



Department of Mineral Resources



SHAREHOLDER
PERFORMANCE AGREEMENT
("SHAREHOLDER COMPACT")
(2018/19)

Entered into by and between the

MINTEK BOARD,
(herein represented by the Chairperson of the Board)

and

THE GOVERNMENT
of the
REPUBLIC OF SOUTH AFRICA,
(herein represented by the Minister of Mineral Resources)

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1. SHAREHOLDER PERFORMANCE AGREEMENT - AGREED PRINCIPLES

1.1 Introduction

1.1.1 The Mintek Board, as the Accounting Authority of a Schedule 3 Public Entity, is required to enter into an annual performance agreement with the Executive Authority – the Minister of Mineral Resources - as per Regulation 29 of the Treasury Regulations of the Public Finance Management Act No. 1 of 1999.

1.1.2 This Shareholder Compact is the performance agreement for the financial year 2018/19, and it derives its goals and objectives from Mintek’s founding legislation, the Mineral Technology Act No. 30 of 1989. The Compact is also inclusive of the Corporate Plan, which is submitted in terms of Section 52 of the PFMA, and consists of the budget, strategic intent and financial plans for the next three years.

1.1.3 The Shareholder Compact also comprises the overarching principles from the Mineral Technology Act No. 30 of 1989; the programmes and key performance objectives that have to be attained over the medium to long term; as well as targets and performance indicators that will be used to measure progress over the Medium Term Expenditure (MTEF) period 2018-2021. It is aligned to the Strategic Plan of the Department of Mineral Resources and compliments its programmes that are in support of the National Development Plan.

1.2 Interpretation

In this Shareholder Compact, unless otherwise indicated or contrary to the context, the words and phrases set out below shall have the meanings ascribed to them as follows:

1.2.1 An **Accounting Authority** of a national public entity is the Board of Directors appointed by the Executive Authority of that entity.

1.2.2 **Board** refers to the Mintek Board of Directors.

1.2.3 **Executive Authority** refers to the Minister.

1.2.4 **Mindev** refers to Mindev (Pty) Ltd, a company with limited liability in terms of the Companies Act No. 71 of 2008, which is a wholly-owned subsidiary of Mintek, and has its registered head office at the same address as Mintek.

1.2.5 **Minister** refers to the Honourable Minister of Mineral Resources in his capacity as such.

1.2.6 **Mintek** is a Science Council established in terms of the Mineral Technology Act No. 30 of 1989, with its principal place of business situated at 200 Malibongwe Drive, Randburg, South Africa.

1.2.7 **Party** refers to either the shareholder or Mintek and **parties** mean both the shareholder and Mintek.

1.2.8 **PFMA** refers to the Public Finance Management Act No. 1 of 1999 as amended by Act No. 29 of 1999.

1.2.9 **R&D** refers to research and development as set out in the Mineral Technology Act No. 30 of 1989.

1.2.10 **Shareholder** refers to the Government of the Republic of South Africa, represented by the Minister.

1.2.11 **Shareholder Compact** refers to the performance agreement between the Board and the Shareholder together with all appendices attached hereto, as defined in the PFMA.

1.3 Nature of the Shareholder Compact

1.3.1 The Shareholder Compact is designed solely to regulate the relationship between the Shareholder and the Board, specifically in relation to the expected outputs and outcomes that are products of Mintek’s work in fulfilling its mandate as articulated by the Mineral Technology Act No. 30 of 1989.

1.3.2 The Shareholder Compact is not intended to:

(i) Interfere in any way with the normal company law principles and the normal relationship between the Shareholder, on the one hand, and the Board, on the other. In giving effect to those principles, the Shareholder would have communicated its expectations to the Board and management;

(ii) Create rights and expectations that third parties may rely upon. It is hereby specifically recorded that this Shareholder Compact does not create, confer and/or afford any third party rights or expectations in terms hereof.

1.4 Period

1.4.1 This Shareholder Compact will be effective for the period 1 April 2018 to 31 March 2019.

1.4.2 It is hereby recorded that the agreed principles, although subject to review annually, set out matters that are applicable beyond a period of a year. In the event that they are amended, the parties shall take into account initiatives already commenced on the basis of such principles.

1.5 Mandate, Vision and Mission of Mintek

1.5.1 Mintek derives its mandate from the Mineral Technology Act No. 30 of 1989. According to the Act, Mintek was established to meet a national imperative “to promote mineral technology; and to foster the establishment and expansion of industries in the field of minerals and products derived therefrom” through research, development and technology transfer.

1.5.2 The Shareholder acknowledges that, included in its mandate, Mintek has a developmental role that may require decisions that are not always optimal from a commercial perspective, but contribute to growth

and development in South Africa and the rest of the continent.

1.5.3 The **vision** of Mintek is to be a global leader in mineral and metallurgical innovation.

1.5.4 The **mission** of Mintek is to serve our stakeholders by adding value to the mineral sector through research, development and technology transfer, in support of national priorities and sustainable growth.

1.6 Strategic Intent and Objectives

1.6.1 The strategic intent and objectives of Mintek are closely aligned with national imperatives and priorities that are in the National Development Plan with specific reference to:

- (a) Maximising the utilisation of finite ore resources by also considering opportunities such as the reprocessing of old discard and tailings facilities. These discard may contain significant amounts of the original commodity, as well as a potential source of secondary commodities that have since become of interest.
- (b) Alleviating poverty and creating employment. Promoting the use of minerals to make the final product i.e. beneficiation activities.
- (c) Adding value to mineral and metal products, and assisting to stimulate transformation within the mining and minerals sectors.
- (d) Promoting the transition from a resource-dominated economy to a knowledge-based economy.

1.6.2 In order to attain its strategic intent, Mintek shall strive to:

- i. **Enhance visibility and credibility among stakeholders** by implementing an integrated marketing and communications strategy;
- ii. **Research and develop efficient mineral processing technologies and value added products and services** in order to, amongst others, strengthen Mintek's position as a global supplier of mineral processing technologies, equipment, process design and control optimisation systems, ultimately contributing to the efficient production of locally manufactured finished products;
- iii. **Promote the mineral-based economies of rural and marginalised communities** through technical assistance and skills development through training programmes that promote a portable skills, by establishing appropriate technologies and strategies with the aim to expand the industry and to lower entry barriers. In pursuit of this objective, Mintek also aims to initiate poverty alleviation programmes and to support the growth of Small, Medium and Micro Enterprises (SMMEs) in the mineral sector; as well as former mineworkers in need of re-skilling.

iv. **Uphold good governance practices** that comply with all applicable national and international regulatory frameworks and standards, maintain fiscal discipline, and enhance organisational efficiencies.

v. **Develop human capital and organisational skills to build world class R&D excellence** while transforming its internal and external business processes and the workforce profile to ensure that they are in line with the demographic profile of South Africa.

To achieve Mintek's strategy, specific and focussed research and development activities are a national priority, and are categorised below:

- The development of downstream applications for PGM's. Mintek currently manages the Hydrogen South Africa (HySA) programme on behalf of the Department of Science and Technology. This programme aims at the development of platinum based fuel cells for use in stationary and automotive applications including Electric Vehicles (EVs). Demand for platinum in the diesel automotive autocatalyst sector appears to have peaked and consequently the development of new markets for platinum are of long term importance in ensuring the sustainability of the South African PGM sector. Over and above the fuel cell activities, Mintek continues to assess additional commercial uses of platinum, for example in the pharmaceutical and chemical sectors.
- The development and facilitation of downstream beneficiation opportunities that assist in the transition of South African from a resource to a manufacturing economy. Particularly opportunities that promote the Black Industrialist and other economic transformation objectives.
- In terms of the economy, platinum group metals, gold, iron, manganese and chromite ores, are major contributing commodities;
- Energy minerals, particularly coal due to Eskom constructing two new coal fired power stations (Medupi in the Waterberg coalfield, and Kusile in the Witbank Coalfield), as well as uranium and thorium;
- "Technology metals" of strategic importance in high technology applications particularly titanium, magnesium, and the rare earth group becoming of greater interest for the electronic goods industry (cellular telephones, computers/tablets etc.);
- Mineral processing technologies that minimise the consumption of energy and water, and minimise environmental impact. Dry beneficiation/minerals processing technologies, such as the recent developments in XRT sorting, are of national strategic importance for water scarce countries such as South Africa, and particularly in the extremely dry Waterberg Coalfield region. This region will become the replacement for the Emalahleni/Highveld/Secunda Coalfields, which are rapidly being depleted after over 100 years of mining activities and what remains is largely low quality. The Waterberg region will therefore become of greater

commercial importance as the replacement energy from coal deposit;

- Addressing point sources of environmental impact and environmental damage caused by mining activities. The main drivers in this field would be the rehabilitation of derelict and ownerless mines, particularly the more harmful minerals such as asbestos. Moreover, acid mine drainage has become a severe problem associated with the mining industry and therefore the development of technology for the treatment of acid mine drainage is essential;
- The development of “value added” processes to allow for the maximisation of the extraction of value from various mineral deposits. This could include the inclusion of novel methods to improve a process plant by modifying the process flowsheet to extract other minerals of interest currently not recovered or previously not seen as important. Furthermore, the development of downstream beneficiation processes to reprocess the plant discards/tailings material that can be added onto an operating plant. A further consequence of the latter would be the reduction in the size of the discards/tailings dumps, and potential mitigation of environmental liabilities such as acid mine drainage, leaching of toxic elements into the groundwater etc.
- The development of suitable technologies for exploiting currently non-viable ore resources is a necessity to ensure some sustainability for the minerals industry. The higher grade, easier to process ores are being depleted and will need to be compensated for by the processing of the lower grade/harder to process ores, which are currently deemed non-viable; and
- Facilitating the entry of SMMEs and the emerging resource companies to the industry who typically do not have in-house specialist technical expertise or basic testing laboratories/facilities. Mintek can therefore provide the appropriate technical support required across the mining value chain, from geology, mineralogy to the minerals processing and ultimately beneficiation needed such as hydrometallurgical, biotechnology processing and pyrometallurgical processing prior the production of the final metal product. Furthermore, techno-economic evaluations can be performed within the Mineral Economic and Strategy Unit to assist in the development of bankable feasible studies for these companies and, moreover, the Advanced Materials Division is able to test the suitability of the final product for the envisaged target market. The Analytical Services Division is able to provide extensive analytical services across all stages of projects development and render assistance to those without adequate laboratory facilities. Additionally, training of personnel on beneficiation techniques and/or setting up the manufacturing of certain niche products is also possible via the Small Scale Mining Division.
- Provision of consulting services to mines wanting to rehabilitate their mined out operations based on Mintek’s expertise gained in the management of the rehabilitation of derelict and ownerless asbestos mines.

Mintek will continue to identify suitable opportunities detailed above and develop the most appropriate, innovative technological solutions for transfer to industry. In addition, the provision of commercial based test work, consultancy,

analytical and mineralogical services will be made available to industry as required.

1.6.3 Mintek’s Products and Services

Mintek has a suite of products and services encompassing:

- Research and development, financed through a combination of public and private sources, parliamentary grants, competitive national and international sponsorship and internal reserves;
- The development and evaluation of various technologies for either the optimisation of current operations, or new projects by means of laboratory-, pilot- and demonstration scale test work;
- The transfer of innovative technology to industry by the most appropriate means such as licensing, sale or in exchange for equity in a project;
- Design and fabrication of specialised plant and equipment for the minerals industry;
- Production and supply of specialised mineral and metal products; and
- Provision of specialised consultancy, training and advisory services to the minerals industry.

1.6.4 Client Base

Mintek’s client base consists of three spheres of government, other state enterprises, communities, mineworkers, large multi-national mining companies (majors), emerging resource companies, engineering contractors and SMMEs both locally and internationally.

1.6.5 Competitors

Mintek, which operates in the global arena, servicing a multi-national industry, means that Clients have the option to source similar services from comparable facilities in Australia, Europe, Canada, Brazil, Chile, USA, China and Russia. The Client’s selection of their preferred institution is often based on the reputation of the technical experts along with the quality of the facilities. In this regard, Mintek has very strong competitive advantages with respect to its excellent, large-scale facilities, an excellent reputation as a “one-stop shop” and, more especially an enormous information database developed since 1934, the year Mintek was originally established as the then Mineral Research Laboratory, which was based at the University of the Witwatersrand in Johannesburg. Despite this, the greatest challenge facing Mintek is the recruitment and retention of world-class expertise to maintain the historical high reputational standards.

1.6.6 Business Environment

The global mining industry has experienced an almost-unprecedented period of difficulty over the last 10 years or so, where mineral and metal demand tumbled, metal prices reached exceptional lows, grades are declining in the remaining reserves/ore bodies which, coupled with rapidly rising costs, mean that stakeholder expectations are at odds with the industry reality. China, the global mineral commodity growth engine and is the major producer of some 29 minerals/metals, has also reduced its demand in line with its shift from infrastructural investment to consumer-led growth. A growing

demand for [Electric Vehicles (EVs) will have major implications for future demand of minerals, mainly on Platinum Group Metals.

Consequently, the project development pipeline, a key indicator of the demand for Mintek's commercial services, was slow in recent years but the geological exploration programmes and project investments appear to be beginning to enter a growth phase.

Industry consensus was that 2017 was expected to be the start of the recovery of the industry from its current depressed state. This was seen to be the case with most commodity prices improving significantly from 2015, though some volatility within the markets exists. One notable event was the palladium price exceeding that of platinum. However, it should be borne in mind that demand for Mintek services may not be seen immediately since potential Clients will need to focus on debt reduction, resume deferred construction and/or expansion and brownfields projects. Thereafter, consideration may be given to new greenfields projects and exploration programmes that will require the services of Mintek. It is therefore expected that this will create lag of between 1 to 2 years from recovery to the Client using Mintek's services.

In short, the weakened demand for Mintek commercial services evident over the past few years is expected to continue until late 2018 to mid-2019.

Although the continued changing global and local economic landscapes require Mintek to reposition itself such that the business remains sustainable well beyond the next century, the State funded research programmes are showing promise as future opportunities whereby the remediation of acid mine drainage and tailings/dump reprocessing will allow for the removal of either contaminants or valuable material in these tailings. In the short term, there not be any financial gain for the mining companies, but mining reserves are depleting and are also becoming increasingly difficult to mine with respect to depth and the limitations of current mining technologies. Therefore, the recovery of material from the tailings and dumps will be necessary to sustain the minerals industry, whilst further values will be extracted by the recycling/reprocessing of electronic waste.

Through discussion with the CEOs of several major mining companies in South Africa, an opportunity to assist those companies operating in other African countries has potential that can be exploited to Mintek's benefit, such as Tanzania and Zimbabwe, where the governments of those countries are applying pressure to the South African companies to perform local refining/beneficiation rather than exporting the concentrates to South Africa for this step of the value chain. Through the application of, for example, our Minataur refinery process, these companies have the potential to use Mintek technology and expertise to refine the concentrates locally to a high degree of purity, whilst simultaneously fulfilling the request from the host governments regarding refining and beneficiation within their borders. Through this initiative, Mintek's footprint in Africa can be expanded by assisting the mining houses of those countries in a similar manner.

As the commodity prices improve, in particular the platinum group metals, the development of alternative uses for these metals needs some additional stimulation on the demand side,

such as investment bullion bars, investment coins such as a platinum Kruggerand to complement the current gold and newly minted silver versions. Consideration should also be given to the establishment of a central PGM repository thereby ensuring security of supply in the event of either local or global shortages to enable the manufacturing of autocatalysis to continue unaffected.]

1.7 Corporate Plan

- 1.7.1 Mintek's corporate plan, incorporating its budget, strategic intent and financial plans, is submitted to the Executive Authority in terms of Section 52 of the PFMA.
- 1.7.2 Mintek's corporate plan, including its goals and objectives, is aligned with the strategic intent and will inform the direction for Mintek going forward.
- 1.7.3 The Shareholder will monitor Mintek's performance based on the strategic business targets set out in the Corporate Score Card Section.

1.8 Roles and Responsibilities

- 1.8.1 The Shareholder is empowered and hereby reserves the right to determine initiatives, projects or activities that Mintek shall undertake or become involved in, in the national interest, subject to the requirement that such activities shall:
 - be funded from the parliamentary grant, and
 - not prejudice Mintek's operations, financial health and ongoing viability as a going concern.
- 1.8.2 The key performance measures for Mintek, if necessary, shall be adjusted by the Shareholder to take into account Mintek's developmental role.
- 1.8.3 Any Developmental Project determined in terms of clause 1.8.1 shall be deemed to have been approved in terms of Section 54 of the PFMA, and no further approval shall be required in respect of such projects.
- 1.8.4 A definition of what constitutes major Developmental Projects and the applicable criteria shall be developed by the Board and agreed to with the Shareholder prior to commencement of the project.
- 1.8.5 The Board and the Shareholder shall agree on an amount to be set aside for developmental projects.
- 1.8.6 The Board hereby:
 - 1.8.6.1 Undertakes to oversee and to contribute to the development of the strategic intent and the management of the business in accordance with such strategic intent, corporate plan, the Mineral Technology Act and any applicable legislation. The directors shall exercise their skill and fiduciary duties to ensure that management pursue the objectives and targets as set out in the corporate plan;

- 1.8.6.2 Commits itself to the achievement of the vision, mission, goals and objectives, and strategic intent of Mintek, and always acts within its powers and in the best interest of Mintek;
- 1.8.6.3 Accepts its responsibility to direct and guide the business in a proper manner in keeping with good governance practices, the PFMA, the Mineral Technology Act, the Shareholder Compact, and in particular, in compliance with the materiality framework agreed to with the Shareholder, which is annexed hereto as Appendix I; and
- 1.8.6.4 Recognises the importance of speedy decision-making and will use its best endeavours to prevent undue delays with regard to critical decisions.
- 1.8.7 Subsidiaries:
- 1.8.7.1 The performance of Mindev will be regulated by Mintek in its capacity as shareholder in line with the broad policy and direction from the Shareholder. Mintek shall enter into a Shareholder Compact with each of the main subsidiaries formed or to be formed, which Compacts shall be regarded by the Shareholder as compliant to the PFMA.
- 1.8.7.2 In addition, Mintek will ensure that Mindev and all its subsidiaries shall comply with the policies of the Shareholder, and that they adhere to acceptable governance practices in terms of reporting and accountability, as well as the materiality framework annexed as Appendix I.

1.9 Undertakings by the Shareholder

The Shareholder undertakes for the duration of this agreement to:

- 1.9.1 Give reasonable notice before the introduction of any new or additional requirements during the validity period of this Compact. In addition, the parties shall, in such an event, amend the key performance indicators and targets, failing which, no new requirements or targets may be introduced;
- 1.9.2 Allow the Board the space to exercise its own discretion regarding matters falling within its authority, as provided for in this agreement, the PFMA and Mineral Technology Act No. 30 of 1989;
- 1.9.3 Respond speedily to critical decisions or the proper constitution of the Board, and to fill vacancies that arise in the Board within a reasonable time; and
- 1.9.4 Ensure that the Mintek Board or any of its directors are not in breach of any legal duty.

1.10 Mineral Technology Act

- 1.10.1 The Shareholder, in consultation with the Board, shall ensure that the Shareholder Compact and the

Compact between Mintek and its subsidiary shall be consistent with the Mineral Technology Act No. 30 of 1989 and the Memorandum and Articles of Association of any of the main subsidiaries.

- 1.10.2 In the event that there is any conflict between the provisions of this agreement and the Mineral Technology Act the provisions of the Act shall prevail.

2. SUBSIDIARIES – MINDEV

Mindev is a sole Mintek subsidiary that was first registered in 2001 with the aim of having a flexible entity that would facilitate joint ventures and/ or participation with various partners in order to optimise Mintek's technologies.

In line with the Companies Act, No. 71 of 2008, Mindev registered its Memorandum of Incorporation with the Companies and Intellectual Property Commission and was issued with a certificate of confirmation by the Commission in 2012.

Mindev has entered into various joint ventures over the years but is currently dormant from both an investment and operational perspective. The resultant effect of Mindev's prior years' net investment activities is that there are reserves of R39.5 million, currently represented as an interest free loan receivable from Mintek.

Mintek is still of the view that Mindev should be retained in order to maximise the commercial value of Mintek's fully developed technologies in the future. In each specific instance, the role of Mindev in maximising the commercial value of fully developed technologies will be reassessed at the appropriate time.

Mintek will continue to invest all Mindev funds and provide for all resultant taxes due on the interest earned. The entity will also comply with the applicable company legislation requirements.

3. PROGRAMMES

This describes the technical activities planned for each of Mintek's Strategic Business Units (SBUs). The activities are associated with either performing research and development, or providing products and services to the private sector.

The following are Mintek's programmes for the duration of this Shareholder Compact:

3.1 Technology

This programme consists of four strategic business units that have a greater focus on commercial business compared to research programmes. These divisions are, Minerals Processing, Hydrometallurgy, Pyrometallurgy and Analytical Services.

3.1.1 Minerals Processing Division

The Minerals Processing Division (MPD) transforms the ores found in nature to value-added products. Ores typically contain many waste and undesirable elements thus processing them involves difficult and complex technologies or methodologies. MPD therefore develops mineral engineering solutions for the recovery of minerals from a large variety of ores, through laboratory bench test work and pilot test campaigns. The division aims to supply world-class, innovative test work, technologies, products and consulting services to the metallurgical industry and government agencies.

The specific details vary across the different commodities. However the over-arching cross cutting research themes and activities in MPD are focused on the following strategic imperatives:

- Improve energy efficiency - Development of energy efficient technologies and practices, underground ore processing and upgrading of concentrates;
- Improve water efficiency - Development of water lean technologies, in-circuit recovery and recycling and use of poor quality water;
- Enhance process efficiency - Enhanced recovery technology, process intensification and enhanced fines recovery;
- Extend ore reserves - Improved ore characterization, pre-concentration technology and tailings and waste treatment; and
- Optimize economic value - Modelling & simulation, mineral-to-concentrate value optimization and geometallurgical tools & techniques.

MPD's principal areas of specialist expertise include the disciplines of **Comminution, Physical Separation and Flotation**.

The process flow sheet for most metallurgical plants starts with crushing and milling circuits. Testwork is required to design these circuits. Sample selection for the test work also needs to be representative of the mining plan. MPD's **Comminution Group** therefore possess extensive facilities for sample preparation, bulk crushing and milling of metallurgical samples. This group also conducts pilot scale testing that utilize a range of equipment, including AG/SAG milling or SMD or Deswick mills.

Physical separation features in almost every mineral processing circuit. This involves the use of a broad range of techniques and technologies including hydrocyclones, gravity concentration methods (including jigs, spirals, centrifugal concentrators, tables, heavy media separators) and thickeners, all of which make use of the inherent density differences between two mediums. The **Physical Separation Group** of MPD specializes in utilizing these techniques including sensor-based sorting (XRT, XRF, Laser) and magnetic methods to initiate separation of various minerals both at laboratory and pilot scale. Overall, suitable techniques are selected and used with fines or coarse processing to produce concentrate products at target specifications.

Flotation test work is required for more complex ores, especially those containing sulphides. The **Flotation Group** of

MPD therefore executes testwork from bench scale up to pilot scale to enable clients determine the optimum flowsheet design and operating conditions required for the achievement of optimised commodity value.

MPD key service offerings include optimisation of unit operations, plant audits, evaluation of metallurgical technologies, modelling, benchmarking and metallurgical industry standard tests.

MPD's services usually results in commercialization of a new or improved technologies within the mining and metallurgical industry. In general, the final output results in implementation of a new technologies and processes within the commercially sponsored projects. For example, currently, various testwork involving reflux classification have been undertaken for many clients in the industry by MPD.

MPD undertakes desktop, laboratory and pilot plant scale studies to develop the most suitable plant configuration for existing operation or new project or ore types. The technical expertise offered by the division to the minerals industry are considered to be a distinct competitive advantage since few companies have the knowledge, experience and equipment to operate such large integrated pilot plants.

MPD has identified processing of low-grade and complex ore bodies, water and energy efficiency and sensor based sorting as important industry drivers therefore these are the themes that feature strongly in the divisional strategy over the short to medium term.

3.1.2 Hydrometallurgy Division

Hydrometallurgy is a collection of techniques for obtaining metals from their ores or concentrates generated from ores. It is a discipline within the field of extractive metallurgy involving the use of aqueous chemistry for the recovery of metals from ores, concentrates, and recycled or residual materials. It also represents the final stage of beneficiation in the extractive metallurgy process since impurities are removed from process streams allowing for the generation of pure metals or metal salts that can then be used for downstream value creation. The Hydrometallurgy Division (HMD) at Mintek leverages its unprecedented range of integrated test and pilot facilities as well as a high level of expertise to develop processing solutions for the minerals industry, primarily in South Africa, but also worldwide. This process development is supported by a broad in-house network of related disciplines such as minerals processing, pyrometallurgy and mineralogy as well as an extensive analytical facility.

The activities in the HMD are directed from a strategic point of view, by a number of high level imperatives which include:

- Sustainable development of South Africa's mineral wealth; and
- Development of novel technologies and process solutions to support and stimulate identified growth areas in the minerals industry.

Both these high level imperatives are aimed at creating jobs in the industry and therefore to contribute to the ideal of a better life for all in South Africa.

In order to drive these imperatives, a number of technology goals have been identified in order to provide more focussed strategic guidance. These goals include:

- Energy efficiency.
- Water efficiency.
- Process efficiency.
- Economic efficiency.
- Greening of processes.
- Extending economic resources.

In order to fulfil its mandate, HMD is divided into two commodity groups:

- Precious Metals and Uranium.
- Technology Metals.

The competence in each of these groups comprises of a collection of technical disciplines focussed on the commodities that they serve and include the following:

- Leaching (dissolving metals from their ores).
- Solution concentration and purification (removal of impurities from process streams).
- Metal precipitation or electrowinning (preparing pure metals for downstream value-add).

Particular areas of expertise within these categories are pressure leaching, direct electrowinning, solvent extraction and ion exchange, process simulation as well as cyanide and arsenic speciation.

Although the development of processing technologies continues across the entire minerals industry from base metals through rare earths to precious metals, HMD currently focusses on the development of capacity in a number of key areas believed to be of strategic importance for the country, industry as well as the commercial sustainability of the Division and Mintek. These areas include:

- Gold processing (Current focus is on environmentally responsible gold tailings and reclamation projects. Recovery of gold from refractory ores using continuous pressure oxidation as one of the processing options). Due to the large number of gold containing dumps in South Africa, these technologies can open up significant potential job opportunities by involving local communities in the processing of these dumps;
- Holistic approach to cyanide management (includes dosing optimisation, real time monitoring, destruction, recycling and on site generation);
- Uranium processing (resin-in-pulp extraction, pressure oxidation of sulphide containing ores, high

saline and high pH ion exchange recovery and direct precipitation, application of nano-filtration technology for reagent recycling);

- Rare Earth Element extraction and refining (Process Simulation, Rare Earth ore cracking, REE concentrate purification and REE separation and techno-economic evaluation);
- Ion exchange technologies (NIMCIX process modelling, novel hybrid IX systems);
- Enhanced leaching systems (ionic liquids, ultrasonic assisted leaching, Pressure oxidation (POX));
- Water lean technologies (Membrane technologies, intelligent process water utilisation);
- Residue stability manipulation (POX);
- Value recovery and stabilization of various mine dumps (jarosite, vanadium, thorium and uranium containing); and
- Treatment of contaminated water and waste streams (SAVMIN™ and Ion Exchange fibres/resins, alternative adsorbents, research in direction of such contaminants removal as As, Se and Cr from AMD waters and industrial waste waters).

