
Annual Report 2001





The prime strategy of Austpac Resources N.L. is to use the Company's proprietary technologies to participate as an equity partner in major, high-yielding mineral sand projects world-wide and build substantial and sustainable shareholder value.



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Chairman's Review



Chairman Alf Paton discusses pilot plant operations with Austpac engineer John Winter

During the 2000–2001 financial year, Austpac Resources N.L. made considerable progress toward realising our clearly stated strategies, namely:

- the practical application of the proprietary ERMS and EARS technologies
- capital investment in the projects resulting from the application of our technologies
- research and development programs relating to the technologies.

Highlights of the company's activities over the period under review are set out on the opposite page.

The completion of the Austpac-Ticor Joint Venture agreement in July 2000 opened up new horizons for Austpac as it:

- provides financing on a loan basis for Austpac in projects where both parties are involved
- includes Ticor's participation in the AusRutile joint venture in India with resulting added resources for the project and financing of Austpac's share of expenditure as required
- facilitates the progressing of the WIM 150 exploration program and possible development of a new coarse grained strand line heavy mineral deposit in the Murray Basin.

During the year we significantly increased the capacity and capability of the Pilot Plant at Kooragang Island. The plant has been fully occupied with test programs for the Indian Project, as well as development work for Austpac and other parties involved in the Murray Basin and elsewhere.

The progress outlined above, which includes an increased diversity of activities complementary to Austpac's strategic plan, has resulted in wide recognition of the Company by the mineral sands industry, both in Australia and internationally.

The approvals necessary for the 10,000 tonnes per annum AusRutile Project are well advanced and we are awaiting the approval for foreign investment in the project from India's Minister of Trade and Commerce. Upon this approval being granted, along with the finalisation of other formalities, we can move into the construction phase next year.

On behalf of shareholders, I would like to thank the Managing Director, his management team and technical staff, and my fellow directors for their contributions in making the year one of significant progress.

A.L. Paton
Chairman

Highlights

Austpac's Newcastle pilot plant on Kooragang Island has been substantially upgraded with two new larger fluid bed roasters installed in addition to the existing 250mm bed diameter roaster. These roasters, together with the leaching, acid regeneration and other equipment give Austpac a technically advanced, flexible facility for piloting a variety of mineral processes, and we are undertaking an increasing amount of testwork for a number of local and overseas companies, both in mineral sands and other commodities.

The AusRutile Project encompasses the construction and operation of a fully integrated synthetic rutile plant in Orissa State, India, incorporating Austpac's ERMS and EARS processes. In January 2001, Ticor commenced funding the AusRutile project under the Austpac-Ticor Joint Venture, and in accordance with the agreement, Austpac has been reimbursed for expenditure retrospective to March 2000. Funding for Austpac's share of the project, including the first plant, will be provided as a project loan from Ticor to Austpac. Further funds required for project expansion or for new projects will, at Austpac's election, be provided by Ticor, with Austpac contributing its technology and expertise.

During the year, the bulk of the work at the pilot plant involved the AusRutile Project, where technical data was collected to assist the project design engineers, Ausenco Limited, develop the final flowsheet. By August 2001, pilot plant testing, plant design, equipment specifications and costings were essentially complete. Approvals for the project are being sought at State and Central Government levels, though the slow pace of this process has delayed project implementation. Provided all Government and joint venture partner approvals are in place, construction can commence in 2002, followed by production in 2003.

Exploration Licence 4521 in the southern part of the Murray Basin was granted to Austpac and Ticor in December 2000 for an initial period of 2 years. In February 2001, Austpac excavated a bulk sample of heavy mineral bearing sand from the large, fine grained WIM 150 deposit, which is located in the eastern half of the E.L. Initial bench scale testing at our Newcastle pilot plant to produce synthetic rutile from this material has been encouraging. Further work is required to establish the commercial viability of treating these fine grained heavy minerals.

