

Tronox Ltd  
Form 10-K  
February 28, 2013  
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**UNITED STATES**  
**SECURITIES AND EXCHANGE COMMISSION**

Washington, D.C. 20549

**Form 10-K**

(Mark One)

**ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the Year ended December 31, 2012

OR

**TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from \_\_\_\_\_ to \_\_\_\_\_

1-35573

(Commission file number)

**TRONOX LIMITED**

(ACN 153 348 111)

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(Exact Name of Registrant as Specified in its Charter)

Western Australia, Australia  
(State or Other Jurisdiction of

98-1026700  
(I.R.S. Employer

Incorporation or Organization)

Identification Number)

One Stamford Plaza  
263 Tresser Boulevard, Suite 1100

1 Brodie Hall Drive  
Technology Park

Stamford, Connecticut 06901

Bentley, Australia 6102

Registrant's telephone number, including area code: (203) 705-3800

Securities Registered Pursuant to Section 12(b) of the Act:

<u>Title of each class</u>	<u>Name of each exchange on which registered</u>
Class A Ordinary Shares, par value \$0.01 per share	New York Stock Exchange
Securities Registered Pursuant to Section 12(g) of the Act: None	

Indicate by check mark if the Registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes  No

Indicate by check mark if the Registrant is not required to file reports pursuant to Section 13 or 15(d) of the Act. Yes  No

Indicate by check mark whether the Registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the Registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes  No

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Website, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes  No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of Registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

Indicate by check mark whether the Registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of large accelerated filer, accelerated filer, and smaller reporting company in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer  Accelerated filer   
 Non-accelerated filer  Smaller reporting company

Indicate by check mark whether the Registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes  No

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The aggregate market value of the ordinary shares held by non-affiliates of the Registrant as of June 30, 2012 was approximately \$4,282,293,322.

As of January 31, 2013, there were 113,339,879 shares of the Registrant's Class A ordinary shares and Class B ordinary shares outstanding.

### **DOCUMENTS INCORPORATED BY REFERENCE**

Portions of the Registrant's proxy statement for its 2013 annual general meeting of shareholders are incorporated by reference in this Form 10-K in response to Part III Items 10, 11, 12, 13 and 14.

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**TRONOX LIMITED**  
**ANNUAL REPORT ON FORM 10-K**  
**FOR THE FISCAL YEAR ENDED DECEMBER 31, 2012**

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**PART I**

*For the purposes of this discussion, references to we, us, our, and the Company refer to Tronox Limited, together with its consolidated subsidiaries, when discussing the business following the completion of the Transaction, and to Tronox Incorporated, together with its consolidated subsidiaries, when discussing the business prior to the completion of the Transaction.*

*We make statements under the captions Business, Risk Factors, Management's Discussion and Analysis of Financial Condition and Results of Operations and in other sections of this Form 10-K that are forward-looking statements. In some cases, you can identify these statements by forward-looking words such as may, might, will, should, expect, plan, anticipate, believe, estimate, predict, potential, project, likely, can have or continue, and the negative of these terms and other comparable terminology. These forward-looking statements, which are subject to known and unknown risks, uncertainties and assumptions about us, may include projections of our future financial performance based on our growth strategies and anticipated trends in our business. These statements are only predictions based on our current expectations and projections about future events. There are important factors that could cause our actual results, level of activity, performance or achievements to differ materially from the results, level of activity, performance or achievements expressed or implied by the forward-looking statements. In particular, you should consider the numerous risks and uncertainties outlined in Risk Factors.*

**Item 1. Business**

Tronox Limited, a public limited company registered under the laws of the State of Western Australia, Australia, and its subsidiaries (collectively referred to as Tronox or the Company) is a global leader in the production and marketing of titanium-bearing mineral sands and titanium dioxide pigment (TiO<sub>2</sub>). Our world-class, high performance TiO<sub>2</sub> products are critical components of everyday applications such as paint and other coatings, plastics, paper and other applications. Our mineral sands business consists primarily of two product streams titanium feedstock and zircon. Titanium feedstock is used primarily to manufacture TiO<sub>2</sub>. Zircon, a hard, glossy mineral, is used for the manufacture of ceramics, refractories, TV glass and a range of other industrial and chemical products. We have global operations in North America, Europe, South Africa and Australia.

Tronox Limited was formed on September 21, 2011 for the purpose of the Transaction (see below). Prior to the completion of the Transaction, the Company was wholly-owned by Tronox Incorporated, and had no operating assets or operations. Tronox Incorporated, a Delaware corporation (Tronox Incorporated), was formed on May 17, 2005, in preparation for the contribution and transfer by Kerr-McGee Corporation of certain entities, including those comprising substantially all of its chemical business into a separate operating company.

**Acquisition of Mineral Sands Operations**

Consistent with our strategy to become a fully integrated global producer of mineral sands and TiO<sub>2</sub> with production facilities and sales and marketing presence strategically positioned throughout the world, on June 15, 2012 (the Transaction Date), we combined the existing business of Tronox Incorporated with Exxaro Resources Ltd's (Exxaro) mineral sands operations, which includes its Namakwa Sands and KwaZulu-Natal (KZN) Sands mines, separation and slag furnaces in South Africa, along with Exxaro's 50% share of the Tiwest Joint Venture in Western Australia (together, the mineral sands business) (the Transaction).

The Transaction was completed in two principal steps. First, Tronox Incorporated became a subsidiary of Tronox Limited, with Tronox Incorporated shareholders receiving one Class A ordinary share (Class A Share) and \$12.50 in cash (Merger Consideration) for each Tronox Incorporated common share. Second, Tronox Limited issued 9,950,856 Class B ordinary shares (Class B Shares) to Exxaro and one of its subsidiaries in consideration for the mineral sands business. Upon completion of the Transaction, former Tronox Incorporated shareholders held 15,413,083 Class A Shares and Exxaro held 9,950,856 Class B Shares, representing approximately 60.8% and 39.2%, respectively, of the voting power in Tronox Limited. Exxaro retained a 26% ownership interest in the South African operations that are part of the mineral sands business in order to comply with the Black Economic Empowerment (BEE) legislation of South Africa.

