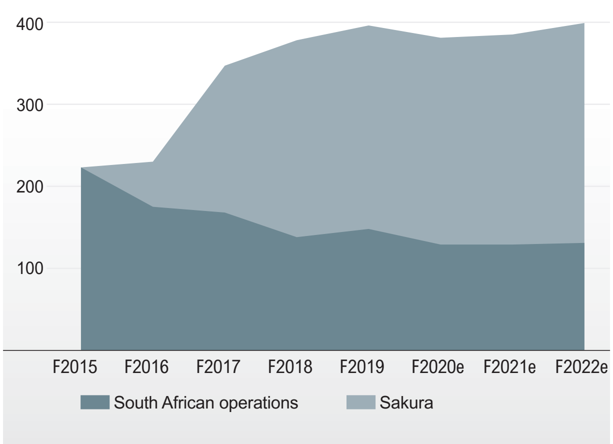
IRON ORE SALES VOLUMES
(000t)



MANGANESE ORE SALES VOLUMES
(000t)



MANGANESE ALLOY SALES VOLUMES
(000t)



SUMMARY SUSTAINABILITY STATISTICS

	unit	F2019	F2018	F2017	F2016	F2015
Employee indicators						
Average number[1]		**11 426**	10 247	8 662	9 953	10 759
– Permanent employees		**5 293**	5 017	4 522	5 638	6 138
– Contractors		**6 133**	5 230	4 140	4 315	4 621
LTIFR per 200 000 man-hours		**0.19**	0.13	0.17	0.22	0.26
Environmental indicators						
Scope 1 and 2 carbon emissions[2]	tCO_2e	**624 030**	587 032	608 040	615 843	813 691
Total water withdrawn[3]	million m^3	**11.9**	10.2	9.8	11.5	10.8
Energy use						
– Electricity	MWh	**825 906**	829 371	875 415	887 382	1 164 218
– Diesel	000 litres	**61 118**	59 163	49 837	54 264	58 387
Community investment indicators						
Total CSR	R million	**120**	102	69	73	107
– CSI	R million	**9**	7	6	9	28
– LED	R million	**111**	95	63	64	79

1 Permanent employees and contractors are reported as an average for the year, consistent with the calculation of safety statistics.
2 Reported on an attributable basis.
3 Includes rainfall and runoff water harvested, surface water withdrawn from rivers, municipal water and groundwater.

ARM FERROUS continued

SUMMARY KEY PERFORMANCE INDICATORS – ON A 100% BASIS

IRON ORE DIVISION

Operations:
Khumani and Beeshoek mines – on a 100% basis unless otherwise stated.

Ownership:
50% held through Assmang (Pty) Ltd.

Management:
Assmang is jointly managed by ARM and Assore. ARM provides administration and technical services, while Assore performs the sales and marketing function and technical consultation.

	unit	F2019	F2018	F2017	F2016	F2015
OPERATIONAL						
Production volumes	000t	**17 786**	18 578	17 714	16 726	16 076
Khumani Mine	000t	**14 145**	14 694	14 560	13 616	12 649
Beeshoek Mine	000t	**3 641**	3 884	3 154	3 110	3 427
Sales volumes	000t	**17 543**	17 874	17 275	17 008	16 185
Export iron ore	000t	**14 430**	14 315	14 061	14 103	13 658
Local iron ore	000t	**3 114**	3 559	3 214	2 905	2 527
Unit cost changes						
On-mine production unit costs	%	**8**	2	3	(8)	3
Unit cost of sales	%	**15**	6	2	(2)	(4)
FINANCIAL						
Sales revenue	R million	**20 827**	14 534	15 853	12 110	12 197
Total costs	R million	**12 000**	(10 304)	(10 091)	(9 149)	(9 106)
Operating profit	R million	**8 827**	4 230	5 762	2 961	3 091
EBITDA	R million	**10 284**	5 631	7 179	4 478	4 517
Headline earnings	R million	**6 795**	3 343	4 373	2 430	2 494
Capital expenditure	R million	**2 097**	1 780	1 169	901	1 646

AFS Refer to note 2 to the annual financial statements for the iron ore segmental information.

MANGANESE DIVISION

Operations:
Nchwaning and Gloria mines (collectively Black Rock Mine), Cato Ridge Works and Ferromanganese Works and Sakura Ferroalloys.

Ownership:
50% held through Assmang (Pty) Ltd.

Management:
Assmang is jointly managed by ARM and Assore. ARM provides administration and technical services while Assore performs the sales and marketing function and technical consultation.

	unit	F2019	F2018	F2017	F2016	F2015
OPERATIONAL						
Production volumes						
Manganese ore	000t	**3 409**	3 717	3 069	2 934	3 087
Ferromanganese	000t	**455**	450	403	204	319
Sales volumes						
Manganese ore*	000t	**3 434**	3 177	2 974	3 090	2 736
Ferromanganese	000t	**398**	360	303	175	223
Unit cost changes – manganese ore						
On-mine production unit costs	%	**15**	16	1	(6)	17
Unit cost of sales	%	**17**	13	12	(5)	2
FINANCIAL						
Manganese ore						
Sales revenue	R million	**12 493**	10 495	8 322	4 841	4 909
Total costs	R million	**7 796**	(6 017)	(4 971)	(4 140)	(3 843)
Operating profit	R million	**4 697**	4 478	3 351	701	1 066
EBITDA	R million	**5 307**	5 015	3 759	1 056	1 328
Headline earnings	R million	**3 449**	3 192	2 407	527	762
Capital expenditure	R million	**2 256**	1 240	1 617	1 939	1 889
Ferromanganese						
Sales revenue	R million	**2 293**	2 338	1 897	1 810	2 219
Total costs	R million	**2 038**	(1 711)	(1 887)	(1 930)	(2 588)
Operating profit	R million	**255**	627	10	(120)	(369)
EBITDA	R million	**356**	684	67	(3)	18
Headline earnings/(loss)	R million	**(228)**	616	(85)	(132)	(185)
Capital expenditure	R million	**54**	45	31	(11)	95

* *External sales only and includes sales to Sakura Ferroalloy.*

AFS Refer to note 2 to the annual financial statements for the manganese segmental information.