A detailed review of earlier drilling programs undertaken in the western portion of the WIM 150 licence area suggested good potential for the discovery of coarse grained strand line deposits. In September 2001, Austpac and Ticor commenced an exploration program for these deposits, and drilling is scheduled to commence in October 2001. A discovery would augment the value of the very large WIM 150 deposit and significantly enhance our position in the Murray Basin.

During the year, Austpac has undertaken testwork for a number of groups to successfully reduce the chrome levels in Murray Basin ilmenite concentrate. The objective is to licence the ERMS roasting process for chrome removal to potential mineral sand producers in the region.

In August 2001, Austpac and Ticor commenced a study into the viability of establishing a synthetic rutile facility for processing ilmenite from the Murray Basin, using ERMS and EARS technologies. Pilot testing at our Newcastle plant has already demonstrated that these processes are ideally suited to the upgrading of Murray Basin ilmenites, which are not suitable for traditional technologies such as the Becher process used in Western Australia.

Directors' Report

on Technology and Mineral Sands



Engineering team at Kooragang Island pilot plant

ERMS AND EARS TECHNOLOGIES

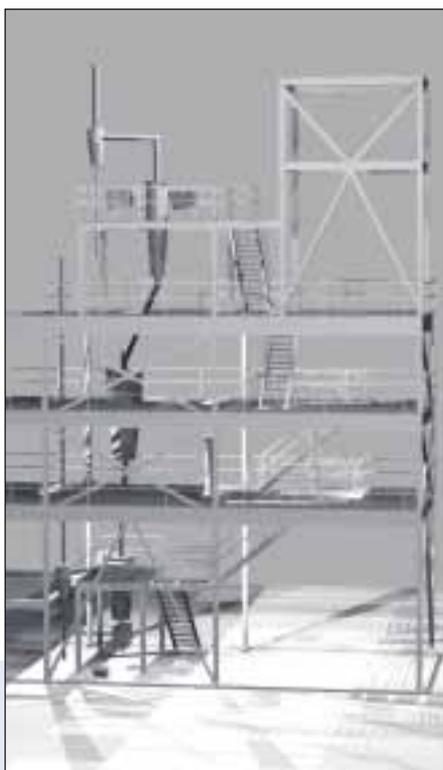
Austpac's two technologies for upgrading ilmenite, the primary ore of titanium, have now been fully developed at pilot plant level and are ready to be implemented commercially. The technologies, ERMS (Enhanced Roasting and Magnetic Separation) and EARS (Enhanced Acid Regeneration System), will be incorporated in a 10,000 tpa integrated synthetic rutile plant. This will demonstrate the technologies and provide commercial parcels for plant trials by titanium dioxide (TiO₂) pigment manufacturers, a necessary step prior to obtaining long term sale contracts for larger product volumes.

The processes have been described in previous annual reports and are reviewed on our website (www.austpacresources.com). High grade synthetic rutile can be made from any ilmenite by Austpac's ERMS and EARS processes through an innovative series of uncomplicated operations. Ilmenite, which is composed of iron oxide and titanium dioxide, is initially roasted to condition it for leaching by ensuring the TiO₂ is in the insoluble rutile form. It is then rapidly leached at atmospheric pressure in strong hydrochloric acid (25% w/w HCl) to remove the iron, leaving a network of rutile crystals (TiO₂) in the former ilmenite grain. This 'synthetic' rutile is then washed, filtered and heated (calcined) to make the final product. The iron chloride liquors are then processed in an EARS plant to regenerate the strong acid, leaving benign iron oxide pellets which can be sold to a steel plant or disposed of as inert landfill. Austpac's synthetic rutile process has the advantage of producing a much higher grade product than other commercially available synthetic rutiles, and it is less capital intensive than other processes. In addition, the ability of EARS to regenerate strong acid (other processes produce 18% w/w HCl) makes the leaching step more cost effective than other acid leach processes.

