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CHAIRMAN'S REVIEW

In my introduction to last year's Annual Report, I mentioned the clear objective of the Board and Management to complete the Corporate agreements necessary to progress the commercial applications of the ERMS and EARS technologies.

It was at the end of the year under review that Ticor Limited and Austpac Resources reached agreement to form a new joint venture (the Austpac Ticor Joint Venture – ATJV) for the exclusive worldwide application of Austpac's ERMS and EARS technologies for the upgrading of titaniferous feedstock. The ATJV aims to gain a major position in the TiO_2 pigment industry as a significant supplier of high grade synthetic rutile feedstock. The ATJV will target further opportunities where the technologies can be applied to achieve this position. Ticor is a major participant in the Australian mineral sands industry through the Tiwest Joint Venture, which is a fully integrated project involving the mining and processing of mineral sands, the upgrading of ilmenite to synthetic rutile and the production of titanium dioxide pigment.

Alfred L. Paton
Chairman

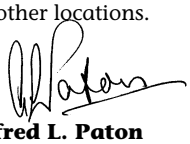
The AusRutile Joint Venture between Indian Rare Earths and Austpac Resources has progressed significantly. The joint venture company, AusRutile India Pvt Ltd, will construct both an ERMS plant and an EARS plant at IRE's mine and mineral processing plant (the OSCOM facility) in Orissa State, India. The ERMS plant will confirm the efficiency of Austpac's technology to produce synthetic rutile, while the matched EARS plant will confirm the Company's capacity to regenerate hydrochloric acid for use by the ERMS plant. The ATJV provides for Ticor to become a participant in the AusRutile Joint Venture, and for Ticor to loan Austpac the funds for Austpac's share of the initial synthetic rutile plant in India. We are now proceeding to execution of the formal agreement between IRE, Ticor and Austpac. We acknowledge the assistance and support of the staff of Indian Rare Earths in the achievement of the recognition of Austpac's technologies in India. We also express our appreciation to the Federal Government of India and to the State Government of Orissa.

In Australia we are about to embark on the evaluation of a very large but decidedly challenging resource assessment in the Murray Basin. We look forward to the application of Australian technologies, developed by Austpac, to this important project in Australia. Further details of the year's activities are set out in the *Directors' Report on Technology and Mineral Sands.*

On behalf of shareholders, I take this opportunity to thank the Managing Director and his technical group for the significant advances in the Company's position over the year under review, which has proven most rewarding for the Company. I would also like to thank my fellow director, Harold Hines, for his contribution to the Board, and particularly for his input to the Indian project, based on his extensive experience in the mineral sand industry and in India.

Austpac values the keen interest shown by its shareholders in the progress of the Company towards accomplishment of its key goals. We recently established an internet site, *www.austpacresources.com,* which contains information on current projects, corporate data and technology developments. It also provides copies of the Company's reports to the Australian Stock Exchange and research reports on the Company published by independent brokers. I commend the site to shareholders.

There is no doubt that Austpac has generated a valuable asset in India and we are on the way to generating benefits to shareholders. We have also gained an important position in the Murray Basin and expect also to progress this project during the coming calendar year. I look forward to the year ahead, wherein we will move closer to our goal of synthetic rutile production in India and at other locations.



Alfred L. Paton
Chairman

HIGHLIGHTS OF THE YEAR

Definitive testwork, engineering design and costing are well advanced for the first integrated ERMS and EARS plant. This will be built in Orissa State in India, adjacent to Indian Rare Earths (IRE) Limited's mineral sands production facilities at OSCOM. To date the work has been undertaken by Austpac as manager of AusRutile Pvt Ltd, a joint venture company established with IRE to commercialise the technologies in India.

In July 2000 Austpac Resources and Ticor Limited jointly announced the formation of a 50/50 joint venture for the worldwide application of Austpac's ERMS and EARS technologies for the upgrading of titaniferous feedstock. The joint venture will initially concentrate on the AusRutile project in India, in which Ticor will take a 37% interest and Austpac and IRE will hold a 37% and 26% interest respectively, subject to Indian Government approvals which are expected in the fourth quarter of 2000.

