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29 May 2006

BEHRE DOLBEAR AUSTRALIA COMPLETE INDEPENDENT TECHNICAL REVIEW ON MOUNT WELD RARE EARTHS PROJECT

The Directors of Lynas Corporation Limited (ASX code LYC, "Lynas") are pleased to announce that Behre Dolbear Australia (BDA) has completed an independent technical review on the Mount Weld Rare Earths project with no significant technical issues raised.

The Scope of Work of BDA's technical review included:

- an independent assessment of the technical aspects of the Project
- preparation of a summary report and risk assessment of the geology, drill and sample data, resource and reserve estimates, proposed mining plans and mining operations, metallurgical testwork, planned process flowsheet, plant design and proposed processing operations, infrastructure and environmental issues
- review of the capital and operating cost estimates
- review of the proposed rare earths products

BDA has reviewed Lynas' mining and processing plans and test-work, the resources and reserves, the proposed production schedule and estimated capital and operating costs. BDA has also reviewed the Feasibility Study documents and development proposals. BDA has visited the Mount Weld project site, the proposed trucking route from Mount Weld to Laverton, the Laverton rail loading facility and the Esperance port facility. BDA has also visited the Zibo City plant site, the Chinese Design Institutes preparing the detailed plant designs, the relevant infrastructure facilities and has reviewed the environmental proposals.

Please find a full copy of the BDA report attached.

About Lynas Corporation

Lynas owns the richest deposit of Rare Earths in the world at Mount Weld, 35km south of Laverton in Western Australia. A feasibility study has been completed on the Rare Earths deposit and all Australian and Chinese approvals required for project development have been received. Lynas has a strategy of creating a reliable, fully integrated source of supply from mine through to customers, and to become the benchmark for security of supply and environmental standards in the global Rare Earths industry.

Lynas' Mount Weld tenement also has a JORC compliant poly-metallic resource known as the "Crown" deposit. This is a titanium and niobium-rich rare metals resource that is a separate deposit to the Mount Weld Rare Earths deposit.

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About Behre Dolbear Australia

BDA specialises in technical due diligence and review work on mining and processing projects, primarily for financial institutions. BDA has been involved in numerous such studies and Independent Engineer assignments in recent years, and is well qualified to undertake the technical review work required. BDA is the Australian subsidiary of Behre Dolbear & Company Inc., an international minerals industry consulting group which has operated continuously world wide since 1911, with offices in Denver, New York, Toronto, Vancouver, Guadalajara, Santiago, London, Hong Kong and Sydney. Behre Dolbear specialises in mineral evaluations, due diligence studies, independent expert reports, independent engineer certification, valuations, and technical audits of resources, reserves, mining and processing operations and project feasibility studies. BDA has primarily used engineering consultants from the Sydney office in this review, together with specialist rare earths expertise from Europe and North America.

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Dear Sir

INDEPENDENT TECHNICAL REVIEW

LYNAS CORPORATION LIMITED - MT WELD RARE EARTH PROJECT

BEHRE DOLBEAR AUSTRALIA

1.0 INTRODUCTION

Transocean Group and Arbuthnot, Financial Advisers and Nominated Adviser and Broker respectively to Lynas Corporation Limited ("Lynas") have requested that Behre Dolbear Australia Pty Limited ("BDA") undertake an independent technical review of the proposed Mt Weld Rare Earth Project ("Mt Weld Project" or "the Project") and prepare an independent technical report for inclusion as a Competent Persons Report in a Prospectus and Admission Document which Lynas is preparing for a listing on the Alternative Investment Market ("AIM") in London.

Lynas plans to raise approximately £20 million ("£20M") which will be applied towards developing the Mt Weld mine in Western Australia and constructing a Rare Earth ("RE") Processing Plant in Zibo City in the Shandong Province of the Peoples Republic of China (Figure 1). The ore at Mt Weld will be mined by open pit methods, crushed and stockpiled. Ore will be trucked in eight tonne ("t") kibbles to the rail siding at Leonora, where the kibbles will be transferred to rail cars and railed to the Western Australian port city of Esperance. At Esperance the ore will be transferred to ships for sea freight in approximately 30,000t lots to the port of Qingdao or Longkou in Shandong Province, in China. The ore will be trucked to the plant in Zibo City for processing, comprising initial concentration by flotation, followed by acid decomposition and water leaching and solvent extraction. Initial production of 10,500 tonnes per annum ("tpa") of Rare Earth Oxides ("REOs") is planned. Lynas has completed a Feasibility Study of the project which forms the basis of this review.

The Scope of Work of BDA's technical review includes:

- an independent assessment of the technical aspects of the Project as currently defined
- preparation of a summary report and risk assessment of the geology, drill and sample data, resource and reserve estimates, proposed mining plans and mining operations, metallurgical testwork, planned process flowsheet, plant design and proposed processing operations, infrastructure and environmental issues
- review of the capital and operating cost estimates
- review of the proposed RE products.

BDA has reviewed Lynas' mining and processing plans and testwork, the resources and reserves, the proposed production schedule and estimated capital and operating costs. BDA has also reviewed the Feasibility Study documents and development proposals. BDA has visited the Mt Weld project site, the proposed trucking route from Mt Weld to Laverton, the Laverton rail-loading facility and the Esperance port facility. BDA has also visited the Zibo City plant site, the Chinese Design Institutes preparing the detailed plant designs, the relevant infrastructure facilities including the Qingdao port facilities and has reviewed the environmental proposals.

Rare earth resources and reserves defined within the Mt Weld tenements have been reviewed; however, BDA has not undertaken an audit of the Lynas data, or re-estimated the resources or reserves. Categorisations are stated in accordance with the Australasian Code for Reporting Identified Mineral Resources and Ore Reserves prepared by the Joint Committee of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia, December 2004 update ("the JORC Code").

BDA has not conducted a review of the status of the various tenements or agreements; this work is being undertaken by others as part of the legal due diligence. Lynas has advised that all material tenements are in good standing.

BDA specialises in technical due diligence and review work on mining and processing projects, primarily for financial institutions. BDA has been involved in numerous such studies and Independent Engineer assignments in recent years, and is well qualified to undertake the work required. BDA is the Australian subsidiary of Behre Dolbear & Company Inc., an international minerals industry consulting group which has operated continuously world wide since 1911, with offices in Denver, New York, Toronto, Vancouver, Guadalajara, Santiago, London, Hong Kong and Sydney. Behre Dolbear specialises in mineral evaluations, due diligence studies, independent expert reports, independent engineer certification, valuations, and technical audits of resources, reserves, mining and processing operations and project feasibility studies. BDA has primarily used engineering consultants from the Sydney office in this review, together with specialist rare earth expertise from Europe and North America.

This BDA report is primarily based on information provided by Lynas. BDA's assessment of the projected development schedules and capital and operating costs are based on technical reviews of Project data and Project site visits. However, any forecasts and projections cannot be assured and factors both within and beyond the control of Lynas could cause the actual results to be materially different from BDA's assessments and any projections contained in this report.

The sole purpose of this BDA report is for use by the Directors and advisors of Lynas in connection with the proposed AIM listing and should not be used or relied upon for any other purpose. Neither the whole nor any part of this report nor any reference thereto may be included in or with or attached to any document or used for any other purpose, without our written consent to the form and context in which it appears.

2.0 SUMMARY

2.1 Project Background

The Lynas Mt Weld RE project is based on a concentration of rare earth elements (the fifteen lanthanides plus yttrium) within the residual weathered horizon overlying the circular Mt Weld carbonatite intrusive. Mt Weld is located in the North-Eastern Goldfields of Western Australia, approximately 32 kilometres ("km") southeast of Laverton, and 10km east of the Placer Dome Granny Smith gold mine (Figure 1). The area is arid with sparse vegetation. Annual rainfall averages 230 millimetres ("mm") with an annual evaporation rate of 3,070mm. Temperatures range from a winter mean minimum of around 5°C to a summer mean maximum of around 36°C.

The Mt Weld area is covered by four mining leases (Figure 2). Lynas, through its wholly owned subsidiary Mt Weld Mining Pty Limited ("MWM"), owns three leases; the fourth lease is owned by Wesfarmers CSBP ("Wesfarmers"), but MWM has rights to the rare earth (non-phosphate) ores. BDA has not undertaken any legal due diligence on the status of the tenements or Native Title issues but Lynas has advised that all material tenements are in good standing.

The Mt Weld carbonatite intrusive was discovered in 1966 by follow-up investigation of a circular magnetic anomaly. Various parties have owned, or held interests in the deposit. Lynas first acquired its interest in the project through the acquisition of Mt Weld Rare Earths Pty Limited in November 2000, and acquired 100% control of Mt Weld Mining Pty Limited (the tenement holding company) in April 2002. The deposit has been largely defined by diamond drilling and reverse circulation ("RC") drilling.

It is proposed to mine the ore from the Central Lanthanide Deposit ("CLD") at Mt Weld (Figure 2) by open pit in a series of mining campaigns. The deposit has an average overburden thickness of 25-30 metres ("m") comprising clay lake sediments and alluvial sands and gravels; the ore zone has an average thickness of 35m with a maximum thickness of around 60m. The maximum pit depth is approximately 90m. The rare earth ore will be mined and stockpiled and then progressively loaded into 8t kibbles and trucked approximately 160km to the rail head at Leonora. The kibbles will be loaded onto rail cars and the ore will be railed to the West Australian port of Esperance, where it will be loaded into bulk carriers for shipping to the Peoples Republic of China ("PRC") for concentration and secondary processing treatment. It is planned to ship approximately

120,000tpa initially, building up to 220,00tpa. Shipments in Years 1-11 are planned to average approximately 17-20% Rare Earth Oxides ("REO"); from Years 12-18 the grades range from approximately 13-15% REO.