In response to a significant increase in the requirement for testwork, primarily for the Indian project, Austpac has considerably expanded the facilities at its pilot plant on Kooragang Island in Newcastle. In addition to the 100mm diameter batch fluid bed roaster, three continuous fluid bed roasters (250mm, 400mm and 500mm bed diameter) have been installed. These three roasters can be operated individually or in series, using solid, liquid or gaseous fuels, which provides a great deal of flexibility to the roasting operations. Leaching of roasted ilmenite is undertaken in batches in specially designed vessels which assist leaching and minimise losses from attrition. The pilot plant can also be configured to operate as an EARS acid regeneration plant. Both our synthetic rutile and acid regeneration technologies have been operated continuously for extended periods and we are confident that they both can be readily scaled up to a commercial operation.

We have an innovative, multidisciplinary team of engineers in Newcastle using the broad range of processing equipment installed at the pilot plant, giving Austpac a technically advanced and flexible facility for piloting a variety of mineral processes.

During the year the pilot plant was used primarily to provide design data for the AusRutile project in India. If operated at full capacity the plant would produce 1,000 tonnes of synthetic rutile per year, or one tenth that of the proposed integrated plant. In addition to the AusRutile project, testwork has been



Layout of Austpac's integrated fluid bed reactors at the pilot plant

Directors' Report

on Technology and Mineral Sands

conducted for a number of companies on ilmenites from the Murray Basin, Eastern Australia and Africa. This work has included the removal of deleterious chromite and other gangue minerals from ilmenite concentrates, modification of chemical properties to improve product acceptability, and synthetic rutile manufacture. Since acquiring the WIM 150 mineral sand deposit in Victoria, we have also undertaken work on fine grained mineral separation, treatment and agglomeration. These activities are described in the relevant sections later in this report.



Monitoring conditions in the large roaster

INDIA

Austpac's interest in India was kindled by the country's vast mineral sand resources, which are among the largest and highest grade in the world. The Government estimates that 20% of the world's ilmenite occurs in India, over 80% of which is located in the states of Orissa, Andhra Pradesh and Tamil Nadu. East Coast ilmenites generally contain 50-52% TiO_2 , and while they are suitable for TiO_2 manufacture using the sulfate process, they require upgrading before they can be used in the chloride process. Austpac's ERMS and EARS technologies are ideally suited for upgrading this type of ilmenite.

Indian Rare Earths Limited (IRE), an Indian Government undertaking established in 1950, is India's largest mineral sand producer with operations in Orissa, Tamil Nadu and Kerala States. IRE's largest facility is the Orissa Sands Complex (OSCOM), where it is mining a world class heavy mineral sand deposit near Chatrapur in the southeast of the state. OSCOM currently produces around 200,000 tonnes per year of ilmenite concentrate, most of which is exported to Europe and Asia.

The Indian Government's priority is to value-add to its ilmenite resources and it favours projects which include upgrading. While the ultimate objective is TiO_2 pigment manufacture, synthetic rutile production is encouraged. Accordingly, IRE was seeking appropriate synthetic rutile technology and in 1997, Austpac demonstrated in bench scale tests at the Newcastle pilot plant that the ERMS and EARS technologies were able to produce a synthetic rutile containing over 96% TiO_2 from Indian ilmenites.

Testwork continued on OSCOM ilmenite in 1998, and in August 1999, IRE and Austpac agreed to investigate the feasibility of establishing a plant at OSCOM to demonstrate our synthetic rutile process. It was envisaged this plant would purchase ilmenite from and use existing acid regeneration facilities at OSCOM. An Indian company, AusRutile India Private Limited, was established to facilitate the joint venture in which Austpac held a 74% interest and IRE a 26% interest. The joint venture envisaged that once the first plant was operational the project would be expanded to a world class synthetic rutile facility of 100,000 tpa or more.