The impact and acceptance of new technologies or products developed in HMD are normally maximised through partnerships with the industry. Examples of these are the demonstration of the MetRIX Resin-in-Pulp technology for uranium and base metals in collaboration with Tenova as well as the demonstration of the SAVMIN™ acid mine drainage treatment process in partnership with the world's largest water treatment company, Veolia.

More established products, such as the Minataur® gold refineries and the Nicksyn™ nickel and cobalt extraction synergist, are supported from HMD, while marketing and application of these products are done through collaboration with industry partners.

Inexpensive technologies for the reclamation of value from residue disposal facilities can be transferred through social responsibility initiatives with mining companies, DMR and NGOs. Through these initiatives commercial opportunities can be created for distressed communities by making available appropriate technologies and providing technical and business support to them. An example of this is the ReFlAuT™ technology which provides a commercially viable route to setting up local communities to derive value from the gold containing mine dumps.

In summary therefore, HMD provides processing solutions for the promotion of sustainable exploitation of the mineral wealth in South Africa and globally by:

- Providing world class technical expertise and unparalleled test work facilities;
- Implementing, improving or adapting process flow sheets to suit clients' site-specific conditions;

- Increasing process efficiencies resulting in increased viability of operations;
- Greening processing by minimising process liabilities, reducing waste production and minimising environmental impact by enhancing residue stability;
- Fostering downstream beneficiation by providing metals of correct specification to the technology and manufacturing industries; and
- Seeking partnerships with industry to leverage appropriate technologies for economic relief in communities distressed by cessation of mining activity.

3.1.3 Pyrometallurgy Division

The Pyrometallurgy Division (PDD) exists to develop and test processes and equipment for the production of metals at high temperatures. Mintek has well-equipped pyrometallurgical laboratories and pilot-plant furnaces (up to 5.6 MVA), and these are supplemented by a strong capability in computer modelling of electrical and chemical process fundamentals and PDD is one of the few places where large-scale piloting and process demonstration can be carried out at about one tenth of commercial scale, running continuously for months, treating up to thousands of tons of feed. Over the past thirty years, Mintek has become best known for its expertise in electric smelting, with a particular emphasis on direct current (DC) arc furnaces. Industrial processes have been developed for chromite smelting to produce ferrochromium, ilmenite smelting to produce titania slag and pig iron, cobalt recovery from copper slag, treatment of stainless-steel dust, battery recycling, and ferronickel production from laterite ores. Many of these processes are in use internationally as well as in South Africa. Other notable past work has included the fuming of zinc from a variety of hazardous wastes followed by condensation / absorption and distillation, the fuming and condensation of magnesium, and the recovery of platinum group metals from 'difficult' feedstocks.

The overarching principle for all research in the Division is aligned with the principles of the national development plan, 'eco-efficiency' and aimed at delivering high-impact output that will enable the creation and support of the local industry. The Division's research is targeting efficient extraction of strategic metals in Southern Africa with priority metals dominated by ferro-alloys like chromium and manganese with the primary aim to do so with maximum benefit for the citizens of South Africa.

PDD is structured broadly into three technical teams. The Process Demonstration team incorporates the Division's laboratories and the work in this section focus primarily on developing of process flowsheets through a combination of laboratory-scale and pilot plant testing. The group is very active in ferro-alloys, platinum group metals, base metals, but provides a large range of services to industry through specialized experimental development to support process development. The New Technology team focus on research that provides step-change technologies, with development of new smelting technologies a primary focus. Treatment of activated carbon, chlorination and specialized metals research

forms part of this team's specialization. Project support for large scale pilot plant research is facilitated by the largest of the three technical teams. The team provides technical and resource support for pilot projects and includes the technical team responsible for MTEF projects. The division operates two large pilot-plant bays, which is managed by the Project Support team.

PDD strives to develop efficient and effective pyrometallurgical processing technologies and value adding products and services whilst continuing to build world-class pyrometallurgical R&D excellence to enhance South Africa's environmental assets and natural resources. The efficiency principle adopted as part of PDD's research roadmap is supported through the following main priority research themes:

- Energy and water efficiency.
- Process and resource efficiency.
- Greening of processes.
- Extending and unlocking resources.

PDD focusses on project development in a number of key areas believed to be of strategic importance for the industry as well as the commercial sustainability of the Division and Mintek. The aim is to find suitable industry partners to commercialize key technologies and thus PDD is currently focusing on several priority areas, amongst others. These areas include:

- PyEarth™ smelting technology for upgrading of low-grade rare earth oxide containing ores (high iron ores in particular);
- Impril™ an improved smelting process for processing titania-containing ores like ilmenite focusing specifically on energy efficiency and improving process recoveries;
- Implementation and support for the low-grade chromite smelting process;
- DC coal gasification – a process technology aiming at utilizing waste coal to produce energy and potentially recover value metals from the slag;
- Smelting of pre-reduced titaniferous magnetite to recovery vanadium, iron and high-titania slag (demonstration facility to be constructed at Mintek);
- Implementation of process using waste manganese slag to produce cement and recover manganese;
- Implementation of an anode design;
- Implementation of DC smelting technologies including ferrochromium smelting, slag cleaning and ConRoast™; and
- Recovery of zinc from waste, slags and other residues, Enviroplas™.

The Division is also supporting stakeholders to develop research roadmaps for the manganese, iron and chromite industries via a variety of support interventions and is playing the role of partner in the INTPART exchange project aiming at building research capacity in South Africa and Norway.

3.1.4 Analytical Services Division

The Analytical Services Division is the chemical analytical arm of Mintek. The primary reason for the existence of the Analytical Services Division is to provide accurate and timeous analytical results to the internal technical divisions of Mintek. While this is the primary reason for the existence of ASD, the division also caters for the wider mining industry as well. Thus the types of projects the division is involved in, are usually as a result of one of the technical divisions running it and ASD running the project as a support function to the division. To this end, ASD is able to run 24 hour shifts in support of a project, depending on the requirements of the client.

With a status of 22 years of unbroken ISO 17025 accreditation, the division strives to serve both Mintek business units and the mining sector around the country. ASD provides a complete analytical service, ranging from training to service analysis. The recent renovations have further enhanced the functioning of the division to world class standards in the following ways:

- Process flow has been optimized to improve sample flow. This allows for higher sample throughput efficiency. Movement between floors carrying samples has been reduced markedly. Staff have access to a desk and computer closer to their laboratories.
- ISO 17025 accreditation of a minimum of one method in each section (Fire Assay, Classical Chemistry, ICP-OES, AAS, XRF). Soon these methods will be upgraded to include the service of biological monitoring of U in urine by ICP-MS. These accredited methods service both the major and junior commodities miners of South Africa (Au, PGMs, Cr, U, and Fe) and the region.
- Automation through an advanced LIMS that manages the administrative functions of the laboratory starting from the logging of a sample and culminating with a final analytical report. Analytical equipment are interfaced to the LIMS, greatly improving turnaround time and data quality.
- State-of-the art-instrumentation in all the sections (Primary Preparation, Secondary Preparation, Fire Assay, Classical Chemistry, ICP-OES, ICP-MS, AAS, and XRF) with a 5 year capital replacement program for major equipment expenditure.
- Provision of training to the industry through on-the-job twin-streaming laboratory activities for Mintek bursars and work integrated learners. The division is further involved in hosting an annual analytical symposium to broaden the scope of knowledge transfer.

Quality assurance is of the utmost importance to clients and the laboratory has a history of using blanks, replicates and

or/duplicates, and Certified Reference Materials to control quality.

The South African Reference Materials (SARM) is an ASD owned Certified Reference Material production facility and brand. The reference materials are produced on demand for resale, or for use by clients as their own internal quality control. ASD is flexible to be able to meet these client requirements for Certified Reference Materials.

To ensure a constant supply of new skills, the division sponsors students at Universities. Currently there are two students studying for their PHDs, and one studying for an Honours degree. On completion of their studies, they are absorbed to work for the division, injecting new skills into the division in the process.

The division has replaced two old electrical fusion furnaces in Fire Assay with modern gas fired furnaces. This will assist in general electricity cost control both for the division and ultimately for Mintek, as gas furnaces generally are cheaper to run. The temperature ramp up is faster than that of conventional electrical furnaces.

The Analytical Services Division is a unique laboratory servicing both the metallurgical and research needs of Mintek while at the same time serving the global geochemical, mining sector and associated industries.

3.2 Research and Development

This programme consists of five strategic business units that have a greater focus on research and development rather than commercial programmes.

3.2.1 Advanced Materials Division

The Advanced Materials Division (AMD) develops cost-effective metal-based materials through value-addition to South Africa's most strategic metals and minerals (precious, ferrous and base) for use in the fields of metallurgy, biomedical, catalysis, nanotechnology and the environment. The division has strong interactions with local and international higher education institutions, and mainly derives its human capital pipeline from various DST and the National Research Foundation (NRF) human capital development programmes such as the Professional Development Programme (PDP) and the DST Internship programme. The division's revenue stream primarily emanates from large government-funded programmes, as well as from the provision of products and services to local and international clients.

The DST-funded programmes and projects hosted by the division are as follows:

- Advanced Metals Initiative (AMI) – Under this initiative there are two areas:
 - Ferrous Metals Development Network (FMDN) hosted by the Physical Metallurgy Group. The FMDN undertakes research into durable and cost-effective materials for broader industrial applications.
 - Precious Metals Development Network (PMDN) hosted by the Catalysis Group with an emphasis to

conduct pilot plant work and develop products in collaboration with end-users.

- Centre of Competence in Hydrogen Catalysis (HySA/Catalysis) – The primary task of the HySA Catalysis Centre of Competence, which is jointly hosted by Mintek and the University of Cape Town (UCT), is to accelerate the establishment of a local value chain in the manufacturing of fuel cell catalysts, components and systems in collaboration with local and international industry partners.
- The HySA Programme Office – The programme office was established for the sole purposes of coordinating the activities of the HySA National Programme. Although the office does not fall under AMD, however, in its formative stage, the Division is providing a supporting function as the office gets off the ground.
- DST/Mintek Nanotechnology Innovation Centre (NIC) – The centre focuses on the development of nanostructures and their usage as systems or tools for therapeutics, water treatment and diagnostic purposes (e.g. developing electrochemical sensors and optical diagnostic devices).

A world-class clean room facility has been completed where nano-device prototypes and products will be manufactured for sale to customers and collaborators.

All these programmes are focused on enabling the creation of new industries and improving the global competitiveness of existing industries in South Africa supported by a technologically evolved workforce.

The Physical Metallurgy Group is currently involved in the aluminium (thermo-mechanical and texture analysis) and precious metal (jewellery alloys) R&D programmes within AMD. It is also leading the technical assistance programme in collaboration with the National Foundry Technology Network (NFTN), an initiative funded by the Department of Trade and Industry (the dti), to assist the South African foundry industries and other non-ferrous companies.

In addition to a healthy income stream from R&D activities emanating from government-funded programmes, there is a major effort in the division to derive revenue from products and services that emanate from technical outcomes of various R&D programmes. The product and services activities in AMD include the following:

Metallurgical service work conducted under the Metals Technology Centre (MTC), which provides consulting and testing services to the metallurgical industry. It also provides consulting and technology assistance on corrosion, and foundry project work to local, Southern African Development Community and international clients;

- The MinNanogold™, MinDiagnostics™ and the MinPeptides™ products and services activities from the Nanotechnology Group;
- The marketing and selling of gold catalyst products (AuroLITE™ and AuroLITH™). To date, over ½ tonne of catalysts have been sold to 18 local and international customers. The Catalysis Group has also started marketing and selling Pt-based catalysts. Interest in this suite of customised catalyst products is starting to come from both research institutions and big companies; and
- The positioning of the Centre for Metal-based Drug Discovery (CMDD) to be the preferred provider of metal-

based compounds that can be used for various applications including drug design and discovery, and a suite of services that include sample evaluation, development of assays, training and equipment usage.

Given infrastructural investment that the CMDD group has garnered over the years, the group is also looking at environmental sciences as one of the key strategic areas. More importantly the group will focus on the new and emerging contaminants in soil and water. Other areas of interest include mycotoxin identification and characterisation in animal feed, dairy etc. Furthermore, this work will be conducted in collaboration with leading local and international stakeholders in the field.

3.2.2 Biotechnology Division

The Biotechnology Division (BIO) develops bioleaching technologies and has established an internationally recognised position for the treatment of sulphide ores and concentrates bearing gold and base metals. BIO's tank bioleaching activities include amenability testwork, piloting, flowsheet design, techno-economic studies and plant commissioning. As a result two commercial gold tank bioleaching plants have been licensed in Tasmania and China. A bioleaching pilot plant has been used to demonstrate the treatment of polymetallic concentrate in Mexico, and most recently the first tank bioleaching plant in the world for nickel extraction has been commissioned in Finland.

With the depletion of higher grade resources BIO has also diversified into heap leaching, firstly as a laboratory testwork service supplier. A large number of copper, uranium and nickel ores have passed through our laboratories during the past 15 years. Kipoi (DRC) and Tschudi (Namibia) are recent regional heap leaching projects for which the designs have been based on data generated in the Mintek heap leaching laboratories. BIO has also undertaken research into the advancement of heap leaching technology. Examples include modified agglomeration and curing processes and quantified geo-mechanical characterisation of ores for heap leaching.

The Division has recently expanded its research activities to include topics that are of generic application and are more directly applicable to the South and Southern African needs. Such topics allow greater interaction with other local institutions and broaden the research funding base. The division is developing competencies in the following areas:

- Treatment and extraction of value from solid industrial wastes such as electronic waste and process residues such as tailings from gold and uranium mining operations.
- Processes for the treatment of effluents from gold and coal mining activities, including microbially-assisted reduction of sulphate.
- Synthesis of environmentally friendly minerals processing bioreagents.

Collaborative links are being maintained with European consortium partners to maximise mutual benefit.

3.2.3 Measurement and Control Division

The Measurement and Control Division (MaC) is a leading international supplier of advanced process control and instruments to industrial minerals processing, hydrometallurgical, and smelting plants. The division covers the full product development cycle, from discovering and understanding the needs of the industry, conceptualising novel solutions, developing and testing the resulting products, to transferring the technologies into industry, and marketing, commissioning, and supporting them. By taking this approach, the division strives to deliver the maximum benefit to the client, though having product, technology, and process experts all “under one roof”.

MaC has developed and commercialised a number of niche measurement instruments for the gold, ferroalloy, and PGM industries to provide both process and environmental monitoring capabilities upon which control systems can be designed and implemented. The most notable of these instruments is the Cynoprobe, an online, in-pulp cyanide measurement instrument that is used by gold leach plants to both optimise the dosage of cyanide into the gold leach tanks to ensure the gold is leached effectively, and at the tail-end of the process to monitor the cyanide levels in effluent streams to ensure compliance with environmental guidelines. Mintek has sold well over 100 of these instruments to over 20 countries.

Focus in the 2017/18 FY year is to continue with the development of a low cost version of the Cynoprobe, which will enable smaller gold producers to obtain this technology, and reap the benefits of better process performance and reduced environmental impact. This year the division aims to finalise the commercial version of the Handheld Cynoprobe, which has been generating much interest. The handheld version will facilitate the use and evaluation of Cynoprobe’s more robust amperometric measurement technique within a Client’s own laboratory to assist with International Cyanide Management Code (ICMC) compliance and to evaluate the measurement principle for wider online implementation of the Cynoprobe v3 as part of a broader ICMC compliance strategy.

In addition to the Cynoprobe, MaC has recently added an ultrasonic-based carbon concentration meter, the C² Meter, to its suite of gold-process measurement instruments, which has been experiencing good uptake in the market. In 2017/18, the division aims to release a lower cost version of this instrument that also includes an online pulp density measurement. The C² Meter requires the density as an input to its calculations, but currently these have to be entered manually, or fed to the instrument from a remote density measurement. This innovation will allow the C² Meter to compensate for variations in density without relying on outside information. This results in more accurate, consistent measurements, while simultaneously reducing manufacturing costs.

The second major focus area for the MaC division is the development and application of advanced process control (APC) technologies. In many respects, the division is the leader in the field of APC for minerals processing. The division’s flagship control systems: FloatStar, MillStar, FurnStar, and LeachStar, are regularly shown to improve plant recovery by in excess of 2%. This results in payback periods of as little as 3 months in some cases. The challenge with most

modern control systems is that they rely on a mathematical model of the plant to determine and predict what effect control actions will have on the plant. The problem is that the models are never perfect, and plant conditions and responses change. A manual remodelling process is therefore required periodically to ensure the control system continues to operate effectively. Last year, Mintek released its “Automodeller” tool that is able to inject signals into the plant, while still under control, to extract a model of the plant without the need for any manual process. This means the modelling process can be run more frequently and for longer periods, unattended, to get better, more accurate models and ensure the control system continues to operate effectively.

The models that the Automodeller produces can be used to determine the optimum steady-state operating point of the process – a technique termed real-time optimisation (RTO). Here the control system is able to determine where it needs to compromise in order to get the best performance from the system as a whole. Traditionally control systems rely on the metallurgist or operator to specify the setpoints to which the controller must control, but these are rarely adjusted, and often result in the plant being run sub-optimally when conditions change or disruptions occur. With the real-time optimiser, these setpoints are now automatically determined by the control system to provide optimal overall performance. Several refinements to this technology were made in 2016/17, and one of the main objectives in 2017/18 is to apply this technology to new and larger sections of process plants. Early 2017/18 will see RTO being used to optimise the mass pull on flotation concentrators.

Further cutting edge R&D to be performed in 2017/18 will be in the form of investigations into the application of Deep Learning, a form of artificial intelligence (AI) used by the big technology companies like Google and Microsoft, to minerals processing applications. Success here could mean a paradigm shift in the way metallurgical plants are operated.

3.2.4 Mineralogy Division

Mintek’s Mineralogy division is looking at adding value to mineralogical and metallurgical offerings through application to geological and mining attributes in order to understand and predict process variability. The saleable product at the end of this research is a holistic approach to ore deposit exploitation that minimises technical and economic risks of the operation. The division’s intentions are to achieve a competency in geometallurgy that can be marketed to clients in the commodity industry, starting with the PGM industry. The division is looking at expanding its services by adding value at sampling stage before samples are sent to Mintek for characterisation. To achieve this the division will be working closely with its mining clients. The sampling will be conducted by engaging with geologists/mining engineers/plant personnel and economic advisors. This approach to ore deposit development and sustainability is holistic, rather than process- or unit operation focused.

Mintek has mineralogists with geological and resource evaluation experience, process engineers, metallurgists and economic evaluation expertise. Coupling this with mining engineering expertise from our clients, our service offering will

be enhanced, thereby providing positive financial impacts compared to the current practice. Although currently this research piloted on the PGM market, the approach is applicable to all commodities, so would apply to the entire minerals value chain.

The diamond provenance laboratory of MNL has been in existence since 2008. To effectively use the laboratory and its equipment it has been decided to increase the suite of mineral analyses that can be undertaken. With further experience an interest has been established and a need noted for homogenous calibration materials that are also matrix matched. At the European Workshop of Laser Ablation (EWLA) of 2014, the idea of nanoparticulate standards arose. Mintek has made, and continues to make, the SARM set of calibration materials for bulk element analysis and has a reputation with researchers for this. The division will be conducting a research on producing nanoparticulate standards, having matrix matched calibration materials for LA-ICP-MS users. This research will not only increase Mintek's portfolio but also place Mintek on the map for reliable calibration materials that meet both requirements for a technique that is being used more frequently for trace element analyses.

The production of these standards that are homogeneous at the nano-scale would allow for accurate mapping of trace element distributions in minerals, particularly refractory minerals hosting gold, PGE, etc. This would fill a gap in the analytical sphere of microbeam methods, and aligns with national priority 10, on enhancing natural assets. Coupled with lower grades is difficult access to element, and understanding their distribution at high resolution is required. Producing such standards will be enabler and thereby unlock further potential for appropriate processing.

According to the Processing Road Map of the Technology Innovation Roadmap, "innovation would have to happen in the context of lower grade and more complex ore requiring to be processed". Micro-analytical techniques such as LA-ICP-MS can provide such innovation due to the scale to which the LA system can analyse a solid sample - between 10 and 100 microns. This speaks to the creation of calibration materials on the nano-scale for optimum usage of this technique. These standards may have relevance to other scientific spheres, namely the EMPA and XRF.

3.2.5 Small Scale Mining and Beneficiation Division

The small scale mining and minerals beneficiation sector plays a crucial role in the South African economy as it presents mineworkers and communities in rural and peri-urban areas with a solution to poverty alleviation and improved livelihoods. This sector is however characterised by limited resources, primitive mining and processing methods, lack of understanding of legislation, limited business acumen and many other developmental challenges. Mintek, through the Small Scale Mining and Beneficiation Division (SSMB), provides supports through research and development of appropriate technologies for use by SMMEs within the sector. Further technical training, business and marketing support is also provided to ensure sustainable development of these SMMEs.

The shortage of skills within the sector requires more focussed interventions because of its informality and the level of education of operators and crafters in the sector. Accredited quality skills transfer programmes represent greater promise in ensuring long-term sustainability of operations, while maximising the macro-economic and social benefits and minimising the environmental costs. The training programmes offered by SSMB that are a vehicle for economic development, job creation, poverty alleviation and upliftment of both women and unemployed youth include introduction to small scale mining, jewellery, semi-precious gemstones, glass beads, glass slumping and pottery manufacturing.

E-waste is an informal name given to electronic and electric equipment (EEE) that have reached the end of their useful life. Electronic equipment is composed of three main components, namely: ferrous and non-ferrous metals, plastics and glass. At present, there is no cost-effective process for treating and recycling ABS (type-7) plastic in South Africa. SSMB has embarked on a project to develop an efficient and cost effective process for the treatment of e-waste plastic. In addition, by recycling this material will provide employment opportunities to poor communities in the country that can benefit by producing saleable plastic products.

3.3 Business Development

Business Development (BDD) functions include the following:

- Appropriate updating of Mintek's Board, Executive and Management teams by monitoring strategic trends in the local and international mining industry, with particular emphasis on the identification of innovation needs and opportunities.
- Provision of support to Mintek's operating Divisions with respect to market intelligence, marketing support and, the management of intellectual property with a view to technology transfer and ultimately technology commercialisation.
- The coordinating of research at a national level, to ensure coherence and synchrony with other science councils, universities and the wider mining community. A vital aspect is the creation and maintenance of strategic alliances and initiatives with other international bodies similar to Mintek.

3.3.1 Mineral Economics and Strategy Unit

The Mineral Economics and Strategy Unit (MESU) was created as part of the Business Development function to provide insight and business intelligence into all facets of the mining/minerals value chain – both upstream and downstream. Typical outputs from this unit would be mineral economics assessments, techno-economic assessments, supply and demand value chain assessments, minerals statistical analysis and forecasting (e.g. commodity trends and prices), inclusive growth and transformation interventions related to the minerals sector, and environmental sustainability assessments such as Mintek's energy consumption, water consumption and carbon footprint.

The division will strengthened during the next year to be able to meet the requests for more of these assessments for Mintek's Executive Management and render higher levels of

internal support. Moreover, this will enable the division to service external stakeholders as required. Moreover, it will allow the division to be proactive in providing relevant assessments and studies regarding technology improvements, commodity trends and also geo-political climates relevant to the mining and minerals processing sectors. This improved capacity building will be done gradually to balance the needs of both Mintek and the division with respect to the overall state of the industry. The ultimate goal would be to restore this division to be able to contribute significantly to our stakeholders by providing relevant intelligence and policy guidance as it did in previous years.

Furthermore, MESU has extended its service offering in recent years following a request from the DMR to implement rehabilitation programmes for derelict and ownerless mines. The work is undertaken as and when requested by the DMR. A direct consequence of the numerous sites rehabilitated to date, is the high level of competence has been developed this specialised field. It is envisaged that this service offering can be made available to external parties on a commercial basis.

Additionally, MESU is developing capabilities in the form of information management using GIS technology, and the use of drones for the management of rehabilitation sites.

3.3.1.1 Marketing

Mintek supplies a wide range of metallurgical services, technologies, and plant equipment to the global minerals industry. The nature of this commercial activity therefore requires direct interaction between the Client and the appropriate technical specialists from the relevant Divisions providing the service. A large proportion of Mintek's business is derived from repeat clients and the maintenance of this loyalty is paramount for the sustainability of Mintek's commercial activities. Creating market awareness of products to new clients was typically undertaken by the presentation of technical papers at major local and international conferences, and publishing of technical papers in credible journals. These activities still continue, but alternative forms of marketing are also being considered such as representatives from the various operating divisions are visiting the Clients at their operations, whilst Mintek's Executive management is engaging with the executive teams of our major clients to further raise awareness of Mintek and its offerings including the specific work done for the various Clients in recent years.

Mintek follows a decentralised marketing model with the various business units being largely responsible for marketing their own products and services due to the complexity of these products and services with central coordination and support from the Business Development section. Going forward, this model will change to some degree with Business Development and MESU working more closely with the business units.

3.3.1.2 Mintek Office of Technology Transfer

Mintek is required, in terms of the Intellectual Property Rights from Publicly Financed Research and Development (IPR-PFRD) Act, to maintain an office for technology transfer and commercialisation. From the project and IP pipeline, which is derived from our research activities, a greater emphasis with respect to transfer and commercialisation will be of greater importance for Mintek going into the future. This function

falls under MESU, and the group ensures that publically-funded IP is recorded, properly exploited and reported to the National Intellectual Property Management Office (NIPMO). The office also provides Intellectual Property (IP) advice to the business units, interfaces with external IP attorneys and maintains the register of Mintek IP. Additionally the office maintains the central registry of all of Mintek's various agreements, contracts and memoranda of understanding and agreement.

3.4 Corporate Services

Corporate Services currently gives strategic and operational support to all of Mintek divisions in the following areas:

- Corporate Governance and Organisational Compliance;
- Human Resources Management, Training and Skills Development;
- Communications Services;
- Library and Knowledge Management; and
- Conferencing Services and Events.

Corporate governance and organisational compliance are extremely important aspects of organisations and Corporate Services is tasked with ensuring that Mintek is a good corporate citizen that is fully compliant with all the applicable laws and governance standards. To this end, Corporate Services ensures that the Board is given the necessary support to enable it to discharge its duties efficiently and effectively in line with the required fiduciary duties enunciated mainly in the Public Finance Management Act, Treasury regulations and the Minerals Technology Act.

Corporate Services will continue to carry out the responsibility of ensuring that Mintek meets its obligations to the DMR as the executive authority, and fulfil its reporting obligations to the Parliament of the Republic of South Africa and other key stakeholders. The responsibilities are carried out through two support divisions, viz. Human Resources Division and Information and Communications Division.

3.4.1 Human Resources Division

The Human Resources Division (HRD) is a strategic business partner to Mintek Divisions that provides consultative and administrative support to Mintek on people-related issues impacting on productivity, profitability and sustainability. The work of HRD is organised into three strategic units, namely:

- Organisational development, HR planning and Training & development;
- Employee Relations, and Wellness; and
- Human Resource Management and administrative systems.