The ore will be shipped to the Chinese port of Qingdao in Shandong Province and trucked approximately 210km to the processing plant site within the Qilu Industrial Park ("QIP") in the Linzi District, 20km from Zibo City (Figure 1). Jinan, the capital of Shandong province is located approximately 100km to the west, and Beijing is located 350km to the northwest. Infrastructure and transport facilities are good, with regular flights and a modern four lane highway connecting the area with Beijing.

The QIP is a 42 square kilometre ("sq km") industrial park and accommodates a number of chemical and petrochemical plants; it is one of the four principal petrochemical bases in China. Other industries comprise building materials, papermaking, textiles and machinery, and include a number of foreign-owned enterprises. The disposal site for waste solids lies about 10km by road from the plant site.

It is planned to produce approximately 10,500tpa of REOs in the initial years, building up to around 15,000tpa by Year 5.

2.2 Geology and Mineralisation

- The Mt Weld carbonatite is a 3.5km diameter near-vertical plug of igneous calcitic to dolomitic carbonate, intruded into an Archaean volcanic and sedimentary sequence of the Yilgarn Craton (Figure 2). The carbonatite is cut by a steeply-dipping dolerite dyke, approximately 100m wide.
- The upper portion of the carbonatite has been weathered and lateritised. Within the residual 20-60m weathered profile rare earth elements have been concentrated to ore grade levels.
- The carbonatite intrusion and residual weathered profile have been buried by freshwater lacustrine sediments, mostly clays. The lacustrine sediments themselves are buried by a blanket of transported alluvial sand and gravel.
- A zone of high grade REO mineralisation has been identified near the centre of the carbonatite, termed the Central Lanthanide Deposit. This zone forms the basis for the open pit mine plan. The mineralised regolith comprises secondary and supergene mineralisation within amorphous and variably cemented iron oxides and phosphates. The dominant gangue mineralogy is limonite; iron oxide levels tend to vary inversely with REO content; the REO grade plus the iron oxide content of the ore typically comprise 70% of the sample.
- Two major ore types have been designated which together comprise 65% of the deposit:
  - *CZ* - soft phosphatic siltstone regolith; main ore type and basis of Feasibility Study and reserves; fine grain friable low density siltstone
  - *LI* - limonitic carbonatite regolith; poorer concentration and recovery performance than CZ; can be more cemented, nodular or concretionary; not included in Feasibility Study reserves.
- Overall, the geology appears relatively straightforward and the geological controls and mineralisation are relatively well defined.

2.3 Geological Data

- Although a number of different organisations have been involved in the exploration and drill definition of the deposit, the bulk of the work has been undertaken under the supervision of a single geologist, R K Duncan, thereby providing continuity and standardisation of processes and procedures.
- The geological data has been independently reviewed and verified by Mining Resource Technology Pty Limited ("MRT") - Golder Associates ("Golder") in 2000-2001.
- Resource data is primarily based on drilling campaigns post 1991. While early exploration drilling was commonly unsatisfactory due to sticky clays, unconsolidated ground and high groundwater flows, in 1991 Placer Dome installed a borefield to provide water for the nearby Granny Smith gold processing operation which resulted in a significant lowering of the water table and a more satisfactory sampling regime. Only the more recent RC aircore holes and diamond drill holes were used for Measured and Indicated resource estimation. Drill spacing over the central portion of the main mineralised zone averages approximately 20m, with more peripheral areas based on 80m spacing.
- All routine analyses have been carried out by Genalysis Laboratories in Perth. Standards have been used to monitor assay quality and check samples have been submitted for analysis by an independent laboratory.

- Samples were analysed using the Inductively Coupled Plasma - Mass Spectrometer ("ICP-MS") method for the fourteen lanthanides (La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Tb, Lu) plus yttrium, thorium and uranium and ICP-OES (Optical Emission Spectrometer) for major elements (aluminium, silica, phosphate, manganese, iron and calcium). Results are reported for individual lanthanides but are also summarised as TLn (arithmetic total abundance of all lanthanides in a sample) or TLnO (arithmetic total abundance of all lanthanide oxides). Rare earth oxides refers to the sum of the lanthanide oxides (TLnO) plus yttrium oxide.
- Although initial drilling and sampling was subject to some uncertainties due to the high water flows, later work post the 1991 dewatering appears satisfactory. The geological data collection appears to be generally comprehensive and to have been professionally undertaken. The continuity of geological supervision is a significant benefit. The database has been thoroughly reviewed by MRT-Golder. Density data appears somewhat limited and MRT-Golder considered that the density could be slightly overestimated; overall however the data is considered to provide a satisfactory base for the estimation of resources and reserves.

2.4 Resources and Reserves

- The Mt Weld resources and reserves have been reviewed in accordance with the Australasian Joint Ore Reserve Committee (JORC) Code requirements. The JORC Code differentiates between resources, which are effectively an inventory of mineralisation, and reserves, which represent that part of the resource which is planned to be mined, including mining dilution and mining losses, and for which the necessary mine planning and design work has been carried out.
- The Feasibility Study resource is based on an estimation undertaken by Hellman and Schofield ("H&S") using Ordinary Kriging ("OK"). Geological modelling was carried out in conjunction with the project geologist, R K Duncan. Geological units were digitised and wire-framed. The main ore zone was modelled as one unit, combining the CZ and LI lithologies. The proportion of LI and CZ within each carbonatite regolith block was estimated by indicator kriging.
- The geological database used for grade estimation of Measured and Indicated blocks comprised 194 air core RC holes and 6 diamond drill holes. An additional 142 holes drilled prior to the 1991 dewatering were used only for estimation of Inferred blocks. The average drill hole spacing within the Measured and Indicated resource areas is approximately 20m; outside this area hole spacing averages approximately 80m.
- Based on an 8%TLnO cut off, H&S estimated the following resources:

Table 2.1

Mount Weld Resource Summary - 8% TLnO Cut Off

Unit	Category	Tonnage Mt	Grade TLnO%	Contained TLnO kt
CZ	Measured	0.84	17.0	143
	Indicated	1.45	14.4	209
	Meas/Ind	*2.29*	*15.40*	*352*
	Inferred	0.14	12.9	18
	Total	*2.44*	*15.2*	*371*
LI	Measured	0.20	13.9	28
	Indicated	0.69	14.5	100
	Meas/Ind	*0.89*	*14.3*	*128*
	Inferred	0.20	13.0	26
	Total	*1.09*	*14.1*	*153*
Total CZ/LI	Measured	1.04	16.4	171
	Indicated	2.14	14.4	309
	Meas/Ind	3.18	15.1	479
	Inferred	0.34	13.0	44
	Total	*3.53*	*14.9*	*525*
Total All Units	**Total**	**5.39**	**14.5**	**783**

Note: Mt = million tonnes, kt = thousand tonnes

- The reserve tonnages and grades at Mt Weld are based on the Measured and Indicated in-pit resource obtained from open pit optimisation studies after application of appropriate mining costs and pit slope parameters and after allowance for mining dilution and mining recovery factors. The reserve estimation work was carried out by Australian Mine Design and Development Pty Limited ("AMDAD") based on the H&S resource block model. AMDAD's optimisation studies indicate that 8% TLnO is the appropriate mining cut-off grade.

- At this stage of the project planning it is intended to ship and process only the CZ material. Only the CZ material is thus included in the Mt Weld reserves as shown in Table 2.2. The LI material within the open pit will be mined as waste, but will be separately stockpiled and may ultimately be processed subject to further testwork.
- Based on an 8%TLnO cut off, AMDAD estimated the following reserves:

Table 2.2

Mount Weld Reserve Summary - 8% TLnO Cut Off

Unit	Category	Tonnage Mt	Grade TLnO%	Contained TLnO Kt
CZ	Proved	0.831	16.7	139
	Probable	1.249	14.6	182
	Total	**2.080**	**15.5**	**321**

Note - LI included in waste totals 0.7Mt Measured and Indicated at 13.9% TLnO containing 97,000t TLnO; stripping ratio 6.7:1 waste:ore (waste including LI); Lynas quotes 0.880Mt of LI in pit averaging 12.5% TLnO which includes Inferred material

- Overall, the resource and reserve estimation procedures appear appropriate and the work has been competently undertaken by recognised specialists. In the resource estimation process the CZ and LI ores, based on drill hole logging, were not sufficiently continuous to allow wire frame modelling, and kriging was applied to estimate the proportion of each ore type within each block. In the opinion of Lynas' geological staff, continuity is likely to be better in practice than currently indicated. The allocation of CZ and LI proportions into blocks is likely to give a reasonable overall estimate; the detailed distribution will be defined by grade control drilling during mining. However, BDA considers that the mining dilution and recovery factors used in the reserve estimation may be optimistic and that separation of CZ ore from waste and other ore types could result in dilution levels in excess of current estimates.