Location of Orissa Sands Complex (OSCOM)

Directors' Report

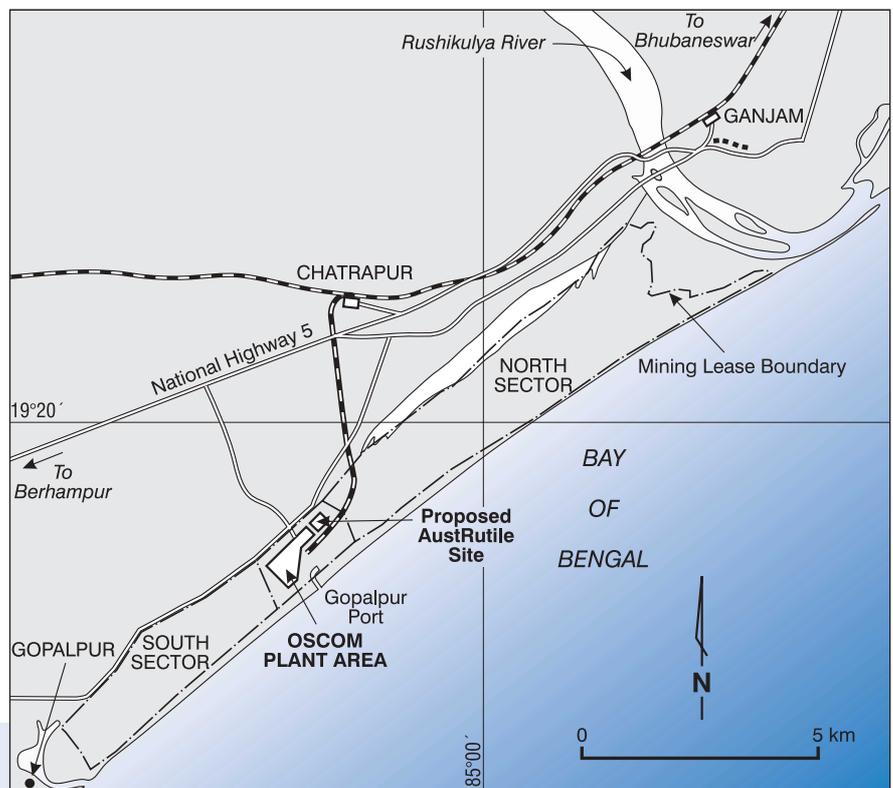
on Technology and Mineral Sands



Port facilities at Gopalpur, Orissa

Austpac then commenced the prefeasibility study into this project and decided to seek a joint venture partner to assist with financing. Ticor Limited (Ticor) recognised the potential of the Indian opportunity and in July 2000 we agreed to form the Austpac-Ticor Joint Venture, a 50/50 undertaking 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 synthetic rutile plant and the Kwinana TiO₂ pigment plant in Western Australia. Tiwest is the only fully integrated mineral sand to pigment operation in the world. Ticor's strategic objective is to focus on growth in the titanium feedstock industry, which is now its core business. Austpac's technologies and India have therefore become part of Ticor's future plans.



Location of proposed AusRutile SR plant

In late 2000 Austpac, Ticor and IRE executed an agreement whereby Ticor joined the AusRutile project. This agreement was ratified by the IRE Board in December 2000. Under this agreement Austpac and Ticor each hold a 37% interest in AusRutile, while IRE holds a 26% interest. AusRutile's objective is to develop a synthetic rutile complex based on the high grade mineral sand deposit at OSCOM.

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It was decided to initially construct a 10,000 tpa fully integrated synthetic rutile plant adjacent to OSCOM's processing plant facilities. The plant will incorporate ERMS and EARS technologies and will purchase ilmenite from OSCOM. It will demonstrate the technologies, provide commercial parcels to pigment manufacturers for plant trials prior to entering into supply contracts, and provide technical experience and cultural exposure to operating in India.