During 2012, we repurchased approximately 12.6 million Class A Shares, which was approximately 10% of our total voting securities. During October 2012, Exxaro purchased 1.4 million Class A Shares in market purchases. At December 31, 2012, Exxaro held approximately 44.6% of our voting securities.

Prior to the Transaction Date, Tronox Incorporated and Exxaro Australia Sands Pty Ltd., a subsidiary of Exxaro, operated the Tiwest Joint Venture, which included a chloride process TiO<sub>2</sub> plant located in Kwinana, Western Australia, a mining operation in Cooljarloo, Western Australia, and a mineral separation plant and a synthetic rutile processing facility, both in Chandala, Western



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Australia. As part of the Transaction, we acquired Exxaro Australia Sands Pty Ltd. and therefore Exxaro's 50% interest in the Tiwest Joint Venture. As such, as of the Transaction Date, we own 100% of the operations formerly operated by the Tiwest Joint Venture.

### **Principal Business Lines**

Subsequent to the Transaction, we have two reportable operating segments, Mineral Sands and Pigment. Additionally, our corporate activities include our electrolytic manufacturing and marketing operations.

#### **Mineral Sands**

The Mineral Sands segment includes the exploration, mining and beneficiation of mineral sands deposits. Mineral sands refers to concentrations of heavy minerals in an alluvial environment (sandy or sedimentary deposits near a sea, river or other water source). We separate these minerals from these primary sources. We process ilmenite into either slag or synthetic rutile. Other than zircon, all of these materials are sometimes referred to as titanium feedstock. Titanium feedstock is the most significant raw material used in the manufacture of TiO<sub>2</sub>.

We acquired the mineral sands business from Exxaro on the Transaction Date. The mineral sands business operations are comprised of the KZN Sands and Namakwa Sands mines, both located in South Africa, and Cooljarloo Sands mine located in Western Australia, which have a combined production capacity of 723,000 tonnes of titanium feedstock and 265,000 tonnes of zircon. The KZN Sands operations involve the exploration, mining and beneficiation of mineral sands deposits in the KwaZulu-Natal province of South Africa, and the Namakwa Sands operations involve the exploration, mining and beneficiation of mineral sands deposits in the Western Cape province of South Africa. The Tiwest operations conduct the exploration, mining and processing of mineral sands deposits and the production of titanium dioxide pigment in Western Australia.

The Mineral Sands segment includes:

#### *Titanium Feedstock*

Titanium feedstock is considered to be a single product, although it can be segmented based on the level of titanium contained within the feedstock, with substantial overlap between each segment. Different grades of titanium feedstock have similar characteristics, and are generally suitable substitutes for one another; therefore, TiO<sub>2</sub> producers generally source a variety of feedstock grades, and supply a wide variety of feedstock grades to the TiO<sub>2</sub> producers.

Titanium minerals (ilmenite, rutile and leucoxene), titanium slag (chloride slag and sulphate slag) and synthetic rutile are all used primarily as feedstock for the production of TiO<sub>2</sub> pigment. According to the latest data provided by TZ Minerals International Pty Ltd ( TZMI ), approximately 90% of the world's consumption of titanium feedstock is used for the production of TiO<sub>2</sub> pigment.

#### *Titanium Minerals*

*Ilmenite* Ilmenite is the most abundant titanium mineral in the world. Naturally occurring ilmenite may have a titanium content ranging from approximately 35% to 65%, depending on its geological history. The weathering of ilmenite in its natural environment results in oxidation of the iron, which increases titanium content.

*Rutile* Rutile is essentially composed of crystalline titanium and, in its pure state, would contain close to 100% titanium. Naturally occurring rutile, however, usually contains minor impurities and therefore, commercial concentrates of the mineral typically contain approximately 94% to 96% titanium.

*Leucoxene* Leucoxene is a natural alteration of ilmenite with a titanium content ranging from approximately 65% to more than 90%. The weathering process is responsible for the alteration of ilmenite to leucoxene, which results in the removal of iron, leading to an upgrade in titanium content.

#### *Upgraded Titanium Products*

The lower amount of titanium used in the TiO<sub>2</sub> manufacturing process, the more feedstock required and waste material produced. Naturally occurring high-grade titanium minerals required for the production of TiO<sub>2</sub> pigment are limited in supply. This limited supply has prompted the mineral sands industry to develop beneficiated products to increase the titanium content in the feedstock that can be used as substitutes for, or in

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conjunction with, naturally occurring titanium minerals. Two processes have been developed commercially: one for the production of titanium slag (with a titanium content of approximately 90% to 93%) and the other



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for the production of synthetic rutile (with a titanium content of approximately 86% to 89%). Both processes use ilmenite as a raw material, and are essential processes for the removal of iron oxides.

***Titanium Slag*** The production of titanium slag involves smelting ilmenite in an electric arc furnace under reducing conditions, normally with anthracite (coal) used as a reducing agent. The slag, containing the bulk of the titanium and impurities other than iron, is tapped off the top of the furnace while a high purity pig iron is recovered from the bottom of the furnace. The final quality of the slag is highly dependent on the quality of the original ilmenite and the ash composition of the anthracite used in the furnace.

***Synthetic Rutile*** A number of processes have been developed for the beneficiation of ilmenite into products containing between approximately 90% and 95% titanium. These products are known as synthetic rutile or upgraded ilmenite. The processes employed vary in terms of the extent to which the ilmenite grain is reduced, and the precise nature of the reducing reaction and the conditions used in the subsequent removal of iron. All of the existing commercial processes are based on the reduction of ilmenite in a rotary kiln, followed by leaching under various conditions to remove the iron from the reduced ilmenite grains.

### *Co-products*

The primary co-products of heavy mineral sands mining and titanium slag production are zircon and high purity pig iron.

***Zircon*** Zircon is extracted, alongside ilmenite and rutile, as part of the initial mineral sands beneficiation process. Zircon is a mineral which is primarily used as an additive in ceramic glazes to add hardness, which makes the ceramic glaze more water, chemical and abrasion resistant. It is also used for the production of zirconium and zirconium chemicals, in refractories, as a molding sand in foundries, and for TV glass, where it is noted for its structural stability at high temperatures and resistance to abrasive and corrosive conditions.