2.5 Mining

- The proposed mining operations are relatively modest in size, and will be undertaken by contract, using conventional small to medium sized mining equipment in the form of hydraulic excavators and rear-dump trucks.
- Pit designs have been optimised and appropriate allowances have been made for drilling, blasting and ripping according to the drill-hole information. It is noted that Wesfarmers has rights to the phosphate ore (the fresh carbonatite) within MWM's leases, which typically underlies the rare earth deposits. It is unlikely that this will have any material effect on the proposed mining.
- Mining is planned in a series of three major campaigns. Approximately 5.1Mt of ore and waste will be mined in the first year, providing approximately 960,000t of ore or approximately seven years of plant feed. The ore will be stockpiled according to ore type and grade for systematic reclaim through the planned blending programme. Mining on site will then cease for a period of four years, recommencing in the sixth year of the project at similar rates for an additional year of ore and waste mining (5.2Mt of waste and 0.7Mt of ore). The final campaign will be conducted in the ninth year, generating around 3.7Mt of waste and 1.3Mt of ore.
- Mining will be conducted in 2.5m flitches, with close-spaced grade control drilling well ahead of mining. Dilution allowances of 2% and mining losses of 2% have been estimated, both of which BDA considers optimistic. However, Lynas suggests that the contacts with waste are generally planar, visual and predictable from exploration and grade control drilling. Based on this advice, dilution at the relatively low rates predicted and with the small-scale equipment proposed may be achievable but BDA retains some reservations.
- The water table, prior to pumping by Placer Dome, was at around 14m; the current water table in the CLD area is at around 65m. While some dewatering of the pit is likely to be required this should be readily manageable.

2.6 Processing

- Site processing at Mt Weld is relatively limited, comprising only crushing and stockpiling. Run of Mine ("ROM") material will be stockpiled at the mine site according to grade and lithology. Front end loaders will feed the ore to a transportable crushing plant comprising a simple bin, feeder and jaw crusher. Material will be crushed to approximately 100% passing 120mm. It is estimated that the ore grade over the first eleven years will range from approximately 17-20% REO with a ROM moisture content of about 12.5%.

- The proposed flotation plant and downstream processing plant are located in the QIP (Qilu Industrial Park) in the Linzi district of Zibo City, Shandong Province, China. The reasons for locating the processing plants in China relate to both costs and the provision of technology.
- The flotation plant will comprise a simple secondary crushing and single stage grinding plant followed by a froth flotation concentrator utilising both conventional and specific proprietary flotation reagents. Flotation will comprise an initial rougher stage and five cleaning stages. The final concentrate will be thickened and the solids filtered and the filter cake product delivered to the downstream processing plant. The concentrator will initially treat approximately 120,000tpa of Mt Weld ore containing about 17% REO and is projected to achieve 63% REO recovery into a concentrate grading 40% REO, generating approximately 32,000tpa of concentrate for downstream processing. A progressive de-bottlenecking and expansion is planned to increase throughput to 174,000tpa by Year 5 and to 220,000tpa by Year 9.
- The flotation tailings will comprise approximately 88,000tpa (in the initial stages) of an iron oxide material ("IOM") which it is proposed will be dried and packaged for sale as a cement, plastic or rubber filler.
- The downstream extraction stage comprises roasting with sulphuric acid, water leaching and solvent extraction to extract the various REO products from the flotation concentrate for sale. REO intermediate products are precipitated from concentrated solutions in a form that is acceptable to consumers who will recover the individual RE elements in their own plants.
- The downstream plant will treat approximately 32,000tpa of REO concentrates at a moisture content of about 13% grading 40% REO and containing about 12,000t of REOs. The downstream recovery through all production steps is 87% to a planned output of 10,500tpa of REO. The planned product suite comprises:
  - a high purity cerium chloride or nitrate with about 45% REO content
  - a light RE LPN (lanthanum, praseodymium and neodymium) chloride with about 45% REO content
  - a medium RE SEG (samarium, europium and gadolinium) concentrate containing about 98% REO content
  - a heavy RE ("HRE") concentrate with about 98% REO content.
- While the flowsheet for the downstream processing is relatively complex, with many steps and circulating loads, nevertheless it is considered conventional and mature in the Chinese industry. The flowsheet is based on bench scale testwork conducted in 2001/02 by the Chinese company, Gansu Rare Earths Group with some larger scale confirmatory tests in 2002 to 2004 conducted by the Australian group, ANSTO.
- A puggy solids/acid mixture of flotation concentrate with sulphuric acid is roasted in a rotary kiln at about 400-600°C which gives greater than 95% decomposition of the REOs. Temperature and roasting time are critical in ensuring proper decomposition of the REOs to soluble sulphates as well as rendering many of the impurities insoluble. The roasted product is discharged to a bank of agitated reactor tanks where it is leached in water and the pulp is screened and filtered to recover the leachate (a RE sulphate solution) and to remove and wash the solids. The leachate discharges to a series of neutralisation tanks where magnesia (MgO) powder is used for pH control. The neutralised slurry is filtered in filter presses and the solids recycled for releach. The liquor is sent to the solvent extraction ("SX") plant and the residual high phosphate solids, approximately 27,000tpa, are trucked to a nearby (10km) tailings storage facility ("TSF") and placed into lined ponds and covered with soil.
- The RE aqueous sulphate solution from the leach is neutralised and fed to the first SX extraction circuit using an organic compound and kerosene as an inert organic carrier. The organic adsorbs the HREs and medium or SEG REs. The loaded organic is washed using a weak acid solution. The SEGs and HREs are removed or stripped from the organic using concentrated HCl in a number of stages. Once stripped the organic is recirculated to the extraction circuit.
- The SEG and HRE liquors are treated together or separately using oxalic acid or ammonium carbonate ($(NH_4)_2CO_3$) to precipitate the metals. The metal concentrate is centrifuged and then dried and calcined to remove ammonia and the products packaged for market. The concentrate grades greater than 98% REO and annual production is projected at about 460t.
- The aqueous liquor raffinate after SX extraction contains the light REs such as lanthanum, cerium, praseodymium and neodymium ("LCPN"). To produce a separate cerium product the liquor is oxidised and extracted in a second SX circuit to selectively remove the Ce(IV). In the organic phase it is reduced to Ce(III) and stripped from the organic using HCl to produce a cerium chloride. If the market demands cerium nitrate, a strip with nitric acid is possible. At 95% cerium recovery the planned production capacity based on two production lines is about 10,300tpa of cerium chloride grading 45% REO, giving an REO content of 4,600tpa. The planned capacity of 2,300tpa per line is in excess of the norm of 1,500tpa per line

but this limitation is principally related to the design and construction of the mixer-settlers; Lynas plans to utilise a more robust construction material and design in order to achieve the increased capacity.

- The remaining raffinate contains low cerium LPN REs. This liquor is neutralised using magnesia and then filtered. The filtrate is sent to a third stage of SX to remove the LPNs and convert them to chlorides in the strip circuit with HCl. The LPNs are extracted, washed with weak acid and then stripped with strong HCl. The final precipitates are filtered and heated under vacuum prior to crystallisation and packaging. The product grade is about 45% REOs and production is estimated at about 12,000tpa or 5,400tpa REOs. If necessary the base metals such as iron, lead and zinc can be removed in another SX circuit; this step allows the production of magnet grade LPN.
- The final raffinate solutions after all the REs have been extracted is treated to remove the entrained organics and then neutralised to precipitate any remaining metal compounds. The slurry is filtered and the solids sent to the solids disposal area. The filtrate is neutral and is delivered to a local waste treatment company where it is treated before discharging to an ocean outfall system.
- Overall, BDA considers that the testwork has been appropriate and that the samples tested should provide a reasonable level of representivity. Flotation treatment of the REO material is relatively straightforward though the down stream processes will rely on the success of the flotation. The testwork has been conducted by reputable laboratories in a professional manner. A sufficient number of bench-scale tests and pilot scale tests have been conducted to allow reasonable confidence in the final metallurgical flowsheet and metallurgical performance. Grades and recoveries achieved in testwork vary, but overall the Feasibility Study projections appear reasonable.
- There are aspects of the downstream processing that will require close control. Testwork has indicated that roasting temperature and time controls are critical. A means of treating the crud produced in the SX circuit while minimising metal losses will be a critical component. Ideally, with a plant that incorporates complex processes such as roasting, cracking, solvent extraction and product precipitation, design would be based on some pilot scale testwork. However, the technologies, roasting, leaching and SX, follow conventional practice in China and has similarities with the processes used by Mountain Pass in the USA. There is a high level of Chinese expertise in the RE extraction processes. Lynas has been assisted by Chinese engineering personnel who have had considerable industrial experience in design, construction and operation of all aspects of the proposed operation. Lynas advises that it has further strengthened this group in April 2006 with the recruitment of an additional three experienced rare earths operations engineers for the design phase.

2.7 Transportation and Infrastructure

- Overall infrastructure requirements are modest and generally well catered for by existing facilities. Existing infrastructure in Western Australia provides a good basis for the Australian section of project. The road, rail and ship-loading facilities proposed to be used are currently being used by other resource projects and adequate spare capacity is available for the project. No significant infrastructure is required at the Mt Weld mine site as all mining and primary crushing will be on a contract basis and power and water supplies will be provided by the mining contractor; workforce accommodation is available in Laverton or at a nearby operating gold project. Some upgrading of site roads will be required to facilitate the use of road-train type ore haulage trucks.
- The road from Laverton to the Leonora rail siding is sealed. It may be necessary to upgrade a loop road to the north of the town to minimise the movement of road trains through the town itself. The loading and trucking operation will be contracted. Approximately three to four road trains per day will be required from Mt Weld to Leonora. Rail loading facilities are available at Leonora and Lynas intends to use the same facilities as are currently employed for the loading of nickel concentrates at Leonora.
- There is an existing rail link from Leonora to the port of Esperance which is currently used for the transport of bulk materials. Lynas has been in discussions with the port authorities at Esperance. The Esperance port has appropriate storage and ship-loading facilities and a number of bulk commodities are currently exported through Esperance. Given the current expansions underway in a number of mineral operations Esperance Port Authority is considering further development of its storage and port facilities.
- Ore will be transported by ship to the Shandong port of Qingdao or possibly Longkou. Lynas has been conceptually planning on 3-4 shipments of 30-40,000t per shipment. Given the demands on storage facilities at the port of Esperance more frequent shipments of smaller loads may be required. Good port facilities are available at Qingdao for handling the Lynas ore. The ore will be transported by truck to the Linzi QIP plant near Zibo City. The roads are generally sealed and sufficiently wide to handle large vehicles.