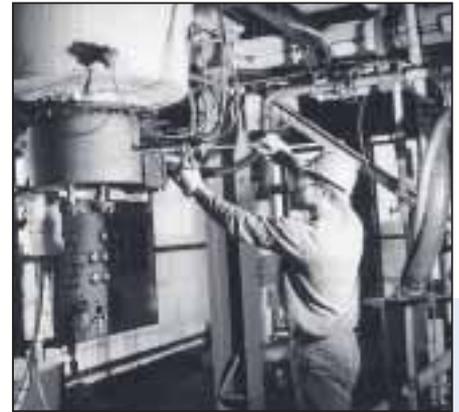
The OSCOM resource is large enough to support a world scale synthetic rutile facility for over 20 years. The AusRutile joint venturers envisage expanding the operation by at least 100,000 tpa of synthetic rutile once the initial plant has demonstrated the technical and economical viability of the ERMS and EARS processes and formal sales contracts have been obtained for AusRutile's high grade synthetic rutile.

The agreement between Austpac, Ticor and IRE gives AusRutile access to sufficient resources to support a 200,000 tpa synthetic rutile operation through a sub-lease of part of IRE's existing mining lease. AusRutile's large scale facility will be supplied by its own mine and mineral separation plant. AusRutile has an advantage over larger, lower in ground value deposits elsewhere in the world, as the AusRutile project will be able to operate economically at lower levels of production.

Under the Austpac-Ticor Joint Venture, Ticor has funded the project since the beginning of 2001 and has reimbursed Austpac for expenditure incurred since March 2000. Funding for Austpac's share of this work and for the first plant will be provided as a project loan from Ticor. The joint venture also provides that, at Austpac's request, Ticor will provide Austpac's share, also by way of a project loan, of any funds required for project expansion or for new projects.

AusRutile Plant Design

Ausenco Limited of Brisbane was commissioned to complete the detailed design and final costing of the integrated plant. To provide basic design criteria for Ausenco, Austpac has undertaken a definitive testwork program on Orissa



Adjusting combustion air to the large fluid bed reactor



General layout of proposed AusRutile 10,000 tpa synthetic rutile plant

Directors' Report

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Calibration of ilmenite feed to pre-heat reactor



Centralised pneumatic control centre at the pilot plant

ilmenite at the Newcastle pilot plant during the past six months. This culminated in a series of continuous plant trials being undertaken for each process step involved in the application of the ERMS and EARS technologies. The pilot plant was run for continuous periods of 36 hours at a through-put equivalent to one tenth of the proposed 10,000 tpa plant to establish operating equilibriums and confirm process reliability. We are confident that the ERMS and EARS processes can be readily scaled up to produce 10,000 tpa of high quality synthetic rutile.

Ausenco has now completed all general arrangement drawings, process and instrumentation diagrams and equipment lists. Requests for quotations for supply of materials and services for the synthetic rutile plant at Orissa have been issued. The major suppliers have already responded with indicative prices within the range of the original scoping study.

In August 2001, Jacobs H & G of Mumbai, India, completed the collection of field data for the environmental impact assessment for the plant construction approvals. No adverse environmental conditions were identified during the site assessment. A significant feature of the AusRutile plant is that there will be no effluent or tailings discharge. The hydrochloric acid is regenerated from spent leach solutions for further use in leaching. Waste heat is recovered from the roasting stage and used to generate steam for the leaching operations. The leached iron and other plant waste streams are converted to inert, dust-free iron oxide pellets and stockpiled for future use.

Pilot plant samples and indicative specifications for the AusRutile high grade synthetic rutile product have been presented to potential customers, the major pigment producers, and these received a positive response.

Approvals for the AusRutile project, both at the State and Central Government level are being progressed, though the slow pace of the approval process is now delaying project implementation. Provided all Government and Joint Venture partner approvals are in place, construction can commence in 2002, followed by production in 2003.