Delivery of HR services is by a team of Generalists who provide operational support to the Divisions as well as managing recruitment and a team of Specialists who provide more strategic support to the Divisions. The HR Division has three focus areas and a number of goals which align to Mintek's strategic objectives. In terms of Mintek's objectives to enhance visibility and credibility to all stakeholders as well

as to uphold good governance practices, HRD strives to execute its work with excellence, complies with standards and legislation and ensures that Mintek has effective HR systems in place. Most of HRD's projects are executed under the Mintek strategic objective which is to develop human capital and organisational skills to build world class R&D excellence. These projects include the development of skills and leadership and the transfer of these skills, to build a talent pipeline and retain this talent, accelerate transformation, drive high performance culture, cultivate good EE/ER relations and enhance employee health and wellness.

The Organisational development, HR planning and Training & development unit provides a comprehensive service related to the recruitment, selection and on-boarding of employees and development initiatives undertaken for continuous professional improvement. Recruitment is geared towards addressing short, medium and long term human capital requirements of Mintek. Mintek also maintains a talent pipeline through a full-time study bursary scheme, which ensures a steady flow of young engineer and scientist graduates into the organisation.

The training and development programmes support two categories of human capital development initiatives. The first category includes Mintek's contribution to the country's human capital in the mineral and metallurgical resources sector. In pursuit of this goal, Mintek participates actively in the promotion of Science, Technology, Engineering, Mathematics and Innovation (STEMI) as fields of study that are essential in creating a human capital base. Mintek has firmly established itself in the calendar of STEMI promotion by partnering with various higher education institutions and having a strong presence in career fairs across the country. The flagship Minquiz programme enjoys a high profile, and will continue to do so in the current financial year.

There are significant partnerships that have been established with Higher Education Institutions (HEIs) and Mintek will continue to extend partnerships to previously disadvantaged HEIs in order to increase the pool of previously disadvantaged students that can specialise in our area of operation. Initiatives undertaken in this category are of benefit not only to Mintek but to the country as a whole. Mintek also partners with a number of state institutions in human capital development, including the Mining Qualifications Authority (MQA), the DST, and the NRF. In these partnerships, Mintek either provides funding by means of bursaries and scholarships, or on-the-job training and structured learning in a workplace environment.

The second category of human capital development initiatives focuses internally on Mintek staff. The Training & development unit administers a part-time bursary programme for Mintek staff and also a calendar of skills programmes throughout the year. The intention is to ensure that Mintek retains and enhances its credibility as a science council that is innovative and leads knowledge production in relation to minerals technologies.

Mintek has a 15-month Graduate Development Programme (GDP) in which recent graduates in science and engineering are taken through a structured learning programme that is both educative and experiential. By the end of the programme, participants emerge as well-rounded professionals in mineral

and metallurgical processing. The implementation of the GDP will continue as an important developmental programme in Mintek.

This unit also includes an area that deals with organisational capacity and addresses issues relating to attracting, motivating and retaining staff, as well as organisational performance management and organisational culture. Mintek places a lot of emphasis on retaining staff that is motivated, while also maintaining a performance culture that rewards top performance and innovation, in keeping with Mintek's mandate as a science council. One of the successful initiatives that bring out top, competitive performance from researchers is the annual Apex awards, which recognises and rewards technological innovation and excellence.

The Human Resource Administrative Systems unit provides effective HR administration and information. The unit has been focusing on a progressive migration of business processes from manual to electronic systems in the last three years, and will continue with this focus. The main objective for automating business processes is to improve efficiencies and allow human resource practitioners to dedicate valuable time on providing strategic business advice to divisions instead of pushing paper. The time and attendance system supports the planning and allocation of available resources to optimise productivity. New employees go through a comprehensive induction programme to familiarise themselves with the Mintek working environment as well as the Code of Conduct and Business Ethics and the Disciplinary Code.

The Employee Relations and Wellness unit focuses on maintaining a harmonious working relationship between the employer and its employees. Training of staff and managers in labour relations matters is provided on a regular basis.

Mintek has an on-site clinic and conducts medical surveillance and biological monitoring as well as performing entrance and exit medicals. The clinic also renders prompt emergency care and runs a number of occupational health programmes to support the wellbeing of employees. There is also an in-house Employee Assistance Programme which provides counselling and proactive interventions in respect of employee wellbeing. Mintek has an active HIV/AIDS programme which provides support and treatment to employees who are affected by HIV. Participating employees are provided with nutrition boosters as well as treatment to maintain a relatively healthier immune system. There is an active cohort of peer educators in Mintek who provide information to employees and screening is offered to employees during Wellness Day events.

Mintek submitted an Employment Equity Plan for the three year period 2015-2018 to the Department of Labour. This will be implemented as set out in the Employment Equity Act. . Our overall employment equity target of 90% has not been achieved although we are tracking close at 89%. Efforts to improve on this metric will continue. Mintek is committed to transformation and has stretch targets in place. There is a particular focus on rectifying traditional gender imbalances in the STEMI field by recruitment and development of women in line with the economically active population demographics as well as recruitment of people living with disability. The Board continuously monitors Mintek's performance in this regard.

3.4.2 Information and Communications Division

The Information and Communications Division (IAC) within Mintek is a service-driven division that caters to external and internal clients. IAC's role is to ensure good corporate governance and provide strategic information and communication services to the organisation. The Division's focus areas are Communications, Conferencing and Events and the Library and Knowledge Management Services.

IAC emphasises on areas of corporate governance and compliance, and supports the Mintek Board in providing company secretariat services. This includes servicing the Board and its Committees as well as updating matters of the Board as required from time to time.

Mintek's communications plan is aimed at supporting the organisation's overall objective of maintaining and monitoring its position as one of the world's leading mineral technology research and development organisations. The Communications Unit offers a wide range of strategic, corporate, marketing and media communications and support services to the business-oriented divisions. In so doing, the unit contributes to the successful delivery of Mintek's mandate by guaranteeing that correct communication and messages are delivered to various audiences as required. The unit monitors Mintek's exposure on a local and global front through media monitoring services. The regularly updated Mintek corporate webpage is used as another portal for advertising of Mintek products and services. This is also the case for Mintek's social media pages, which are updated daily, and encourages Mintek to interact with stakeholders.

IAC's Communications unit is tasked with both Internal and External Communication. In Internal Communication, the unit is responsible for informing Mintek staff of the latest developments in the organisation including news, forthcoming events, on-site services, policies and procedures. The channels of communicating are mainly daily staff announcements, which are communicated via e-mail, with urgent announcements communicated instantaneously through newsflashes (via email). Additional forms of communication include posters, flyers and electronic notice boards. In addition to these, the unit compiles and publishes an electronic monthly staff newsletter called Mintek News. This newsletter is also distributed to the Board and internal stakeholders. IAC serves as a custodian, designer and advisor on items hosted on the corporate intranet, such as information on services to staff, policies and procedures, health and safety as well as Staff Association matters. The Communications Unit is entrusted with the preparation of quarterly reports (submitted to DMR), the Annual Report, as well as Board documents.

Mintek Conferencing operating under the Communications Unit enhances Mintek's competitive position and strives to be the best choice for clients, especially Mintek technical divisions, by offering support with following: the launch of facilities; hosting of international delegations; organising site visits; exhibitions and trade fairs; corporate social investment events; colloquia; workshops; open days; and consumer education programmes. Although Mintek's Division get first priority when it comes to conferencing, the service is also marketed and offered to various external clients.

The Library and Knowledge Management unit is responsible for providing Mintek's researchers with critical scientific and technical information in support of Mintek's business requirements. This includes the collection, organisation, retrieval and dissemination of information that ultimately adds value by meeting Mintek's high-level objectives of knowledge production and dissemination, innovation of new products/services and improved business process and procedures.

In maintaining and protecting Mintek's IP, the management of Mintek's IP and corporate memory, which forms the basis of Mintek's vast knowledge base, is done through developing electronic catalogue collection of the holdings using a library management system. This contributes to the patenting process by searching for prior art using sophisticated information resources, and ensuring that Mintek researchers remain in the forefront of their specialist areas by providing access to internationally recognised databases in full-text. In addition to the above, the unit ensures that work of potentially commercial value is protected through patenting and maintenance of such records.

3.5 Internal Audit

Internal Audit (IA) is an independent, objective assurance and consulting activity established in terms of section 51(1)(a)(ii) of the Public Finance Management Act No. 1 of 1999, as amended. Internal Audit is an important component of internal control, risk management and corporate governance and provides the necessary assurance and advisory services to Mintek. Internal Audit adds value by enriching Mintek's operations through advice derived from its evaluation and assessment of Mintek's work during the course of the year. The Internal Audit's role is to assist Mintek accomplish its objective by evaluating the adequacy and effectiveness of risk management, control and governance processes and recommending areas of improvement where applicable.

The Internal Audit Section prepares a Risk based audit plan each year which is approved by the Audit and Risk Committee. The Risk based Audit plan details all the projects to be reviewed by the Internal Audit Section.

An external five year quality assurance and improvement review (QAR) was conducted during the 2017/18 financial year. The recommendations of the QAR report have been taken into account in preparing the 2018/19 Risk based audit plan. The Audit and Risk Committee Charter and the Internal Audit Charter have been reviewed and the results of the QAR were also taken into account. The Internal Audit Section will also conduct a review of the Internal Audit Methodology during the year.

The Internal Audit Section will continue to identify suitable programmes which will assist in accelerating skills in the ICT auditing competency. Furthermore, Internal Audit will be working on the combined assurance framework in order to ensure that the audit process is integrated across divisions.

3.6 Finance Group

The Programme comprises four main components; namely, Finance, Information Communication Technology, Engineering and Maintenance Services and Supply Chain Management.

The programme provides a support service and creates an enabling environment to all other divisions within Mintek.

3.6.1 Finance Division

The Finance Division (FIN) provides a broad range of different services to meet corporate, statutory, and compliance requirements. They provide transactional, administrative and professional services to the business, and deliver financial and management reporting and value add decision support. The main activities of the division include: budget control, internal control management, revenue and expenditure management and accounting system management.

The division will amongst others focus on the following:

- Adoption of Standards of Generally Recognised Accounting Practice (GRAP);
- Utilisation of technology to improve efficiencies, such as automated reporting; and
- Improved management reporting.

3.6.2 Information Communications Technology

Information Communication Technology Division (ICT) ensures that Mintek's ICT infrastructure and systems remains available to Mintek's users. Typical ICT related processes and functions include backing up of data, virus protection, providing remote access to mobile users, internet access, office utilities (e.g. word processing and spreadsheets), and electronic mail. The ICT Division also provide support for specialised systems, including SAP (ERP system) and LIMS (laboratory information management system).

During the year, ICT will be working on the following projects, some of which are carried over from the previous year:

- Increasing the value of Mintek's SAP system to business through implementation of leave automation using SAP Employee Self Service;
- Further development of various SharePoint based processes, e.g. SHEQ management, document and records management;
- Increasing storage space for data through the implementation of a new primary storage area network (SAN);
- Improving e-mail resiliency through the implementation of an Exchange database availability group (DAG);
- Modernising the off-site backup process by replacing tape backups with cloud based backups; and
- Improving the security of the corporate Mintek website by hosting the corporate website on premises.

3.6.3 Engineering and Maintenance Services

Engineering and Maintenance Services (EMS) is responsible for the management and maintenance of Mintek facilities and other assets of Mintek. The services include basic maintenance service, electrical and instrumentation, building maintenance (including the laboratories) and mechanical maintenance (Drainage, Effluent, Bays, Mobile Equipment and Mechanical Equipment).

Whilst optimization of maintenance processes, energy management and SHEQ compliance continues, we will be putting a focused efforts to identify areas where we can minimize outsourcing through upskilling our human resources to ensure that we improve the value of our service to our clients whilst contributing towards a lean organization.

Having recently acquired a gas pipeline from Egoli Gas, Mintek will construct a gas-to-electric plant over time, the design process for this plant will be concluded in this period.

Upgrade of existing infrastructure and development of new infrastructure (where required) will continue to form the greater part of the divisions function as Mintek continues to embark on the improvement of the facilities to return them to modern and world class status. Such upgrades include Block 7000 upgrade, Block 9000 common areas and glazing, and central HVAC system upgrade, etc.

3.6.4 Supply Chain Management

The Supply Chain Management (SCM) section is primarily responsible for the provisioning of products and services to sustain Mintek's business operations. It consists of procurement, vendor & tender administration, fixed assets and inventory management.

SCM assists business units with sourcing and the identification of suitable suppliers, the request-for-quotation process, the evaluation of quotations and vendor selection. Vendors for high value products and services are selected by way of a tender process. Stock of operational supplies and consumables are kept to minimise supply delays.

During the year SCM plans to introduce the following initiatives:

- Improving supplier relationship management through monitoring of supplier performance by implementing service level agreements with critical suppliers as well as supplier performance evaluation and the improvement of contract management. This will be achieved through the optimisation and utilisation of the contract management module on SAP.
- Review of processes in place for regulatory compliance monitoring to increase efficiencies in procurement processes; and
- Continuation to emphasise the importance of asset management. More asset verifications will be conducted to improve control over the movements of assets.

4. SAFETY, HEALTH, ENVIRONMENT, QUALITY AND RADIATION PROTECTION PLAN (SHEQ-RP)

The Safety, Health, Environment and Quality (SHEQ) unit is responsible for maintaining ISO9001, ISO14001, OHSAS18001 and ISO17025 accreditation status and also ensuring that Mintek complies with Safety, Health, Environment, Quality and Radiation Protection (SHEQ-RP) legal and other requirements.

Mintek has a SHEQ-RP Policy which outlines the organization's commitment to implementing the highest SHEQ-RP principles. SHEQ-RP objectives have been set to ensure that the commitments that are outlined by the organization in the SHEQ-RP policy are achieved. People are considered as the most valuable asset to the organization, as such a Zero Fatalities and ≤ 1 Lost Time Incident Frequency Rate (LTIFR) targets have been set. The Zero Fatalities and ≤ 1 LTIFR targets have been met and exceeded at Zero (0) at the end of 2017. Mintek is also a responsible and good steward of the environment.

There were no major environmental incidents in 2017. The organization continues to produce quality products and services through sound quality management systems. The objective of $90\% \leq$ Client Satisfaction Frequency Rate (CSFR) has been met and exceeded. Continuous improvement is always part of Mintek's business processes. In July 2017 SGS external auditors recommended that Mintek gets accredited on the new ISO9001:2015 and ISO14001:2015 standards. The SHEQ-RP management system will continue to improve and add value to the business division's processes as the new standards are entrenched in the new financial year 2018/19.

5 FINANCIAL PLANNING

5.1 Consolidated Budget – 2018/19 to 2020/21

The consolidated budget for the 2018/19 financial year is presented below. Total expected income is R562 million with state grant contributing 57% to that. This is mainly due to additional MTEF revenue that will be generated in the financial year. The additional allocations are project based and therefore the state grant allocation will be subject to significant fluctuations as and when the projects are completed. The consolidated budget shows positive net results coming mainly from the commercial activities of the organisation although the international economic outlook remains bleak. The summarised budget is however projecting a positive financial outlook through-out the MTEF period if the current economic conditions improve. The table should be read together with the State grant reconciliation table which reconcile the figures as per the Adjusted Estimates of National Expenditure (AENE) document including all MTEF allocations and the spending in the same period.

Mintek undertakes a rigorous budget process in January of each year, on a strategic business unit level, considering current market conditions and inflation. A realistic budget is then compiled reflecting the business plan for the next financial year. The outer years of the MTEF period (2019/2020 and 2020/2021) is however based on assumptions. The following

assumptions were used to compile the project income and expenditure budget for 2019/2020 and 2020/2021:

- State grant – allocation as confirmed by Department of Mineral Resources used;
- Commercial income (contract research and products and services) – average of 2% increase per year;
- Sundry and investment income - average of 2% increase per year;
- Staff costs – increased by 2% and 1% respectively;
- Bursaries – increased by 2%;
- Operating expenses – increase of 2% per year but adjustment of R35 million and R20 million respectively to account for fluctuations in State grant in those years; and
- Depreciation – an increase of 1% per year.

The figures predicted in the Statement of Financial Position and Cashflow statements are purely projections based on history and the current financial status of the company.

Table 1. Income and Expenditure Budget (R'000)

Income ['000 Rand]	2017/2018 Forecast	2018/2019	2019/2020	2020/2021
State grant	289 753	318 820	287 091	303 535
Contracted research	50 093	50 327	51 333	52 360
Products and services	144 132	156 758	160 770	170 311
Investment income	31 758	31 758	32 394	33 042
Sundry Income	4 844	4 371	4 459	4 548
Total Income	520 580	562 035	536 047	563 796
Expenditure ['000 Rand]	2017/2018 Forecast	2018/2019	2019/2020	2020/2021
Staff Costs	312 215	316 612	322 944	326 173
Bursaries	11 994	13 157	13 420	13 688
Operating costs	176 601	209 137	178 759	201 963
Depreciation	14 406	14 593	14 739	14 887
Total Expenditure	515 216	553 499	529 862	556 711
Net result	5 365	8 536	6 185	7 084

Table 2. Statement of Financial Position Budget (R'000)

	2017/2018 Forecast	2018/2019	2019/2020	2020/2021
Non-current assets	276 042	270 329	280 065	289 712
Property, plant and equipment	274 594	268 881	278 616	288 263
Intangible Assets	1 448	1 448	1 448	1 448
Current assets	454 449	503 481	472 553	479 442
Inventory	8 838	8 838	8 838	8 838
Trade receivables	39 742	39 742	39 742	39 742
Short term investments	362 413	411 445	380 517	387 406
Cash and cash equivalents	43 456	43 456	43 456	43 456
Total assets	730 491	773 810	752 618	769 154
Equity	444 786	453 145	459 153	466 060
Revaluation surplus	148 306	146 775	145 244	143 713
Retained Income	296 480	306 369	313 909	322 347
Long term liabilities	21 129	20 072	19 069	18 115
PRMA liability	21 129	20 072	19 069	18 115
Current liabilities	264 577	300 593	274 396	284 978
Trade and other payables	42 487	42 487	42 487	42 487
Loans and advances from subsidiary	39 515	39 515	39 515	39 515
Deferred Income	182 575	218 591	192 394	202 976
Total funds and liabilities	730 491	773 810	752 618	769 154

Table 3. Cash Flow Budget (R'000)

	2017/2018 Forecast	2018/2019	2019/2020	2020/2021
	R'000	R'000	R'000	R'000
Cash generated from operations	-25 113	27 387	-37 666	-489
Interest received	31 758	31 758	32 394	33 042
Net cash from operating activities	6 645	59 145	-5 273	32 553
Additions to property plant and equipment	-54 437	-54 714	-48 865	-50 331
Funds received towards purchasing of PPE	19 313	45 834	24 390	25 797
(Increase)/decrease in investment deposits	26 619	-49 209	30 751	-7 066
Net cash from investing activities	-8 505	-58 089	6 276	-31 600
PRMA obligations movements	-2 986	-1 056	-1 004	-953
Net cash from financing activities	-2 986	-1 056	-1 004	-953
Net increase in cash	-4 845	0	0	0
Cash at beginning of the year	48 301	43 456	43 456	43 456
Cash at end of the year	43 456	43 456	43 456	43 456
<i>Cash generated from operations - calculation</i>				
Profit from operations	5 365	8 536	6 185	7 084
Investment income	-31 758	-31 758	-32 394	-33 042
Depreciation	14 406	14 593	14 739	14 887
Working capital changes	-13 125	36 016	-26 197	10 582
Increase in inventories	-868	0	0	0
Increase in receivables	-10 383	0	0	0
Decrease in payables	-9 002	0	0	0
Increase/(decrease) in deferred income	7 127	36 016	-26 197	10 582
Cash (utilised in)/generated from operations	-25 113	27 387	-37 666	-489

5.2 Capital Investment Plan

The table below (table 4) illustrate the Capex budget for the MTEF period from the anticipated funding sources. Mintek will continue the investment on capital expenditure averaging at R50million annually and 36% of the total Capex will be from the state grant allocation while the balance comes from reserves and MTEF funding. Funding from reserves will increase as MTEF funding decreases over the coming three years.

Table 4. Capital Expenditure Budget (R'000)

Capital expenditure budget ['000 Rand]	2017/2018 Forecast	2018/2019	2019/2020	2020/2021
State grant - capital allocation	18 713	19 844	21 022	22 244
MTEF funding - capital allocation	600	25 990	3 368	3 554
Capex funded from reserves	35 124	8 880	24 475	24 534
Total Expenditure	54 437	54 714	48 865	50 331

5.3 Sources of Funding

5.3.1 State Grant Allocation

Mintek has two main sources of funding for its long-term research programme – Baseline State Grant (Science Vote) and MTEF allocations. Wherever possible, additional funding is leveraged from private companies and international agencies. Mintek funds its early stage research from baseline science vote and largely utilises the MTEF funding for specific later stage development.

Mintek's R&D programme is structured into various platforms or themes. These themes are determined according to (a) government priorities and (b) industry needs and opportunities. A structured, rigorous process is applied in determining budget allocation between the themes, initiating research project opportunities within these themes, stopping projects that do not deliver the desired results and re-allocating the budget where necessary. The annual process of allocating state grant is very extensive and involves consideration of progress and outputs of all current projects. In an effort to ensure that priorities are addressed the grant is re-allocated between the clusters as can be seen in the tables 5 and 6 below.

Mintek's key performance areas and research and development clusters are also highlighted for reference. The budget values shown excludes value added tax (VAT), the administration fee, and the capital transfers. It can be seen from the table that the State Grant is allocated in accordance with Mintek's Mandate and Mission; namely, to develop mineral processing technologies and products/services derived therefrom, play a significant role in interventions in marginalised communities, and in organisational development. Mintek supports the mineral strategies and initiatives of the Department of Mineral Resources. The DMR has identified 10 commodities and 5 value chains as priorities as a basis for deciding on technical programmes. Mintek's R&D plans and activities are thus fully aligned with DMR priorities.

The state grant allocation for the financial year 2018/2019 is presented below in broad categories or themes, namely, Mintek's Strategic Business Units, Strategic Goals, Research & Development Clusters, and per Commodity. The starting cost-basis budget for Science Vote (SV) distribution for the current financial year is R179m and a provision of R14m is made for Human Resource Development (HRD) and Information & Communications (IAC) Divisions. This results in R164 million being available for distribution to clusters, which is R8m (5%) increase from the financial year 2017/2018. The gross MTEF funding allocation has also increased by R35 million (63%) from R55m in FY 2017/2018 to R90m for the current financial year, this exclude D & O and roll-overs.

The allocation trends in the table below shows a steady increase in science vote allocation to precious metal (PM) and Eco-efficiency (EE) cluster due to the strategic focus the organisation decided to take and also due to abundance of precious metals within South Africa. Eco-efficiency deals with greening of our technologies. There is a reduction in base metal (BM) allocation and this will continue until we reach the 5% mark. The rest of the clusters allocation will remain the same.

5.3.2 MTEF Allocations

In contrast to the State Grant allocations, the MTEF projects are motivated to Treasury for specific project activities. These project proposals are based on successful early stage research funded from the State Grant and where there is close alignment with Government priorities. Once a project has been accepted by Treasury, operational management and oversight of the project is undertaken by the same team that manages the allocation and oversight of the State Grant research funds.

Because MTEF applications are closely aligned to Mintek's State Grant research areas, there is similarity between the areas being researched, although the MTEF funds are used to undertake later stage development of promising research ideas. Currently the main areas of MTEF research are:

- Eco-efficiency: Mintek is currently undertaking a range of projects aimed at improving the efficiency of utilisation of electricity and water in minerals processing, and reducing the environmental impact of this activity. There are currently four projects, namely;
 - Water efficiency: waterless mineral processing;
 - Energy efficiency: reduced energy in comminution and smelting;
 - Environmental impact: Technology to minimise mine discharges; and
 - Waste and residue recycling: Mining waste dump reprocessing

Collectively, these activities can be regarded as focusing on "Eco-efficiency". Mineral and metal production is being increasingly restricted in South Africa due to the lack of availability and the increasing cost of both water and electricity. Focusing on this eco-efficiency is thus critical to sustain South Africa's existing mineral production – a sector with one of the highest contributions to employment and foreign exchange earnings.

- Titaniferous Magnetite: This is a long term development project aimed at assessing and identifying technologies suitable to unlocking the value contained in the Bushveld Complex titaniferous magnetites which is starting during the current financial year. These represent the world's largest known reserves of titanium and vanadium, and along with the contained iron represent a significant opportunity for South Africa in the future. There is currently no technology that can economically process these deposits for the recovery of the titanium, vanadium and iron. The project aims to develop suitable technology so that in future (10 to 20 years) these deposits can be economically exploited.

5.4 Cost Containment Plan

The definition of cost containment is "The process of controlling the expenses required to operate an organisation or perform a project within pre-planned budgetary constraints." The cost containment process is an important management function that helps keep costs down to only necessary and intended expenses in order to satisfy financial targets. Budget monitoring is performed on a regular basis to ensure that there is no excessive spend. The focus for Mintek is to improve efficiencies through better utilisation of resources.

The cost containment plan as set in the National Treasury Instruction/circular No. 02 of 2016/2017 issued on the 30th September 2016 gives account of some of the

measures that Mintek will continue to implement over the planning period.

The Mintek Cost Containment Plan is contained in Appendix II.

5.5 Allocation of other Government Grant

5.5.1 Rehabilitation Project

In terms of a contract with the DMR signed in June 2013, Mintek managed the rehabilitation of certain derelict and ownerless (abandoned) mine sites identified by the DMR, with a specific focus on asbestos mines. The Initial contract was for duration of 3 years, with a value of R165 million, and concluded at the end of March 2016. Subsequently, further allocations of R55.6 million and an additional R 24 million respectively, were received from the DMR. These allocations were over and above the initial R165 million 2013 agreement allocation. Due to the nature of these projects, both progress and expenditure has not been linear over the 2013-2016 time frame. During this period, the DMR postponed the rehabilitation of both the Osizweni site and Heuningsvlei Village projects due to external factors, although the detailed project planning and designs were completed. The allocated amount of R 55.6 million for the Osizweni site was subsequently later reallocated to other projects.