The joint venture provides for payments totaling A$3 million to Austpac, subject to agreed milestones, and for Ticor to advance loan funds for Austpac's share of the first AusRutile plant. If requested by Austpac, Ticor will also provide loan funds for Austpac's share of development costs of subsequent plants.

The initial AusRutile plant will have a capacity of 10,000 tonnes per annum (tpa). Detailed design work will be completed in time for the commencement of construction during the second quarter of 2001, with production commencing in 2002. Once the initial plant is in operation, and the ERMS and EARS technologies proven at a bankable level, it is envisaged a full scale commercial ERMS and EARS facility with ultimate capacity of up to 200,000 tpa will be developed.

Opportunities to apply Austpac's ERMS process to reduce chrome levels in Murray Basin ilmenites continue to be evaluated. A major testwork program at Kooragang Island, which may lead to a technology licence, is planned for early 2001 by one group active in the Basin.

In a new initiative Austpac successfully tendered for a 933 square kilometre exploration licence in the Victorian sector of the Murray Basin. The area contains the very large, fine-grained WIM 150 resource and three other similar, though less well delineated, heavy minerals resources. The area also has good potential for the coarser, lower tonnage strandline deposits that are currently the subject of intense exploration programs throughout the Basin.

Austpac will focus on the WIM 150 deposit and believes its proprietary technologies can address the fine-grained character of the heavy mineral suite. The Victorian Government reports the core area of WIM 150 to contain a resource of over one billion tonnes containing 4% heavy mineral. Ilmenite comprises almost one third of the heavy mineral suite, together with 9% rutile, 12% leucoxene and 13% zircon. A resource of this magnitude could form the basis for the development of a major synthetic rutile/heavy mineral sand complex.

DIRECTORS' REPORT on Technology and Mineral Sands

Mineral separation plant in dredge pond at mine site

Heavy mineral concentrate

ERMS roaster

Magnetic separation

Roasted ilmenite

ERMS leach vessels

SPENT ACID

REGENERATED ACID

Acid regeneration plant

Inert oxide pellets

Synthetic rutile

EARMS AND EARS TECHNOLOGIES

Over the past 12 years Austpac has developed and patented two processes which have direct application to the mineral sand/titanium dioxide industry. These are:

- ERMS: Enhanced Roasting and Magnetic Separation, and
- EARS: Enhanced Acid Regeneration System.

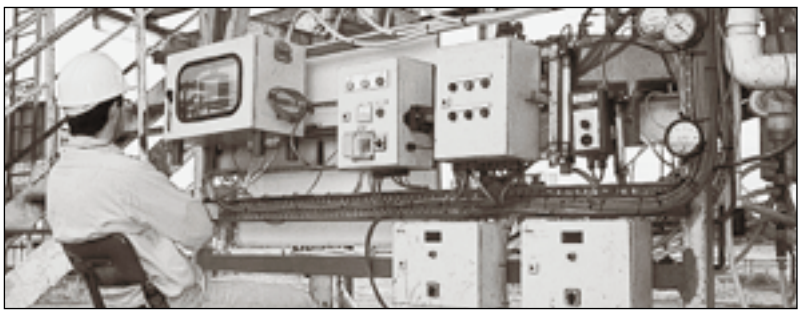
ERMS is a controlled roasting process which selectively magnetises ilmenite so it can be easily separated from other minerals. This has application where heavy mineral concentrates contain deleterious minerals such as chromite. For example, ERMS can be used to produce a saleable ilmenite concentrate from the chrome-contaminated heavy mineral deposits in the Murray Basin.

The ERMS roasting process also conditions ilmenite for leaching in hydrochloric acid. Acid leaching removes most of the iron in the ilmenite leaving a high value, titanium-rich product; synthetic rutile. Both the vast ilmenite resources along the east coast of India and ilmenite in the Murray Basin are amenable to upgrading using the ERMS process.