- Existing infrastructure in China provides a good basis for the Chinese section of the project. Port and road infrastructure is high quality with more than adequate spare capacity for the project. Power, water and other utilities, reagents and supplies are readily available at the QIP.
- Electricity will be purchased from a local supplier via a 10 kilovolt ("kV") supply line. Process water will comprise raw water obtained from a borefield about 5km from the plant mixed with recycled process water and fed to the process plant after treatment in a reverse osmosis ("RO") plant. Heating will be provided by purchase of steam from a neighbouring power station or acid plant. Steam will also be required for the process.
- The extraction plant involves a relatively complex metallurgical operation with significant reagent requirements. Most of the reagents will be imported from various Chinese vendors. Sulphuric acid is a major consumable and some consideration has been given to the manufacture of the acid within the operation. However, the consumption of acid approximates 50,000tpa which in BDA's view is insufficient to justify erection of even a small acid plant. It is likely that sulphuric acid will be purchased from local suppliers. Overall, the reagents contribute about 105,000tpa of the material transported to the plants, with sulphuric acid and hydrochloric acid constituting the bulk of the requirement.

2.8 Environment, Regulatory Compliance and Occupational Health and Safety ("OH&S")

- The Mt Weld Project was formally assessed in 1992 and environmental approval was granted by the WA Minister for the Environment and Heritage in November 1992. The project concept subsequently altered and further approvals and extensions were granted. In late 2003, Lynas applied for a three-year extension to the Environmental Approval, and this was subsequently approved in January 2004. In December 2004, Lynas applied for approval of changes which included deferment of construction of a plant at Mt Weld and inclusion of transport of RE ore through the Port of Esperance. Approval for this change was granted in February 2005. At the present time, Lynas retains the necessary environmental approval for development of the Project as currently proposed. Once the form and schedule for the project has been finalised and a decision made to commence development, a statutory Notice of Intent ("NOI") and Works Approval application will need to be submitted to the WA Department of Environment and the Department of Resources and Industry for approval prior to the commencement of site works. BDA can see no reason why these remaining regulatory approvals will not be obtained in a timely and satisfactory manner.
- Lynas is developing an Environmental Management System and an OH&S Management System for both the West Australian and Chinese operations which Lynas advises will conform with appropriate International Standards and the Equator Principles.
- Based on the proposed pollution control and mitigative measures, the environmental risks associated with operating the Mt Weld mine and the QIP RE processing plant appear to be acceptable, provided that all proposed environmental and OH&S management strategies are applied diligently and commitments implemented.
- From the development consent information provided by Lynas, BDA considers that all the necessary development consent and licensing requirements under Western Australian and Chinese regulatory processes including the Zibo City Environment Protection Bureau ("EPB") regulations have been identified and either have been or are being obtained in a diligent manner. The proposed schedule for obtaining the various permits and approvals is appropriate.
- For the QIP development, approvals are required only at the municipal level, the nature and cost of the development precluding the need for provincial level approval. EPB compliance approval is required of the Environment Protection Plan at the plant commissioning stage. Until this compliance certificate is granted, there remains a risk that the production might be restricted until any EPB identified shortcomings and/or deficiencies are rectified.

2.9 Production Plan

- The production plan for the Mt Weld mining operation consists of three separate mining campaigns, with long term ore stockpiles built up according to grade and ore type, and progressively reclaimed and blended according to requirements for regular trucking and rail shipments. Approximately 5.1Mt of ore and waste will be mined in the first year, providing approximately 960,000t of ore or approximately seven years of plant feed. Mining on site will cease for a period of four years, recommencing in Year 6 of the project for an additional year of ore and waste mining (5.2Mt of waste and 0.7Mt of ore). The final campaign will be conducted in Year 9, generating around 3.7Mt of waste and 1.3Mt of ore.

- This is an unusual but practical approach, given the small mining volumes, the remoteness of the area and the ongoing cost of maintaining and appropriately servicing a workforce for long-term small-scale operations. In BDA's opinion the approach should work reasonably well, provided there is no ore quality or metallurgical deterioration when subjected to up to five years exposure.
- The Feasibility Study presents a production plan which covers 18 years of operation. The initial production rate of 10.500tpa of RE products in Year 2 increases to 15,000tpa by Year 5 based on a 'de-bottlenecking' exercise. The production plan shown in Table 2.3 incorporates a one year ramp-up for ore treated and a two year ramp-up period for metal production. Ore treatment rate increases from around 120,000tpa initially to 220,000tpa by Year 9 in order to maintain a constant REO production rate with lower grade material being processed.

Table 2.3

Mt Weld Rare Earth Project Production Plan

Activity	Units	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9
Mining										
Waste	Mt	4.2					5.2			3.7
HG Ore	Mt	0.6					0.4			0.3
LG Ore	Mt	0.4					0.3			1.0
Total Ore	Mt	1.0					0.7			1.3
HG Grade	%REO	19.3					19.0			18.0
LG Grade	%REO	12.6					12.3			11.4
Total Grade	%REO	16.6					15.8			12.8
HG Metal	t	101,000					69,400			48,600
LG Metal	t	47,900					42,000			117,600
Total Metal	t	158,900					111,400			166,200
Processing										
CZ Ore	t	90,000	121,000	121,400	132,900	153,700	174,000	173,000	187,800	220,300
Conc. @ 40%	t	23,600	32,400	35,900	41,900	44,900	44,900	44,900	44,900	44,900
REO Prod'n	t	7,900	10,500	12,000	14,000	15,000	15,000	15,000	15,000	15,000
Iron Tails	t	66,400	90,800	85,500	91,000	108,800	129,100	128,100	142,900	175,400

Note: processing schedule for Years 10-18 based on similar schedule to Year 9

- The proposed production schedule appears generally reasonable. The actual mining schedule may differ from that proposed but the mining component is relatively straightforward. Ore grade will be a critical component of the REO production schedule. The schedule incorporates a ramp-up component but given the complexity of the processing stages the ramp-up rate may prove optimistic. Expansion of the front end of the processing plant (the concentrator) will be required to increase throughout from 120,000tpa to 220,000tpa.

2.10 Capital Costs

- The current capital cost estimate for the project totals A$16.3M for the Australian facilities and 229.7M RMB for the Chinese facilities for a total of US$41.4M at current exchange rates, or US$47.5M including a 15% contingency allowance. The estimate is categorised by Lynas as a Feasibility Study estimate with an accuracy of ±10-15%. The estimate is to a large extent based on 2004 and 2005 construction costs. The contingency allowance includes a nominal 5% allowance for escalation in Chinese costs as advised by the Chinese Design Institutes who prepared the original estimates. In BDA's view there could also be increases in EPCM and Owner's costs and an allowance should be made for a spares inventory. Using indicative factors BDA suggests it would be prudent to allow a further US$2.5M for additional EPCM and Owner's costs and for a spares inventory which would increase the total capital to around US$50M at a suggested accuracy of ±15-20%. The Lynas Capital Cost estimate is summarised in Table 2.4.

Table 2.4

Mt Weld Rare Earth Project Capital Cost Summary

Cost Centre	Cost A$M	Cost RMB M	Total Cost US$M
Australian Costs			
Mine Development	14.4		
Site Processing and Infrastructure	0.9		
Site Rehabilitation Bond	1.0		
Australian Total	**16.3**		**11.9**
Chinese Costs			
Concentrator and Infrastructure		59.4	
Cracking Plant and Infrastructure		137.0	
Owner's Costs and EPCM		33.3	
Chinese Total		**229.7**	**29.5**
Contingency			
Australian Contingency - 15%	2.4		1.8
Chinese Contingency - 15%		34.5	4.3
Total Project Cost	**18.7**	**264.2**	**47.5**
Deferred Capital			17.2

Note - exchange rate US$1.00 = RMB7.79;A$1.00 = US$0.73; Deferred Capital comprises two further mining campaigns and a RMB20M de-bottlenecking allowance in Year 3

- Capital costs for the Australian facilities are minimal, as all operations will be by contract. It is not intended to buy any mine-specific equipment or infrastructure, as all requirements will be provided by the contractor. However, Lynas has included the mining contractor costs in the capital estimate. The initial pre-strip and first mining campaign costs are included in the Initial Capital, with the second and third mining campaigns included in Deferred Capital. The Australian infrastructure and mining contractor costs use a proposal from the independent mining contractor BGC Limited ("BGC").
- The Flotation Plant (Concentrator) capital costs have been estimated by a Class A Chinese Design Institute, the Metallurgical Design Institute of Shandong ("MDIS"), and the Downstream Cracking and Extraction Plant capital costs have been estimated by the Chinese engineering company, Baiyan Zhengang Engineering and Consulting Company ("BZECC").