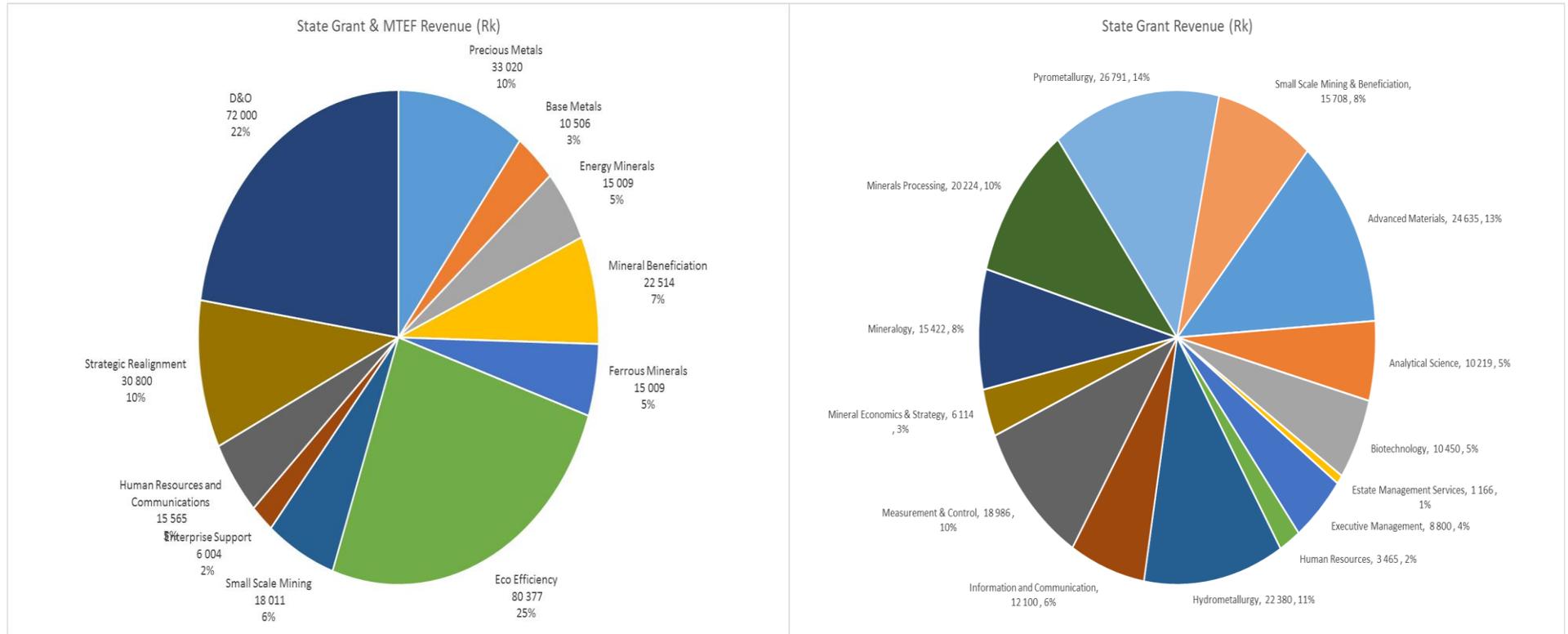
To date 35 sites have been rehabilitated with great success. It was envisaged that the initial budgeted R244.6 million would have been spent or committed by the end of March 2016, though it did not occur due to delays in the approval process. The contract/project was extended into a second phase over a three year period from 2016 to 2019 to the value of R 155 million.

The very large Streatham project, in the Limpopo province, was divided into 4 separate smaller projects due to the size of the project. The tender process began in December 2016, with the initial contractor start-up activities such as site establishment, personnel recruitment followed by medical examination, induction and other required training taking place. The project then saw activities on site commencing in early 2017.

During 2016, 10 sites were subjected to a detailed evaluation and of these it was found that 5 sites need to be rehabilitated. These sites were subjected to detailed design for tender purposes during the 2017 financial year and are expected to begin in the first quarter of the 2018 financial year.

Further work undertaken during the 2017 financial year was the establishment of the ownership of the remaining 155 derelict and ownerless asbestos sites, where it was established that 61 were located on State owned land. Initial scoping evaluations were conducted during the year and will be ranked and recommendations regarding the priority/urgency of rehabilitation will be completed in the early part of the 2018 financial year.

Table 5. State Grant allocations per cluster allocation (commodities) and allocations per Mintek's Strategic Business Units, 2018/2019 (R'000)



5.6 State Grant Reconciliation

Table 6 below shows a reconciliation of all allocations as per the Adjusted Estimates of National Expenditure (AENE) document and the Mintek Budget.

Table 6. Reconciliation of allocations as per the AENE and Mintek Budget

State grant reconciliation	2017/2018 Forecast	2018/2019	2019/2020	2020/2021
Available allocation CASH	367 256	420 368	369 989	390 339
less VAT	45 102	51 624	45 437	47 936
Amount excluding VAT	322 154	368 744	324 552	342 403
less capex	19 313	45 834	24 390	25 797
State grant - capital allocation	18 713	19 844	21 022	22 244
MTEF funding - capital allocation	600	25 990	3 368	3 554
Available state grant revenue	302 842	322 910	300 161	316 605
MTEF				
Water Efficiency: waterless mineral processing	15 000	10 000	-	-
Energy Efficiency: Reduced energy in comminution and smelting	15 000	10 000	-	-
Environmental impact: Technology to minimise mine discharges	10 000	20 000	-	-
Waste and residue recycling: Mining waste dump reprocessing	10 000	30 000	-	-
Titaniferous Magnetite	5 000	20 000	21 120	22 282
D&O	62 696	66 622	70 353	74 222
Total	117 696	156 622	91 473	96 504
less VAT	14 454	19 234	11 234	11 851
Available MTEF	103 242	137 388	80 239	84 653
MTEF funding - current allocation	93 257	98 908	69 577	73 403
MTEF funding - capital allocation	600	25 990	3 368	3 554
Admin fee at 10%	9 386	12 490	7 294	7 696
Available MTEF	103 242	137 388	80 239	84 653
Available state grant revenue	302 842	322 910	300 161	316 605
Current allocation not classified as revenue	-13 070	-13 070	-13 070	-13 070
Carry over MTEF from previous financial year	108 546	108 565	-	-
Carry over MTEF to next financial year	-108 565	-99 585	-	-
Total state grant revenue	289 753	318 820	287 091	303 535

5.6.1 Programme for Developing Human Capital

Mintek implements a number of human capital development interventions funded by government grants. One of the interventions is the *Science, Technology, Engineering, Mathematics and Innovation (STEMI) Promotion*, which includes Mintek's Undergraduate and Postgraduate Bursary programmes, as well as the renowned *Minquiz* competition. *Minquiz* aims to encourage interest in careers in Science, Engineering and Technology among secondary school learners through fun-filled and curriculum-aligned competition that combines the rigors of an Olympiad with the excitement of a live quiz show. Mintek's drive to establish additional *Minquiz* centres across the country will continue in partnership with host institutions and corporate sponsors to broaden the footprint of the competition. It has been partially funded by corporate sponsorship and grants from a number of sponsors including the Department of Science and Technology, Sasol and others. A total of R1.6 million is budgeted for 2017/18.

Staff Bursaries are budgeted for Mintek employees for part-time undergraduate studies and postgraduate studies, both for technical (science and engineering) and non-technical studies. The programme also augments Mintek's retention strategy. Studies will be funded through the Science Vote while non-technical studies will be funded from Mintek funds. The total budget is R4.1 million for the 2017/18 financial year.

The *Work-Integrated Learning (WIL) Programme* provides a one year practical work-based learning experience for National Diploma and B.Tech students in fulfilment of their study requirements. The programme is fully-funded by the MQA. A budgeted expenditure of R2.6 million is estimated for WIL during the 2017/18 financial year.

The *Artisan Learnership Programme (ALP)* is aimed at training learners to become artisans and to achieve trade status and is funded by the Mining Qualifications Authority (MQA). In the 2017/18 financial year, Mintek was supporting 6 external female learners to become Artisans in the fields of fitting and instrumentation.

The *Graduate and Researcher Development* portfolio includes a Graduate Development Programme (GDP) which entails a structured on-the-job technical training programme, accompanied by soft skills training programme and is funded by Mintek. The primary focus is to place scientists and engineers on a structured development programme for them to gain and upgrade their professional registration with the South African Council for Natural Scientific Professions (SACNASP) and the Engineering Council of South Africa (ECSA). The programme runs for a 15-month period from January to the following March and gives candidates a detailed learning experience and also aligns with Mintek's performance management cycle.

A number of *Internship Programmes* are implemented to provide graduates the invaluable opportunity to obtain

work exposure in a real world environment for a limited time period. There is a particular focus on providing internship opportunities to young unemployed black science and engineering graduates. The programmes are: the Department of Science and Technology Professional Development Programme (DST PDP), the Mining Qualifications Authority Graduate Development Programme (MQA GDP), and the Department of Science and Technology National Research Foundation (DST-NRF) Internship Programme.

The DST PDP aims to address the accelerated development of a group of scientists and research professionals at post-graduate level (Doctoral and post-Doctoral), that is specifically to encourage black scientists and engineers in particular to remain involved in research and further their research careers within Mintek's research environment. It is funded and administered using the NRF grant.

6. PERFORMANCE ASSESSMENT WEIGHTING

Table 7. Performance Assessment Weighting

OBJECTIVES	WEIGHTING
Enhance Mintek’s visibility and credibility to all stakeholders	5%
Research and develop efficient mineral processing technologies and value added products and services	50%
Promote the mineral-based economies of rural and marginalised communities	15%
Uphold good governance	15%
Develop human capital and organisational skills to build world class R&D excellence	15%

Corporate Scorecard, 2017/18 to 2019/20

To comply with the requirements of the Public Finance Management Act (PFMA), a set of annual corporate objectives have to be included in Mintek’s Shareholder Compact and external reporting. For internal management control of the business, a more comprehensive set of indicators and Executive Committee priorities will apply and be used for regular internal reporting.

The corporate objectives and performance indicators for 2017/18 were developed during the annual planning workshop, involving the Mintek Board and the Management team. Various national documents were taken into account during the planning workshop, and the process followed their performance methodologies closely. Some of the documents included:

- “Framework for Managing Programme Performance Information” – Published by the National Treasury,

May 2007, ISBN 978-0-621-37152-9: Formeset Printers Cape (Pty) Ltd;

- “Guide to the Outcomes Approach” – Prepared by the Presidency, Version: 27 May 2010.

The 12 National Outcomes contained in the “Guide to the Outcomes Approach” formed the starting platform for the Mintek planning process. The possible support and contribution that Mintek could make to each of the Outcomes was carefully considered, and these were formulated into Mintek’s Strategic Objectives.

At the conclusion of the process, five Objectives supporting 5 of the 12 National Outcomes were identified (this was also the case last year), and these were cascaded into a larger number of Activities with Performance Indicators that are based on the SMART criteria. The mapping of National Outcomes to Activities per Programme and Performance Indicators that emerged is as follows:

National Priority	Mintek Objectives
Decent employment through inclusive economic growth	– Research and develop efficient mineral processing technologies and value added products and services
A skilled and capable workforce to support an inclusive growth path	– Research and develop efficient mineral processing technologies and value added products and services – Promote the mineral-based economies of rural and marginalised communities
Vibrant, equitable and sustainable rural communities	– Promote the mineral-based economies of rural and marginalised communities
An efficient, effective and development oriented public service and an empowered, fair and inclusive citizenship	– Enhance Mintek’s visibility and credibility to all stakeholders – Uphold good governance practices
Environmental assets and natural resources that are well protected and continually enhanced	– Research and develop efficient mineral processing technologies and value added products and services

The above Mintek Objectives have been grouped using a Balanced Scorecard Approach as shown below. Details of the score card highlighting Mintek’s Strategic Objectives, Programmes, Measures and Indicators follow in section 7.

Stakeholder Perspective
– Enhance Mintek’s visibility and credibility to all stakeholders – Research and develop efficient mineral processing technologies and value added products and services – Promote the mineral-based economies of rural and marginalised communities
Financial & Internal Business Perspective
– Uphold good governance practices
Learning and Growth Perspective
– Develop human capital and organisational skills to build world class R&D excellence

7. CORPORATE SCORECARD

Stakeholder Perspective

Strategic Objective 1: Enhance Mintek's visibility and credibility to all stakeholders							
STRATEGIC PROGRAMMES PER OBJECTIVE (What elements constitute the Objective?)	ACTIVITY PER PROGRAMME (What have we achieved by 31 March 2019)	PERFORMANCE INDICATOR (What elements constitute the Objective?)	Baseline 2017/18 Forecast	Annual Targets			Compact Number
				2018 / 19	2019 / 20	2020 / 21	
Integrated marketing and communication functions	Updating and implementing the marketing and communications plan	Annually updated marketing and communications plan approved and implemented	1	1	1	1	2019-1.01
Enhancing the visibility and credibility of Mintek	Mintek promotion	# of technical articles in credible publications	35	36	38	38	2019-1.02
		# of conference presentations and posters	74	72	75	75	2019-1.03
	IP creation and transfer	# of Patents filed	7	7	6	6	2019-1.04
		# of IP license agreements	1	1	2	2	2019-1.05
		# of discoveries (IPR-PFRD Act)	18	19	18	19	2019-1.06
	Attained annual customer satisfaction target	% Annual Customer Satisfaction Rating Index	> 90	> 90	> 90	> 90	2019-1.07
	Enhanced media exposure	Advertising Value Equivalent (AVE) in R million	25.0	25.0	26.0	26.0	2019-1.08
	Enhanced relations with oversight bodies	# of requests for technical assistance to the DMR (upon request)	1	1	1	1	2019-1.09
		# of presentations to Parliament on impact of Mintek's work and role	2	2	2	2	2019-1.10
		Timely submission of Shareholder's Compact	1	1	1	1	2019-1.11
		Timely submission of quarterly reports on the attainment of targets in the scorecard	4	4	4	4	2019-1.12
	Integration of staff exchange	# of visits and # of instances of staff exchange	4	4	4	4	2019-1.13

Strategic Objective 2: Research and develop efficient mineral processing technologies and value added products and services

STRATEGIC PROGRAMMES PER OBJECTIVE (What elements constitute the Objective?)	ACTIVITY PER PROGRAMME (What have we achieved by 31 March 2019)	PERFORMANCE INDICATOR (What elements constitute the Objective?)	Baseline 2017/18 Forecast	Annual Targets			Compact Number
				2018 / 19	2019 / 20	2020 / 21	
Competitive technologies, products and services for optimal mineral resource utilisation	Develop analytical methods and supply of services	# of methods	6	6	6	6	2019-2.01
		Rand value (Rm)	40	41	41	41	2019-2.02
	Develop mineralogical methods and supply of services	# of methods	6	6	6	6	2019-2.03
		# of internal reports	15	15	15	15	2019-2.04
		# of external reports	10	10	10	10	2019-2.05
	Develop new technologies under state grant	# of internal reports	69	72	72	72	2019-2.06
		# of new technologies	6	4	4	4	2019-2.07
		# of prototypes evidenced by reports	3	2	2	2	2019-2.08
	Sales of products, plant and equipment	# of reports	12	16	12	12	2019-2.09
		Rand value of control system sales (Rm)	25	25	27	27	2019-2.10
		Rand value of Certified Reference Materials (CRM) sales (Rm)	3	3	3	4	2019-2.11
	Commercial investigations and feasibility studies	# of external reports	85	92	97	102	2019-2.12
	Provision of Mineral Economics and Strategy advice	# of internal reports	8	8	8	8	2019-2.13
Beneficiation to value added products and services	Develop applications for precious-, ferrous- and base metals in the areas of:- Environment & Health (HIV, Water, Toxicology and Food Security)	# of internal reports	15	15	20	20	2019-2.14
		# of external reports	15	15	15	15	2019-2.15

Strategic Objective 2: Research and develop efficient mineral processing technologies and value added products and services

STRATEGIC PROGRAMMES PER OBJECTIVE (What elements constitute the Objective?)	ACTIVITY PER PROGRAMME (What have we achieved by 31 March 2019)	PERFORMANCE INDICATOR (What elements constitute the Objective?)	Baseline 2017/18 Forecast	Annual Targets			Compact Number
				2018 / 19	2019 / 20	2020 / 21	
	- Catalysis (chemical processing, fuel cells, environmental) - Nanotechnology (water, health) - Physical metallurgy R&D and metallurgical industry support	# of reports from the Metals Technology Centre (MTC)	150	160	165	165	2019-2.16
Green technologies	Develop water efficient processes and flow sheets to optimise water consumption and enable processing of ore bodies in water stricken areas	# of internal reports	16	13	11	11	2019-2.17
		# of external reports	4	4	5	5	2019-2.18
	Develop energy efficient processes, flow sheets and control technologies that minimise energy consumption and carbon emissions	# of internal reports	7	8	8	9	2019-2.19
		# of external reports	4	4	5	5	2019-2.20
	Develop waste management and recycling technologies for treating and recycling waste in order to extend mineral resources	# of internal reports	5	6	4	4	2019-2.21
		# of external reports	1	1	1	1	2019-2.22
	Rehabilitate derelict & ownerless mine sites	Number of sites rehabilitated*.	R40m	6	3	3	2019-2.23

* This performance measure has been amended from monetary value to the number of sites. The 2017/18 baseline forecast figure is a monetary forecast, not the number of sites.

-Strategic Objective 3: Promote the mineral-based economies of rural and marginalised communities

STRATEGIC PROGRAMMES PER OBJECTIVE (What elements constitute the Objective?)	ACTIVITY PER PROGRAMME (What have we achieved by 31 March 2019)	PERFORMANCE INDICATOR (What elements constitute the Objective?)	Baseline 2017/18 Forecast	Annual Targets			Compact Number
				2018 / 19	2019 / 20	2020 / 21	
Development of technologies and strategies relevant to rural and marginalised communities	Establish technologies and strategies relevant to small scale operators, for transfer to rural and marginalised communities	# of technologies adapted or developed	2	2	2	2	2019-3.01
		# of feasibility reports	10	12	13	13	2019-3.02
Economically sustainable businesses created in rural and marginalised communities	Develop and support economically sustainable rural and marginalised communities	# of new businesses created	4	5	5	5	2019-3.03
		# of jobs created from new businesses	40	50	50	50	2019-3.04
		% of businesses still in existence after 1 year	95	95	95	95	2019-3.05
		% of businesses still in existence after 2 years	70	73	73	73	2019-3.06
Training and skills development interventions in rural and marginalised communities	Provide value-added beneficiation training relevant to rural and marginalised communities.	# of people trained	100	120	140	140	2019-3.07
		Maintain accreditation in jewellery manufacturing / design and small scale mining as evidenced in certificate or report	maintained	maintained	maintained	maintained	2019-3.08
		# of retrenched mineworkers trained	120	120	140	140	2019-3.09

Financial & Internal Business Perspective

Strategic Objective 4: Uphold good governance practices							
STRATEGIC PROGRAMMES PER OBJECTIVE (What elements constitute the Objective?)	ACTIVITY PER PROGRAMME (What have we achieved by 31 March 2019)	PERFORMANCE INDICATOR (What elements constitute the Objective?)	Baseline 2017/18 Forecast	Annual Targets			Compact Number
				2018 / 19	2019 / 20	2020 / 21	
Enhanced fiscal discipline and the effective management of resources	BEE procurement as a % of total discretionary spend	% BEE Spend of total discretionary spend	96	90	90	90	2019-4.01
	Strengthened Internal Financial Controls	Unqualified audit as evidenced in audit report	Unqualified	Unqualified	Unqualified	Unqualified	2019-4.02
	Sound Debtor Management	% Debtors write off of commercial revenue	N/A	< 0.25	< 0.25	< 0.25	2019-4.03
		Average Debtors Days	37	< 50	< 50	< 50	2019-4.04
	Total Income	Rand Value (R'000)	520 580	562 035	536 047	563 796	2019-4.05
	Net Result (surplus)	Rand Value (R'000)	5 365	8 536	6 185	7 084	2019-4.06
	Optimal Yield on Investment	% Return on investment	7	5	5.5	5.5	2019-4.07
	Total Capital Expenditure	Rand Value (Including Funding) (R'000)	54 437	54 714	48 865	50 331	2019-4.08
	Maintained balance between R&D and Commercial Revenue streams	Ratio of Research / Total Revenue expressed as a %	77	≥60	≥60	≥60	2019-4.09
	Maintained balance between TCTC Salary Bill/Total Expenditure	Ratio of TCTC Salary Bill / Total Expenditure expressed as a %	58%	58%	58%	55%	2019-4.10
	Enhanced Liquidity Ratio	Liquidity Ratio	1.9	≥ 2	≥ 2	≥ 2	2019-4.11
	Improved cash flows from operations	Cash generated from operations after working capital (excluding movements in deferred income) (R'000)	>2 000	>2 000	>2 000	>2 000	2019-4.12
Enhanced organisational efficiencies	Productivity Ratio	Recoverability %	80	85	90	90	2019-4.13
	Energy Efficiency	Power factor correction (target was changed to 0.9-1)	Target achieved	Target achieved	Target achieved	Target achieved	2019-4.14
		Efficiency monitoring	Implemented	Reduced energy	Reduced energy	Reduced energy	2019-4.15

Strategic Objective 4: Uphold good governance practices

STRATEGIC PROGRAMMES PER OBJECTIVE (What elements constitute the Objective?)	ACTIVITY PER PROGRAMME (What have we achieved by 31 March 2019)	PERFORMANCE INDICATOR (What elements constitute the Objective?)	Baseline 2017/18 Forecast	Annual Targets			Compact Number
				2018 / 19	2019 / 20	2020 / 21	
				utilisation = 5%	utilisation = 5%	utilisation = 5%	
	ICT Security	Intrusions/virus breakouts on system	2	<3	<3	<3	2019-4.16
	Monitoring of critical facility availability	Upside/ availability of ICT facilities (%)	99	≥98	≥98	≥98	2019-4.17
		Upside/ availability of critical facilities (%)	≥85	≥85	≥85	≥90	2019-4.18
Compliance with national and international regulatory frameworks, and applicable standards	Compliance with appropriate standards, regulations and legislation	% achievement of compliance checklist	100	100	100	100	2019-4.19
	Internal Audits conducted	No. of audits	16	18	16	16	2019-4.20
	Review of applicable Audit Charters	No. of reviews	1	2	1	2	2019-4.21
	Fraud Awareness Campaigns	No. of campaigns	8	8	10	10	2019-4.22
Enhanced Safety, Health, Environment and Quality	SHEQ standards maintained and enhanced	Maintain Mintek Accreditation status	maintained	maintained	maintained	maintained	2019-4.23
		Achieved target for Fatalities	0	0	0	0	2019-4.24
		Achieved target for Lost Time Injury Frequency Rate (LTIFR)	<1	<1	<1	<1	2019-4.25

Learning & Growth Perspective
Strategic Objective 5: Develop human capital and organisational skills to build world class R&D excellence

STRATEGIC PROGRAMMES PER OBJECTIVE (What elements constitute the Objective?)	ACTIVITY PER PROGRAMME (What have we achieved by 31 March 2019)	PERFORMANCE INDICATOR (How do we measure our progress?)	Baseline 2017/18 Forecast	Annual Targets			Compact Number
				2018 / 19	2019 / 20	2020 / 21	
Training and Skills Development	Enhanced Skills Development	WSP Compliance Report	1	1	1	1	2019-5.01
		Total spend on training expressed as a % of payroll	2	2	2	2	2019-5.02
	Enhanced relationships with Institutions of Higher Education and other similar organisations.	Number of partnerships maintained	6	6	7	7	2019-5.03
		# of partnerships maintained with previously disadvantaged Higher Education Institutions	2	2	2	2	2019-5.04
		# of Graduate Recruitment Programmes and other Science Events	11	10	10	10	2019-5.05
	Science, Technology, Engineering, Maths and Innovation (STEMI) Promotion	Annual Minquiz competition	1	1	1	1	2019-5.06
	Effective Full-time Bursary Programme	# of under-graduate bursars	15	18	18	18	2019-5.07
		% Under-graduates Absorption Rate	100	100	100	100	2019-5.08
		# of post graduate bursars	11	9	9	9	2019-5.09
		% Postgraduate Absorption Rate	100	100	100	100	2019-5.10
	Effective Part-time Bursary Programme	# of under-graduate bursars	37	40	40	40	2019-5.11
		# of Hons/Other bursars	17	17	17	17	2019-5.12
		# of Masters bursars	26	26	26	26	2019-5.13
		# of Doctoral bursars	7	7	7	7	2019-5.14
	Work-Integrated Learning, Studentships and Internship Programmes	# of Candidates enrolled	60	60	30	30	2019-5.15

Strategic Objective 5: Develop human capital and organisational skills to build world class R&D excellence

STRATEGIC PROGRAMMES PER OBJECTIVE (What elements constitute the Objective?)	ACTIVITY PER PROGRAMME (What have we achieved by 31 March 2019)	PERFORMANCE INDICATOR (How do we measure our progress?)	Baseline 2017/18 Forecast	Annual Targets			Compact Number
				2018 / 19	2019 / 20	2020 / 21	
	Artisan Learnership Programme	# of Persons enrolled	13	6	6	0	2019-5.16
		% Retention of internal and absorption of external learners	100	0	100	0	2019-5.17
	Development Programmes for recent graduate scientists & engineers	Graduate Development Programme review report	1	1	1	1	2019-5.18
	Development Programme for researchers, scientists, engineers and technicians	An approved programme	0	1	0	1	2019-5.19
Organisational Development	Transformation of the Mintek Organisation	Report on compliance with DoL regulations	1	1	1	1	2019-5.20
		% of women at Mintek (towards achievement of Employment Equity targets)	39	46	46	46	2019-5.21
		% employees with disability (towards achievement of Employment Equity targets)	2	3	3	3	2019-5.22
		Interventions to increase women representation in Mintek	1	1	1	1	2019-5.23
		Overall % of designated groups (towards achievement of Employment Equity targets)	89	90	90	90	2019-5.24
	Structured mentorship programme to transfer skills and knowledge from specialists to mid-level professionals	% of employees participating in structured interactions between specialists and mid-level professionals	10	10	10	10	2019-5.25
	Compliance with Performance Management Policy	% Performance Contracts and Assessment done and signed (for qualifying employees)	100	100	100	100	2019-5.26
	Enhanced Experience Profile of Researchers	Average years of Mintek experience of researchers	8	6	6	6	2019-5.27

Strategic Objective 5: Develop human capital and organisational skills to build world class R&D excellence

STRATEGIC PROGRAMMES PER OBJECTIVE (What elements constitute the Objective?)	ACTIVITY PER PROGRAMME (What have we achieved by 31 March 2019)	PERFORMANCE INDICATOR (How do we measure our progress?)	Baseline 2017/18 Forecast	Annual Targets			Compact Number
				2018 / 19	2019 / 20	2020 / 21	
		Average age of researchers at Mintek	37	33	33	33	2019-5.28
	Proportion of Researchers to Total Staff	Proportion expressed as a %	33	33	33	33	2019-5.29
	Proportion of staff with Masters degree	Proportion of staff with Masters degree expressed as a %	12	10	10	12	2019-5.30
	Proportion of staff with Doctoral degree	Proportion of staff with Doctoral degree expressed as a %	5	5	5	5	2019-5.31
	Enhanced staff Retention & Succession	Staff Turnover rate	9	9	9	9	2019-5.32
		% Staff Turnover of Professionals in Mintek core Divisions	10	10	10	10	2019-5.33
		% of Core to Support employees	75	75	75	75	2019-5.34
	Effective Leadership Development Programme	# Leadership Development Programmes	0	0	1	2	2019-5.35
Employee Health and Wellness	Enhanced Employee Health and Wellness Programme	# of Employee Wellness Programme interventions	5	5	5	5	2019-5.36
		% of Working days lost to absenteeism	3.2	3.5	3.5	3.5	2019-5.37
		% compliance with obligatory annual medical assessment	100	100	100	100	2019-5.38
Effective human resource systems	Enhanced administrative efficiency	Average time (in months) to fill vacancies	2.3	2.5	2.5	2.5	2019-5.39
		Vacancy rate	2.1	5	5	5	2019-5.40

It is hereby recorded that the Corporate Scorecard, as presented in Section 7 above has been accepted by the Shareholder.

Dated at _____ on this the _____ day of _____ 2018.

AS WITNESSES:

1. _____
(Minister of Mineral Resources for and on behalf of the Republic of South Africa)

2. _____

Dated at _____ on this the _____ day of _____ 2018.