The EARS acid regeneration process was developed by Austpac to enhance the economics of ERMS synthetic rutile production. Iron chloride waste liquors are produced as a co-product when ilmenite is leached in hydrochloric acid. The iron chloride must be reconverted to acid for synthetic rutile to be produced economically. The EARS process achieves this at significantly lower capital and operating costs than other acid regeneration systems. The only waste produced by EARS is inert iron oxide in easily handled pellet-form, which can be used for making steel, shotblasting or safely disposed as land fill. It is an environmentally friendly process.

PILOT PLANT

Austpac has developed a state-of-the-art pilot plant at an industrial site on Kooragang Island, in Newcastle. The heart of Austpac's processes is fluid bed roasting and related operations, and the pilot plant has one batch and two continuous fluid bed roasters (one with a bed diameter of 0.5 metres) capable of handling large tonnages of material. Other equipment at the plant allows Austpac to process ilmenite through to high grade synthetic rutile, as well as regenerate hydrochloric acid from spent leach liquors using the EARS process.



Austpac pilot plant facilities at Kooragang Island, Newcastle

Austpac pilot plant facilities at Kooragang Island, Newcastle

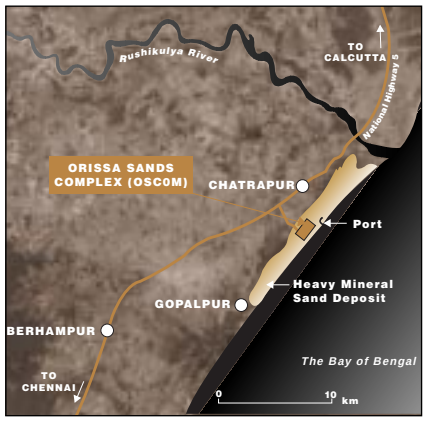
INDIA

India's mineral sand resources are among the largest and highest grade in the world. The deposits generally contain about 20% heavy minerals, including the valuable heavy minerals rutile, zircon and leucoxene, together with ilmenite. The ilmenite generally constitutes half the heavy mineral suite. The Government estimates the country's ilmenite resource base totals 278 million tonnes of ilmenite (or almost 20% of the world's resources), at least half of which is mineable.

Heavy mineral deposits along the East Coast in Orissa, Andhra Pradesh and Tamil Nadu contain over 80% of India's ilmenite. East Coast ilmenite generally contains 50-53% TiO_2 which is not suitable as a chloride feedstock for TiO_2 pigment manufacture unless it is upgraded. Electrosmelting of ilmenite to produce titania slag is not economically viable in India because of the high cost of power, and the TiO_2 content is too low to be treated economically by the Becher synthetic rutile process. It is, however, amenable to acid leach synthetic rutile processes such as Austpac's ERMS and EARS process or the more technically complex Benilite process.

Until recently only Government entities were permitted to exploit mineral sands in India. Recognising the potential of the mineral sand sector, the National Government now permits participation by non-government Indian companies. However any project which has foreign participation must include value-addition to ilmenite (ie. upgrading), and must have a minimum of 26% government participation. Several foreign groups have sought to exploit the country's mineral sand resources, but the key to entry is viable ilmenite upgrading technology. The ERMS and EARS processes therefore provide Austpac with a unique opportunity to participate in the creation of a new, world class mineral sand mining and processing operation.

Location of the Orissa Sands Complex (OSCOM) in India



Location of the heavy mineral deposit and the processing complex, OSCOM, near Chatrapur in Orissa State

Part of the existing infrastructure at the OSCOM mineral sand processing plant

INDIAN RARE EARTHS LIMITED

Indian Rare Earths Limited (IRE) is an Indian Government undertaking established in 1950 under the administrative control of the Department of Atomic Energy. With mining commencing in the mid-1960s, IRE is now by far the largest mineral sand producer in India with operations at Chavara in Kerala State, Manavalakurichi in Tamil Nadu, and at Chatrapur in Orissa State. IRE has also been involved in exploration in these three states and holds a number of other deposits, including one at Kudiraimouzi in Tamil Nadu. This deposit contains 23 million tonnes of ilmenite and is one of three massive inland dune deposits in the southeast of the state which together comprise a resource of more than 60 million tonnes of ilmenite.