Zircon typically represents a relatively low proportion of heavy mineral sands mining but has high value compared to other heavy mineral products, resulting in it contributing a significant portion to total revenue. Refractories containing zircon are expensive and are only used in demanding, high-wear and corrosive applications in the glass, steel and cement industries. Foundry applications use zircon when casting articles of high quality and value where accurate sizing is crucial, such as aerospace, automotive, medical and other high-end applications. Historically, zircon has constituted a relatively minor part of the total value produced as a result of the mining and processing of titanium minerals. However, from early 2000, zircon has increased in value as a co-product, although it remains dependent on the mining of titanium minerals for its supply.

***High Purity Pig Iron*** Producing titanium slag, ilmenite smelters can recover iron in the form of high purity pig iron containing low levels of manganese. When pig iron is produced in this manner, the molten iron is tapped from the ilmenite furnace during the smelting process, alloyed by adding carbon and silicon and treated to reduce the sulfur content, and is then cast into ingots, or pigs. The pig iron produced as a co-product of titanium slag production is known as nodular pig iron, ductile pig iron, low manganese pig iron or high purity pig iron.

### **Pigment**

The pigment segment primarily produces and markets TiO<sub>2</sub>, and has production facilities at the following locations: Hamilton, Mississippi; Botlek, the Netherlands; and Kwinana, Western Australia, representing an aggregate of 465,000 tonnes of annual TiO<sub>2</sub> production capacity.

TiO<sub>2</sub> is used in a wide range of products due to its ability to impart whiteness, brightness and opacity, and is designed, marketed and sold based on specific end-use applications. TiO<sub>2</sub> is used extensively in the manufacture of paint and other coatings, plastics and paper and in a wide range of other applications, including inks, fibers, rubber, food, cosmetics and pharmaceuticals. According to TZMI data, the paint and coatings sector is the largest consumer of pigment averaging approximately 58% of total pigment consumption in 2011. The plastics sector accounted for approximately 22% of TiO<sub>2</sub> consumption in 2011, while the remaining 20% was divided between paper, inks, fibers and other.

TiO<sub>2</sub> is a critical component of everyday consumer applications due to its superior ability to cover or mask other materials effectively and efficiently relative to alternative white pigments and extenders. TiO<sub>2</sub> is considered to be a quality of life product and some research indicates that consumption generally increases as disposable income increases. We believe that, at present, TiO<sub>2</sub> has no effective mineral substitute because no other white pigment has the physical properties for achieving comparable opacity and brightness or can be incorporated in as cost-effective a manner.

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### **Corporate and other**

Corporate and other is comprised of corporate activities and businesses that are no longer in operation, as well as its electrolytic manufacturing and marketing operations, all of which are located in the United States.

Our electrolytic and other chemical products operations are primarily focused on advanced battery materials, sodium chlorate and specialty boron products.

#### *Battery Materials*

Battery material end-use applications include alkaline batteries for flashlights, electronic games, medical and industrial devices as well as lithium batteries for power tools, hybrid electric vehicles, laptops and power supplies. The battery industry is primarily comprised of two application areas: primary (non-rechargeable) and secondary (rechargeable) with the former representing the majority of battery shipments.

The primary battery market is dominated by alkaline battery technologies, which are designed to address the various power delivery requirements for consumer and industrial battery-powered devices. We believe that alkaline batteries are higher performing and more costly than batteries using the older zinc carbon technology, and represent the majority of primary battery market demand in the United States. Demand for domestic alkaline batteries in the United States is estimated to be flat to slightly negative, driven by a flat market for electronic devices.

Electrolytic manganese dioxide ( EMD ) is the active cathode material for alkaline batteries. We believe that we are one of the largest producers of EMD for the global alkaline battery industry. EMD quality requirements for alkaline technology are much more demanding than for zinc carbon technology and, as a result, alkaline-grade EMD commands a higher price than zinc carbon-grade EMD. The older zinc carbon technology remains in developing countries such as China and India. As the economies of China and India continue to mature, and the need for more efficient energy sources develops, we anticipate that the demand for alkaline-grade EMD will increase. We expect demand for alkaline-grade EMD to be sustained by the long-term growth of consumer electronics devices, partly offset by the trend toward smaller battery sizes and rechargeable batteries.

#### *Sodium Chlorate*

Sodium chlorate is used by the pulp and paper industry in pulp bleaching applications. The pulp and paper industry accounts for more than 95% of the market demand for sodium chlorate. Although there are other methods for bleaching pulp, we believe the chlorine dioxide process is preferred for environmental reasons. The primary raw material that we use to produce sodium chlorate is salt, which we purchase under both multi-year agreements and spot contracts.

#### *Boron*

Specialty boron product end-use applications include semiconductors, pharmaceuticals, high-performance fibers, specialty ceramics and epoxies as well as igniter formulations. According to publicly available industry reports, we are one of the leading suppliers of boron trichloride, along with JSC Aviator, Sigma-Aldrich Corporation, and several Asian manufacturers. We anticipate demand for boron trichloride will remain positive driven primarily by the growth of the semiconductor industry. We believe we hold a similar leading position in the elemental boron market. We expect demand for elemental boron will continue to be largely flat following the trends in the defense and automotive industries in the United States.

### **Mining and Processing Techniques**

This section describes the mineral sands mining and production process by which TiO<sub>2</sub> pigment is ultimately derived and how its primary input, titanium feedstock, and the co-products zircon and pig iron, are obtained from deposits of mineral sands.

#### *Mining*

The mining of mineral sands deposits is conducted either wet, by dredging or hydraulic water jets, or dry, using earth-moving equipment to excavate and transport the sands. Dredging, as used at the Cooljarloo mine, is generally the favored method of mining mineral sands, provided that the ground conditions are suitable and water is readily available. In situations involving hard ground, discontinuous ore bodies, small tonnage or very high grades, dry mining techniques are generally preferred.



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***Dredge Mining*** Dredge mining, or wet mining, is best suited to ore reserves located below the water table. A floating dredge removes the ore from the bottom of an artificial pond through a large suction pipe. The bulk sand material is fed as slurry through a primary, or wet, concentrator that is typically towed behind the dredge unit. The dredge slowly advances across the pond and deposits clean sand tailings behind the pond for subsequent revegetation and rehabilitation. Because of the capital cost involved in the manufacturing and location, dredge mining is most suitable for large, long life deposits, often of a lower grade. The dredging operations at Cooljarloo use two large floating dredges in a purpose-built pond. The slurry is pumped to a floating concentrator, which recovers heavy minerals from the sand and clay.