2.11 Operating Cost

- Due to the campaign approach to mining and the inclusion of mining costs in the capital estimate, the average annual operating cost is a little misleading. The mining costs equate to A$12.70/t (US$8.80/t) of ore mined over the life of the operation. In addition to the contract mining cost, Mt Weld operational costs include crushing, site operations, transportation costs (trucking, rail and port charges), and royalties. These have been calculated for Year 2 (Table 2.5) and average A$84/t (US$60/t) of ore mined; of these costs about 70% relate to transport.
- The process operating costs in China were estimated by BZECC with a quoted accuracy of ±10% and were updated in November 2005 as shown in Table 2.5. The Year 2 costs have been calculated based on treating 121,000t of ore grading 17% REO producing 32,400t of concentrate at about 40% REO. Costs for treatment in the flotation plant and in the downstream plant and including the shipping costs total approximately US$200/t of ore. Including the Australian costs the unit costs total US$260/t of ore treated or approximately US$3,000/t of REO produced, based on the production of 10,500tpa REO.
- Reagent and consumables account for approximately 40% of the costs, transport accounts for 27% of costs, and energy and water represent 14% of costs. Labour and maintenance comprise 5% and 3% of the total costs respectively. These percentages do not take into consideration the mining contractor costs, which are treated as capital costs. If included in operating costs, mining would represent around 3-4% of total costs.
- The projected operating costs appear generally reasonable. Maintenance costs appear low. The total cost to produce the RE products is US$260/t mined or around US$32Mpa (RMB252Mpa). Variable costs for the combined operations represent about 82% of the total; even for such an intensive process-related project this split is high.

Table 2.5

Mt Weld Rare Earth Project Operating Cost Estimate at 10,500tpa REO (Year 2)

Cost Centre	TPA	A$M	A$/t	RMBM	RMB/t	US$M	US$/t
Production Parameters							
Ore Treated/Shipped	*121,000*						
REO Concentrate Produced	*32,400*						
REO Produced	*10,500*						
Australian Costs							
Total Australian Cost		10.190		59.210		7.440	
Unit Cost /t Ore Treated	*121,000*		84.20		490		60
Shipping and Transport to Plant							
Sea Freight and China Transport				24.250		3.050	
Unit Cost /t Ore Treated	*121,000*				200		25
China Processing Costs							
Concentrator, Cracking, Separation				168.250		21.137	
Unit Cost/t Ore Treated	*121,000*				1,390		175
Total Cost				**251.710**		**31.627**	
Total Cost/t Ore Treated	*121,000*				**2,080**		**260**
Total Cost/t REO Produced	*10,500*				**23,972**		**3,012**

Note - exchange rate US$1.00 = RMB7.96;A$1.00 = US$0.73; based on ore throughput of 121,000tpa and concentrate production of 32,400tpa; Australian costs include crushing, road and rail ore transport to port, port charges and royalties, but not mining costs which are included in capital; China Processing Costs include cost of production of HRE, SEG, LPN and Ce Chloride (25%) and Ce Nitrate (75%)

2.12 Project Implementation/Ramp Up

- Lynas proposes a design and construction time of 20 months from the commencement of basic engineering of the cracking and separation plant, which BDA considers generally achievable. The implementation plan prepared by Lynas to support this schedule is considered reasonable, subject to Lynas engaging and maintaining a suitably experienced and expert project Owner's Team.

2.13 Marketing

- BDA has not undertaken a marketing study as this work is being carried out by others. The current price and demand for REOs remains strong. BCC Research has completed an independent rare earths market report.
- Lynas has signed a Heads of Agreements with Rhodia Electronic and Catalaysis ("Rhodia"), a major French chemical company. Lynas will supply REOs from its Zibo City Processing Plant to Rhodia's La Rochelle plant. Rhodia also intends to invest in further downstream REO processing in China and Lynas will provide support to this growth.
- Lynas will have access to Rhodia's Liyang Separation Plant in China to undertake further down-stream processing of its REOs, once Rhodia has completed quality acceptance tests on the Lynas products. The Liyang Plant currently supplies an international customer base. Liyang provides Lynas with downstream processing capacity sufficient for Lynas' initial phase of operations. This complements the Zibo City plant, and puts in place a downstream processing capability to complete the integrated supply chain from run of mine ore through to separated REO output which can be marketed under Lynas' Rare Earths Direct RED® brand trademark.
- Lynas advises that sales under this Heads of Agreement will form approximately 40% by value of Lynas' planned 10,500t annual REO production.

3.0 RISK SUMMARY

3.1 Overview

Mining and exploration companies have a relatively high risk profile compared with many industrial and commercial operations. Each orebody is unique. The nature of an orebody, the occurrence and grade of the ore, and its behaviour during mining and processing can never be wholly predicted. Estimates of the tonnes, grade and overall metal content of a deposit are not precise calculations but are based on interpretation and on samples from drilling which, even at close drill hole spacing, remain a very small sample of the whole orebody. There is always a potential error in the projection of drill hole or sample data when estimating the tonnes and grade of the surrounding rock. Ground and hydrology conditions and open pit wall instability can impact on mine productivity and the availability of reserves. The plant design and process projections depend on the representivity of the testwork samples and the scale up of the testwork results.

Estimations of project capital and operating costs are rarely more accurate than ±10%. For projects in the early planning stages, estimation accuracy will be no better than ±15-25%. Mining project revenues are subject to variations in metal prices and exchange rates, though some of this uncertainty can be removed with hedging programmes and long-term contracts. Environmental and social issues can impact on productivity and costs.

In reviewing the Mt Weld project, BDA has considered areas where there is perceived technical risk to the operation, particularly where the risk component could materially impact the projected cashflows. The assessment is necessarily subjective and qualitative. Risk has been classified from low through to high.

3.2 Risk Profile

A summary of the principal risk components of the Mt Weld project is given in Table 3.2.

Table 3.2

Mt Weld Risk Components

Risk Component	Comments
Resources/Reserves *Low/Medium Risk*	The geology and mineralisation controls are reasonably well defined and well understood. Data collection relies on a number of different campaigns under different organisations, but there has been continuity of geological supervision. The database has been independently reviewed and verified. Recognised independent specialist groups have undertaken the resource and reserve estimations; the work appears to have been professionally undertaken and in accordance with industry standards. Achieving the reserve tonnes and grade will be dependent on ability to segregate in-pit the ore and waste and the different ore types; there is some question over the continuity of the separate ore zones. More detailed grade control drilling may resolve this issue but until that is demonstrated BDA considers that the reserve grade risk should be categorised as medium. In BDA's opinion dilution levels are likely to be underestimated and the mining recovery may be optimistic. However, overall, the estimates appear to be a reasonable and appropriate basis for development planning.
Open Pit Mining *Low Risk*	Mining is straightforward and conventional although the projected levels of dilution may be optimistic; the tonnages of ore and waste to be moved are modest and well within the capacity of smaller contractors. The concept of campaign mining is logical given the low tonnages to be shipped and treated each year. The pit depth is relatively shallow and wall stability should not be a major issue. Dewatering has depressed the water table below the levels of initial mining but ongoing dewatering could be necessary for the later mining campaigns.
Flotation Processing *Low Risk*	The flotation of a concentrate is an appropriate process route in preparing a concentrate for downstream extraction of the REOs. The flotation plant has been designed on the basis of pilot plant studies. Downstream processing can be affected by flotation concentrate grades but the cracking process is relatively robust and can handle a range of grades. Grade and recovery will be optimised based on downstream costs. Recoveries are based on treating CZ material which reports the best flotation metallurgy. If the ore is a mixture of CZ and LI during mining, then this may reduce the projected concentrate grades and possibly recoveries. The plan is to ship only CZ material but there will be some mixing. Testwork has indicated that a mix of up to 30% LI material may not be significantly deleterious.

Risk Component	Comments
Downstream Processing *Medium Risk*	Downstream processing of the concentrate uses roasting and acid/water leaching. The downstream processing steps have been designed based on bench tests only. While BDA would normally consider that such an important section of the plant should also be pilot tested it is accepted that such an option may not be practicable. The process flowsheet follows conventional Chinese practice. The proposed Ce(IV) extraction technology is the same as used by major Chinese processors; it is sensitive to the price of the oxidizing agent. Other technologies for the oxidation and selective extraction of cerium are available including electrolytic oxidation. Based on the volume of the mixer - settlers, the normal scale of production is limited to 1,500tpa of cerium oxide per line. Lynas propose to install two trains, but with a capacity of 2,300tpa each. There is some risk that these throughputs will not be achieved, but Lynas and its consultants are confident that with more robust materials and design the necessary capacity can be incorporated in the two production lines. In BDA's view ramp-up will take longer than projected given the complex combination of SX and other processes.
Infrastructure *Low Risk*	Some road upgrading will be required in the vicinity of Mt Weld and possibly around Leonora. Other infrastructure requirements in Australia are largely in place. A number of expansion projects are under consideration at the port of Esperance and it will be important for Lynas to confirm its requirements with the Port Authority as soon as possible. Port and road facilities in Shandong province are appropriate to the project requirements. Electrical energy will be purchased from third parties as will steam, heat, and water. The reagent supply will be through contracts with vendors. Water quality for flotation is critical; the process water will be treated by a RO plant, which is a common 'off the shelf' item of process equipment.
Environmental Issues *Low Risk*	WA environmental approval has been granted for the Mt Weld project; a statutory NOI and Works Approval application will need to be submitted for approval prior to the commencement of site works. Initial environmental approval has also been granted for Chinese portion of the project, together with advice concerning the specific national standards that will need to be complied with for the construction and operation of the plant. These standards are being incorporated into the detailed engineering designs currently being developed, which will be submitted to the government for approval prior to construction commencing. A Compliance Audit will be conducted by the Zibo City EPB upon commissioning of the plant, and the subsequent issue of a Compliance Certificate will complete the formal environmental approval process. Neither the ore nor the waste streams are classified as radioactive material according to Chinese, Australian, or international codes.
OH&S *Low Risk*	Lynas proposes to develop and implement an OH&S Management System in line with relevant national and international standards.
Production Plan *Low Risk*	The mine plan is based on campaign mining and development of stockpiles. Provided the ore is appropriately identified and stockpiled this should give significant flexibility and allow blending to optimise the grade and material-type requirements for the process plant. The mining rates should be easily attained. The trucking, railing and shipping requirements are all achievable. The plan and schedule for production of flotation concentrates and the ultimate REO intermediate compounds appear reasonable, although BDA considers the proposed ramp-up to be optimistic and the planned cerium REO output may be limited by the capacity of the planned two trains.