AS WITNESSES:

1. _____
(Chairperson of the Board of Mintek)

2. _____

APPENDIX I – MATERIALITY FRAMEWORK FOR 2018/19

BACKGROUND

Mintek's **vision** is to be a global leader in mineral and metallurgical innovation.

The **mission** of Mintek is to serve our stakeholders by adding value to mineral resources through technology, industrial growth and human development in a sustainable manner.

Mintek's strategic goals are to:

- Enhance Mintek's visibility and credibility to all stakeholders;
- Research and develop efficient mineral processing technologies and value added products and services;
- Promote the mineral based economies of rural and marginalised communities;
- Uphold good governance practices;
- Develop human capital and organisational skills to build world class R&D excellence.

2. SCOPE

The materiality framework is developed in accordance with Treasury Regulation 28.3.1 which requires that for the purposes of materiality [sections 50(1), 55(2), & 66(1) of the Public Finance Management Act (PFMA)] and significance [section 54(2) of the PFMA], the Accounting Authority must develop and agree on a framework of acceptable levels of materiality and significance with the relevant Executive Authority. This framework will be reviewed annually prior to the commencement of the financial year.

3. PURPOSE

The purpose of the document is to record the level and reasoning for the suggested levels of materiality for consideration by the Board and approval by the Executive Authority as required. It outlines management's assessment of qualitative and quantitative materiality, taking cognisance of the existing framework of risks and controls within Mintek. The materiality framework, as set out below, represents management's assessment of the potential impact of transactions and other events within Mintek on the presentation of financial information used for decision making by management, and other users of the financial statements.

Corporate accountability in essence requires companies to be accountable for their decisions and performance that have a potentially large impact on people, the environment or company value.

Materiality as a concept is therefore used to determine the materiality or significance of the issues to be reported for Mintek as noted above.

4. DEFINING 'MATERIAL' AND 'SIGNIFICANT'

The materiality concept states that financial information is material to the financial statements if it would change the opinion or view of a reasonable person. In other words, all important financial information that would sway the opinion of a financial statement user should be included in the financial statements.

International Accounting Standards (IAS 1), Presentation of Financial Statements, read together with South African Accounting Standards (SAAS 320.03), defines items as material 'if they could, individually or collectively, influence the economic decisions of users taken on the basis of the financial statements. Materiality depends on the size and nature of the omission or misstatement judged in the surrounding circumstances. The size or nature of the item, or a combination of both, could be the determining factor.' Materiality can thus be either quantitative or qualitative or both. Materiality is inherently subjective in nature and it enables a company to measure and disclose only those transactions that are sufficiently large amounts to be of concern to the users of financial statements.

'Significant' implies a higher level of importance than 'material'. A significant transaction impacts on Mintek as a whole. An occurrence may be material but not necessarily significant, whereas any occurrence that is significant will

be material, as it will have an impact on the fulfilment of Mintek’s mandate as a public entity and its operative effectiveness. In terms of Mintek’s nature of business and extent of operations, a significant item is defined as one which exceeds the maximum monetary limit that the Chief Executive Officer of Mintek can authorise, in terms of Mintek’s Delegation of Authority.

In the Mintek environment, the public nature of the funds that constitute a significant portion of Mintek’s income necessitates a narrower definition of “material” than merely being an influence on economic decisions. As such, therefore, the definition of “material” transactions within Mintek will necessarily include any transactions that may have an impact on the presentation of the annual financial statements, as an accurate representation of the “full and proper records of the financial affairs” of Mintek, as required by Section 55(1)(a) of the PFMA.

Implications

An understanding and application of the concept of materiality helps to manage, and be seen to be managing significant impacts and issues better. Matters that rise to the level of ‘materiality’ are those that require high-level, co-coordinated effort. Many other issues, whilst not material, will still be addressed and managed by the company, and need to be communicated to stakeholders – but in focused, targeted ways – not in the annual report.

With a full understanding of materiality and how it works, stakeholders should become better equipped to raise the issues that matter most to them.

5. DETERMINATION OF MATERIALITY - GUIDELINES APPLIED IN THE COMPUTATION OF MATERIALITY

Quantitative Materiality can be based on a number of financial indicators of the type that is widely used and accepted in the accounting profession as a basis of calculating materiality.

The following table depicts acceptable basis used in the computation of materiality.

Basis	Acceptable Ranges
Gross Revenue/Turnover	0.2% – 1 %
Net Income	1 – 5 %
Total Asset	1 – 2 %
Equity	0.5 – 2 %

5.1 Significance of Indicators

The nature of Mintek is such that both the balance sheet and the income statement indicators are of significance. Mintek has significant assets and revenue streams – both are significant to the users of the financial information.

5.2 Stability of Indicators

Gross revenue and total assets remained stable indicators for Mintek despite the volatile economic conditions of recent years and will therefore be used in the calculation of materiality. The gross revenue for the first 6 months of the 2017/18 financial year were considered in November and a forecast was made that appear to be indicative of the likely results for the year.

Net income should be disregarded as MINTEK is not a profit making institution, and there are fluctuations and many dependencies that influence this figure.

Mintek has historically used a rate of 0.3% in calculating the materiality level. This is within the range specified above of 0.2% - 1% of gross revenue and provides a level that is acceptable both quantitatively and qualitatively.

5.3 Computation of Materiality

Gross revenue:

The 2017/2018 forecast budget as indicated in the compact will be used for the computation of materiality. The calculations are as follows:

Gross Turnover:

0,3% of R 520 580 108= R 1 561 740

Asset calculation

Use 1% of R755 770 2016(2017-total assets) = R7 55 7 702

Different levels can be set for different classes of transactions. Mintek has however decided to take a more conservative approach by using gross revenue and not assets as the basis for calculating Materiality. The Materiality level will cover all classes of transactions.

The materiality for the previous financial period was set at R1.5m, representing the lower end of the range for gross revenue. Gross revenue/turnover includes 100% state grant allocation, revenue from contract research, and sales of products and services. The calculations above results in the materiality figure of R1,5million however Mintek has decided to keep materiality at the same levels as in the previous financial period mainly because the sudden increase in revenue is project driven and may decrease in future.

Therefore the materiality for the current period will be kept at R1,5 million.

6. CONTROL ENVIRONMENT

The Board of Directors consists of independent non-executive members who are appointed by the Minister of Mineral Resources. The Audit and Risk Committee consists of some Board members and two independent non-Board members.

Mintek is managed by a CEO assisted by five General Managers, who together make up the Executive Management team. Mintek maintains a system of internal controls designed to provide reasonable assurance as to the integrity and reliability of its financial statements, to safeguard its assets and to minimise the risk of fraud. In terms of the Audit Committee charter, the Audit and Risk Committee reviews the effectiveness of the system of internal controls.

A Risk Steering Committee assists in reviewing the risk management process and significant risks facing the organisation. In terms of the Risk Management Framework, this review is delegated to the CEO.

The Internal Audit function is established and operational. The performance of the Internal Audit function is subject to evaluation by the Audit and Risk Committee, in terms of the Audit and Risk Committee and Internal Audit charters. Additionally, the Audit and Risk Committee reviews and approves the Internal Audit charter, internal audit plans and ongoing internal audit reports on the effectiveness of Mintek's internal controls.

Although Mintek is an entity within the Department of Mineral Resources (DMR), it is also accountable to the Department of Science & Technology (DST) for its Research and Development (R&D) and technology related activities. Strategic goals encompassing economic, technical, social and environmental objectives, determined by the Government and DMR, provide Mintek with a basis for evaluating its activities. These criteria are, therefore, also used in the assessment of significant risks facing Mintek.

6.1 Stakeholders

The primary stakeholders are the Departments of Mineral Resources and Science & Technology.

Users of financial statements:

- Department of Mineral Resources
- Department of Science & Technology
- National Treasury

- Banking institutions
- South African Revenue Services
- Suppliers and other creditors

7. QUANTITATIVE MATERIALITY

Materiality refers to the extent or nature of a misrepresentation and/or omission of financial information which, individually or collectively, can, in the light of surrounding circumstances cause the judgment or decision of a reasonable person to be influenced by such misrepresentation and/or omission when making a decision on the basis of the said information.

In addition to the overall quantitative materiality determined, all transactional items exceeding R50,000 in value which meet the necessary prerequisites for recognition as accruals at year-end, will be classified as such.

Items less than R50,000 which meet the criteria will be considered on merit. Where it is too difficult to value small items, these will be regarded as immaterial. The overriding criteria, however, is that the aggregate of all such small items, individually judged to be immaterial, may not exceed 0.3% of Gross revenue.

In addition, items that individually or collectively meet the definition of “significant” or “material”, as defined earlier in this framework will be considered separately for assessment of materiality and risk. The figure of R1.5million therefore, functions as a guideline to inform management in the overall consideration and management of risk.

8. QUALITATIVE MATERIALITY

Materiality is not merely related to the size of the entity and elements of the financial statements. Misstatements that are large individually or in aggregate may affect the reasonable users’ judgement. Misstatements may also be material on qualitative grounds. The following are some of the qualitative factors to be considered:

- Any breaches to procedures or processes required by legislation or regulation
- Transaction entered into that could result in the reputation risk to Mintek.
- Unusual transaction entered into that are not of a repetitive nature as well as new ventures that Mintek has entered into. These are purely disclosed due to their nature and the knowledge that they could affect the decision of the users of financial statements.
- Any fraudulent and dishonest behaviour of officers or staff.

APPENDIX II – COST CONTAINMENT PLAN

1. Introduction

The definition of cost containment is “The process of controlling the expenses required to operate an organisation or perform a project within pre-planned budgetary constraints.” The cost containment process is an important management function that helps keep costs down to only necessary and intended expenses in order to satisfy financial targets. Budget monitoring is performed on a regular basis to ensure that there is no excessive spend. The focus for Mintek is to improve efficiencies through better utilisation of resources.

Accounting officers and accounting authorities are in terms of section 38(1)(c)(iii) and 51(1)(b)(iii) of the PFMA required to implement control measures to ensure that all expenditure in their respective institutions is necessary, appropriate, cost-effective and is recorded and reported, as prescribed by the relevant legislative framework. In giving effect to this requirement, accounting officers and accounting authorities are responsible for ensuring that all employees are mindful of the current economic realities and the need to intensify efforts to improve efficiency in expenditure.

The cost containment plan as set in the National Treasury Instruction/circular No. 02 of 2016/2017 issued on the 30th September 2016 gives account of some of the measures that Mintek will continue to implement over the planning period.

2. Background

Operational /discretionary expenditure reduced from 43% of total expenditure in 2012/2013 to 36% in 2016/2017. This was partly attributed to the cost containment measures implemented over the years and other efficiencies.

The internal control environment was enhanced to identify excessive costs, such as detailed monthly management reports and quotation based sourcing of goods and services.

The effectiveness of controls is measured throughout the year by the internal audit function and annually by the Auditor General. Mintek has also achieved clean audit status for the last two years. Mintek, has been implementing some cost containment measures over the years and some of those already implemented include the following:

- Energy efficient lighting;
- Printing initiatives that includes double sided, no colour default on all printing machines;
- Energy monitoring;
- Oversight over catering expenses;
- Utilisation of discount agreements such as PURCO; and
- Freezing of vacant post.

3. Supply Chain Management

Mintek maintains a turnkey supply chain management solution where all procurement of goods and services are centralised. This ensures proper control and adherence to policies and procedures. Additional controls to curb wasteful expenditure include:

- Review of all requisitions above R10 000 by Chief Financial Officer for validity and reasonability;
- Authorisation of all requisitions in terms of Delegation of Authority; and
- Thorough tender process for expenditure exceeding R500 000.

4. Areas for cost containment

Cost Containment	Action	Metric	Responsible	Time Frame
4.1 Reduce unnecessary expenditure on consultants	<ul style="list-style-type: none"> • Consultants to be limited to specialist services to ensure increase of knowledge base. • Limit expenditure to consultants who offer independent advice. • Ensure that as part of the approval process normal Mintek procurement processes are followed when consultant services are required and that the criteria as set out on Cost Containment Measures Circular are adhered to. 	Track, monitor and report: <ul style="list-style-type: none"> • No of specialist services consultants. • No of consultants offering independent advice. • Expenditure on engagement of consultants. • Consultant appointments approved in terms of procurement processes. 	Mintek Divisional Managers	Monthly/Quarterly/ Annually
4.2 Reduce travel and accommodation expenditure	<ul style="list-style-type: none"> • The requirements for travel should be assessed on a needs basis and approved at manager's discretion. • Travel should be planned in advance, where possible, to optimise cost savings. • Travel options with various service providers should be considered and the most cost effective option should be selected. • Discounts with third parties, such as PURCO. • Foreign travel may only be conducted as contained in the International Travel Plan and where exceptions occur, travel must be approved by the Chief Executive Officer. 	Track, monitor and report: <ul style="list-style-type: none"> • Approval of travel expenditure by managers. • Approval of travel in advance. • Whether travel options with various service providers are selected. • Value of travel related discounts. • Foreign travel conducted in terms of the International Travel Plan 	Mintek divisional Managers	Monthly/Quarterly/ Annually
4.3 Reduce expenditure on catering and social events	<ul style="list-style-type: none"> • Expenditure controlled at managerial level with Finance oversight • No catering for internal meetings except where the meeting is longer than 5 hours. • Official engagements that are conducted for longer than 5 hours such as training, board and its subcommittees, conferences may incur catering costs. • Meetings with external customers on discretion of the manager. 	Track, monitor and report: <ul style="list-style-type: none"> • Expenditure control at managerial level with Finance oversight. • Catering costs incurred for meetings that are no longer than 5 hours. • Catering costs incurred for meetings that are longer than 5 hours. 	Mintek divisional Managers	Monthly/Quarterly/ Annually
4.4 Reduce expenditure on events, meetings and conferences	<ul style="list-style-type: none"> • Manager discretion to be applied when approving the attendance of local/foreign conferences and events. Budget availability and benefits to be considered when applications are reviewed. • The number of delegates attending such events should be considered and approved at manager's discretion. 	Track, monitor and report: <ul style="list-style-type: none"> • Local conferences and events approved by managers. • Budget availability and benefits analysis conducted when applications are reviewed by managers. Approval of number of delegates attending events, meetings and conferences 	Mintek Divisional Managers	Monthly/Quarterly/ Annually

APPENDIX III – FRAUD PREVENTION PLAN

GLOSSARY OF TERMS

Throughout this document, unless otherwise stated, the words in the first column below have the meanings stated opposite them in the second column (and cognate expressions shall bear corresponding meanings):

“Cabinet” Parliamentary Cabinet of the Republic of South Africa

“Code” For Mintek Staff Members as prescribed in the Mintek Code of Conduct and Business Ethics policy

"Fraud and corruption" includes, but is not limited to, the following legal definitions:

- (i) Fraud, i.e. "the unlawful and intentional making of a misrepresentation resulting in actual or potential prejudice to another";
- (ii) Theft, i.e. the unlawful and intentional misappropriation of another's property or property which is in his/her lawful possession, with the intention to deprive the owner of its rights permanently";
- (iii) Offences in respect of corrupt activities as defined in the Prevention and Combating of Corrupt Activities Act, 2004, i.e.:

- The general offence of corruption which could be summarised as directly or indirectly accepting or agreeing to accept any gratification from another person; giving or agreeing to give any other person any gratification in order to influence that person directly or indirectly to exercise his powers, duties or legal obligations in a manner which is/amounts to:
 - a. Illegal, dishonest, unauthorised, incomplete, or biased;
 - b. Misuse or selling of information or materials acquired;
 - c. Abuse of position of authority;
 - d. Breach of trust;
 - e. Violation of a legal duty or set of rules;
 - f. Designed to achieve an unjustified result; and
 - g. Any other unauthorised or improper inducement to do or not to do anything.
- Corrupt activities in relation to:
 - a. Public officials;
 - b. Foreign public officials;
 - c. Agents;
 - d. Judicial officers;
 - e. Members of the prosecuting authority;
 - f. Unauthorised gratification received or offered by or to a party to an employment relationship;
 - g. Witnesses and evidential material during certain proceedings;
 - h. Contracts;
 - i. Procuring and withdrawal of tenders;
 - j. Auctions;
 - k. Sporting events; and
 - l. Gambling games or games of chance.
- Conflicts of interests and other unacceptable conduct, e.g.:
 - a. Acquisition of private interests in contract, agreement in or investment in public body;
 - b. Unacceptable conduct relating to witnesses; and
 - c. Intentional interference with, hindering or obstruction of investigation of offence;
- Other offences relating to corrupt activities, viz.:
 - a. Accessory to or after an offence;
 - b. Attempt, conspiracy and inducing another person to commit offence; and
- Failure to report corrupt transactions.

Fraudulent and corrupt acts may include:

- i. Systems issues: where a process/system exists which is prone to abuse by employees, the public or other stakeholders, e.g.:
 - a. Procurement fraud, e.g. irregular collusion in the awarding of tenders or orders for goods and/or services;
 - b. Deliberate non-compliance with delegation of authority limits;
 - c. Collusion in contracts management;
 - d. Revenue fraud; e.g. Mintek officials' reluctance in verifying the suppliers/contractors VAT details before any contractual agreement can be entered into with the purposes of rendering services to Mintek.
 - e. Travel and subsistence fraud;
 - f. Abuse of sick leave or other permissible leave;
 - g. Disclosing confidential or proprietary information to outside parties.
- ii. Financial issues: i.e. where individuals or companies have fraudulently obtained money from Mintek, e.g.:
 - a. Syndicate fraud;
 - b. Creditors fraud, e.g. diverting payments to incorrect creditors;
 - c. Suppliers submitting invalid invoices or invoicing for work not done; and
 - d. Payroll fraud, e.g. creation of "ghost employees".
- iii. Equipment and resource issues: i.e. where Mintek's equipment or other sources utilised for personal benefit or stolen, e.g.:
 - a. Theft of assets, e.g. computers, face value forms, consumables, (stationery, globes, fuses) etc.;
 - b. Personal use of resources, e.g. telephones, internet, e-mail; vehicles and
 - c. Irregular destruction, removal, or abuse of records (including intellectual property); and
 - d. Misuse of the Mintek's official time for personal gain/purposes.
- iv. Other issues: i.e. activities undertaken by employees of Mintek, which may be against policies or fall below established ethical standards, e.g.:
 - a. Soliciting gifts or favours from consultants or other suppliers, e.g. acceptance of "kick-backs";
 - b. Pursuing private business interests without permission;
 - c. Nepotism; and Favouritism.

"Fraud Policy"	Fraud risk and whistle blowing policy
"Managers"	Includes all Members of Management and, where appropriate Supervisors
"PFMA"	The Public Finance Management Act (PFMA), 1999 (Act No. 1 of 1999)
"Plan"	Fraud Prevention Plan
"Protected Disclosures Act"	Protected Disclosures Act, Act 26 of 2000

1. INTRODUCTION

Section 27.2.1 of the Treasury Regulations, issued in terms of the Public Finance Management Act, 1999 states that the Accounting Authority must ensure that a risk assessment is conducted regularly so as to identify emerging risks of the public entity. A risk management strategy, which must include a fraud prevention plan, must be used to direct internal audit effort and priority and to determine the skills required of managers and staff to improve controls and to manage these risks

2. APPROACH TO UPDATING THE PLAN

- 2.1 Mintek has a risk register/plan in place, which is updated on a regular basis. The plan was updated with the view to put measures in place to mitigate the effects of the risks identified in the risk register of Mintek.

- 2.2 The Plan also incorporates principles contained in the Public Sector Anti-Corruption Strategy dated January 2002, endorsed by Cabinet.
- 2.3 The Code of Conduct and Business Ethics Policy and the Fraud Policy, as approved, forms an integral part of the Fraud Prevention Plan.
- 2.4 The fraud and corruption risks identified in the updating of the Plan cannot be relied upon as an indication of the full spectrum of fraud and corruption risks facing Mintek, but rather as an indication of the type of risks.
- 2.5 The Plan does not guarantee that Mintek will not be impacted by incidents of fraud and corruption but is intended to serve as an additional measure to assist in the limitation of fraud and corruption risk with a particular focus on creating awareness and promoting ethical business conduct.

3. COMPONENTS OF THE PLAN

The main principles of the Plan are the following:

- Creating a culture which is intolerant to fraud and corruption;
- Deterrence of fraud and corruption;
- Preventing fraud and corruption which cannot be deterred e.g. misuse of internet, conducting private affairs during official hours, etc.;
- Detection of fraud and corruption;
- Investigating detected fraud and corruption;
- Taking appropriate action against fraudsters and corrupt individuals, e.g. prosecution, disciplinary action, etc.; and
- Applying sanctions, which include redress in respect of financial losses.

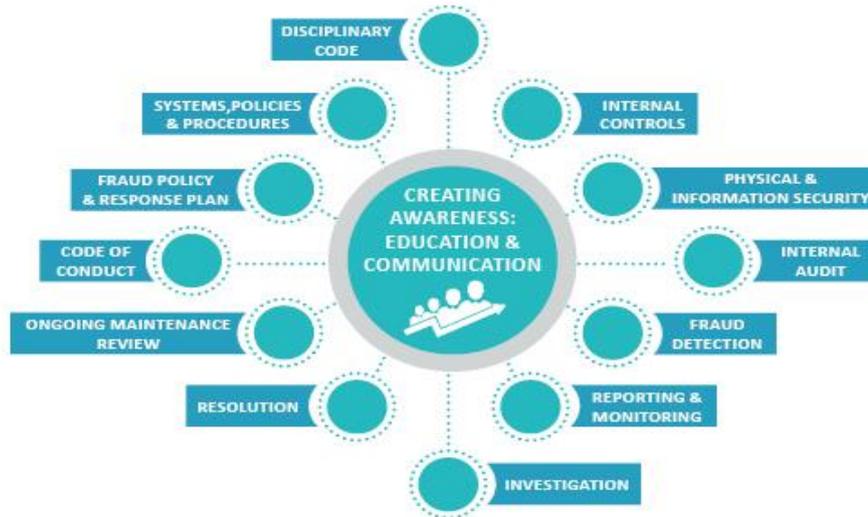
The objectives of the Plan could be summarised as follows:

- Encouraging a culture within Mintek where all employees, the public and other stakeholders continuously behave ethically in their dealings with, or on behalf of Mintek;
- Improving accountability, efficiency and effective administration within Mintek;
- Improving the application of systems, policies, procedures and regulations;
- Effectively managing aspects of Mintek which could facilitate fraud and corruption and allow these to go unnoticed or unreported; and
- Encouraging all employees and other stakeholders to strive towards the prevention and detection of fraud and corruption impacting or having the potential to impact on Mintek's activities.

The above is not intended to detract from the premise that all the components are equally essential for the successful realisation of the Plan. The components of the Plan for Mintek are the following:

- (a) The Code of Conduct and Business Ethics policy in which the management of Mintek believes, and requires their employees to subscribe;
- (b) Mintek's systems, policies, procedures, rules and regulations;
- (c) The Disciplinary and Grievance Code;
- (d) Sound control environment;
- (e) Sound internal controls to prevent and detect fraud and corruption;
- (f) Physical and information security management;
- (g) Internal Audit;
- (h) Ongoing risk assessment and management, which includes systems for fraud and corruption detection;
- (i) Reporting and monitoring of allegations of fraud and corruption;
- (j) A Fraud Policy which includes the policy stance of Mintek on fraud and corruption and a response plan which incorporates steps for the reporting as well as proper resolution of reported and detected incidents and allegations of fraud and corruption;
- (k) Creating awareness amongst employees, the public and other stakeholders (e.g. goods and service providers) through communication and education relating to relevant components of the Plan, the Code and the Fraud Policy; and
- (l) Ongoing maintenance and review of the Plan to ensure effective project-management of its further implementation and maintenance.

An illustration of the Plan is contained in the figure below:



4. PREVENTING FRAUD AND CORRUPTION

4.1 Code of Conduct and Business Ethics (Code)

4.1.1 The ethical principles contained in the Code are applicable to all employees of Mintek. Therefore, the Code forms part of the Plan for Mintek.

4.1.2 Mintek will arrange workshops to create awareness of the Code among employees. A further objective of this training is to reinforce the expectations of Mintek and the governance of employees of Mintek with regard to their conduct and behaving ethically and with integrity.

4.1.3 Processes and mechanisms to manage professional ethics are key to the fight against fraud and corruption. In line with the principles contained in the Public Sector Anti-Corruption Strategy, Mintek will pursue the following additional steps to communicate the principles contained in the Code:

- a) A copy of the Code will continue to be circulated to all employees and included in induction packs for new employees.
- b) Include relevant aspects of the Code in further awareness presentations, training sessions and communication programmes to create awareness thereof amongst employees and other stakeholders. Further objectives of this training will be the following:
 - Helping employees to understand the meaning of unethical behaviour (including harassment in any form) in line with expectations of Mintek;
 - Presenting case studies which will assist in developing behaviour to articulate and encourage attitudes and values which support ethical business conduct;
 - Helping employees to understand issues involved in making ethical judgements; and
 - Communicating the implications of unethical behaviour and its impact for individuals, the workplace, professional relationships, Mintek as whole and external stakeholders including the public.

4.1.4 There is a system in place for the declaration of private business interests, actual or potential conflicts of interest by all employees. The Code of Conduct and Business Ethics is used as a guide regarding acceptance and offering of business courtesies. The declaration of private business interests, actual or potential conflict of interest is done on Sharepoint.

4.2 Mintek's Systems, Policies, Procedures, Rules and Regulations

4.2.1 Mintek has a number of systems, policies, procedures, rules and regulations designed to ensure compliance with government legislation.

- 4.2.2 The management of Mintek will improve awareness and knowledge of the relevant systems, policies, procedures, rules and regulations, including the requirements of the PFMA and the Preferential Procurement Policy Framework Act amongst its employees. Mintek will develop clearly defined communication and training strategies to create awareness of existing and new policies and procedures in order to ensure that all employees are made aware of, and adequately trained in the implementation of policies and procedures relevant to their duties and responsibilities, including:
- (a) Provisions for all employees to acknowledge, in writing, that they have read the policies and procedures applicable to their duties, have undergone relevant training and/or are aware of these policies and procedures;
 - (b) The keeping of adequate records serving as proof that employees have been made aware of the policies and procedures relevant to their duties; and
 - (c) The development and distribution of a regular communiqué outlining the importance of complying with policies and procedures and the implications for employees; for example, the taking of corrective action against offenders not complying with policies and procedures.
- 4.2.3 A structured monitoring mechanism has been administrated for the keeping of proper records of the policies and procedures that are being updated, and of new policies and procedures that are being developed in order to set clear targets and monitor progress.
- 4.2.4 Mintek is committed to developing human resources systems, policies and procedures, which will incorporate the fraud and corruption prevention practices detailed below.
- (a) The administration of a system for transparent and merit-based hiring and promotion practices with objective standards in order to reduce the risk of nepotism and favouritism, both of which are damaging forms of fraud and corruption;
 - (b) Thorough pre-employment and security clearance screening of candidates for sensitive positions. Mintek will verify at least the previous employment, qualifications, citizenship, and criminal records of all persons before they are employed; and
 - (c) Mintek recognises that, despite ongoing organisational and policy changes, for example employment equity policies, matching of competence to the job is extremely important. As part of its approach to the management of human resources, Mintek will continue to pursue steps to limit the risk of incompetent people being appointed.
- 4.2.5 Management must be held accountable for complying with, and implementing, Mintek's systems, policies, procedures, rules and regulations and for preventing fraud and corruption. This will be addressed in job descriptions, agreed work plans and performance contracts.
- 4.2.6 Mintek will also administrate a system with clear guidelines for the placing of prohibitions on individuals and restriction of entities found guilty of fraud and corruption against it.