***Dry Mining*** Dry mining is suitable where mineral deposits are shallow, contain hard bands of rock, or are in a series of unconnected ore bodies. Dry mining is performed at Namakwa Sands, which is located in an arid region on the west coast of South Africa. The ore is mined with front end loaders in a load and carry operation, dumping the mineral bearing sands onto a conveyor belt system that follows behind the mining face. The more competent layers are mined using hydraulic excavators in a backhoe configuration or by trackdozer. Namakwa Sands does not use blasting in its operations. The mined material is transported by trucks to the mineral sizers where primary reduction takes place.

***Hydraulic Mining*** KZN Sands uses a unique hydraulic mining method for mineral sands due to the topography of the ore body and the ore characteristics. A jet of high-pressure water (approximately 2,500 kilopascals) is aimed at a mining face, thereby cutting into and loosening the sand so that it collapses on the floor. The water acts as a carrier medium for the sand, due to the high fines content contained in the ore body. The slurry generated by the hydraulic monitors flows to a collection sump where oversize material is removed and the slurry is then pumped to the primary concentration plant.

### ***Processing***

***Concentration*** Both wet and dry mining techniques utilize wet concentrator plants to produce a high grade of heavy mineral concentrate (typically approximately 90% to 98% heavy mineral content). Screened ore is first deslimed, a process by which slimes (mineral particles that are too fine to be economically extracted and other materials that remain after the valuable fraction of an ore has been separated from the uneconomic fraction) are separated from larger particles of minerals, and then washed through a series of spiral separators that use gravity to separate the heavy mineral sands from lighter materials, such as quartz. Residue from the concentration process is pumped back into either the open pits or slimes dams for rehabilitation and water recovery. Water used in the process is recycled into a clean water dam with any additional water requirements made up from pit dewatering or rainfall.

### ***Mineral Separation***

The non-magnetic (zircon and rutile) and magnetic (ilmenite) concentrates are passed through a dry mill to separate out the minerals. Electrostatic and dry magnetic methods are used to further separate the ilmenite, rutile and zircon. Electrostatic separation relies on the difference in surface conductivity of the materials to be separated. Conductive minerals (such as ilmenite, rutile and leucoxene) behave differently from non-conductive minerals (such as zircon and quartz) when subjected to electrical forces. Magnetic separation is dependent on the iron content of a mineral. Magnetic minerals (such as ilmenite) will separate from non-magnetic minerals (such as rutile and leucoxene) when subjected to a magnetic field. A combination of gravity and magnetic separation is used to separate out zircon from the non-magnetic portion of the heavy mineral concentrate. The heavy mineral concentrate at KZN Sands and Namakwa Sands is passed through wet high-intensity magnetic separation to produce a non-magnetic fraction and a magnetic fraction. This step is not required for the Cooljarloo material.

***Smelting*** Ilmenite at KZN Sands and Namakwa Sands is processed further through direct current arc furnaces to produce titanium slag with a titanium content of approximately 86%. The smelting process comprises the reduction of ilmenite to produce titanium slag and nodular pig iron. Ilmenite and as-received anthracite (dried to remove fine material before smelting) are fed in a tightly controlled ratio through a hollow electrode into an operating furnace where the endothermic reduction of ilmenite occurs. The resultant titanium slag has a lower density than the iron, and separation of the two liquid products occurs inside the furnace. The slag and iron are tapped periodically from separate sets of tapholes located around the circumference of the furnace. The tapholes for slag are on a higher elevation than those for iron. Slag is tapped into steel pots and cooled for several hours in the pots before the slag blocks are tipped out. The blocks are subsequently transported to the blockyard where they are cooled under water sprays for a number of days. They are then crushed, milled and separated according to size fractions, as required by the customers. The tapped pig iron is re-carburized and de-sulfurized, and cast into pigs.

***Synthetic Rutile Production*** Higher grade ilmenite may also be upgraded into synthetic rutile. Synthetic rutile, or upgraded ilmenite, is a chemically modified form of ilmenite that has the majority of the ferrous, non-titanium components removed, and is also suitable for use in the production of titanium metal or TiO<sub>2</sub> pigment using the chloride process. Ilmenite is converted to synthetic rutile in a two-stage pyrometallurgical and chemical process. The first stage involves heating ilmenite in a large rotary kiln. Coal is used as a



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heat source and, when burned in a limited air environment, it produces carbon monoxide, which promotes a reducing environment that converts the iron oxide contained in the ilmenite to metallic iron. The intermediate product, called reduced ilmenite, is a highly magnetic sand grain due to the presence of the metallic iron. The second stage involves the conversion of reduced ilmenite to synthetic rutile by removing the metallic iron from the reduced ilmenite grain. This is achieved through aeration (oxidation), accelerated through the use of ammonium chloride as a catalyst, and acid leaching of the iron to dissolve it out of the reduced ilmenite. Activated carbon is also produced as a co-product of the synthetic rutile production process.

### ***Raw Materials***

The smelters at KZN Sands and Namakwa Sands use anthracite as a reducing agent, which although available from a variety of suppliers, is metallurgically specific in certain conditions. Namakwa Sands imports high quality anthracite for its smelter from Vietnam. Vietnam has a large anthracite resource, however, the Vietnamese government regulates both the price and sales volumes of anthracite. Both of the KZN Sands smelters use anthracite from two local suppliers. Low ash and sulfur content are the main quality considerations. Anthracite suppliers with similar cost and availability to the Vietnamese supplier are available in Russia and Ukraine, as well as locally to our South African operations. Alternatively, char may be used as a substitute reducing agent for anthracite.

The KZN Sands and Namakwa Sands operations currently use Sasol gas, which is available only from Sasol Limited. However, Sasol gas could be replaced with carbon monoxide gas produced by KZN Sands and Namakwa Sands, if necessary. KZN Sands is currently in the process of increasing its use of carbon monoxide gas.

Other raw materials used at the KZN Sands and Namakwa Sands operations include: electrodes, sulphuric acid, flocculant, ferrosilicon, nitrogen and oxygen. Multiple suppliers provide these raw materials.