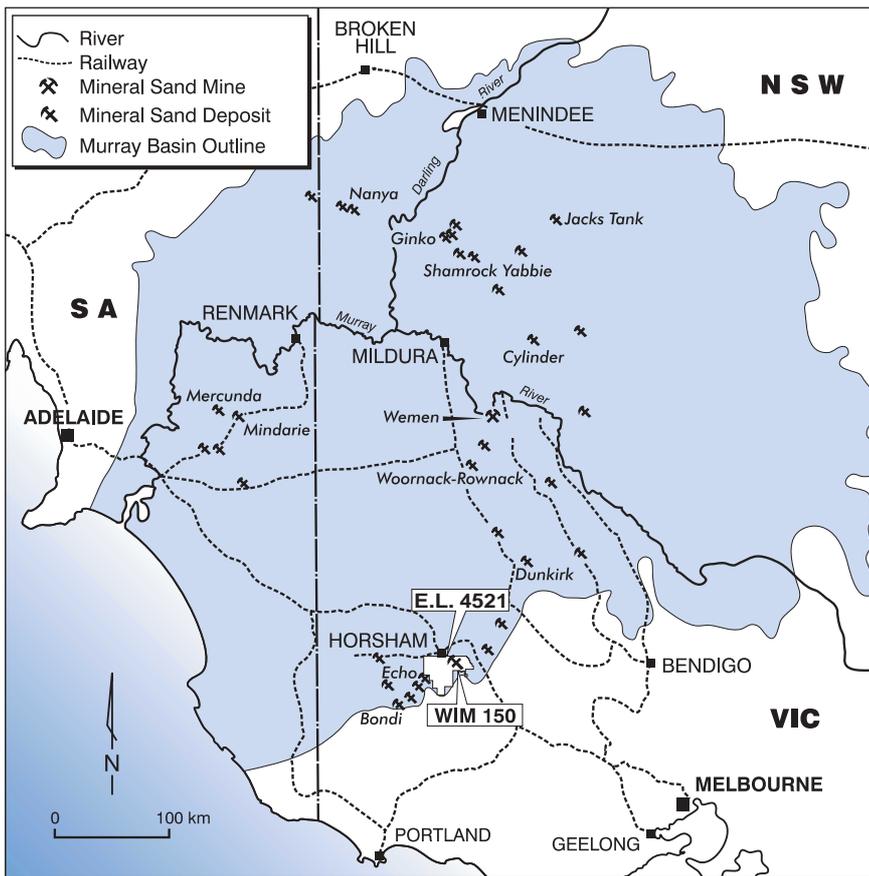
MURRAY BASIN

Mineral sand exploration in Australia over recent years has seen a dramatic acceleration in effort in the Murray Basin, with a corresponding increase in known reserves. Most of the resource delineation has focused on coarse grained strand lines and success in this area has been achieved by Murray Basin Titanium Pty Ltd (15.4 MT heavy minerals), Basin Minerals Limited (24.4 MT heavy minerals), BeMaX Resources N.L. (28 MT heavy minerals), Iluka Resources Limited (11 MT heavy minerals) and Southern Titanium N.L. (6 MT heavy minerals). These are the current total resource estimates reported for each company.

Large, flat sheet-like heavy mineral deposits, the 'WIM-type' deposits, also occur in the Murray Basin, and they contain tens of millions of tonnes of fine grained heavy minerals. These deposits have been recently ignored because it is difficult to economically recover the heavy mineral suite using conventional technology. The WIM 150 deposit is one such example, and Auspac has been undertaking testwork to overcome this problem. Our work is described later in this report.

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Map of the Murray Basin showing the location of Exploration Licence 4521

Chrome Removal from Ilmenite Concentrates

New projects in the Murray Basin propose the sale of the zircon and rutile products, and this has reached fruition for Murray Basin Titanium Pty Ltd (MBT), jointly owned by Sons of Gwalia Ltd and RZM Pty Ltd, with its Wemen deposit commencing production in February 2001. The Wemen mine is producing zircon and rutile, while ilmenite is being stockpiled. Like all ilmenites of the Murray Basin, Wemen ilmenite concentrate contains chromite as a contaminant which restricts market acceptance.

Austpac is presently conducting a program of testwork for MBT aimed at improving the commercial acceptability of ilmenite from Wemen. The work is being undertaken at our Newcastle pilot plant, and is focussed on using Austpac's ERMS technology and processing knowhow to produce a high TiO_2 low chrome ilmenite, suitable for high quality pigment production by both the sulfate and chloride processes.