Disciplinary and grievance code

- 4.2.7 The disciplinary and grievance code prescribes appropriate steps to be taken to resolve disciplinary matters.
- 4.2.8 Mintek recognises the fact that the consistent and efficient application of disciplinary measures is an integral component of effective fraud and corruption prevention. The following steps to expedite the consistent, efficient and speedy application of disciplinary measures will be initiated:
- (a) Creating awareness amongst employees of conduct which is forbidden in terms of the disciplinary and grievance code. Where disciplinary standards are not adhered to, action will be taken against offenders;
 - (b) Ongoing training of managers in the application of disciplinary measures and the disciplinary process, and sustaining this training;
 - (c) Developing a system to facilitate the consistent application of disciplinary measures; and
 - (d) Regular monitoring and review of the application of discipline with the objective of improving weaknesses identified.
- 4.2.9 Where managers are found to be inconsistent and/or inefficient in the application of discipline corrective action will be implemented.

Internal Controls

4.2.10 This section of the Plan relates to basic internal controls to prevent and detect fraud and corruption and the training of employees in internal control and the conducting of their day-to-day duties. The systems, policies, procedures, rules and regulations of Mintek prescribe various controls, which if effectively implemented, would limit the risk of fraud and corruption. These controls may be categorised as follows, it being recognised that the categories contain overlapping elements:

Prevention controls: These are divided into two sub-categories, namely, Authorisation and Physical;

Detection controls: These are divided into four categories, namely, Arithmetic and Accounting, Physical, Supervision, and Management Information; and

Segregation of duties: Separation of responsibilities i.e. an internal control designed to prevent an error and fraud by ensuring that at least two individuals are responsible for the separate parts of any task.

PREVENTION CONTROLS:

- (a) *Authorisation:*
 - (i) All transactions require authorisation or approval by an appropriate responsible person.
 - (ii) The limits for these authorisations are specified in the delegations of authority of Mintek as well as in various government prescripts.
- (b) *Physical:*

These controls are concerned mainly with the custody of assets and involve procedures and security measures designed to ensure that access to assets is limited to authorised personnel.

DETECTION CONTROLS:

- (a) *Arithmetic and accounting*
 - (i) These are basic controls within the recording function which check that transactions to be recorded and processed have been authorised, that they are complete, and that they are correctly recorded and accurately processed.
 - (ii) Such controls include checking the arithmetical accuracy of records, the maintenance and checking of totals, reconciliations, control accounts, and accounting for documents.
- (b) *Physical*
 - (i) These controls relate to the security of records. They therefore underpin arithmetic and accounting controls.
 - (ii) Their similarity to preventive controls lies in the fact that these controls are also designed to limit access.
- (c) *Supervision*

This control relates to supervision by responsible officials of day-to-day transactions and the recording thereof.
- (d) *Management information*
 - (i) This relates to the review of management accounts and budgetary control.
 - (ii) These controls are normally exercised by management outside the day-to-day routine of the system.

SEGREGATION OF DUTIES

- (a) One of the primary means of control is the separation of those responsibilities or duties that would, if combined, enable one individual to record and process a complete transaction, thereby providing him/her with the opportunity to manipulate the transaction irregularly and commit fraud and corruption;
- (b) Segregation of duties reduces the risk of intentional manipulation or error and increases the element of checking;
- (c) Functions that should be separated include those of authorisation, execution, custody, and recording and, in the case of computer-based accounting systems, systems development and daily operations; and

- (d) Placed in context with fraud and corruption prevention, segregation of duties lies in separating either the authorisation or the custodial function from the checking function.

4.2.11 Mintek will continue to initiate steps to address the problem of lack of training, expertise and knowledge in systems, policies, procedures, rules and regulations to improve internal control. Areas of weakness will be identified during audits and risk assessments.

4.2.12 Furthermore, Mintek will also continue to re-emphasise to all supervisors that consistent compliance by all employees with internal control is one of the fundamental controls in place to prevent fraud and corruption.

4.2.13 Where managers do not comply with basic internal controls, e.g. non-adherence to the delegation of authority limits, firm disciplinary action(s) will be considered.

Physical and Information Security

PHYSICAL SECURITY

4.2.14 Mintek will consider conducting a regular detailed review of the physical security arrangements at its offices and improve weaknesses identified. Specific focus areas will be physical security over infrastructure, assets and staff.

INFORMATION SECURITY

4.2.15 Mintek will ensure that all employees are sensitised on a regular basis to the fraud and corruption risks associated with information security and the utilisation of computer resources, in particular – access control, and ensure that systems are developed to limit the risk of manipulation of computer data.

4.2.16 Regular communiqués will be forwarded to employees pointing security policy, with a particular emphasis on e-mail and Internet usage and the implications (e.g. disciplinary action) of abusing these and other computer related facilities. Where employees are found to have infringed on prevailing policy in this regard, disciplinary action will be taken.

4.2.17 Regular reviews of information and computer security will also be considered. Weaknesses identified during these reviews will be addressed.

5. DETECTING AND INVESTIGATING FRAUD AND CORRUPTION

5.1 Internal Audit

5.1.1 Mintek recognises the fact that the positive support by all its managers for Internal Audit and its functions, speedy response to, and the addressing of queries raised by Internal Audit is vital to the success of the Plan. Where managers are found to be slow in addressing internal control queries raised by Internal Audit, firm action will be taken.

5.1.2 Mintek will regularly re-emphasise to all managers that consistent compliance by employees with internal control is one of the fundamental controls in place to prevent fraud and corruption. Managers will be encouraged to recognise that internal control shortcomings identified during the course of audits are, in many instances, purely symptoms and that they should strive to identify and address the causes of these internal control weaknesses, in addition to addressing the control weaknesses.

5.2 Ongoing Risk Assessment and Management

5.2.1 Acknowledging the fact that Mintek faces diverse business risks from both internal and external sources, Mintek is administrating an ongoing process of risk identification and risk management. This information will be used to assist management with the following:

- (a) Prioritising areas for attention and subsequently developing appropriate controls to limit the material risks identified; and
- (b) To enable management to continually assess and update the risk profile (incorporating fraud and corruption risk) of Mintek.

- 5.2.2 Presentations to employees of Mintek will be conducted in order to ensure that they have a more detailed understanding of the fraud and corruption risks facing Mintek and the areas wherein these risks exist, thus enhancing the prospect of detecting irregularities earlier.
- 5.2.3 Mintek will also consider performing specific fraud and corruption detection reviews in the following areas on a regular basis:
- (a) Asset and inventory management;
 - (b) Procurement/Supply Chain Management;
 - (c) Conflicts of interest;
 - (d) Project management and maintenance;
 - (e) Contracts management;
 - (f) Fleet management;
 - (g) Compliance to delegations of authority;
 - (h) Budget control;
 - (i) Creditor payments;
 - (j) Revenue management;
 - (k) Payroll;
 - (l) Travel and subsistence; and
 - (m) Human Resources.

This will include the conducting of presentations to managers and staff to ensure that they have a more detailed understanding of the fraud and corruption risks associated with these areas, thus also enhancing the prospect of detecting irregularities earlier.

5.3 Reporting and Monitoring

- 5.3.1 Mintek has implemented a Fraud Hotline, which is controlled by an independent service provider and is intended to achieve the following:
- (a) To deter potential fraudsters and corrupt individuals by making all employees and other stakeholders aware that Mintek is not a soft target, as well as encouraging the participation of employees in supporting, and making use of this facility;
 - (b) To raise the level of awareness that Mintek is serious about fraud and corruption;
 - (c) To detect incidents of fraud and corruption by encouraging whistle blowers to report incidents which they witness;
 - (d) To assist Mintek in managing the requirements of the Protected Disclosures Act by creating an additional channel through which whistle blowers can report irregularities which they witness or which come to their attention; and
 - (e) To further assist Mintek in identifying areas of fraud and corruption risk in order that preventive and detective controls can be appropriately improved or developed.
- 5.3.2 Mintek will ensure that a fraud and corruption information system is developed for the following purposes:
- (a) Recording all allegations;
 - (b) Tracking progress of investigation of allegations;
 - (c) To facilitate the early identification of systemic weaknesses and recurring risks, and inform managers and employees of systemic weaknesses/risks; and
 - (d) Provide feedback to employees and other whistle blowers on the management of allegations.

The Fraud Policy and Response Plan:

- 5.3.3 A Fraud Policy, which contains the policy stance of Mintek to fraud and corruption as well as the response mechanisms in place to report, investigate and resolve incidents of fraud and corruption which impact it, has been developed for Mintek.
- 5.3.4 The Fraud Policy will be circulated to all employees of Mintek and appropriate sections to the public and providers of goods and services.
- 5.3.5 Fraud and corruption must be reported according to the provisions of the fraud policy.

6. FURTHER IMPLEMENTATION AND MAINTENANCE

6.1 Creating awareness

This component of the Plan comprises two approaches, namely education and communication.

6.1.1 Education: The creation of awareness amongst employees is intended to address the following issues:

- (a) Informing employees on an ongoing basis on what constitutes fraud and corruption;
- (b) Promote Mintek's and national policies that must be adhered to;
- (c) Informing employees of fraud and corruption risks to enable understanding of specific risks to which Mintek may be exposed, thus enhancing the prospect of detecting irregularities earlier;
- (d) Encouraging employees to blow the whistle on fraud and corruption;
- (e) Employee awareness of the current legislative framework as it relates to fraud and corruption, and their obligations and rights should they blow the whistle on fraud and corruption, the nature of the witness protection system and the roles and responsibilities of existing anti-corruption institutions; and
- (f) Inform employees of their obligations and rights in terms of the Access to Information Act.

6.1.2 Communication: The objective of the communication approaches is to also create awareness amongst employees, the public and other stakeholders, in order to facilitate a culture where all stakeholders strive to contribute toward making the Plan a success as well as for sustaining a positive, ethical culture within Mintek. This will increase the prospect of fraud and corruption being reported and improve Mintek's prevention and detection ability.

6.1.3 Communication strategies that will be considered by Mintek are the following:

- (a) Posters, newsletters, pamphlets and other publications to advertise the Code and the Fraud Policy, aimed at employees, the public and other stakeholders;
- (b) Screensavers on computers with appropriate anti-fraud and corruption and pro-ethics messages;
- (c) Attachments to tender invitation documents relating to Mintek's stance to fraud and corruption, where such irregularities can be reported and the actions which will be considered;
- (d) Appropriate attachments to offers of employment and inclusion of appropriate items in induction and training programmes;
- (e) Prudent terms in contracts signed with providers of goods and/or services relating to offering of gifts to employees of Mintek;
- (f) Ensuring that fraud and corruption prevention is a fixed agenda item in meetings;
- (g) Signing of declarations of commitment by all employees to the Plan; and
- (h) Endorsements of correspondence directed at providers of goods and/or services with anti-fraud and corruption and pro-ethics messages.

6.2 Ongoing Maintenance and Review

6.2.1 The Chief Executive Officer will be responsible for ensuring the ongoing maintenance and review of the Plan. This includes appointing appropriate officials to ensure that:

- (a) Reports of fraud and corruption received are evaluated and highlight areas of fraud and corruption risk within Mintek;
- (b) Fraud and corruption threats to Mintek are considered and recommendations to appropriate committees or management are made;
- (c) Criminal activities threatening Mintek are considered and fraud and corruption prevention recommendations with regard to areas that should be examined are made;
- (d) Action taken to implement recommendations relating to incidents of fraud and corruption are monitored;
- (e) The Code and the Fraud Policy are reviewed and appropriate amendments are made;
- (f) The awareness programme as necessary is amended, and the changes are implemented; and
- (g) Ongoing communication and implementation strategies are developed and implemented.

6.2.2 The Plan will be reviewed as the risk profile of Mintek changes, whilst progress with the implementation of the various components will be reviewed regularly. In the latter regard, specific priorities stemming from the Plan, actions to be taken, responsible persons and feedback dates relating to progress made will also be set.

APPENDIX IV – GOVERNANCE STRUCTURE

BOARD OF DIRECTORS (NON-EXECUTIVE)

NAMES	POSITION	GENDER	RACE	QUALIFICATIONS (HIGHEST)	AREAS OF EXPERTISE	OTHER BOARD MEMBERSHIPS
Masemola, ND		Male	African	Master's in Public Management; BBA in Local Government; Executive Leadership in Management	Governance, General Management, Local government, project management; Business administration; Public management	
Dlamini, D.	Chief Financial Officer at the National Arts Council of South Africa	Male	African	MCom; PGD in Business Management; BTech Taxation; N Dip Accounting; Professional Accountant SA	Accounting, tax, business management	KZN FET College
Du Toit, D.	Deputy Director General for International Cooperation & Resources at the DST	Male	White	LLM; LLB; BA	Law, international relations, government relations	None
McClain, K.	CEO for Closure & Rehabilitation Solutions	Female	African	BA in Fine Arts	Mining, mine rehabilitation, public affairs, communication, transformation, governance, fine art	None
Moatshe, R.A.	Chief Director of Mine Environmental Management at the DMR	Male	African	Masters in Environmental Management	Environmental management, project & cost management, data analysis	Director of ARM Environmental Consulting (company currently not operational)
Mohlala, M.S.	Researcher at Vaal University of Technology's Research Directorate Office	Female	African	PhD, Chemistry; MSc; BSc Hon	Chemistry R&D, strategy, business intelligence	None
Mkhombo, P.L.	Associate Director: Business Recoveries at PwC Africa	Male	African	LLM; LLB; BProc	Law, Labour Relations, Contract Risk Management, Financial Law, Corporate Governance	National Board of the South African Restructuring & Insolvency Practitioners Association (SARIPA)
Ngwenya, S.	Wealth Coach,, TNC Wealth Partners	Female	African	MBA, PGD in Management, BCom	Banking; Finance; Accounting; Taxation and Auditing	None
Rachidi, M.J.T.	Chief Executive Officer at Tetelo Computer Services (Pty) Ltd	Male	African	PTC; MDP: Computer Operations and Programming	Information Technology, risk management, human resources, governance, project management	Kamhlabane Timber; Abacus Forestries; SAFCOL; Siyaqhubeka Forests (SQF); Komatiland Forests (KLF); Industrias Florestais de Manica, SA (IFLOMA); Mountains-to-Oceans (MTO); University of Limpopo
Simayi, S	Manager, Metallurgical at Coega Development Corporation	Male	African	PhD in Operations Management; MBA; BTech; N Dip Metallurgical Engineering	Mining and environmental geology, metallurgy, business administration	AFIWAM (Pty) Ltd – Company is currently dormant

MINTEK EXECUTIVE MANAGEMENT TEAM

NAMES	POSITION	GENDER	RACE	QUALIFICATIONS	YEARS OF SERVICE AT MINTEK	AREAS OF EXPERTISE	BOARD MEMBERSHIPS
David Msiza	Acting CEO	Male	African	BSc. Mining Engineering Executive Development Programme (EDP)	<1 Years	Mining, Mine Health and Safety, Skills Development, General Management, Mine Management	Board Chairperson of the Mine Health and Safety Council (MHSC) and the Mining Qualifications Authority (MQA). Chairperson of the Risk Committee at the Department of Health.
Sakhi Simelane	GM: Finance	Male	African	MBA, BCom Hons (Auditing), BCom	9 Years	Finance and Auditing. General Management	UNISA Council; National Department of Economic Development (EDD), Public Service Commission (Audit Committee), MINDEV (Pty) LTD
Gugu Nyanda	GM: Corporate Services	Female	African	MBA, BA Hons; B Paed; Dip. HRM	4 Years	Human Resources Management, Strategic Planning, Communication, Integrity & Compliance Management and General Management	None
David Powell	GM: Business Development	Male	White	PhD (Chem Eng; MSc(Eng)(Metallurgy); BSc (Hons)(Metallurgy); GDE (Metallurgy), Professional Engineer, FSAIMM, FMES	1 Year	Minerals processing, Coal processing, Management of commercial operations, General Management	None
Alan McKenzie	GM: Technology	Male	White	MSc, BSc Hons	26 years	Pyrometallurgy, Mineral Processing and General Management	None
Makhapa Makhafola	GM: Research & Development	Male	African	PhD (Analytical Chemistry), MSc, Post-Graduate Diploma in Project Management, BSc Hons, Executive Development Programme	7 Years	Analytical Chemistry, Quality Assurance and General Management	Centre of Excellence in Strong Materials. Karoo Centre for Human Rights.

APPENDIX V – RISK MANAGEMENT POLICY

1. Legal Mandate

Mintek is classified in terms of The Public Finance Management Act (PFMA), 1999, as a Schedule 3 Public Entity. The following sections of the PFMA are relevant to this Risk Management Policy:

Section	Description
49 (1)	Every public entity must have an authority which must be accountable for the purposes of this Act.
(2)	If the public entity has a board or other controlling body, that board or controlling body is the accounting authority for that entity.
51 (1)	An accounting authority for a public entity –
(a)	must ensure that public entity has and maintains –
(i)	effective, efficient and transparent systems of financial and risk management and internal controls;
(ii)	a system of internal audit under the control of an audit committee.
56 (1)	The accounting authority for a public entity may –
(a)	in writing delegate any of the powers entrusted or delegated to the accounting authority in terms of this Act, to an official in that public entity.
(2)	A delegation or instruction to an official in terms of subsection (1) –
(b)	may either be to a specific individual or to the holder of a specific post in the relevant public entity; and
(c)	Does not divest the accounting authority of the delegated power or the performance of the assigned duty.

In terms of the above, the Mintek Board delegates the duties of risk management to the General Manager: Business Development, who will, hereafter, be referred to as the Risk Management Officer (RMO). A model for the governing structures responsible for the management of risk in Mintek is illustrated in Figure 1.

2 Corporate Governance

'Corporate governance' is the system by which an organisation is directed and controlled at its most senior levels, in order to achieve its objectives and meet the necessary standards of accountability, probity and openness.

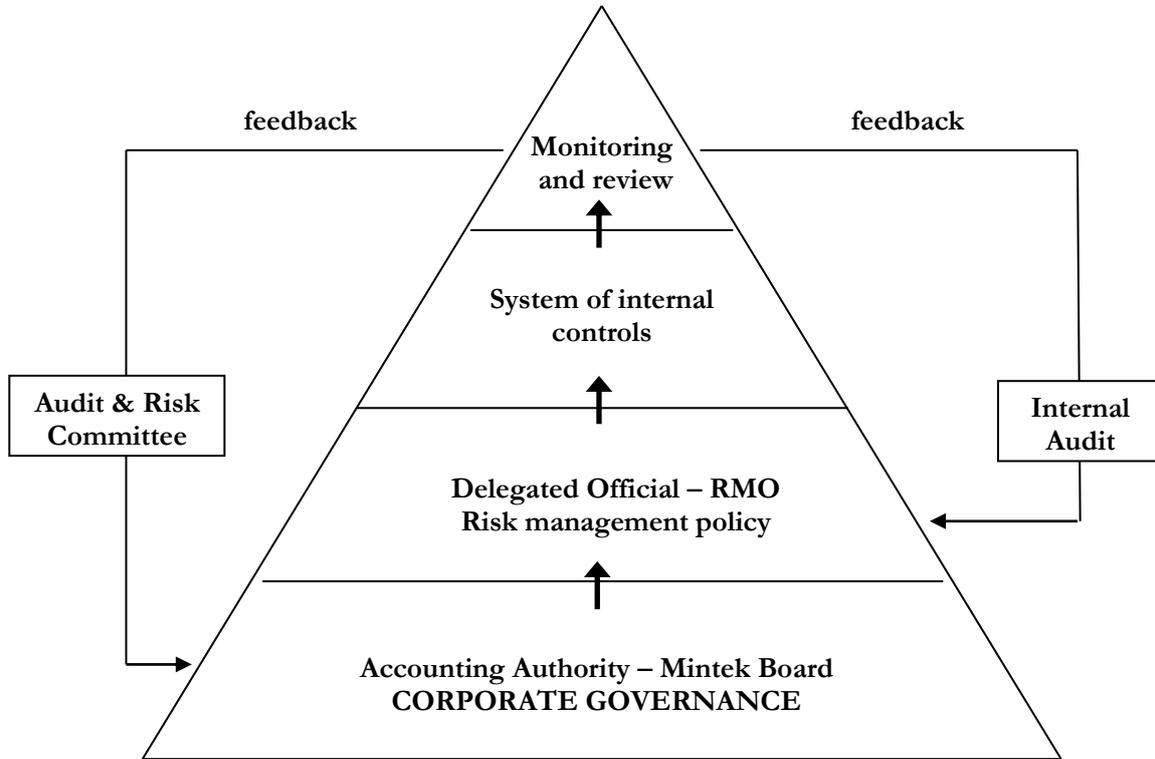


Figure1. Governing structure for the management of risk (RMO is the Risk Management Officer)

Demand for improved corporate governance has grown over the last decade. This has led to a body of guidance on corporate governance, including risk management and internal control. A set of responsibilities must be established in order to cascade the governance requirements down into Mintek. These responsibilities cover:

- a. Establishing an appropriate accountability framework encompassing management structures and practices (leadership, committees, reporting arrangements, policies and strategies etc.) within which the system of internal control can operate.
- b. Ensuring that the core and supporting processes are in place to produce the desired outcome (including a risk management process).
- c. Having the necessary capability (leadership, knowledgeable and skilled staff and adequate financial and physical resources) to ensure the processes and internal controls can work effectively.
- d. Regularly monitoring and reviewing the system of internal control.
- e. Ensuring proper communication and consultation at all levels within Mintek and with external stakeholders.
- f. Obtaining sufficient independent and objective assurance as to the robustness of Mintek's key processes.

The Board fully accepts its responsibility to discharge these governance obligations, including the management of risk. In order to deliver its accountability responsibilities, the Board has agreed a risk management policy that sets out its approach to risk management and the context for the system of internal control.

3 Risk Implementation Plan

Mintek is encouraged to adopt well managed risk-taking. It therefore needs to have in place the skills, management arrangements, and organisational structures to take advantage of opportunities to do things better and to reduce the possibility of failing to achieve key objectives. This document defines Mintek's approach to risk and how risk management will be embedded into management processes to ensure that the key strategic risks are being effectively managed.

Risk management needs to allow for the effective assessment and exploitation of opportunities while also identifying what would prevent us from achieving our objectives, and ensuring we have in place procedures to minimise, or manage, those risks. Risk management therefore involves a planned and systematic approach to the identification, assessment and mitigation of the risks which could hinder the achievement of strategic objectives.

3.1 The Role of the Risk Steering Committee

The Risk Management Officer (RMO) is responsible, on behalf of the Board, for ensuring that Mintek has an effective and operational system for managing risks. All types of high-level risk will be covered. The effectiveness of the system will be reviewed on a regular basis. The RMO will constitute a Risk Steering Committee with the following members:

- Chairman (RMO)
- Chief Executive Officer
- General Manager: Finance
- General Manager: Technology
- General Manager: Research & Development
- General Manager: Corporate Services
- Manager: Finance
- Manager: Human Resources Division
- Manager: Estate Management Services
- Head: Information Technology
- Head: Security
- Head: Safety & Environment

The Committee may, at their discretion, co-opt other participants with specialised knowledge or skills to attend any meeting. The key activities of the Risk Steering Committee will be to:

- identify the key strategic risks that would prevent achievement of Mintek's objectives;
- assign ownership of specific identifiable risks;
- evaluate the significance of each risk;
- assess Mintek's risk appetite;
- identify suitable responses and mitigating actions to each risk;
- ensure that the internal control system helps manage the risks; and
- regularly review the Risk Management Policy and the Risk Implementation Plan.

Copies of the Minutes of each meeting of the Risk Steering Committee, together with the latest version of the Risk Management Policy and the Risk Implementation Plan, will be submitted to the Audit and Risk Committee for discussion. Any comments received will be incorporated into the documents and submitted to the Mintek Board for approval.

Running in tandem with the Risk Steering Committee is Mintek's corporate quality, environmental, and safety management programs. Mintek has been certified compliant with ISO 9001: 2000, ISO 14001: 2004, and OHSAS 18001: 2007. The identification of technical risks, the implementation of appropriate risk mitigation measures, and continuous improvement is an integral part of these management programs. Mintek is audited annually by external auditors, SGS South Africa (Pty) Ltd, who check for consistency, compliance, and conformity with the international standards.

A meeting of the Corporate Safety Committee is held four times per year, whereas the Corporate Quality and Corporate Environmental committees meet twice per year. The Chairman of these committees, (viz. the General Manager: Technology) is also a permanent member of the Risk Steering Committee, thereby ensuring effective communication between these bodies.

3.2 Critical Success Factors

In order to assess the adequacy and success of our approach to risk management a number of critical success factors have been identified:

- senior management support, own, and lead on risk management;
- risk management policies and the benefits of effective management are clearly communicated to all staff;
- the organisational culture supports well thought through risk taking and innovation;
- management of risk is fully embedded in management processes and consistently applied;
- management of risk is closely linked to achievement of objectives;
- risks associated with working with other organisations are assessed and managed;
- risks are actively monitored and regularly reviewed.

3.3 Risk Identification

A strategic approach to risk management depends on identifying risks against key organisational objectives. Operating within this framework helps ensure a consistent approach across the organisation and enables a clear structure to be established.

The mandate of Mintek is set out in the Mineral Technology Act (Act No. 30 of 1989), which is to serve the national interest through research, development and technology transfer, to promote mineral technology and to foster the establishment and expansion of industries in the field of minerals and products derived therefrom.

The vision of Mintek is to be a global leader in mineral and metallurgical innovation.

The mission of Mintek is to serve our stakeholders by adding value to the mineral sector through research, development and technology transfer, in support of national priorities and sustainable growth.

In order to support the mission the Mintek Board will, from time to time, identify Strategic Objectives for the guidance of Management. These Strategic Objectives will be expanded further into Targeted Activities (TAs) to aid the identification of risks.

The Strategic Objectives and TAs will be listed in the Risk Implementation Plan. Mintek will identify the risks relevant to these TAs, which forms the basis of Mintek’s Risk Implementation Plan (copy appended), and each risk is cross-referenced to one or more of these TAs.

3.4 Evaluating the significance of each risk

Mintek has followed the method outlined by National Treasury in their document “Final Risk Management Framework” for the Public Sector for assessing the significance of each risk. The significance, or rating, of risk is a combination of impact multiplied by probability. A system of risk rating can be created by assessing the impact and probability of every risk on a 10 point scale. Such a system results in a 1 to 100 scale, where a score of 1 is indicative of an insignificant risk, and 100 would indicate a potentially catastrophic risk.

The best quantitative criterion for assessing risk is to calculate the financial value of the occurrence. This provides the guideline basis for the risk rating in the table above. However, sometimes there are consequences which cannot be quantitatively reduced to a financial value. Examples include major reputational set-backs, loss of life, decrease in staff morale, etc. All these consequences should be taken into account in determining the impact of the occurrence and corresponding risk rating – the economic impact is only one criterion. The following tables are to be used to assist management in quantifying the potential that a risk exposure may have on the organisation:

Rating	Title	Description of Impact
9-10	Catastrophic/ fundamental	Disaster with the potential to significantly harm the business and is fundamental to the non-achievement of objectives.
7-8	Critical	Critical event which can be endured but which may have a prolonged negative impact and extensive consequences.
5-6	Serious	Major events which can be managed but requires additional resources and management effort.
3-4	Significant	Event which can be managed under normal operating conditions.
1-2	Minor	Not worth worrying about.