The Chandala's synthetic rutile operation uses coal as a reducing agent, which is available locally from two suppliers, both of which have extensive coal resources. The synthetic rutile process relies on the quality of coal from southwest Western Australia for the efficient production of quality synthetic rutile and activated carbon from the synthetic rutile kiln. Other types of coal could be used if both of the current coal suppliers were unavailable, but some temporary adverse impact on the production and cost of synthetic rutile at Chandala would be likely.

### **TiO<sub>2</sub> Manufacturing Process**

TiO<sub>2</sub> is produced using a combination of processes involving the manufacture of base pigment particles followed by surface treatment, drying and milling (collectively known as finishing). There are two commercial production processes in use by manufacturers: the chloride process and the sulphate process. We are one of a limited number of TiO<sub>2</sub> producers in the world with chloride production technology. TiO<sub>2</sub> produced using the chloride process is preferred for some of the largest end-use applications. As a result of these advantages, the chloride process currently accounts for substantially all of the industry-wide TiO<sub>2</sub> production capacity in North America and approximately 50% of industry-wide capacity globally. All of our TiO<sub>2</sub> is produced using the chloride process.

The chloride process is a newer technology, and we believe it has several advantages over the sulphate process: it generates less waste, uses less energy, is less labor intensive and permits the direct recycle of chlorine, a major process chemical, back into the production process. In the chloride process, feedstock ores (slag, synthetic rutile, natural rutile or ilmenite ores) are reacted with chlorine (the chlorination step) and carbon to form titanium tetrachloride (TiCl<sub>4</sub>) in a continuous fluid bed reactor. Purification of TiCl<sub>4</sub> to remove other chlorinated products is accomplished using a distillation process. The purified TiCl<sub>4</sub> is then oxidized in a vapor phase form to produce base pigment particles and chlorine gas. The latter is recycled back to the chlorination step for reuse. Base pigment is then typically slurried with water and dispersants prior to entering the finishing step.

The sulphate process can use lower quality (and therefore less expensive) feedstock. In the sulphate process, batch digestion of ilmenite ore or slag is carried out with concentrated sulfuric acid to form soluble titanyl sulphate. After treatment to remove soluble and insoluble impurities and concentration of the titanyl sulphate, hydrolysis of the liquor forms an insoluble hydrous titanium oxide. This precipitate is filtered, bleached, washed and calcined to produce a base pigment that is then forwarded to the finishing step.

Commercial production of TiO<sub>2</sub> results in one of two different crystal forms, either rutile or anatase. Rutile TiO<sub>2</sub> is preferred over anatase TiO<sub>2</sub> for many of the largest end-use applications, such as coatings and plastics, because its higher refractive index imparts better hiding power at lower quantities than the anatase crystal form and it is more suitable for outdoor use because it is more durable. Although rutile TiO<sub>2</sub> can be produced using either the chloride process or the sulphate process, some customers prefer rutile produced using the chloride process because it typically has a bluer undertone and greater durability. Anatase TiO<sub>2</sub> can only be produced using the sulphate process and has applications in paper, rubber, fibers, ceramics, food and cosmetics. All of our global production capacity utilizes the chloride process to produce rutile TiO<sub>2</sub>.



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### ***Market Conditions***

#### ***Mineral Sands***

Titanium feedstock ores, the primary raw materials used in the production of TiO<sub>2</sub>, experienced a significant rise in selling prices during 2011. Demand and pricing weakened significantly during 2012. The vertical integration of titanium feedstock and TiO<sub>2</sub> production provides Tronox with a secure and cost competitive supply of high grade titanium feedstock over the long term. Our ability to supply all of the feedstock that our pigment operations require enables us to balance our consumption and sales in ways that our competitors cannot.

#### ***Pigment***

During 2012, we saw a softening of TiO<sub>2</sub> sales volumes due to continued customer destocking and decline in global demand, primarily as a result of weaker residential and commercial construction markets in Europe and Asia. While we are encouraged by signs of recovery in the U.S. housing market and the increasingly stimulative national policy in China, market conditions for TiO<sub>2</sub> pigment in the fourth quarter of 2012 were similar to those of the third quarter.

### **Competitive Conditions**

We believe that we are in an advantaged strategic position in our industry under any macro-economic conditions and across business cycles. Vertical integration gives us enduring advantages such as our low-cost position which is enabled by capturing feedstock margin on pigment sales and selling the most attractively-priced feedstock in the merchant market, which we believe will result in higher margins, lower earnings volatility and significant free cash flow generation.

#### ***Mineral Sands***

There are a small number of large mining companies or groups that are involved in the production of titanium feedstock. We believe we are the third largest titanium feedstock producer with approximately 10% of global titanium feedstock production. Rio Tinto, through its ownership of Canadian based Fer et Titane, its share in Richards Bay Minerals ( RBM ) in South Africa and ownership of QMM Madagascar, is the largest producer of titanium feedstock in the world. Australian-based Iluka Resources Limited is the second largest manufacturer, with operations in Australia and the United States. A number of other manufacturers, such as Cristal Global (Saudi Arabia), Eramet SA (France), Kenmare Resources plc (Ireland), Kronos Worldwide Inc. (Europe), Pangang Titanium Industry Co Ltd (China), Kerala Mines and Metals Limited (India) and Ostchem Holding AG (Eastern Europe) also supply titanium feedstock to the global market.

Beyond our structurally assured, relative low cost position, our competitive advantages are our depth of experience in various mining methods and technologies, our ability and know-how to produce upgraded products by means of direct current smelting of ilmenite and the synthetic rutile process, and our capacity to market zircon and rutile for use in a broad range of end-use applications. We are furthermore in a position to supply TiO<sub>2</sub> feedstock, zircon and high purity pig iron from any one of several production units in different geographical locations.