Risk Component	Comments
Capital Costs *Medium Risk*	The estimating methodology used by Lynas and its consultants for direct costs is considered generally reasonable, although based on preliminary engineering. Equipment costs are largely based on budget quotations and civil, structural and building construction costs are based on local standard unit costs. Equipment installation and the cost of piping and electrics are based on experience factors from Chinese design institutes. BDA has identified certain areas, generally in the area of indirect costs, where the estimate appears to be low. Because the feasibility study comprises a number of separate studies undertaken by different specialists without a single engineering group having overall responsibility there is a risk of items which may not fall into a specific discipline being missed and of inconsistent cost parameters being used in different sections of the estimate. The estimate warrants detailed cross checking to identify and include any omitted items. While there are sections of the study where the estimate will be accurate to ±10-15%, overall BDA considers the accuracy of the estimate is ±15-20%. BDA considers there is some risk that once the project enters the detailed engineering phase, there will be increases in the preliminary estimates. BDA recommends provision of an overrun facility of 10% of the construction and commissioning capital cost to cover potential cost overruns and the risk of capital increases from contractor claims, material and labour cost escalation and start-up issues.
Operating Costs *Low/Medium Risk*	Mine costs have been based on appropriate estimates, supported by preliminary quotations from contractors. There may be some exposure to fuel costs and logistics for the contract operations. Energy, water and reagents, especially sulphuric acid and hydrochloric acid, are the major operating cost components. Maintenance costs appear low. BDA considers the order of accuracy of the operating costs estimate to be ±15%.
Project Implementation *Medium Risk*	The plan for implementing the project is described in a preliminary project execution plan. The structure, roles and responsibilities of the Lynas personnel responsible for the project work are still to be clearly defined. While the general plan of letting EPCM contracts for the process plant to suitably qualified and experienced contractors is supported by BDA, such contracts will require to be negotiated, awarded and administered by an Owner's project team with appropriate experience and expertise. Similarly such an Owner's project team will be needed to provide the necessary engineering, procurement and construction management for the remainder of the project facilities. BDA considers the overall implementation plan as currently defined to be medium risk. For similar reasons there is considered a medium risk that the planned project construction schedule of approximately 24 months to the commencement of commissioning could also overrun.
Management *Medium Risk*	Lynas has only a small management team, with several technical and management roles still to be filled. Mt Weld will be the first complex project implemented and operated by Lynas. It is understandable in the current phase that the management team has been kept to a minimum; however, there will need to be a significant expansion of the Owner's team to effectively manage the project development and commissioning. The use of experienced Chinese EPCM contractors will facilitate the process.

Risk Mitigation Factors

There are a number of factors which combine to reduce risks to the project. Principal amongst these are:

- The project geologist who will be managing the mining and grade control operations has been involved with Mt Weld over many years. There is thus a high level of geological knowledge and experience associated with the project.
- The mining requirements are modest and the pit is relatively shallow. Much of the mining will be in relatively soft weathered material.
- Transport of bulk materials by rail from the Leonora rail siding is well established and Lynas will be adopting similar materials-handling procedures to those currently in use.
- The Port of Esperance handles a number of bulk commodities from other mining operations, and has the space and facilities to handle the Mt Weld material. Lynas appears to have good working relationships with the Port Authority and the local council.
- There is significant shipping traffic already between Esperance and various ports in China.

- The ports and transport facilities in China are well able to handle the projects requirements. The industrial park location selected by Lynas appears well suited to the projects requirements and is well served with the necessary infrastructure.
- China has a history of rare earths processing and hence this is an area of relative familiarity to both the government and the mineral processing sector. Lynas has received significant assistance in the flowsheet development and testwork from the Chinese Design Institute and engineering companies engaged on the project.
- The project already has environmental approval from the WA authorities. An Environmental Impact Review ("EIR") has been prepared by the Technical Studies Institute attached to the Zibo City EPB ("Zibo Environmental Protection Institute" or "ZEPI"), ensuring that all the government requirements have been addressed. The EIR has been assessed by an Expert Panel, and the relevant national standards applying to this operation have been identified and incorporated in the detailed engineering design.
- Labour costs are relatively low compared with construction the plant in Australia. Many of the potential workers, operators and engineers will have experience in similar types of industrial plants either in the area or the rare earths sector, resulting in a potential workforce and management team who are experienced and well-acquainted with this type of operation.

4.0 SOURCES OF INFORMATION

During April 2006 BDA undertook a site visit to the Mt Weld project in WA, to the rail siding at Leonora and to the Port at Esperance. A BDA team has visited the site of the process plant near Zibo City, has reviewed the infrastructure and support facilities, the port, roads and waste disposal area, and has had discussions with the Chinese Design Institute and engineering company personnel responsible for the process testwork and plant design.

The principal reports and documents reviewed are listed below:

Lynas - Public Information

- Annual Reports 2004 and 2005
- Quarterly Reports for 2005 and 2006
- Stock Exchange and Press Announcements - 2005 and 2006

Mt Weld Project

- Database Review and Resource Estimation Study - Mining and Resource Technology Pty Limited/Golder Associates, November 2001
- Resource Estimation of the Central Lanthanide Deposit at Mt Weld, Western Australia - Hellman and Schofield, July 2002
- Mineral Tenement Information - Lynas Corporation Limited (Files)
- Environmental Impact Review for a 30,000tpa RE Concentrate Smelting, Cracker and Separator Plant, Report MW 04/12 - Zibo Scientific Research Institute Environment Protection, June 2004.
- Land Survey Report, Zibo Cracking Project, Reports MW 04/10 and 05/33 - Zibo Feitian Geologic Investigation Ltd Co, May 2004 and January 2005.
- Supplementary Report - Ce(IV) Extraction from Rare Earth Sulphate Solutions - Lynas Corporation Ltd, January 2005.
- MDIS Engineering Study for the Concentrator for a Generic Site in Shandong Province, PRC, Report MW 04/23 - January 2005
- Metallurgical Summary on Mt Weld Rare Earths - Lynas Corporation Limited, July 2005.
- Mt Weld Project Feasibility Study, Part A-Australian Operations - Lynas Corporation Limited, October 2005
- Mt Weld Project Feasibility Study, Part B - China Operations Project Summary - Lynas Corporation Limited, October 2005
- Zibo Cracking and Separation Plant Feasibility Study Part 1, Chapter 1: Project Summary - Baiyan Zhengang Engineering and Consulting Company (BZECC)
- Lynas Financial Model prepared by Navigator Project Finance
- Cracking/Separation Plant Technical Specification Report MW 06/03 Revision C - Lynas Corporation Ltd, March 2006
- Estimate Spreadsheet : "Aus Ops Mt Weld Capital Costs 240406.xls", 24 April 2006.
- Estimate Spreadsheet : "China Operations Consolidated CAPEX April 2006 Rev 2.xls", 25 April 2006.
- Initial Capital Expenditure (Monthly) Worksheet - Lynas Financial Model, May 2006.

General Data

- Australasian Code for Reporting of Identified Mineral Resources and Ore Reserves - Report of the Joint Committee of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia, December 2004

5.0 MT WELD RARE EARTHS PROJECT BACKGROUND

5.1 Mt Weld Project Background

Mt Weld Project Location

The Lynas Mt Weld Project is located in the North-Eastern Goldfields of Western Australia, approximately 32km southeast of Laverton, and 10km east of the Placer Dome Granny Smith Gold Mine (Figure 1). Access from Laverton is primarily by unsealed road. The area is arid with sparse Acacia trees, shrubs and grasses. Annual rainfall averages 230mm with an annual evaporation rate of 3,070mm. Temperatures range from a winter mean minimum of around 5°C to a summer mean maximum of around 36°C.

Mt Weld Project Tenements

The Mt Weld area is covered by four mining leases (Figure 2). Lynas, through its wholly owned subsidiary Mt Weld Mining Pty Limited, owns M38/58, M38/59, and M38/326. Mining lease M38/327 is owned by Wesfarmers CSBP, but MWM has rights to the non-phosphate ores; Wesfarmers in turn has rights to the phosphate ore (the fresh carbonatite) within MWM's leases. The bulk of the current open pit RE reserve within the Central Lanthanide deposit lies within M38/326.