We have also been approached by two other parties actively exploring in the Murray Basin who are interested in a technology to reduce chrome in ilmenite concentrates, and it is anticipated that further testwork will be undertaken in coming months.

Acceptance of ERMS technology could see a roaster built to treat the ilmenite from the Wemen mine and possibly from other MBT deposits, in accordance with an ERMS licence agreement. Other potential producers may also licence our technology.



Multi-pole agitated drum magnet at the pilot plant

Directors' Report

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Leaching section of the pilot plant

Synthetic Rutile Plant in the Region

With the Wemen deposit in production and several other companies undertaking feasibility studies on other defined resources, ilmenite production in the Murray Basin is likely to reach a level sufficient to justify investment in a value-adding synthetic rutile complex. Accordingly, in August 2001, Austpac and Tigor commenced a study into the establishment of such a facility. The study is being conducted under the Austpac-Tigor Joint Venture for the worldwide application of Austpac's ERMS and EARS technologies.

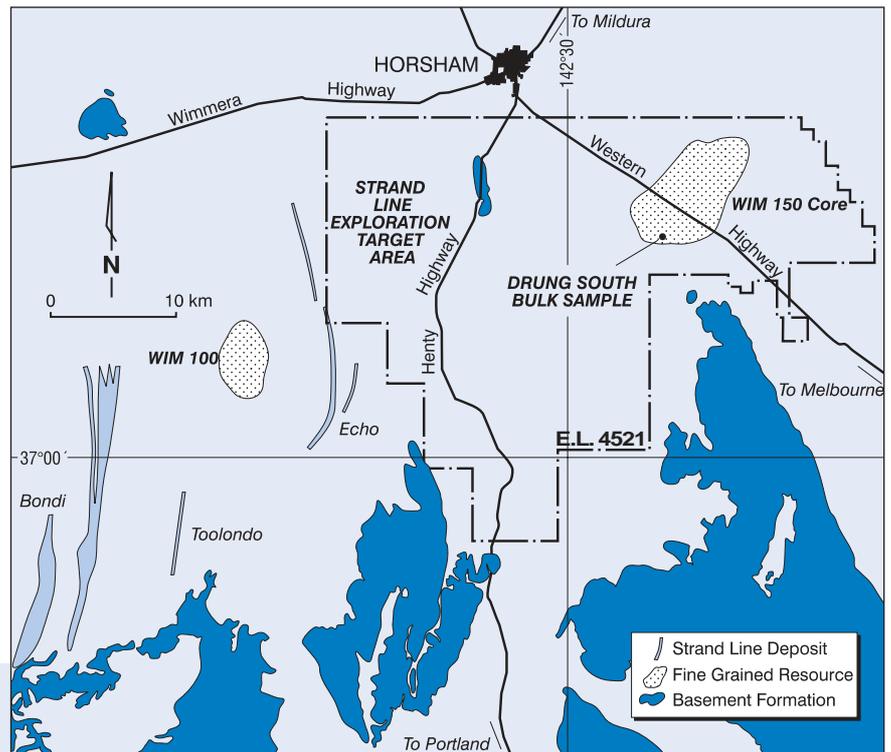
A synthetic rutile complex in the Murray Basin would use the ERMS and EARS processes to upgrade the ilmenite to a preferred feedstock for chloride-route TiO₂ pigment producers. Austpac has already confirmed through pilot plant work at Newcastle that its processes are ideally suited to the upgrading of Murray Basin ilmenites. These ilmenites are generally not amenable to traditional Becher synthetic rutile technology, as used in Western Australia.

An ERMS/EARS facility could have the flexibility to remove chromite and so produce saleable ilmenite, as well as high grade synthetic rutile for export.

This initial study will examine potential plant locations within the broader Murray Basin region, raw material supply options (including ilmenite, coal or other energy sources, and water), infrastructure and Government incentives. Data collection, collation and analysis are now underway and this work will be completed later in 2001.