#### ***Pigment***

According to the latest TZMI data, industry production capacity grew to 6.4 million tonnes from 6.0 million tonnes in the prior year. The global market in which our TiO<sub>2</sub> business operates is competitive. Competition is based on a number of factors such as price, product quality and service. We face competition from major international producers, including DuPont, Cristal Global, Huntsman, and Kronos, as well as smaller regional competitors such as Sachtleben Chemie GmbH and Ishihara Sangyo Kaisha, which operate multiple plants on single continents. We estimate that, based on nameplate capacity, these seven companies accounted for more than 64% of the global market share. During 2012, we had global TiO<sub>2</sub> production capacity of 465,000 tonnes per year, which was approximately 7% of global pigment capacity. In addition to the major competitors discussed above, we compete with numerous smaller, regional producers, including producers in China that have expanded their sulphate production capacity during the previous five years.

Worldwide, we believe that we and the other major producers mentioned above are the only companies that have perfected and successfully commercialized the chloride process technology for the production of TiO<sub>2</sub>. According to TZMI, among the seven largest multi-national producers, 77% of available capacity uses the chloride process, compared to smaller producers who, on average, produce 6% of products using the chloride process, while TiO<sub>2</sub> produced using chloride process technology is generally preferred for some TiO<sub>2</sub> end-use and specialty applications.





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We have global operations with production facilities and a sales and marketing presence in the Americas, Europe and the Asia-Pacific regions. Our global presence enables us to sell our products to a diverse portfolio of customers with whom we have well-established relationships.

In recent years, demand growth has increased in Asia-Pacific, Central and Eastern Europe, the Middle East and Africa and South America more than in the mature economies of North America, Western Europe and Japan. Capacity growth over the next ten or so years is expected to be driven by the above global average demand growth in such emerging markets. While there are several chloride projects planned in China, it is unlikely that they will contribute any significant output before 2014. The probability of new greenfield projects (locations where there is not an existing infrastructure) is limited, given the limitations in feedstock supply, as well as financial risks associated with the large investments in a facility, a long lead time and difficulty in achieving permitting (in particular, environmental permitting). As a result no significant new chloride TiO<sub>2</sub> facility has been built since 1994; however, over the years, the industry has increased capacity through expansion of existing plants and debottlenecking, and we expect this to continue going forward.

### *Electrolytics and Other*

The United States primary battery market, predominantly based on alkaline-grade EMD, is the largest in the world followed by China and Japan according to the Freedonia Group. We are one of the largest suppliers of alkaline-grade EMD in the U.S. market. Other significant producers include Tosoh Corporation, Erachem Comilog, Inc., Energizer Holdings, Inc., and Delta EMD Ltd. The remainder of global capacity is represented by various Chinese producers.

For rechargeable batteries, lithium manganese oxide ( LMO ) remains one of the leading cathode materials for electric vehicles, power tools and other high-power applications. We project the demand for LMO to significantly increase driven by electric vehicles for which the cathode materials are primarily supplied today by Nichia Corp, Toda Kogyo Corp., and other leading Asian LMO materials producers.

### **Seasonality**

There is a seasonal trend in the demand for our products. Because TiO<sub>2</sub> is widely used in paint and other coatings, titanium feedstocks are in higher demand during the second and third quarter of the calendar year in the northern hemisphere economies (spring and summer). This is mostly related to the demand for decorative coatings during seasons when the warmest and driest weather is to be expected. In China, the lowest demand for TiO<sub>2</sub> during the year is experienced in the first quarter, during the two-week Chinese New Year festival.

### **Sales and Marketing**

#### *Mineral Sands*

#### *Titanium Feedstock*

Although we use agents and distribution for some sales in the Asia-Pacific region, direct relationship marketing is the primary technique that we employ for the marketing of titanium feedstocks. Multi-year contracts are negotiated with periodic pricing for the pigment industry, while the contract period for other industries tends to be less than one year (either per shipment, quarterly, half-year or one year). Pricing for titanium feedstocks is usually adjusted either on a quarterly or half-year basis. In some instances, we use traders or agents for the sale of titanium feedstocks.

The geographic market for titanium feedstock is global in scope, and TiO<sub>2</sub> producers regularly source and transport titanium feedstock from suppliers located around the world.

#### *Zircon*

A portion of the zircon produced at Namakwa Sands is supplied on long-term multi-year contracts with some of our larger European customers. The tonnage is subject to agreement on pricing, which we negotiate at quarterly intervals or on a shipment-by-shipment basis. For customers of KZN Sands, and for smaller customers of Namakwa Sands, we contract zircon tonnage and pricing on a quarterly basis. We seek to avoid the use of agents and traders for the sale of zircon, favoring long-term relationships directly with end users.

**Table of Contents***Pigment*

We supply and market TiO<sub>2</sub> under the brand name TRONOX® to more than 1,000 customers in approximately 90 countries, including market leaders in each of the key end-use markets for TiO<sub>2</sub> and have supplied each of our top ten customers with TiO<sub>2</sub> for more than 10 years. These top ten customers represented approximately 46% of our total TiO<sub>2</sub> sales in 2012. The tables below summarize our 2012 TiO<sub>2</sub> sales volume by geography and end-use market:

2012 Sales Volume by Geography		2012 Sales Volume by End-Use Market	
Americas	48%	Paints and Coatings	78%
Europe	24%	Plastics	19%
Asia-Pacific	28%	Paper and Specialty	3%

In addition to price and product quality, we compete on the basis of technical support and customer service. Our direct sales and technical service organizations execute our sales and marketing strategy, and work together to provide quality customer service. Our direct sales staff is trained in all of our products and applications. Due to the technical requirements of TiO<sub>2</sub> applications, our technical service organization and direct sales offices are supported by a regional customer service staff located in each of our major geographic markets.

We believe our TiO<sub>2</sub> operations, and specifically our plant in Hamilton, Mississippi, are among the lowest cost producers of TiO<sub>2</sub> globally. This is of particular importance as it positions us to be competitive through all facets of the TiO<sub>2</sub> cycle. Moreover, our three TiO<sub>2</sub> production facilities are strategically positioned in key geographies. The Hamilton facility is the third largest TiO<sub>2</sub> production facility in the world, and has the size and scale to service customers in North America and around the globe. Our Tiwest facility, located in Australia, is well positioned to service the growing demand from Asia. Our Botlek facility, located in the Netherlands, services our European customers and certain specialized applications globally. Combined with our titanium feedstock assets in South Africa and Australia, this network of TiO<sub>2</sub> and titanium feedstock facilities gives us the flexibility to optimize asset and feedstock utilization and generate operational, logistical and market efficiencies.