Mt Weld Exploration History

The Mt Weld carbonatite intrusive was discovered by follow-up investigation of a circular magnetic anomaly defined by an airborne survey conducted by the Bureau of Mineral Resources in 1966. Various parties have owned, or held interests in the deposit since 1969, including Utah Development Company, Union Oil Development Corporation, Wesfarmers, Carr-Boyd, Ashton, Anaconda Nickel Limited and Lynas. The deposit has been largely defined by diamond drilling and reverse circulation drilling. Initial drilling suffered from a high water table and high water flows which impacted on sample recovery and reliability, but in 1991 Placer Dome developed a borefield in the area to provide water for the nearby Granny Smith operation, lowering the water table and significantly reducing water flows. Total drilling since 1969 comprises 1,442 holes, of which 708 holes and approximately 41,900m are relevant to the RE mineralisation. However, only approximately 200 of the more recent holes are used in the resource estimation of the CLD.

Project Overview

The Mt Weld project is based on a concentration of rare earth elements (the fifteen lanthanides plus yttrium) within the residual weathered horizon overlying the circular Mt Weld carbonatite intrusive (Figure 2). The project plan comprises open pit campaign mining and stockpiling of RE ores within the CLD at Mt Weld, truck and rail transport of the ore to Esperance, initially at around 120,000tpa, and loading and shipping the ore to China for concentration and secondary processing treatment. An overall mine life of eighteen years has been planned.

The CLD has an average overburden thickness of 25-30m comprising clay lake sediments and alluvial sands and gravels; the ore zone has an average thickness of 35m with a maximum of around 60m. The maximum pit depth is approximately 90m. Shipments in Years 1-11 are planned to average approximately 17-20% REO; from Years 12-18 the grade ranges from approximately 13-15% REO.

The ore will be shipped to the Chinese port of Qingdao in Shandong Province and trucked to the processing plant site within the Qilu Industrial Park, 20km from Zibo City (Figure 1). The QIP is located in the eastern part of Xindian in the Linzi district of Zibo City and is 210km from Qingdao Port. Zibo City is located in the central part of Shandong Province. Jinan, the capital of Shandong province lies approximately 100km to the west and Beijing is located 350km to the northwest and is connected by modern four-lane highways. The reasons for locating the concentrator in China are related to both costs and the provision of technology. The QIP accommodates a number of foreign-owned enterprises and is one of the four main petrochemical bases in China. Chemicals and petrochemicals, plastics, building materials, papermaking, textiles and machinery are the dominant industries sited in the Industrial Park.

The Lynas RE project is located on two separate sites. The flotation plant and down-stream processing plants will be constructed within the QIP; the waste solids disposal site lies about 1.5km northwest of the village of Fengjia in the Linzi district, which is about 10km by road from the plant site.

Initially around 120,000tpa of ore is planned to be processed, producing approximately 32,000tpa of concentrate and 10,500tpa of final REO product. By Year 5 production is scheduled to have ramped up to the treatment of 150,000tpa of ore, producing 45,000tpa of concentrate and 15,000tpa of REO product. Output is scheduled to remain at this level, though ore tonnage treated gradually increases to compensate for progressively reducing grades.

5.2 Rare Earths Background

Discovery, Abundance, Occurrence

The term 'Rare Earths' was introduced by the Swedish chemist Johan Gadolin in 1794, and refers to a group of elements with similar chemical properties. The current scientific term for this group of 15 chemical elements, with atomic numbers ranging from 57-71, is 'lanthanides', deriving from the inner transition element Lanthanum of Group III of the Periodic Table. These elements are more common than the name implies and have marked chemical similarity. Separation of the lanthanides was a difficult task to the 19th century chemists, and therefore these elements were among the last to be detected and identified during the period from 1890 to 1940. Yttrium is included with the RE elements because it occurs in conjunction with them due to its similar chemical properties.

All the RE elements except Prometium (Pm, atomic number 61) occur in nature. Their natural abundance in the earth's crust is similar to many better known and widely used metal elements, like copper, nickel, cobalt, and lead. The RE elements and Yttrium are listed in Table 5.1.

Table 5.1

Rare Earth Elements and Yttrium

Element	Atomic Number	Symbol	Atomic Weight	Natural Abundance (ppm)
Yttrium	39	Y	88.91	28.0
Lanthanum	57	La	138.91	18.0
Cerium	58	Ce	140.12	46.0
Praseodymium	59	Pr	140.91	5.5
Neodymium	60	Nd	144.24	24.0
Promethium	61	Pm	146.00	-
Samarium	62	Sm	150.43	6.5
Europium	63	Eu	152.00	0.5
Gadolinium	64	Gd	157.25	0.9
Terbium	65	Tb	158.93	5.0
Dysprosium	66	Dy	162.46	1.2
Holmium	67	Ho	164.93	4.0
Erbium	68	Er	167.26	0.4
Thulium	69	Tm	169.93	2.7
Ytterbium	70	Yb	173.04	0.8
Lutetium	71	Lu	174.97	10.0

The first five lanthanide elements, from Lanthanum to Neodymium are referred to as the 'light' RE elements, Samarium to Gadolinium are referred to as the 'mid' RE elements, while the remaining elements, Terbium to Lutetium and Yttrium comprise the Yttrium subgroup or 'heavy' RE elements.

RE elements are widely distributed in low concentration throughout the earth's crust. More than 70 minerals contain REs in concentration of over 10% REO. However, about 95% of the RE elements occur in three principal minerals, bastnasite, monazite and xenotime; these minerals are the principal source for RE production and separation.

The mineral bastnasite is a fluoro-carbonate, containing predominantly light REs and very low levels of thorium. The mineral occurs in carbonatites and a large deposit was discovered in 1949 at Mountain Pass, California. The Mountain Pass ore contains about 60% carbonates, mainly calcite, 20% barite, 10% RE fluoro-carbonates and 10% of other minerals including silica. Bastnasite ore was regularly mined at Mountain Pass until 2002 and RE concentrates are currently marketed from stocks.

The world's largest deposit of REs is found at Bayan Obo in Inner Mongolia, China, where bastnasite and monazite occur as associated minerals in iron ore. Bastnasite and monazite account for approximately 70% and 30% respectively of the RE fraction of the ore. The deposit contains an estimated 17.5Mt of REO, which amounts to more than 30% of the total world Proved RE reserves, however the overall process recovery is low at 10%.[1]

[1] BCC Research, May 2006

Monazite is a phosphate mineral mainly of the cerium group elements, lanthanum to neodymium and thorium. The mineral is found in many geological environments. Primary monazite deposits have been commercially exploited in only a few places, with operations in South Africa, Colorado, USA and China as part of the Bayan Obo RE deposit. The most important sources of monazite are beach placers and sand deposits, which contain, in addition to monazite, other heavy minerals such as ilmenite, rutile and zircon. Heavy mineral sand deposits are found in large quantities in Australia, Brazil, India, China, Malaysia, South Africa and the USA, however due the relatively high amount of thorium associated with the beach sand monazite these deposits are not commercially viable sources of REs.

While higher concentrations of the lighter REs occur in monazite and bastnasite, xenotime is an important source of heavy REs and yttrium. Xenotime, like monazite, is a RE-thorium orthophosphate, containing up to 63% Y_2O_3/REO. The mineral occurs in a few placer deposits in Malaysia, Indonesia and in Thailand as well as in heavy mineral sands of Australia and China. Xenotime production comprises less than 1% of the total RE production which is dominated by monazite and bastnasite. In southern China, ion absorption clays are mined for their RE content. The clays are formed as a result of intense weathering of phosphoric minerals such as apatite and xenotime. The ore is characterised by a low cerium content of 0.3-5.5% and high concentrations of samarium, europium and yttrium.

The Mount Weld deposit represents a supergene concentration of RE elements within a weathered ferruginous and phosphatic carbonatite regolith. The principal primary minerals from which the RE concentrations have been derived are monazite and apatite. However Mount Weld has lower thorium content than both the beach sand monazites and the Bayan Obo deposit.

Rare Earths Uses and Application

Rare earths have unique properties that make them indispensable for many technological applications. A range of unique chemical, catalytic, electrical, magnetic, metallurgical, and optical properties enable them to play a major role in the advancement of materials technology.

Rare earths already play a critical role in the electronics, automotive, environmental protection and petrochemical sectors. As these industries grow and as research around the world continues to develop applications for rare earths, the demand for these materials is expected to grow.

The overall demand for rare earths is a combination of the demand for each of the elements, which is driven by the demand for the applications that use the different rare earth elements. Some elements are used in a variety of applications; however, some elements have only one major application and as such a change in demand for this application can have a profound affect on overall demand for that element. In practice there is limited ability to use them interchangeably within applications.

The key applications and their associated rare earths elements are shown in Table 5.2. For each application the estimated 2005 demand and the products that are driving growth for each sector are listed.