Exploration Licence 4521

Exploration Licence 4521 covering 933 sq km was granted to Austpac Resources N.L. and Tigor Limited on 1 December 2000 for a period of two years. This licence



Map of Exploration Licence 4521 and geological features

Directors' Report

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covers the WIM 150 deposit and two other less well defined, large fine grained heavy mineral deposits. A higher grade area within WIM 150, the 'WIM 150 Core', comprises a Measured Resource of 452 million tonnes containing 5.9% heavy minerals. The focus has therefore been on applying the ERMS and EARS processes to produce commercially acceptable upgraded products. Austpac is managing this ongoing technical development program.

During the first quarter of 2001, Austpac excavated a broad pit through the covering clay horizon into the mineralised sand horizon at Drung South in the southern portion of the WIM 150 deposit. A bulk sample of 400 tonnes of ore has been stockpiled, and the pit has been rehabilitated for future use by the landowner as a farm dam.

Parcels of this ore have been progressively shipped to the Kooragang pilot plant for sample preparation and magnetic separation of a predominantly ilmenite concentrate. A series of bench scale roasting and leaching tests have been undertaken, yielding progressively better quality synthetic rutile products. This synthetic rutile is too fine to be used by the chloride process to make TiO_2 pigment. Austpac has successfully agglomerated this fine grained material to produce acceptably sized, hard synthetic rutile pellets. These have been made without using a binder, thus avoiding product contamination. This work is ongoing and will lead to market investigations once we are satisfied with the product and the commercial viability of our agglomeration process.

Exploration for Strand Line Deposits

In reviewing the results of drilling conducted in the 1980's by Rio Tinto, Austpac noted drill intersections of coarse grained heavy minerals in the western part of E.L. 4521. As the target of this early drilling was fine grained WIM-type heavy minerals, those intersections were not followed up at the time. The holes, generally 2 to 5km apart, were too widely spaced to find the linear strand line deposits discovered nearby in the southern part of the Murray Basin. However a number of narrow intersections of coarser heavy minerals suggest these holes could have encountered the edge of strand deposits. Examination of Landsat, topographic and radiometric data also suggests the presence of arcuate features indicative of partially exposed dune systems.

Exploration Licence 4521 is bound to the west and south by tenements held by Basin Minerals Limited, which has discovered a major new coarse grained mineral sand province in this southern portion of the Murray Basin. Basin's Douglas Project includes the Bondi, Bondi East, Echo and Acapulco deposits. These are medium to coarse grained strand line deposits (median grain size 150 microns), differing markedly with the fine grained 'WIM' resources (median grain size 45 microns).

Basin Minerals is currently planning production at the rate of 300,000 tpa from the Stage One Resource (being parts of the Bondi and Bondi East strand lines) commencing in the second half of 2003. Their Stage Two development includes the Echo strand line, which occurs to the south and west of E.L. 4521 and abuts the tenement in the southwestern corner. There is a good possibility that the Echo East strand could extend into our licence.



Bulk sampling operations at Drung South



Preparing bulka bags of WIM 150 ore for shipment to Austpac pilot plant

Directors' Report

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Airborne geophysical survey aircraft at Horsham

In late August 2001, Austpac and Ticor announced a phased exploration program to delineate coarse grained strand line heavy mineral deposits within the western half of the licence area. A low level airborne geophysical survey was completed in September 2001 and interpretation of the results will assist target definition. The majority of the work will entail close spaced drilling, which will commence in October 2001, together with subsequent sampling and analysis. This initial program is being managed by Austpac and funded by Ticor.

Schedule of Mining Tenements

	VICTORIA
NATURE OF TITLE	Exploration Licence 4521
AREA	933 sq km
NAME	Horsham
STATUS	Granted 1/12/00 for 2 years
REGISTERED HOLDER	Austpac Resources N.L. and Ticor Limited
BENEFICIAL INTERESTS OF AUSTPAC RESOURCES N.L. GROUP	50%