Our sales and marketing strategy focuses on effective customer management through the development of strong relationships throughout the company with our customers. We develop customer relationships and manage customer contact through our sales team, technical service organization, research and development team, customer service team, plant operations personnel, supply chain specialists and senior management. We believe that multiple points of customer contact facilitate efficient problem-solving, supply chain support, formula optimization and product co-development.

**Research and Development**

We have a research and development facility that services all of our products. The research and development facility focuses on applied research and development testing of both new and existing processes. The research and development facility has a segment area dedicated to heavy minerals in order to prevent contamination and has both laboratory and pilot scale equipment, mostly for physical beneficiation processes. The facility also has a complete mineralogy section.

Additionally, we employ scientists, chemists, engineers and skilled technicians to provide the technology (products and processes) for our pigment businesses. Our product development personnel have a high level of expertise in the plastics industry and polymer additives, the coatings industry and formulations, surface chemistry, material science, analytical chemistry and particle physics. Among the process technology development groups highly developed skills are computational fluid dynamics, process modeling, particle growth physics, extractive metallurgy, corrosion engineering and thermodynamics. The majority of scientists supporting our pigment and electrolytic research and development efforts are located in Oklahoma City, Oklahoma.

Our expenditures for research and development were approximately \$9 million, \$9 million, less than \$1 million and \$6 million for the year ended December 31, 2012, eleven months ended December 31, 2011, one month ended January 31, 2011 and year ended December 31, 2010, respectively. These figures do not include the cost of test work for feasibility studies, which can vary significantly from year to year.

New process developments are focused on increased throughput, control of particle physical properties and general processing equipment-related issues. Ongoing development of process technology contributes to cost reduction, enhanced production flexibility, increased capacity and improved consistency of product quality. In 2012, our development and commercialization efforts were focused on several TiO<sub>2</sub> products that deliver added value to customers by way of enhanced properties of the pigment.



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### **Patents, Trademarks, Trade Secrets and Other Intellectual Property Rights**

Proprietary protection of our intellectual property is important to our business. We have a comprehensive intellectual property strategy that includes obtaining, maintaining and enforcing its patents, trademarks and other intellectual property. However, much of the fundamental intellectual property associated with both chloride and sulfate pigment production is no longer subject to patent protection.

#### *Mineral Sands*

In South Africa, we own three patents (including provisional patent grants) and have another four pending patent applications, and our patents are protected in most of our primary markets. We also rely on intellectual property for our Namakwa Sands operations, which was granted to us in perpetuity by Anglo American South Africa Limited for use on a worldwide basis, pursuant to a non-exclusive license. None of our patents are due to expire in the next five years.

We have 14 trademark registrations (including applications for registrations currently pending) in South Africa and Australia. We protect the trademarks that we use in connection with the products we manufacture and sell, and have developed goodwill in connection with our long-term use of our trademarks; however, there can be no assurance that the trademark registrations will provide meaningful protection against the use of similar trademarks by competitors, or that the value of our trademarks will not be diluted.

We also use and rely upon unpatented proprietary knowledge, continuing technological innovation and other trade secrets to develop and maintain our competitive position. We conduct research activities and protect the confidentiality of our trade secrets through reasonable measures, including confidentiality agreements and security procedures.

#### *Pigment*

While certain patents held for our products and production processes are important to our long-term success, more important is the operational knowledge we possess. We seek patent protection for our technology where competitive advantage may be obtained by patenting, and files for broad geographic protection given the global nature of our business. Our proprietary TiO<sub>2</sub> technology is the subject of over 200 patents worldwide, the substantial majority of which relate to our chloride products and production technology.

At December 31, 2012, we held approximately 200 patents, of which approximately 135 are considered significant to our business. We define significant to our business as patents that are either (1) presently employed in its process or to produce products to its advantage, (2) may not be presently employed by us, but are defensive to prevent competitors from using the technology to their advantage or (3) patents that are likely to be utilized by us in future process or product advancements. Our significant patents have expiration dates ranging from 2013 through 2032.

We also rely upon and have taken steps to secure our unpatented proprietary technology, know-how and other trade secrets. Our proprietary chloride production technology is an important part of our overall technology position. We are committed to pursuing technological innovations in order to maintain our competitive position

### **Employees**

As of December 31, 2012, we had approximately 3,900 employees, with 900 in the United States, 700 in Australia, 1,900 in the South Africa and 400 in Europe and other international locations. Our employees in the United States are not represented by collective bargaining agreements. Approximately 90% of our employees in Australia are represented by collective bargaining agreements. Approximately 90% of our employees in South Africa have collective bargaining agreements with labor organizations. Approximately 90% of our employees in Europe are represented by works councils. We consider relations with our employees and labor organization to be good.

As of December 31, 2011, Tronox Incorporated had approximately 1,800 employees, with approximately 700 in the United States, approximately 300 in Europe and approximately 800 in Australia and other international locations.

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### **Environmental Provisions**

A variety of laws and regulations relating to environmental protection affect almost all of our operations. Under these laws, we are or may be required to obtain or maintain permits or licenses in connection with our operations. In addition, these laws may require us to remove or mitigate the effects on the environment of the disposal or release of chemical, petroleum, low-level radioactive and other substances at our facilities. Operation of pollution-control equipment usually entails additional expense. Certain expenditures to reduce the occurrence of releases into the environment may result in increased efficiency; however, most of these expenditures produce no significant increase in production capacity, efficiency or revenue.

We are in substantial compliance with applicable environmental rules and regulations. Currently, we do not have any outstanding notices of violation or orders from regulatory agencies.

Recurring operating expenses are expenditures related to the maintenance and operation of environmental equipment such as incinerators, waste treatment systems and pollution control equipment, as well as the cost of materials, energy and outside services needed to neutralize, process, handle and dispose of current waste streams at our operating facilities. These operating and capital expenditures are necessary to ensure that ongoing operations are handled in an environmentally safe and effective manner.

From time to time, we may be party to legal and administrative proceedings involving environmental matters or other matters in various courts or agencies. These could include proceedings associated with businesses and facilities operated or used by our affiliates, and may include claims for personal injuries, property damages, breach of contract, injury to the environment, including natural resource damages, and non-compliance with, or lack of properly updated or renewed, permits. Our current operations also involve management of regulated materials and are subject to various environmental laws and regulations.