Rating	Title	Description of Probability
9-10	Almost Certain	The event is expected to occur in most circumstances.
7-8	Likely	The event will probably occur in most circumstances.
5-6	Moderate	The event should occur at some time.
3-4	Unlikely	The event could occur at some time.
1-2	Rare	The event may occur in exceptional circumstances.

The economic impact of an identified risk includes both the direct cost of the event associated with the risk occurring (e.g. the cost of repairs after a fire) and the indirect costs that are a consequence of the event (e.g. the loss of production and income while the repairs are taking place).

Most of the risks in a business environment are controllable, so that the probability of a risk actually occurring is dependent upon the effectiveness of the control measures in place. Added value is therefore to be gained by estimating

the probability of each risk before and after the implementation of suitable control measures, resulting in the assessed inherent and controlled risk.

The assessment of the potential impact of Mintek’s risks and their associated probabilities are determined by the members of Mintek’s Risk Steering Committee. The assessment process is designed to be as objective and quantitative as possible, but still contains a degree of judgement. Some risks will be connected to, or dependent upon, other risks. It is important to understand the relationships between risks so that they can be effectively prioritised. The table below places the risk rating in an economic framework:

Risk rating	Qualitative assessment	Economic assessment
70-100	Catastrophic	>R150m
50-69	High	R60m – R150m
35-49	Medium-high	R20m – R60m
24-34	Medium	R7.5m – R20m
15-23	Low-medium	R1.5m – R7.5m
1-14	Low	<R1.5m

All risks that are determined as having a rating in excess of 15 (greater than R1 million) will be identified and recorded for future monitoring and control, and is in line with Mintek’s Materiality Framework.

Management response to each risk:

Having identified the key strategic risks, the Risk Steering Committee will consider the different ways that Mintek can respond to these risks, and the responses will be recorded in the Risk Implementation Plan. The options for responses include:

- **avoiding** the risk by not starting the activity that creates exposure to the risk;
- **mitigating** the risk through improvements to the control environment (risk treatment may include methods, procedures, applications, management systems, and the use of appropriate resources that reduce the probability or possible severity of the risk);
- **transferring** the risk exposure, usually to a third party better able to manage the risk, e.g. through insurance or outsourcing;
- **exploiting** the risk, where the risk exposure represents a potential missed or poorly-realised opportunity;
- **terminating** the activity that gives rise to the intolerable risk; and
- **integrating** some or all of the risk responses outlined above.

3.5 Assigning ownership

Having identified the key strategic risks, the responsibility for managing them must be allocated. Whereas the Chief Executive Officer remains personally accountable for the organisation as a whole and for its risk management, a framework of senior level delegation of the key risks is essential to effective risk management. The delegation of responsibility has been effected in the Risk Implementation Plan by assigning ownership of every risk element to an appropriate position in Mintek.

3.6 Risk appetite

The main focus of private sector risk management is on maintaining and enhancing profitability. In contrast, the public sector focuses on the fulfilment of objectives and delivery of a beneficial outcome in the public interest. Mintek, as a Schedule 3 Public Entity, is positioned between the private and public sectors.

Mintek must adopt well-managed risk taking where it is likely to lead to improvements in service delivery. It is recognised that risk taking is essential if Mintek is to innovate and improve. Mintek's risk appetite is reflected in our strategic objectives. Our overall portfolio of risks must be balanced to ensure, as far as possible, that the mix of risks remains tolerable.

3.7 Control assurance sources

Having identified the key risks, we have then considered how we manage them to reduce their probability or impact, should they occur. The control assurance sources available to Mintek are listed below, and each identified risk in the Risk Implementation Plan is cross-referenced to one or more of these sources:

- Internal audit
- ISO 9001 internal audits
- ISO 9001 external audits
- ISO 14001 internal audits
- ISO 14001 external audits
- OHSAS 18001 internal audits
- OHSAS 18001 external audits
- Legal compliance audits
- GMR(2) inspections
- Workplace inspections
- IT Steering Committee reviews
- SAP project steering committee
- Security audits
- Wellness Committee reviews

4. System of Internal Control

A control is any action or procedure performed by management to increase the likelihood of activities achieving their objectives. In other words, control is a response to risk, either to contain the risk to an acceptable level or to increase the likelihood of a desirable outcome.

A system of internal control provides a framework for all processes and activities designed to give reasonable assurance regarding achievement of objectives. Such systems should be designed to manage, rather than eliminate, the risk of failure. Controls are broken down into three categories:

Operational	relating to the effective and efficient use of resources
Financial	relating to the proper management and oversight of the organisation's finances, leading to the preparation of reliable published financial statements
Compliance	relating to compliance with applicable laws and regulations

The Chief Executive Officer participates in the exercise of many of the key internal controls or, through participation in activities, sees evidence of their existence and operation. In addition the Chief Executive Officer receives confirmation from the Council's General Managers and others that the controls are working effectively.

5. Monitoring and Review

Because risk management is explicitly linked to the achievement of objectives, reporting will be embedded within the regular processes for reporting on our operating performance. The monitoring and reporting of risks is therefore linked to the operating plan and budget cycle.

The Risk Steering Committee will meet four times per year. The minutes of these meetings, and any review or update of any of the risk documentation, will be included in the pack of documents submitted to members of the Audit and Risk Committee and the Mintek Board at least two weeks prior to the date of the meeting.

6. Roles and Responsibilities

6.1 The Board and Audit and Risk Committee

As the Accounting Authority in terms of the PFMA, the Board has a fundamental role in the management of risk. It will:

- receive an opinion from the Audit and Risk Committee that will include its review of the processes of risk management and internal control;
- consider risk issues as they affect Board decisions;
- review key strategic risks that will be analysed annually alongside the strategic plan;
- periodically review risks as part of the monitoring of the annual operating plan.

6.2 The Chief Executive Officer

The Chief Executive Officer remains ultimately accountable for the organisation and its management of risk. He must:

- have a clear understanding and assessment of the risks that could prevent delivery of objectives;
- ensure that the organisation has effective risk management and control processes;
- be provided with assurance that the processes and the key strategic risks are being effectively managed.

As part of this process the Chief Executive Officer must undertake an annual review of the effectiveness of the system of internal control, which will enable the appropriate statement to be made in Mintek's annual accounts.

6.3 Executive Management

Mintek's General Managers have a key role in facilitating the flow of information from the Board to staff and vice versa. They should:

- report to the Chief Executive Officer on key strategic risks as and when necessary;
- discuss the findings of internal and external audits and implement changes as appropriate;
- take responsibility for the risks that relate to the objectives of their line management;
- ensure that all Board papers identify impact on strategic risks;
- promote a consistent approach within Mintek with respect to risk management;
- act as mentors to all employees and promote a risk awareness culture.

6.4 Risk Management Officer (RMO)

The RMO is responsible for:

- facilitating the identification of key strategic risks and controls mechanisms;
- establishing and co-ordinating Mintek's action plan for implementing appropriate risk reduction management;
- integrating Mintek's ISO 9001, 14001, and OHSAS 18001 quality, environmental, and occupational health / safety management systems into the Risk Management Policy;
- promoting risk awareness and skills in risk assessment and reporting.

6.5 All employees

All staff should be aware of, and understand, the Mintek's Risk Management Policy, the policies on risk, and how these apply to their own roles and responsibilities. In particular, project managers need to understand and manage the risks relating to their activities and the impact on Mintek's key strategic risks.

APPENDIX VI – RISK PLAN

Mintek’s Risk Implementation Plan: an assessment of Mintek’s major corporate and operational risks

Mintek has identified five Strategic Objectives to support Mintek’s Mission. These Strategic Objectives, in accordance with the requirements of the Risk Management Policy, have been expanded further into Targeted Activities (TA’s) to aid the identification of risks.

Strategic Objective 1: Enhance Mintek’s visibility and credibility to all stakeholders by implementing an integrated marketing and communication function;

- (i) Broaden Mintek’s local and international marketing footprints;
- (ii) Improve interaction with key stakeholders, and develop suitable intervention strategies;
- (iii) Improve quality of service and response time.

Strategic Objective 2: Research and develop efficient mineral processing technologies and value added products and services in order to, amongst others, strengthen Mintek’s position as a global supplier of efficient and environmentally-sustainable mineral-processing technologies, equipment, process design and control-optimisation systems;

- (iv) Identify, and respond to, the needs of Mintek’s clients (public and private) with innovative technologies, services, and products;

Strategic Objective 3: Promote the mineral-based economies of rural and marginalised communities through technical assistance and skills development by developing technologies appropriate to the local jewellery, artisanal and small scale mining industries with the aim of expanding the industry and of lowering entry barriers. Initiate poverty alleviation programmes and support the growth of Small, Medium and Micro Enterprises (SMMEs) in the mineral sector;

- (v) Create business opportunities for SMMEs;

Strategic Objective 4: Uphold good governance practices that comply with applicable national and international regulatory frameworks and standards, maintain fiscal discipline, and enhance organisational efficiencies;

- (vi) Prudent financial management;
- (vii) Implementation of effective financial controls;
- (viii) Maintain the integrity of IT and financial systems;
- (ix) Maintain effective safety and environmental programs, and reduce Mintek’s Lost Time Injury Frequency Rate to below 1.0
- (x) Where appropriate, leverage Mintek technology into business opportunities via Mindev;
- (xi) Protect and maintain returns from Mintek’s Intellectual Property;
- (xii) Maintain the effectiveness of Mintek’s technical assets and infrastructure.

Strategic Objective 5: Build world class R&D excellence whilst transforming internal and external business processes and the workforce profile to ensure that it is in line with the socio-economic realities of South Africa today, whilst ensuring broad representation of diverse cultures and people.

(xiii) Improve Mintek's succession and internal transformation processes;

(xiv) Continual on-the-job training and multi-skilling

Mintek will identify the risks relevant to these TAs. The Strategic Objectives and TAs will be listed in the Risk Implementation Plan. Further evaluation of these risks forms the basis of Mintek's Risk Implementation Plan (copy appended), and each risk is cross-referenced to one or more of these TAs.

Evaluating the significance of each risk

Mintek has followed the method outlined by National Treasury in their document "Final Risk Management Framework" for the Public Sector for assessing the significance of each risk. The significance, or rating, of risk is a combination of impact multiplied by probability. A system of risk rating can be created by assessing the impact and probability of every risk on a 10 point scale. Such a system results in a 1 to 100 scale, where a score of 1 is indicative of an insignificant risk, and 100 would indicate a potentially catastrophic risk.

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The assessment of the potential impact of Mintek's risks and their associated probabilities are determined by the members of Mintek's Risk Steering Committee. The assessment process is designed to be as objective and quantitative as possible, but still contains a degree of judgement. Some risks will be connected to, or dependent upon, other risks. It is important to understand the relationships between risks so that they can be effectively prioritised. The table below places the risk rating in an economic framework:

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All risks that are determined as having a rating in excess of 15 (greater than R1,5 million) will be identified and recorded for future monitoring and control. This is in line with Mintek's Materiality Framework.

Management response to each risk

Having identified the key strategic risks, the Risk Steering Committee will consider the different ways that Mintek can respond to these risks, and the responses will be recorded in the Risk Implementation Plan. The options for responses include:

- **avoiding** the risk by not starting the activity that creates exposure to the risk;
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- **transferring** the risk exposure, usually to a third party better able to manage the risk, e.g. through insurance or outsourcing;
- **exploiting** the risk, where the risk exposure represents a potential missed or poorly-realised opportunity;
- **terminating** the activity that gives rise to the intolerable risk; and
- **integrating** some or all of the risk responses outlined above.

Mintek's Risk Implementation Plan: an assessment of Mintek's major risks – 08 November 2017

#	Risk classification Risk owner Risk Category	Description of Risk	Risk reduction measures	Before			After			Present status of risk reduction measures	Targeted Activity (The Roman numerals refer to the Targeted Activities associated with Mintek's Strategic Objectives, as listed in the beginning of this document)	Control assurance
				Risk Rating	Impact	Probability	Risk Rating	Impact	Probability			
1	Business risk Executive management Strategic Risk	Loss of revenue due to the business environment. Management response: Mitigate	<ul style="list-style-type: none"> Ensure top quality control of all products and services Timely delivery of all products and services Ensure competitive pricing Good maintenance backup and/or after sale customer care Adequate business planning Maximise alternative revenue streams Ensuring adequate marketing Keeping customers happy (client surveys) Improving productivity without compromising quality Focus should be on sharing of resources as well as where it is mostly needed Freeze recruitment where appropriate Science vote cluster discussions –focus on projects that Mintek can really benefit from (short-term) 	48	6	8	48	6	8	Adequate	iv Identify, and respond to, the needs of Mintek's clients (public and private) with innovative technologies, services, and products xiv Continual on-the-job training and multi-skilling iii Improve quality of service and response time vii Implementation of effective financial controls	<ul style="list-style-type: none"> Internal audit ISO 9001 internal audits ISO 9001 external audits
2	Physical and operational risks GM Finance Manager: EMS Operational Risk	Loss of external electrical power e.g. loss of power from City Power's infrastructure, load shedding from Eskom. Management response: Mitigate	<ul style="list-style-type: none"> Mintek has a 250kVA, a 350 kVA, a 500kVA, 2 x 700kVA, and a 750kVA power generator to ensure adequate emergency power SBU's emergency power requirements have been analysed. The outcome of this exercise provided information on Mintek's UPS and emergency generator requirements Design and configure an internal integrated emergency power grid to enable load distribution across all E-power plants 	48	8	6	42	7	6	Adequate	xii Maintain the effectiveness of Mintek's technical assets and infrastructure	<ul style="list-style-type: none"> Routine inspections
3	Human resource risk Executive Management GM Corp services Managers SBU Manager: HRD Strategic Risk	Failure to attract and retain skilled personnel. Management response: Mitigate	<ul style="list-style-type: none"> Constant monitoring of best practice strategies for attraction and retention of skilled personnel Annual performance appraisals conducted on all employees to identify necessary skills for accelerated development Coaching and Mentoring program Succession planning Benchmark salary scales against industry and comparable entities Exit interview process to determine the reasons for staff resigning from Mintek 	42	7	6	42	7	6	Adequate	xiii Improve Mintek's succession and internal transformation processes xiv Continual on-the-job training and multi-skilling	<ul style="list-style-type: none"> Internal audit
4	Physical and operational risks GM Technology Head: Corp. SHEQ Manager: EMS Operational Risk	Major fire or explosion causes destruction of building and equipment, and/or injuries to employees. Management response: Mitigate	<ul style="list-style-type: none"> Three yearly fire risk assessments performed Procedures for storing, maintaining and handling of flammable substances and explosive gases Safety related inspections Firefighting equipment is serviced once a year and checked once a month Emergency response and evacuation procedures (including site evacuation) are in place Training of staff on emergency response and evacuation procedures The emergency response and evacuation procedures officially tested at least three times per year (site and buildings) 	70	10	7	40	10	4	Adequate	xii Maintain the effectiveness of Mintek's technical assets and infrastructure xiv Continual on-the-job training and multi-skilling ix Maintain effective safety programs	<ul style="list-style-type: none"> OHSAS 18001 internal audits OHSAS 18001 external audits Legal compliance audit GMR(2) inspections Workplace inspections Fire risk assessments

#	Risk classification Risk owner Risk Category	Description of Risk	Risk reduction measures	Before			After			Present status of risk reduction measures	Targeted Activity (The Roman numerals refer to the Targeted Activities associated with Mintek's Strategic Objectives, as listed in the beginning of this document)	Control assurance
				Risk Rating	Impact	Probability	Risk Rating	Impact	Probability			
			<ul style="list-style-type: none"> Fire-fighting and first aid courses for relevant personnel Ensure detailed documentation is readily available on hazardous agents in inventory to be utilised by Fire Department Overall disaster response procedure developed Improve internal fire equipment to supplement that of the Fire Department 									
5	Physical and operational risks GM Technology Head: Corp. SHEQ Operational Risk	Employee exposure to hazardous substances. Management response: Mitigate	<ul style="list-style-type: none"> Regular occupational hygiene surveys Extraction systems in use, flow rate checked annually PPE issued to employees PIC completed before commencement of project SHEQ briefings conducted. Procedures and training on safe handling of hazardous materials provided to employees working with hazardous materials Minimise volume of samples stored on Mintek site Monthly site inspections to monitor sample volume and condition HazChem database, containing updated Material Safety Data Sheets, made available on all SHEQ officers Biological monitoring of employees exposed to hazardous materials First Aiders trained and available on all shifts. Medical Oxygen available in areas where Cyanide is used Job observations conducted 	72	9	8	32	8	4	Adequate	xiv Continual on-the-job training and multi-skilling ix Maintain effective safety and environmental programs	<ul style="list-style-type: none"> OHSAS 18001 internal audits OHSAS 18001 external audits Legal compliance audit GMR(2) inspections Workplace inspections
6	Physical and operational risks GM Finance Manager: EMS Operational Risk	Loss of internal electrical power e.g. loss of main transformer. Management response: Mitigate	<ul style="list-style-type: none"> Mintek has a 250kVA, a 350 kVA, a 500kVA, 2 x 700kVA, and a 750 kVA power generator to ensure adequate emergency power Weekly maintenance checks on the emergency power generators. This includes running of all generators for 10-15 minutes The cabling has been upgraded to handle 7.9MVA (main incoming supply from City Power) Those sub-stations around Mintek that are fitted with low Voltage circuit breakers have been upgraded The substation switchgears have been upgraded from fuse, oil and vacuum circuit breakers to ring main unit (RMU) gas switch gears SBU's emergency power requirements have been analysed. The outcome of this exercise provided information on Mintek's UPS and emergency generator requirements A program has been implemented in cases where Mintek's power consumption nears the 7.9MVA limit Annual oil transformer oil test Planned quarterly load shedding to test operation of all generators 	48	8	6	32	8	4	Adequate	xii Maintain the effectiveness of Mintek's technical assets and infrastructure	<ul style="list-style-type: none"> ISO 9001 internal audits ISO 9001 external audits ISO 14001 internal audits ISO 14001 external audits GMR(2) inspections Workplace inspections

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				Risk Rating	Impact	Probability	Risk Rating	Impact	Probability			
7	Physical and operational risks GM Technology Manager: PDD Manager: HMD Head: Corp. SHEQ Operational Risk	Mintek's emission license suspended or cancelled as a consequence of a major release of hazardous gas or fume (e.g. chlorine). It is unlikely that Mintek's license would be renewed if this occurred. Management response: Mitigate	<ul style="list-style-type: none"> Procedures and training of operators by chief investigators and divisional heads Testing of systems before operation Appointment of responsible superintendent in PDD; work permit system Fail safe shut-off valve installed on the chlorine manifold Chlorine detector after scrubber interlocked to chlorine supply, with battery backup Chlorine cylinders enclosure vented to scrubber, which has adequate capacity and banded area and is serviced regularly Chlorine inventory specifies the location of all chlorine cylinders Totally enclosed chlorine plant Monitors interlocks and emergency shutdown and evacuation procedures, airline breathing system Bag house and gas monitoring on stacks (at least one accredited check per campaign) Regular checks and continuous improvement to ensure compliance with regulations 	70	10	7	30	10	3	Adequate	<ul style="list-style-type: none"> xii Maintain the effectiveness of engineering solutions xiv Continual on-the-job training and multi-skilling ix Maintain effective safety and environmental programs 	<ul style="list-style-type: none"> ISO 14001 internal audits ISO 14001 external audits Legal compliance audits GMR(2) inspections Workplace inspections
8	Product risk GM Technology Managers: SBU Operational Risk	Consequential damage caused by Mintek product or process. Management response: Transfer	<ul style="list-style-type: none"> Adequate quality control during manufacturing process Procedures and training of operators by chief investigators and divisional heads Subject our products to the necessary certification/accreditation process Covered by contracts and indemnity insurance Mintek's responsibility for consequential damages caused by Mintek products is specifically excluded in contracts signed with clients Standard conditions of agreements in use Special conditions for agreements, which do not fit into the standard contract agreement, in use Limitation of Liability clauses included in Mintek's "Conditions of Sale" template (available on the intranet) 	45	9	5	30	6	5	Adequate	<ul style="list-style-type: none"> iii Improve quality of service and response time vi Prudent financial management of Mintek's investments & liabilities 	<ul style="list-style-type: none"> Internal audit ISO 9001 internal audits ISO 9001 external audits
9	Financial risk Executive Management Strategic Risk	Surge in operational costs resulting in loss of profitability. Management response: Mitigate	<ul style="list-style-type: none"> Comply to accurate and realistic budgeting and implementation thereof Designed ability to pass through increased costs to customers via change in rates/tariffs Pro-active management accounting and variance/trend analysis thereon Regular reviews of pricing policy for Mintek's products and services undertaken Implementation of bi-annual review of workforce planning. Adequate business process analysis Monitor procurement/local content, assembly and fabrication 	40	5	8	30	5	6	Adequate	<ul style="list-style-type: none"> vi Prudent financial management of Mintek's investments & liabilities vii Implementation of effective financial controls 	<ul style="list-style-type: none"> Internal audit
10	Financial Risks Executive Management Manager: FIN Managers: SBU Operational Risk	Inadequate asset management system. Management response: Mitigate	<ul style="list-style-type: none"> Review and modify Fixed Assets standard operating procedure and policy, and monitor compliance Undertake asset audit, document and rectify all anomalies Developed and implemented asset tagging system aligned to serial numbers of asset Implementation of an electronic asset movement system Improved productivity from implementation of planned maintenance system. Ensure effective procurement and utilisation of assets 	35	5	7	30	5	6	In Progress	<ul style="list-style-type: none"> vii Implementation of effective financial controls xii Maintain the effectiveness of Mintek's technical assets and infrastructure 	<ul style="list-style-type: none"> Asset verification Internal Audit

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11	Physical and operational risks GM Finance Head: ITS Operational Risk	Loss of server functionality. Management response: Mitigate	<ul style="list-style-type: none"> Physical security measures in place, e.g. locked doors, biometric access and recording system Server room fire rated and gas based fire-extinguishing (checked periodically) Daily backups of user and server data, off-site storage of backup tapes and backup tapes tested on regular basis by doing restores Regular maintenance checks of server room infrastructure, e.g. air conditioning and UPS Hardware is readily available from vendors if servers had to be damaged or stolen Developed and implemented IT disaster recovery process Dedicated UPS systems with built-in redundancy Server virtualization allows for automated migration of a server to another location 	56	8	7	25	5	5	Adequate	viii Maintain the integrity of IT and financial systems xii Maintain the effectiveness of Mintek's technical assets and infrastructure	<ul style="list-style-type: none"> IT Steering Committee reviews Internal audit ISO 9001 internal audits ISO 9001 external audits Security audits Workplace inspections
12	Financial Risks Executive Management Managers: SBU Fraud Risk	Adequacy of internal controls to limit fraudulent transactions. Management response: Mitigate	<ul style="list-style-type: none"> Review all internal controls, reporting systems and procedures on a regular basis Clearly formalised powers and responsibilities and delegation thereof Fraud hotline available Fraud prevention and awareness program Accounts Payable procedure stipulates requirements for changes made to SAP master data, e.g. supplier bank details 	50	5	10	25	5	5	Adequate	vii Implementation of effective financial controls	<ul style="list-style-type: none"> Internal audit Fraud hotline
13	Product risk GM Technology Head: Corp. SHEQ Operational Risk	Foreign laws relating to safety health and or environment transgressed. Management response: Mitigate	<ul style="list-style-type: none"> When applicable for contracts in foreign countries, this will be handled on a project specific basis. Project Information Chart (PIC) prompts Chief Investigator to state whether foreign laws are applicable. If foreign laws are applicable CI will get the requirements from the client Client is made responsible for these items in the contract 	42	7	6	25	5	5	Adequate	ix Maintain effective safety, health and environmental programs	<ul style="list-style-type: none"> ISO 14001 internal audits ISO 14001 external audits OHSAS 18001 internal audits OHSAS 18001 external audits Legal compliance audits ISO 9001 internal audits ISO 9001 external audits Legal compliance audits
14	Product risk GM Technology GM: R&D Operational Risk	Loss of product while being delivered to client, late delivery penalties etc. Management response: Transfer	<ul style="list-style-type: none"> Ensure goods are adequately insured on a project specific basis. "All risk" insurance required for high value items, e.g. plant Mintek's All Risk Policy provides some cover 	40	8	5	25	5	5	Adequate	vii Implementation of effective financial controls	<ul style="list-style-type: none"> Internal audit
15	Physical and Operational risk GM Technology Head: Corp. SHEQ Operational Risk	Spillage of materials containing natural radioactive elements e.g. uranium and/or thorium causing an unfavorable public response or expose to staff.	<ul style="list-style-type: none"> Mintek only uses transporters approved by the Department of Energy, National Nuclear Regulator and Department of Health All work on radioactive material done in a designated area. Samples are kept in a physically secure area that will prevent unauthorised access and the unauthorised removal of such material Guideline document drawn up specifying the control and handling of radioactive samples entering and leaving Mintek 	64	8	8	24	6	4	Adequate	vii Implementation of effective financial controls (Insurance) xii Relevant engineering controls that prevent spillages xiv Continual on-the-job training and multi-skilling ix Maintain effective safety and	<ul style="list-style-type: none"> OHSAS 18001 internal audits OHSAS 18001 external audits ISO 14001 internal audits ISO 14001 external audits Legal compliance audit