In the mid-1980s IRE developed the Orissa Sands Complex (OSCOM) at Chatrapur based on an ilmenite resource of greater than 20 million tonnes. The OSCOM facility consists of a dredge, mineral separation plant with a nameplate capacity of 220,000 tonnes per annum (tpa) of ilmenite, and a Benilite synthetic rutile plant with nameplate capacity of 100,000 tpa of synthetic rutile. The Benilite plant has not achieved design capacity. Since the mid-1990s, IRE has been seeking alternative technologies applicable to Chatrapur ilmenite to satisfy the Government's desire to value-add to ilmenite to maximise export earnings.

Wet concentrator plant at OSCOM

AUSTPAC, IRE AND TICOR

Following an introduction to Austpac in 1996, IRE became interested in the ERMS and EARS technologies in 1997, when testwork at the Newcastle pilot plant on IRE's Indian ilmenites demonstrated the process could produce a commercially high grade synthetic rutile. While IRE and Austpac agreed the process was ideal for the large scale production of synthetic rutile in India, both parties recognised the need for a smaller plant to minimise the initial capital commitment and technology risk. IRE therefore suggested establishing the initial plant adjacent to OSCOM, where a 10,000 tpa ERMS synthetic rutile plant could use ilmenite and obtain regenerated acid, as well as share some of the infrastructure facilities.

In August 1999 Austpac and IRE signed the AusRutile Joint Venture agreement, whereby the parties would hold a 74% and 26% interest respectively in an Indian Company, AusRutile India Pvt Ltd, to develop the project. This is the first time IRE has entered an agreement with a foreign company to build a synthetic rutile plant.

In July 2000 Austpac and Ticor Limited (Ticor) announced they had formed a 50/50 joint venture (the ATJV) for the global development of the ERMS and EARS processes for upgrading titaniferous feedstocks. Ticor is a major participant in the Australian mineral sand industry, holding a 50% interest in the Western Australian-based Tiwest Joint Venture with Kerr-McGee Chemical Corporation of the USA. Tiwest operates the Cooljarloo mineral sands mine, the Chandala Becher synthetic rutile plant, and a TiO_2 pigment plant at Kwinana. It is the only fully integrated mineral sand to pigment operation in the world. Ticor has stated that its "strategic objective is to focus its efforts on growth in the titanium feedstock industry, which has been defined as its core business". Ticor recognised Austpac's Indian opportunity, and therefore agreed to form the ATJV.

Ticor's Executive General Manager for Strategic Development Peter Robinson discusses the ERMS roasting operation with IRE's Technical Director Siva Subramanium and Austpac's John Winter

Ticor will join the Indian project by taking a 37% interest in AusRutile India, Austpac will reduce its interest to 37% and IRE will remain at 26%. Ticor's participation in the project is subject to the formal approval of IRE and relevant Indian authorities, and it is anticipated this will be obtained during the fourth quarter of 2000.

The Austpac Ticor Joint Venture provides for a series of payments to Austpac totalling A$3 million based on agreed milestones. In addition, loan funds for Austpac's share of the initial ERMS synthetic rutile plant in India will be provided by Ticor. Once the initial plant is operating at design capacity it is envisaged that a full scale commercial plant will be built. If requested by Austpac, Ticor will also provide loan funds for Austpac's share of the development cost of this and any subsequent plants. The resource at OSCOM is sufficient to support the production of over 200,000 tpa of synthetic rutile for more than 25 years.