In accordance with ASC 450, *Contingencies*, and ASC 410, *Asset Retirement and Environmental Obligations*, we recognize a loss and record an undiscounted liability when litigation has commenced or a claim or an assessment has been asserted, or, based on available information, commencement of litigation or assertion of a claim or assessment is probable, and the associated costs can be estimated. It is not possible for us to reliably estimate the amount and timing of all future expenditures related to environmental matters because, among other reasons, environmental laws and regulations, as well as enforcement policies and remediation levels, are continually changing, and the outcome of court proceedings, alternative dispute resolution proceedings (including mediation) and discussions with regulatory agencies is inherently uncertain.

We believe that we have reserved adequately for the probable and reasonably estimable costs of known contingencies. There is no environmental litigation, claim or assessment that has been asserted nor is there any probability of an assessment or a claim for which we have not recorded as a liability. However, additions to the reserves may be required as additional information is obtained that enables us to better estimate our liabilities. We cannot reliably estimate the amount of future additions to the reserves at this time. In certain situations, expenses may be probable but may not be estimable. Additionally, sites may be identified in the future where we could have potential liability for environmental related matters. We would not establish reserves for any such sites.

### **Environmental, Health and Safety Matters**

#### ***Mineral Sands***

Our facilities and operations are subject to extensive general and industry-specific environmental, health and safety regulations in South Africa and Australia. These regulations include those relating to mine rehabilitation, liability provision, water management, the handling and disposal of hazardous and non-hazardous materials and occupational health and safety. The various legislation and regulations are subject to a number of internal and external audits. The following describes environmental, health and safety matters with respect to our operations.

We believe that our mineral sands operations are in compliance, in all material respects, with existing health, safety and environmental legislation and regulations. We employ health, safety and environmental experts to advise us on technical and regulatory matters relevant to the management of our facilities and operations, and we continually invest in our plants, equipment and other infrastructure to ensure that our mineral sands operations comply with our obligations under health, safety and environmental laws and regulations.

#### ***Fairbreeze Environmental Impact Assessment***

In order to receive the environmental authorization necessary to begin the KZN Sands Fairbreeze mining project ( Fairbreeze ), an environmental impact assessment report was prepared and submitted to the Department of Agriculture, Environmental Affairs and



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Rural Development ( DAEARD ), as required under the National Environmental Management Act ( NEMA ). There are two forms of environmental impact reports: a basic assessment report ( BAR ) and a more comprehensive scoping and environmental impact report ( SEIR ). NEMA provides that an applicant may request permission to undertake a BAR instead of an SEIR if the applicant believes that the information included in the BAR will be sufficient to allow DAEARD to reach its decision. DAEARD granted permission to submit a BAR based on the fact that Exxaro Mineral Sands had already conducted extensive environmental impact assessments and scoping studies on the proposed Fairbreeze mining area over a period of approximately 13 years, and that undertaking the SEIR process would have repeated many of those assessments and scoping studies already completed.

In September 2012, the South African Department of Mineral Resources ( DMR ) approved our amendment application to the Environmental Management Program for Fairbreeze. This, together with NEMA authorization received earlier this year, allowed us to commence with selected early-phase construction activities while awaiting further authorizations. In October 2012, the Mtunzini Conservatory filed an application for an injunction to halt the early-phase construction at Fairbreeze. We opposed the injunction and in January 2013 the Durbin High Court dismissed the case and awarded costs in our favor. The Mtunzini Conservatory subsequently appealed the dismissal and cost award. We intend to vigorously oppose the appeal and we are proceeding with early-phase construction at Fairbreeze.

### *Radioactive Minerals*

We have the required permits in South Africa and Australia to mine, treat, store, dispose of, transport, handle and allow employee access to radioactive minerals (zircon and monazite). Provision for the potential cleanup costs related to such activities is included in the mine closure cost and reflected in our consolidated financial statements.

### *The Royalty Act*

The Mineral and Petroleum Resources Royalty Act, 2008 was promulgated on November 24, 2008, became effective on March 1, 2010 and imposes a royalty on refined and unrefined minerals payable to the South African government.

The royalty in respect of refined minerals is calculated by dividing earnings before interest and taxes ( EBIT ) by the product of 12.5 times gross revenue calculated as a percentage, plus an additional 0.5%. EBIT refers to taxable mining income (with certain exceptions, such as no deduction for interest payable and foreign exchange losses) before assessed losses, but after capital expenditure. A maximum royalty of 5% of revenue has been introduced for refined minerals.

The royalty in respect of unrefined minerals is calculated by dividing EBIT by the product of nine times gross revenue calculated as a percentage, plus an additional 0.5%. A maximum royalty of 7% of revenue has been introduced for unrefined minerals. Where unrefined mineral resources constitute less than 10% in value of the total composite mineral resources, the royalty rate in respect of refined mineral resources may be used for all gross sales and a separate calculation of EBIT for each class of mineral resources is not required.

### *Environmental Management*

Since 1993, in accordance with the terms of an amendment of the South African Minerals Act, 1991, each new mine was required to prepare an Environmental Management Program Report ( EMPR ) for approval by the DMR. EMPRs covered the environmental impacts of a mine during its life, up to the point where the DMR issues a closure certificate. EMPRs made specific provision for environmental management during the construction, operational, decommissioning and aftercare phases. EMPRs also set out timetables and the extent of financial commitments to cover each phase of management.

In terms of the Mineral and Petroleum Resources Developmental Act of 2002 ( MPRDA ), applicants for a mining right are required to conduct an environmental impact assessment and submit an Environmental Management Program, while applicants for a prospecting right, mining permit or reconnaissance permit have to submit an Environmental Management Plan (collectively referred to as an EMP ).

Applicants for converted mining rights may rely on the EMPR approval for their old order mining right but may be required by the DMR to update this to comply with the provisions of the MPRDA. Prospecting and mining rights only become effective under the MPRDA on the date that the corresponding EMP has been approved. The MPRDA includes a requirement to make financial provision for the remediation of environmental damage, as well as for the issuing of a closure certificate and requires that the financial provision be in place before approval of the EMP. An application for a closure certificate now becomes compulsory upon lapsing of the right or cessation of activities.