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		Management response: Mitigate	<ul style="list-style-type: none"> Appointment of Radiation Protection Officer to ensure that the transporting of radioactive material is done according to the regulations for the safe transport of radioactive material. (International Atomic Energy Agency TS-R-1) Public communication procedure (Emergency Response Procedure) developed to deal with communication aspects involved in the case of any spillages, or gas releases, affecting the public Emergency response plan developed to respond to accidents both at Mintek and associated with the transporting of Radioactive Material which may give rise to a risk of nuclear damage 								environmental programs	<ul style="list-style-type: none"> NNR external audits
16	Physical and operational risks GM Technology Head: Corp. SHEQ Operational Risk	Major spillage of hazardous solutions into drains which lead directly to river which has to be reported and cleaned up. Management response: Mitigate	<ul style="list-style-type: none"> Procedures, training, and supervision of staff working with hazardous solutions Speed limit of 20km/h enforced Condition of vehicles entering the site is checked at the gate Work areas where there is a risk of spillages, are situated north of Bays. All drains in this area lead to the tailings dam. Water from tailings dam gets treated in effluent plant before release to sewer The storm water drains, situated in the road that runs directly south of the Bays, have been routed to the effluent treatment system Public communication procedure developed to deal with communication aspects involved in the case of any spillages, or gas releases, affecting the public Overall emergency response procedure developed 	64	8	8	24	8	3	Adequate	<ul style="list-style-type: none"> xii Maintain the effectiveness of Mintek's technical assets and infrastructure xiv Continual on-the-job training and multi-skilling ix Maintain effective safety and environmental programs 	<ul style="list-style-type: none"> ISO 14001 internal audits ISO 14001 external audits Legal compliance audits
17	Financial Risks GM: Finance Manager: EMS and the Head: Security Operational Risk	Theft of physical assets and/or consumables. Management response: Mitigate	<ul style="list-style-type: none"> Security on site 24/7/365 Access control systems implemented Regular asset and stock counts Staff and vehicles searched Surveillance cameras installed 	54	6	9	24	4	6	Adequate	<ul style="list-style-type: none"> vii Implementation of effective financial controls. xii Maintain the effectiveness of Mintek's technical assets and infrastructure 	<ul style="list-style-type: none"> Internal audit Security audits
18	Physical and operational risks GM Corp services Manager: EMS Manager: INF Operational Risk	Archives containing research records are destroyed by fire. Management response: Mitigate	<ul style="list-style-type: none"> Pyroshield fire extinguishing systems has been installed and is in operation. System is serviced every three months by external company Archived material scanned into electronic format. If a fire destroys the hard copies, the electronic versions of the documents will still be available. This also allows for backups 	40	8	5	24	8	3	Adequate	<ul style="list-style-type: none"> xi Protect and maintain returns from Mintek's Intellectual Property (IP) xii Maintain the effectiveness of Mintek's technical assets and infrastructure 	<ul style="list-style-type: none"> OHSAS 18001 internal audits OHSAS 18001 external audits ISO 9001 internal audits ISO 9001 external audits GMR(2) inspections Workplace inspections Legal compliance audits
19	Financial Risks GM: Finance Manager: FIN Fraud Risk	Lack of sufficient controls on identification on goods received/prevent employee collusion with preferred suppliers.	<ul style="list-style-type: none"> Reviewed and updated Procurement Policy and Standard Operating procedure 	36	6	6	24	6	4	Adequate	<ul style="list-style-type: none"> vii Implementation of effective financial controls 	<ul style="list-style-type: none"> Internal Audit

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		Management response: Mitigate										
20	Business Risks Executive Management GM: Business Development Strategic Risk	Inadequate marketing results in missed business opportunities. Management response: Mitigate	<ul style="list-style-type: none"> Annual Marketing Plan GM's to ensure that the individual divisions have adequate marketing plans in view of the fact that they have direct responsibility. 	24	4	6	24	4	6	Adequate	iv Identify, and respond to, the needs of Mintek's clients (public and private) with innovative technologies, services, and products i Broaden Mintek's local and international marketing footprints	<ul style="list-style-type: none"> Internal audit
21	Business Risks Executive Management GM: R&D Strategic Risk	Lack of integrated business model for rural and marginalised communities. Management response: Mitigate	<ul style="list-style-type: none"> SSMB business model was developed 	24	4	6	24	4	6	Adequate	v Create business opportunities for SMMEs	<ul style="list-style-type: none"> Internal audit
22	Financial Risks GM: Finance Manager: FIN Operational Risk	Loss of Credit Rating with suppliers Management response: Mitigate	<ul style="list-style-type: none"> Ensure that payment of all creditors are within stipulated timeframes Regular review of creditor age analysis Review all terms and conditions with approved suppliers - Letters sent to all suppliers stipulating Mintek requirements i.t.o. payments Supplier evaluations Regular review of procurement policy 	24	4	6	24	4	6	Adequate	vii Implementation of effective financial controls	<ul style="list-style-type: none"> Internal audit
23	Physical and operational risks GM Finance Head: ITS Operational Risk	Loss of business critical electronic data. Management response: Mitigate	<ul style="list-style-type: none"> Storage Area Network (SAN) in place with RAID configuration (disk redundancy) Backup process in place. Daily incremental backups and weekly full tape backups done. Backup tapes stored off-site Critical servers can be restored from two different sources (backup tapes and Platespin Forge) The DRP implemented by ITS caters for business continuity of critical IT services In-house IT skills developed, e.g. SAP basis and Exchange SLA in place with SAP consulting company to ensure availability of required SAP basis and functional skills Skills transfer with retention clause Staff redundancy where practical through training program Finance related paper records and original contracts stored in area fitted with gas based fire-extinguishing system 	56	8	7	21	7	3	Adequate	viii Maintain the integrity of IT and financial systems xiv Continual on-the-job training and multi-skilling	<ul style="list-style-type: none"> IT Steering Committee reviews Internal audit ISO 9001 internal audits ISO 9001 external audits
24	Financial Risks GM: Finance Manager: FIN	Impact of foreign currency fluctuations on procurement and sales	<ul style="list-style-type: none"> Proposals quoted in Rands whenever possible. If managers do business in a foreign currency, they must contact the Manager: Finance for the best exchange rate at that specific stage. This forms part of the pricing policy 	35	7	5	21	7	3	Adequate	vii Implementation of effective financial controls	<ul style="list-style-type: none"> Internal Audit

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	Strategic Risk	Management response: Avoid / Mitigate	<ul style="list-style-type: none"> Maintain an awareness of currency fluctuations in Mintek's exposure to particular currencies. 									
25	Business Risks Executive Management CEO Strategic Risk	Government priorities and policy changes. Management response: Mitigate	<ul style="list-style-type: none"> Continuous monitoring Increased visibility of Mintek at National Treasury and DMR specifically focusing on funding issues Continuous monitoring of departmental strategic plans and other notifications Participation in departmental task teams and strategy sessions to remain abreast of policy changes and emerging priorities 	21	7	3	21	7	3	Adequate	iv Identify, and respond to, the needs of Mintek's clients (public and private) with innovative technologies, services, and products	<ul style="list-style-type: none"> Senior management
26	Human resource risk GM Technology GM Corp Services Manager: HRD Managers: SBU Head: Corporate SHEQ Head: Security Operational Risk	Fatality caused by Mintek operations or plant. Management response: Mitigate	<ul style="list-style-type: none"> Controlled access to hazardous areas, work permits issued, no-entry signs Engineering controls on plant Induction and training of employees and contractors Safety and Health risk assessment conducted in the divisions Job observations done to ensure that training was adequate Mintek ensures that contractors provide a Letter of Good Standing from the Compensation Commissioner. This ensures that the labour broker and contractor personnel can claim workmen's compensation via the companies officially employing them In cases where a third party claim (civil case) is made by someone injured on campus management has ensured that Mintek is adequately insured Incorporated limited liability clauses in Mintek's "General Conditions of Contract" and "Conditions of Service" (for claims by people that are not employed by Mintek but seriously injured, or from his/her family in the event of a fatality) 	80	10	8	20	10	2	Adequate	xiv Continual on-the-job training and multi-skilling ix Maintain effective safety and environmental programs	<ul style="list-style-type: none"> OHSAS 18001 internal audits OHSAS 18001 external audits Legal compliance audit GMR(2) inspections Workplace inspections Internal audit
27	Physical and operational risks GM Finance Manager: EMS Head: Corp. SHEQ Operational Risk	Gas (flammable and inflammable) storage and reticulation causes explosion which destroys surrounding buildings and causes fatalities. Management response: Mitigate	<ul style="list-style-type: none"> Three yearly fire risk assessments performed Procedures for storing, maintaining and handling of flammable substances Safety related inspections LPG bulk tanks are protected by water sprays and shut off valves, which are checked and maintained by gas supplier on a yearly basis. EMS checks these on a monthly basis Leak detection in the tunnels conducted weekly by EMS A professional consultant has done an MHI and fault tree analysis. He has determined that the installation complies with MHI requirements Gas supplier did a risk assessment and Mintek is complying with all their requirements Monthly safety inspections are done and recorded by EMS maintenance and gas supplier does two yearly inspections The emergency response and evacuation procedures officially tested at least three times per year, and the site evacuation once per year Site evacuation alarm installed Overall disaster response procedure developed 	50	10	5	20	10	2	Adequate	xii Maintain the effectiveness of Mintek's technical assets and infrastructure xiv Continual on-the-job training and multi-skilling ix Maintain effective safety and environmental programs	<ul style="list-style-type: none"> OHSAS 18001 internal audits OHSAS 18001 external audits Legal compliance audits GMR(2) inspections Workplace inspections

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28	Physical and operational risks GM Technology Manager: PDD Operational Risk	Major explosion in bay 1 or 2 results in Mintek's license to operate scheduled processes to be suspended Public may be able to object to operations of certain processes on premises on re application for license. Management response: Mitigate	<ul style="list-style-type: none"> Hazop studies conducted on PDD operations to identify high-risk operations and plant/process weaknesses, which are then addressed A possible cause of explosions could be water leaks into a furnace. Various interlocks (fatal alarms, etc.) installed to monitor water flows, temperature, etc. Procedures written for all equipment and tasks addressing identified hazards. These procedures are reviewed for each project and where necessary modified to accommodate the project specific risks Training and retraining and close supervision of operating staff is done Combustible gases that have not combusted could result in explosions. To safeguard against this occurrence the gases are combusted in a controlled safe manner as close to the source as possible Phasing out of Khron switches in sub stations. EMS determined that the current switches are still legal, but they will be replaced with vacuum breakers as circumstances allow Electrical protection/tripping systems have been implemented in SUB 1 Protection networks have been installed on Bay 2 contactors to protect feed transformers to the DC drives All oil breakers are being serviced and checked (Oil tests to be conducted annually) Infrared assessments of High Tension switchgear performed on a yearly basis by external company 	50	10	5	20	10	2	Adequate	<ul style="list-style-type: none"> xii Maintain the effectiveness of Mintek's technical assets and infrastructure xiv Continual on-the-job training and multi-skilling ix Maintain effective safety and environmental programs 	<ul style="list-style-type: none"> OHSAS 18001 internal audits OHSAS 18001 external audits GMR(2) inspections Workplace inspections
29	Physical and operational risks GM Corporate Services and R&D Head: Corp. SHEQ Operational Risk	Public exposed to contaminated biological matter. Management response: Mitigate	<ul style="list-style-type: none"> Mintek makes use of an approved Health Care Waste disposing company Spillages of medical waste by the medical waste disposing company, e.g. in the case of a vehicle accident, is cleaned up by trained personnel from that company 	50	10	5	20	10	2	Adequate	<ul style="list-style-type: none"> xiv Continual on-the-job training and multi-skilling ix Maintain effective safety and environmental programs 	<ul style="list-style-type: none"> OHSAS 18001 internal audits OHSAS 18001 external audits Legal compliance audit GMR(2) inspections Workplace inspections
30	Financial Risks GM: Finance Manager: FIN Strategic Risk	Extent of Mintek's liquidity ratio. Management response: Mitigate	<ul style="list-style-type: none"> Increased effort to collect outstanding debt Cash flow planning to increase investment returns Control over expenditure 	30	5	6	20	4	5	Adequate	vii Implementation of effective financial controls	<ul style="list-style-type: none"> Internal audit
31	Financial Risks Manager: EMS and the Head: Security Fraud Risk	Poor key control resulting in unauthorized access or theft. Management response: Mitigate	<ul style="list-style-type: none"> Use of specialized key safes where practical Use of biometric access where practical 	20	4	5	20	4	5	Adequate	vii Implementation of effective financial controls	<ul style="list-style-type: none"> Internal audit Security audits
32	Business Risks Executive Management Management: Support	Non-compliance to the applicable legislation, e.g. <ul style="list-style-type: none"> Labour Act 	<ul style="list-style-type: none"> Database for Occupational Health & Safety, as well as Environmental, legislation, is available to Mintek staff. Database kept updated with new or changed legislation – updates communicated to SHEQ Department. Applicable new and updated legislation 	60	6	10	18	6	3	In Progress	<ul style="list-style-type: none"> vii Implementation of effective financial controls ix Maintain effective safety and 	<ul style="list-style-type: none"> ISO 14001 internal audits ISO 14001 external audits OHSAS 18001 internal

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				Risk Rating	Impact	Probability	Risk Rating	Impact	Probability			
	Divisions Managers SBU Head: SHEQ Strategic Risk	<ul style="list-style-type: none"> Environmental Act OHS Act PFMA Mintek Act Companies Act Tax Act Management response: Mitigate	<ul style="list-style-type: none"> communicated to relevant Divisions for implementation Mintek is subscribed to Sabinet Netlaw and it gets updated when legislation is updated Keep abreast of changes to the relevant legislation through training Employment of skilled personnel Legislation compliance software system implemented Project Information Chart and Risk Registers state which legislation Mintek should comply with 								environmental programs <ul style="list-style-type: none"> audits OHSAS 18001 external audits Legal compliance audit Internal audit Compliance checklists (FIN) 	
33	Physical and operational risks GM Technology Head: Corp. SHEQ Strategic Risk	Loss of quality, environment or safety certification affects client's decision to use Mintek's services. Management response: Mitigate	<ul style="list-style-type: none"> Integrated Safety, Health, Environment and Quality (SHEQ) Management System implemented SHEQ management system audited internally and externally against ISO 9001, ISO 14001, ISO 17025 and OHSAS 18001 requirements Regular internal audits and checking of system compliance. Audit reports submitted to Divisional Management Legal compliance audits done by third party to ensure Mintek's compliance to all legislation that impact on Mintek's operations Regular management reviews by SHEQ Committee to monitor, review and modify policies and procedures 	56	8	7	18	6	3	Adequate	iv Identify, and respond to, the needs of Mintek's clients (public and private) with innovative technologies, services, and products iii Improving quality of service and response time xiv Continual on-the-job training and multi-skilling xii Maintain the effectiveness of Mintek's technical assets and infrastructure ix Maintain effective safety and environmental programs	<ul style="list-style-type: none"> ISO 9001 internal audits ISO 9001 external audits ISO 14001 internal audits ISO 14001 external audits ISO 17025 internal audits ISO 17025 external audits OHSAS 18001 internal audits OHSAS 18001 external audits Legal compliance audits GMR(2) inspections Workplace inspections
34	Financial and business risk GM: Finance Head: ITS	Inadequate change control leading to loss or destabilization of business or technical systems.	<ul style="list-style-type: none"> Clear identification of milestones and the monitoring thereof by the project manager Change control process in place 	30	6	5	18	6	3	Adequate	vii Implementation of effective financial controls viii Maintain the integrity of IT and financial systems	<ul style="list-style-type: none"> Project steering committee
35	Physical and operational risks GM: Finance Manager: EMS Operational Risk	Danger to employees on Mintek site arising from criminal activity. Management response: Mitigate	<ul style="list-style-type: none"> Camera surveillance to cover major vulnerable areas Improve camera monitoring, security reaction times and procedures Adequate security presence in high risk areas Improve enforcement of access control Increase general staff and security staff awareness of risk Implement access control of parking area 	24	6	4	18	6	3	Adequate	ix Maintain effective safety and environmental programs	<ul style="list-style-type: none"> Campus inspections Compliance with security audits Security committee
36	Business Risks GM: Corporate Services Manager: HRD Operational Risk	Industrial action Management response: Mitigate	<ul style="list-style-type: none"> Keep abreast of developments Reviewed strike management policy and procedure Reviewed security procedure for industrial action Defined roles in dealing with media, police and public Developed communication strategy 	24	6	4	18	6	3	Adequate	xiv Continual on-the-job training and multi-skilling	<ul style="list-style-type: none"> HR Committee Internal audit
37	Business Risks	Records of key external and	<ul style="list-style-type: none"> Procedures developed to ensure good record keeping practices 	24	4	6	16	4	4	Adequate	viii Maintain the integrity of IT and	<ul style="list-style-type: none"> Internal audit

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				Risk Rating	Impact	Probability	Risk Rating	Impact	Probability			
	GM: Corporate Services Manager: INF Operational Risk	Internal documents cannot be found. Management response: Mitigate									xi financial systems Protect and maintain returns from Mintek's Intellectual Property (IP)	<ul style="list-style-type: none"> • ISO 9001 internal audits • ISO 9001 external audits • ISO 14001 internal audits • ISO 14001 external audits • OHSAS 18001 internal audits • OHSAS 18001 external audits • Legal compliance audits • GMR(2) inspections • Workplace inspections • IT Steering Committee reviews • SAP project steering committee • Security audits • HIV/AIDS committee reviews
38	Physical and operational risks GM Finance Manager: EMS Operational Risk	Diesel tank leaks underground causing environmental incident which has to be reported. Clean up and repair would be needed. Management response: Mitigate	<ul style="list-style-type: none"> • Monthly check on stock levels indicates whether there are leaks 	20	4	5	16	4	4	Adequate	xii Maintain the effectiveness of Mintek's technical assets and infrastructure ix Maintain effective safety and environmental programs	<ul style="list-style-type: none"> • ISO 14001 internal audits • ISO 14001 external audits • Legal compliance audits
39	Physical and operational risk GM Technology Managers SBU Operational Risk	Passenger and goods liability when transporting goods and hazardous substances on public transport roads and public carriers. Management response: Mitigate / Transfer	<ul style="list-style-type: none"> • Mintek only makes use of accredited Hazardous Substance Transport companies to transport hazardous material • Mintek has the required insurance cover in cases where Mintek is held jointly liable with client • Vehicles must have the required signage • Drivers to have required permits 	64	8	8	15	5	3	In progress	ix Maintain effective safety and environmental programs	<ul style="list-style-type: none"> • ISO 14001 internal audits • ISO 14001 external audits • Legal compliance audits • Internal audit
40	Management risks Risk Management Officer Strategic Risk	Inadequate risk management Management response: Mitigate	<ul style="list-style-type: none"> • Developed and implemented a risk management framework • Risks identified, categorized, impacts assessed and mitigation strategies thereof determined • Risks reviewed quarterly 	49	7	7	15	5	3	Adequate	vii Implementation of effective financial controls	<ul style="list-style-type: none"> • Internal audit • ISO 9001 internal audits • ISO 9001 external audits • ISO 14001 internal audits • ISO 14001 external audits • OHSAS 18001 internal

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												audits • OHSAS 18001 external audits
41	Business Risks Executive Management GM: Finance GM Corp services Manager: FIN Managers SBU Strategic Risk	Non-achievement of BEE accreditation. Management response: Mitigate	<ul style="list-style-type: none"> Understand the legislative requirements of the Broad-Based Socio-Economic Empowerment Charter for the South African Mining Industry Developed and implemented a BBSEE strategy Reviewed, modified and implemented procurement policy to align to BBBEEE scorecard to achieve accreditation Undertook a supplier audit to verify Broad-Based Black Economic Empowerment accreditation with focus on the preferred supplier list Investigate new suppliers to achieve goal Ensure that Mintek attains its employment equity and skills development targets 	40	8	5	15	5	3	Adequate	vii Implementation of effective financial controls xiii Improve Mintek's succession and internal transformation processes	• Internal audit
42	Physical and Operational risk Manager: MESU Strategy Risk	Excessive CO ₂ emissions (carbon footprint), arising from high electricity usage, result in application of financial penalties. Management response: Mitigate	<ul style="list-style-type: none"> Evaluate and update Mintek's carbon footprint annually Ensure that electricity is being used as effectively as possible Demonstrate that Mintek's R&D, which is resulting in the direct electricity usage, focuses on technologies to reduce industry's electricity consumption, and that the net effect will be beneficial to the SA economy 	28	4	7	15	3	5	Adequate	ix Maintain effective safety and environmental programs vii Implementation of effective financial controls	• ISO 9001 internal audits • ISO 9001 external audits • ISO 14001 internal audits • ISO 14001 external audits • OHSAS 18001 internal audits • OHSAS 18001 external audits
43	Financial Risks Executive Management Fraud Risk	Lack of controls on approval of overtime. Management response: Mitigate	<ul style="list-style-type: none"> Overtime policy implemented 	24	4	6	15	3	5	Adequate	vii Implementation of effective financial controls	• Internal Audit
44	Physical and operational risks GM Finance Head: ITS Fraud Risk	Inadequate IT security leading to unauthorized access to electronic data. Management response: Mitigate	<ul style="list-style-type: none"> IPS implemented (intrusion prevention solution) No unsecured shares allowed on servers. Hidden and normal shares have been implemented for all user shares ITS has implemented secure dial up connection using a Virtual Private Network (VPN) ITS supplies cable locks for all our users who have Mintek laptops Firewalls maintained and antivirus software kept up to date Users to comply with security policies A document management system implemented with strict control over access to Mintek IP where required Multi-level PC security to prevent unauthorized use internally. This is based on group security membership and user profiles Developed and implemented a password change policy 	56	8	7	12	6	2	Adequate	viii Maintain the integrity of IT and financial systems	• IT Steering Committee reviews • Internal audit • ISO 9001 internal audits • ISO 9001 external audits
45	Security risk	Inadequate access control.	<ul style="list-style-type: none"> Implemented database to record and control visitor access 	50	5	10	12	3	4	Adequate	xii Maintain the effectiveness of	• Internal audit

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	GM: Finance Manager: EMS Head: Security	Management response: Mitigate	<ul style="list-style-type: none"> Electronic access control CCTV at all gates IT server room fitted with biometric access control Manual access control on secondary gates, these gates are only opened at specific times, at which time it is also guarded Additional lighting provided at critical areas and gates Patrols of fence, buildings and grounds Armed response linked to panic alert system PSIRA rated security company used Security audits performed by external company on annual basis 								Mintek's technical assets and infrastructure	<ul style="list-style-type: none"> Security audits
46	Financial Risks GM: Finance Manager: FIN	Non-compliance to Pension & Medical aid fund Legislation. Management response: Mitigate	<ul style="list-style-type: none"> Keep abreast of developments Total cost to company packages aligned the benefit as a defined contribution Capped liability for post-retirement medical aid funding by contracting liability to an external financial service provider Liability settled for Group 1 and 2 employees 	50	5	10	12	2	6	Adequate	vi Prudent financial management of Mintek's investments & liabilities	<ul style="list-style-type: none"> Internal audit Board of Trustees
47	Financial and business risk GM: Finance Head: ITS Manager: HRD	Lack of capacity to maintain business critical IT systems. Management response: Mitigate	<ul style="list-style-type: none"> Employ adequately trained and qualified staff Enter into SLA with SAP partner for maintenance Skills transfer with retention clause Staff redundancy where practical through training program Opportunity to contract in skills 	42	7	6	12	4	3	Adequate	viii Maintain the integrity of IT and financial systems xiv Continual on-the-job training and multi-skilling	<ul style="list-style-type: none"> IT Steering Committee
48	Financial Risks Executive Management Managers:SBU Fraud Risk	Non-compliance to the delegation of authority, checks and balances system. Management response: Mitigate	<ul style="list-style-type: none"> Clearly defined and communicated organisational structure Delegation of authority document approved and communicated 	25	5	5	12	4	3	Adequate	vii Implementation of effective financial controls	<ul style="list-style-type: none"> Internal Audit
49	Physical and operational risks GM Technology Head: Corp SHEQ Manager: EMS	Natural disasters, e.g. hailstorms, earthquakes Management response: Mitigate	<ul style="list-style-type: none"> Emergency response and evacuation procedures available. Regular training and awareness of staff on emergency response and evacuation procedures. 	10	10	1	10	10	1	Adequate	xii Maintain the effectiveness of Mintek's technical assets and infrastructure ix Maintain effective safety and environmental programs	<ul style="list-style-type: none"> ISO14001 internal and external
50	Credit/Bad debt Risks GM: Finance Manager: FIN	Client unable to complete payment for plant, product or process. Management response:	<ul style="list-style-type: none"> Review debtors ageing report regularly. Seek legal advice on long outstanding debts No services to be rendered until a credit rating has been obtained from credit bureau Develop a policy and framework in relation to new and existing clients in relation to credit vetting, invoicing and collection Credit guaranties on foreign customers 	30	6	5	9	3	3	Adequate	vii Implementation of effective financial controls	<ul style="list-style-type: none"> Internal audit Mancom

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		Mitigate										
51	Physical and operational risks GM Finance Manager: EMS Operational Risk	Loss of water supply. Management response: Mitigate	<ul style="list-style-type: none"> Ultrasonic level detector has been installed at the water tower A technical review of Mintek's entire water reticulation system is being undertaken, which will focus on reduction of Mintek's Rand Water Board water use as well as minimising impacts of any future supply disruption 	18	6	3	9	3	3	Adequate	xii Maintain the effectiveness of Mintek's technical assets and infrastructure	<ul style="list-style-type: none"> ISO 9001 internal audits ISO 9001 external audits GMR(2) inspections Workplace inspections
52	Financial Risks GM Finance Manager: SBU Fraud Risk	Internal requisition fraud - staff taking goods etc. Management response: Mitigate	<ul style="list-style-type: none"> Automated requisition process via maintenance system Matching of requisition to job card Clearly formalised powers and responsibilities and delegation thereof Reviewed and improved access control Ensure all goods are adequately insured 	24	3	8	8	2	4	Adequate	vii Implementation of effective financial controls	<ul style="list-style-type: none"> Internal audit
53	Financial Risks GM: Finance GM Technology/R&D Manager: FIN Managers: SBU Fraud Risk	Procurement fraud - requester/ buyer /supplier collusion lack of internal controls – procurement. Management response: Mitigate	<ul style="list-style-type: none"> Review all Internal Controls and reporting systems and procedures on a regular basis Check and ensure compliance with procurement policy Clearly formalise powers and responsibilities and delegation thereof 	16	2	8	8	2	4	Adequate	vii Implementation of effective financial controls	<ul style="list-style-type: none"> Internal audit
54	Human Resource Risk GM: Corporate Services Manager: HRD Fraud Risk	Fraudulent misrepresentation of qualifications results in risk of technical or professional errors, client dissatisfaction, reputation loss or safety issues. Management response: Mitigate	<ul style="list-style-type: none"> Verification check on new employee qualifications 	16	2	8	8	2	4	Adequate	vii Implementation of effective financial controls	<ul style="list-style-type: none"> Internal audit
55	Financial Risks GM: Finance Manager: FIN	Accuracy of financial reporting – impact on decision making. Management response: Mitigate	<ul style="list-style-type: none"> Regular review of financial system (SAP) and system of internal controls for integrity Measurement against budgets. Reporting on major variances Implemented a financial reporting framework, incorporating due dates, responsibilities, delegated authority 	30	5	6	4	2	2	Adequate	vii Implementation of effective financial controls viii Maintain the integrity of IT and financial systems	<ul style="list-style-type: none"> Internal audit MANCOM EXCO Board and subcommittees
56	Financial Risks	Adequacy of insurance cover	Reviewed current insurance policy for completeness and accuracy	25	5	5	4	2	2	Adequate	vii Implementation of effective	<ul style="list-style-type: none"> Internal audit

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	GM: Finance Manager: FIN	Fire and theft Public liability Product recall Professional indemnity Fidelity Accident cover Management response: Mitigate	<ul style="list-style-type: none"> Implement asset management system, incorporating detailed asset register 								financial controls	
57	Investment Risk Executive Management	Equity position of Mintek in other companies causes Mintek to incur financial loss. Management response: Mitigate	<ul style="list-style-type: none"> Due diligence and regular financial reporting Investment and disinvestments policy in place 	12	4	3	4	2	2	Adequate	vi Prudent financial management of Mintek's investments & liabilities	<ul style="list-style-type: none"> Internal audit Mindev Board EXCO Mintek Board
58	Financial Risks GM: Finance Manager: FIN	Poor investment of surplus cash reserves at Banking institutions. Management response: Mitigate	<ul style="list-style-type: none"> Surplus reserves to be invested as per investment policy Compliance to investing activities by Schedule 3 PFMA companies Accounting treatment and disclosure of such investments 	10	2	5	2	1	2	Adequate	vi Prudent financial management of Mintek's investments & liabilities	<ul style="list-style-type: none"> Internal audit