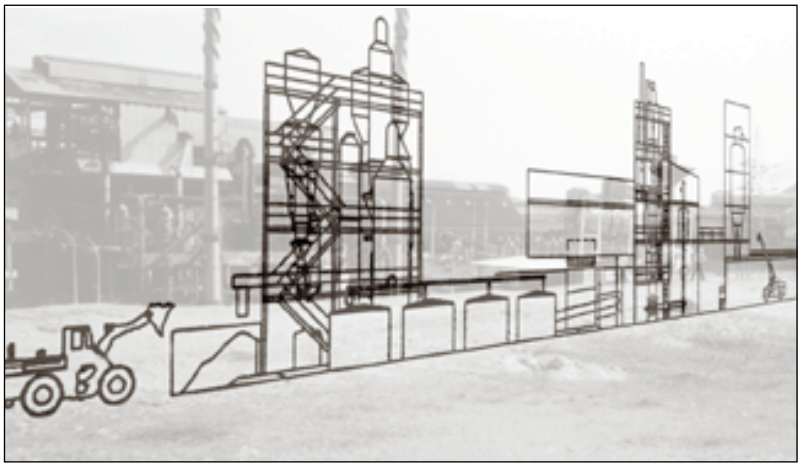
THE AUSRUTILE PROJECT

It was initially envisaged that AusRutile would construct a 15,000 tpa ERMS synthetic rutile plant which would use Chatrapur ilmenite and share the existing acid regeneration facilities at OSCOM. Ausenco Limited, the Brisbane-based consulting engineering group, was commissioned last October to design and cost this initial plant. The work was essentially complete by July 2000. However, following the significant increase in oil prices during the year, the scope of the AusRutile project has had to be re-examined as the IRE process uses oil to generate its energy.

Engineers from IRE, Ausenco and Austpac review the site for the ERMS and EARS plant at OSCOM

Both the ERMS and EARS processes use low cost coal from nearby coal mines in Orissa for energy, so with the cost of acid regeneration using the existing facilities becoming prohibitive, Austpac is provided with a more than competitive edge by using the EARS Technology. The parties now envisage the construction of a 10,000 tpa synthetic rutile plant, which still uses OSCOM ilmenite, but is integrated with a complementary EARS acid regeneration plant. Preliminary estimates indicate the integrated project is viable, and its successful development would provide greater confidence for the design of any subsequent fully integrated large scale synthetic rutile facility, thus facilitating its financing.

The testwork program at Newcastle has therefore been expanded to include EARS pilot plant runs and this will be completed by December 2000. It is envisaged that detailed design will be completed in time for the commencement of construction during the second quarter of 2001, with production commencing in 2002.



Schematic representation of the integrated ERMS and EARS plant, adjacent to IRE's Orissa Sands Complex

Once the 10,000 tpa plant is operating satisfactorily, the AusRutile joint venture partners envisage expanding the operations to at least 100,000 tpa synthetic rutile, followed by further expansion if market conditions are favourable. Such a facility would assist meeting part of the predicted shortfall by 2005 of high grade chlorinatable feedstock for the TiO_2 pigment industry. By supporting the Indian Government's goal of value-adding to ilmenite through synthetic rutile production, AusRutile (and thus Austpac) will become a significant producer of synthetic rutile within the next 3–5 years.

MURRAY BASIN

Heavy mineral deposits have been known in the Murray Basin for some time following the discovery in the 1980s by CRA (Rio Tinto) of the 'WIM-type' deposits. These deposits are typically large, flat and sheet-like, and contain tens of millions of tonnes of fine-grained heavy minerals. A subsequent initiative by the Aberfoyle Group led to the discovery of coarser-grained 'strandline' deposits, which are typically long and ribbon-like, and are generally more heavily oxidised than the WIM-type deposits. Discoveries to date indicate the tonnage potential of the individual strandlines deposits is a lot smaller than the WIM-type. It is, however, the strandline deposits that have been the focus of intense exploration over the past three years, because of the technical challenge of beneficiating the fine-grained WIM-type deposits.

Chrome Removal from Murray Basin Ilmenite

The heavy mineral suites of both the coarse-grained and fine-grained deposits in the Murray Basin contain chromite. When the heavy minerals are processed, the chromite reports with the ilmenite and the resultant concentrate generally contains more than 1% Cr_2O_3, which is either unsaleable or will not command a premium price. The industry generally does not accept ilmenite with a chrome content of more than 0.4% Cr_2O_3.

Austpac has demonstrated that the ERMS process can successfully reduce the chrome levels in ilmenite on many different types of ilmenite, including those from the Murray Basin. The coarser strandline deposits which tend to be higher in

TiO_2 due to iron removal during oxidation, often containing more than 60% TiO_2. This is considered a high grade ilmenite, but the chrome levels must be acceptable to rate as a premium product. In one test on high grade Murray Basin ilmenite, the ERMS process reduced the Cr_2O_3 content from 1.25% to 0.14%, while increasing the TiO_2 content from 56% to 62%, with better than 95% recovery.

Over the past two years, Austpac has undertaken testwork for many groups actively exploring in the Murray Basin and demonstrated the efficacy of the ERMS process for chrome removal. One group, at a more advanced development stage than the other explorers, plans a major testwork program early next year when significant tonnages of ilmenite concentrate become available. This program will be undertaken as part of a pre-feasibility study into the use of the ERMS process to produce a premium feedstock.

Austpac envisages licensing the ERMS process for the removal of chromite to potential ilmenite producers in the Murray Basin. Most deposits are still in the exploration stage, but the Company is well placed to benefit as these resources reach the development stage.

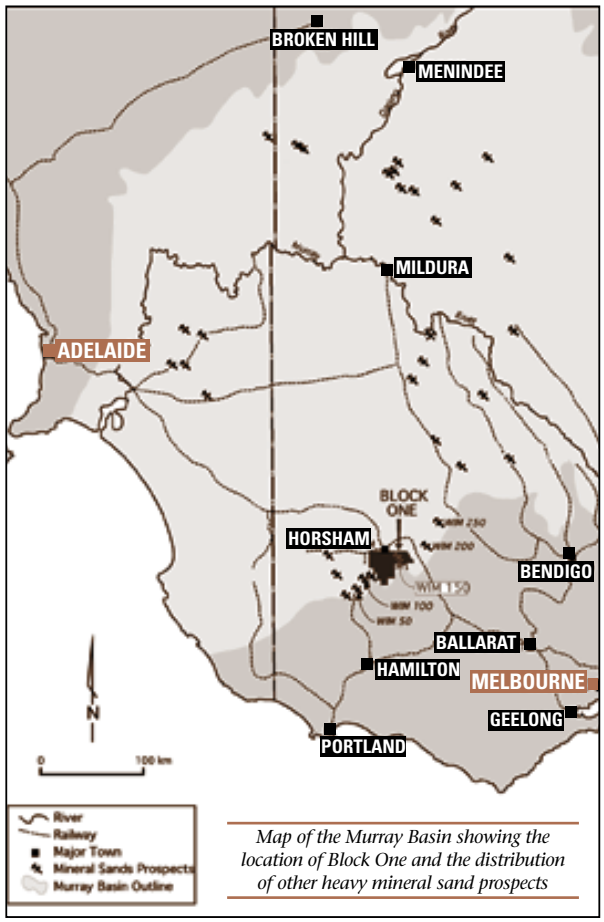
Potential for Synthetic Rutile from the Murray Basin

In addition to removing chrome from Murray Basin ilmenites, testwork at Austpac's Newcastle pilot plant has shown that the ERMS process can produce a high grade synthetic rutile (>96% TiO_2) from both the premium grade coarse strandline ilmenites as well as the finer-grained high iron ilmenites, which typically contain 50% TiO_2. However the fine-grained nature of the heavy minerals WIM-type has hitherto prevented development of the WIM-type deposits. Austpac has for some time been working on this problem and has developed a novel treatment method to produce a product acceptable to the industry. Details of the process remain confidential, subject to the application for a patent.

The industry generally considers that larger capacity synthetic rutile plants are desirable to gain a competitive edge in the feedstock market. Larger plants need to be backed up by larger deposits and 10 million tonnes of ilmenite is considered a good target. While the known strandline deposits are smaller, the WIM deposits have the potential to provide an adequate resource base and, having found a way to treat the fine-grained material, Austpac sought opportunities to exploit its discovery.

In May 2000, the Victorian Minister for Energy and Resources called for tenders for the right to apply for an exploration licence in 14 areas in the Murray Basin. Two of these areas were formerly held by Rio Tinto, and the others by RGC.

Austpac tendered on behalf of the Austpac/Ticor Joint Venture for Block 1, an ex-Rio Tinto area, and in September, was advised that its tender was successful. Block 1 covers 933 square kilometers and contains the WIM 150 resource, as well as a further three fine grained WIM-type heavy mineral accumulations, the WIM 150 Extended (west of WIM 150), the Nathan (part) and MacKenzie prospects. All these deposits were delineated by CRA Exploration/Rio Tinto during their Murray Basin exploration program.



Map of the Murray Basin showing the location of Block One and the distribution of other heavy mineral sand prospects

The WIM 150 resource was first drilled in 1982. Numerous drilling programs were subsequently completed on the project, the most recent in 1995. A total of 1,247 heavy mineral exploration holes have been drilled on Block 1, approximately 800 within the limits of what is referred to as the WIM 150 global resource area.

The WIM 150 resource includes a core area of approximately 40 square kilometres which contains over 30Mt of heavy minerals. Resource estimates published by the Victorian Government are given in Table 2 and they are based on Rio Tinto's 500 x 500 metre drilling grid (at least for the core area).

The WIM 150 deposit is relatively flat-lying and is overlain by 5–10 metres of overburden. The ore zone comprises numerous mineralised layers interleaved with relatively unmineralised sand.

The mineralized sequence ranges in thickness from 4 to 15 metres, and the core area has an average stripping ratio of 0.8:1. The heavy mineral fraction includes 31% ilmenite, 9% rutile, 12% leucoxene and 13% zircon. The majority of the valuable heavy minerals occur within the range 38 to 75 microns.

In accordance with the tender, Austpac has applied for an exploration licence for two years over Block 1, and this is expected to be granted later this year. The first year's program, which will commence early in 2001, will include large diameter drilling to obtain a bulk sample for testwork at Newcastle. Products from this testwork will be made available for evaluation by TiO_2 pigment manufacturers. If all results are positive, it is envisaged a prefeasibilty study into the establishment of a large ERMS and EARS synthetic rutile complex in Victoria will be completed by the end of the second year of the exploration licence.

Austpac's new initiative in the Murray Basin is a major opportunity to apply the Company's technologies in Australia.

Table 2. **Resource estimate for WIM 150**

	Global Resource	Core Resource
Ore	4,900 million tonnes	1,014 million tonnes
Grade	2.2% total heavy minerals	4.0% total heavy minerals
Size	>200 square kilometres	41 square kilometres

SOUTH AFRICA

In 1998 two technology licences were issued to Iscor Limited, the major South African steel producer, the first for the commercial application of Austpac's ERMS titanium minerals upgrading technology, and the second for Austpac's EARS acid regeneration process. The licences followed two years of testing of Iscor's mineral sand concentrates using the Austpac processes.

The licences are for the use of the ERMS and EARS processes within Iscor's IHM project. This project encompasses a sand mine at Hillendale which will supply heavy minerals to a separation plant and a 250,000 tpa titania slag smelter complex at Empangeni, near Richard's Bay in KwaZulu-Natal Province, South Africa. Details of the licences remain confidential until a commitment is made to develop all phases of the IHM Project.

In March 2000 Iscor announced that it intended to proceed with the first stage of the project, and mine development at Hillendale is now underway. It is likely that the heavy minerals, including ilmenite, will be exported and no commitment has yet been made to construct the slag smelter. Austpac's licences will become effective when the total project is implemented.