Table 5.2

Summary of Key Rare Earth Applications, Demand, and Growth Drivers

RE Application	RE Elements	2005 RE Demand	Growth Drivers
Magnets	**Nd**, Pr, Dy, Tb, Sm	17,170t	Hybrid vehicle electric motors, electronic power steering, small electric motors, air conditioners, generators, hard disk drives
NiMH Batteries	**La**, Ce, Pr, Nd	7,200t	Hybrid vehicle batteries, rechargeable batteries
Auto Catalysis	**Ce**, La, Nd	5,830t	Gasoline and hybrids, diesel fuel additive, tightening of automotive emission standards globally
Fluid Cracking Catalysis	**La**, Ce, Pr, Nd	15,400t	Oil production, increased use for sour oils
Phosphors	**Eu, Y, Tb**, La, Dy, Ce, Pr, Gd	4,007t	LCD TVs and monitors, plasma TVs and displays, energy efficient compact fluorescent lights
Polishing Powders	**Ce, La, Pr**, mixed	15,150t	LCD TVs and monitors, plasma TVs and displays, silicon wafers and chips
Glass additives	**Ce, La**, Nd, Er, Gd, Yb	13,590t	Optical glass for digital cameras, fibre optics
Other applications	**Ce, La, Nd, Pr, Y** and others	16,935t	Metallurgy, water treatment, advanced ceramics, light flints, lasers, fertilizers, pharmaceuticals

*Note: **bold** denotes the main rare earth element(s) for each specific application*

Rare Earth Commodities and High Purity Oxides - Prices

The current export prices of mixed RE compounds and separated high purity REs in oxide form of Chinese origin are summarised in Table 5.3

Table 5.3

Rare Earth Commodity Prices 2005-2006 FOB China

Name	Specification	Unit	Avg March 2005	Avg March 2006	% Change
La Oxide	99% min	US$/Mt	1,400	2,150	53.6
Ce Oxide	99% min	US$/Mt	1,200	1,600	33.3
Nd Oxide	99% min	US$/Mt	5,900	10,350	75.4
Pr Oxide	99% min	US$/Mt	7,550	10,300	36.4
Sm Oxide	99% min	US$/Mt	2,600	2,500	-3.8
Dy Oxide	99% min	US$/kg	35	64	82.9
Eu Oxide	99% min	US$/kg	290	250	-13.8
Tb Oxide	99% min	US$/kg	300	410	36.7
Mischmetal	25% La	US$/kg	2.35	4.8	104.3
Mischmetal	48% Ce	US$/kg	2.25	2.65	17.8

Source: BCC Research Report, May 2006

6.0 GEOLOGY AND MINERALISATION

Geology

The Mt Weld RE deposit is centred on the Mt Weld carbonatite, a 3.5km diameter near-vertical plug of igneous calcitic to dolomitic carbonate, intruded into an Archaean volcano-sedimentary sequence of the Yilgarn Craton (Figure 2). The carbonatite intrusion has been dated at around 2,000M years. The carbonatite is cut by a steeply-dipping NW-SE trending dolerite dyke, approximately 100m wide. The upper portion of the carbonatite has been weathered and lateritised. Within the residual weathered lateritic ferricrete profile rare earth elements have been concentrated to ore grade levels. The weathered profile ranges from 20-60m in thickness. It is suggested the regolith was developed post Permian (220-270My) and pre the deposition of overlying Eocene (40-60My) lacustrine sediments.

The topographic irregularities of the carbonatite intrusion and associated residual profile have been buried by freshwater lacustrine sediments, mostly clays. The lacustrine sediments themselves are buried by a blanket of transported alluvial sand and gravel. A simplified stratigraphic sequence is shown in Table 6.1.

Table 6.1

Mt Weld Stratigraphic Sequence

Unit	Code	Age	Thickness	Comment
Sands and Gravels	A	Recent	18-24m	Transported alluvial sands and gravels overlying lacustrine clays
Lacustrine Sediments	B	Eocene – 40-60My	0-50m	Lacustrine clays unconformably overlying regolith
Mt Weld Regolith	C	Mesozoic/Tertiary - 60-220My	20-60m	Residual weathered horizon post Permian glaciation, lying above a karsitic surface of fresh carbonatite
Dolerite Dyke		Proterozoic/Palaeozoic	100m wide	Vertical dyke cross-cutting the carbonatite
Mt Weld Carbonatite	D	Palaeo-Proterozoic - 2000My	3.5km diameter	Intrusive calcitic and dolomitic carbonate body
Yilgarn Craton		Archaean	Many kilometres	Sedimentary, volcanic and volcanoclastics units, variably regionally metamorphosed, folded, with granitic intrusives

Mineralisation

Rare earths are distributed throughout the regolith, but a zone of high grade REO mineralisation has been identified near the centre of the carbonatite, termed the Central Lanthanide Deposit (Figure 2). The CLD is bounded to the east by the dolerite dyke and by fresh carbonatite to the south; to the west the regolith thins significantly and appears to have been eroded pre-deposition of the lacustrine clays; to the north there is a gradational drop off in lanthanide grade.

The mineralised regolith comprises secondary and supergene mineralisation within amorphous and variably cemented iron oxides and phosphates. Much of the rare earth content exists as phosphatic intergrowths with the iron oxides, and the mineral suite is termed secondary rare earth phosphates. The dominant gangue mineralogy is limonite, comprising goethite, maghaematite and haematite. Iron oxide levels tend to vary inversely with REO content; the REO grade plus the iron oxide content of the ore typically comprise 70% of the sample.

Two major ore types have been designated which together comprise 65% of the deposit:

- CZ - soft phosphatic siltstone regolith; main ore type and basis of Feasibility Study and reserves; fine grained friable low density siltstone
- LI - limonitic carbonatite regolith; poorer concentration and recovery performance than CZ; can be more cemented, nodular or concretionary; not included in Feasibility Study reserves.

The distribution of the various lanthanides is relatively constant, and is comparable to the distribution in primary sources, with little evidence of relative concentration or depletion. The proportion of yttrium which is more distantly related is more variable; one small lens on the eastern side of the deposit has anomalously high ratios of cerium, but these appear isolated exceptions to the otherwise consistent distribution.

Conclusions

The overall geology appears relatively straightforward and the geological controls and mineralisation are relatively well defined.

7.0 GEOLOGICAL DATA

Geological Supervision

Although a number of different organisations have been involved in the exploration and drill definition of the deposit, the bulk of the work has been undertaken under the supervision of a single geologist, R K Duncan, thereby providing continuity and standardisation of processes and procedures. The geological data has been independently reviewed and verified by Mining Resource Technology Pty Limited - Golder Associates in 2000-2001.

Drilling

Resource data is primarily based on drilling campaigns post 1991. Exploration drilling prior to that time was difficult and sampling was commonly unsatisfactory due to sticky clays, unconsolidated ground and high groundwater flows. Rotary air blast ("RAB"), conventional RC and small diameter core drilling had limited success with poor recovery. Large diameter core drilling (PQ) gave acceptable recoveries, but the costs were prohibitive for routine exploration. The aircore reverse circulation system was found to be satisfactory, producing a small diameter core delivered up the central tube of the twin-walled drill rods. However, high groundwater flows remained a problem.

In 1991 Placer Dome installed a borefield to provide water for the nearby Granny Smith gold processing operation. This resulted in a significant lowering of the water table, reduction in groundwater flows and institution of a more satisfactory sampling regime. Only the more recent RC aircore holes (RC419-627) and six diamond drill holes were used for estimation of Measured and Indicated resources and Proved and Probable reserves. Drill spacing over the central portion of the main mineralised zone averages approximately 20m, with more peripheral areas based on 80m spacing.

Survey

The initial drill grid was constructed using tape and compass, but a professional survey grid based on AMG coordinates was installed in 1981. A number of hole collars were re-surveyed in 2000. All other collars are based on conversion of the historical data.

All holes have been drilled vertically. Down hole measurements were made on some of the early core holes, using acid tubes. No down-hole camera or other down-hole survey techniques have been used but given that the holes are relatively shallow, any down-hole deviation is not considered material for resource estimation purposes.

Sampling

As noted above, early sampling of cores and RC samples was unsatisfactory due to poor ground conditions and high water flows. A hydrocyclone sampling plant was developed which could recover 100% of the +30 micron ("µm") material and up to 50% of the -30+10µm material.

The situation improved significantly with the dewatering associated with the Granny Smith borefield. Aircore drilling was found to give the most satisfactory samples for routine exploration and infill drilling. Using 1,000 litre bulker bags on a steel frame, the whole of the sample slurry could be collected from each interval and after draining and drying over a few days the sample was sufficiently dry to allow sub-sampling for analysis. Using a hand auger, a 10kg sample was taken which was then repeatedly split through a riffle splitter to obtain three 2kg samples, of which one was sent for analysis, one was used for analytical repeats and for process testwork, and one was retained in storage. Limited testing of field duplicates was undertaken.

Samples were submitted to Genalysis Laboratories in Perth ("Genalysis") where they were dried, pulverised and split to a 150gm pulp.

Assaying

All routine analyses were carried out by Genalysis in Perth. A 0.2 gram sample from the 150 gram pulp was analysed using the Inductively Coupled Plasma - Mass Spectrometer (ICP-MS) method for the fourteen lanthanides (La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Tb, Lu) plus yttrium, thorium and uranium and ICP-OES (Optical Emission Spectrometer) for major elements (aluminium, silica, phosphate, manganese, iron and calcium). Results are reported for individual lanthanides but are also summarised as TLn (arithmetic total abundance of all lanthanides in a sample) or TLnO (arithmetic total abundance of all lanthanide oxides). Rare earth oxides (REO) refers to the sum of the lanthanide oxides (TLnO) plus yttrium oxide.

Check Assaying

Standards made up from the Mt Weld material were routinely submitted to monitor assay quality. In addition 100 sample pulps were submitted to UltraTrace Pty Limited ("UltraTrace") for independent check assaying using both ICP-MS and OES using standard and fusion preparation. The pulps were then renumbered and resubmitted for analysis by XRF.

Precision of assaying between Genalysis and UltraTrace was generally good for the rare earths and most of the contaminants, and moderate for Al_2O_3 and MnO. The Genalysis rare earth results were generally around 2% lower than the UltraTrace results, although elsewhere in the various reports up to a 12% differential is reported. Given that there is no clear indication as to which laboratory is the more accurate, the Genalysis results have been used without any factoring or adjustment, but with the possibility, based on the UltraTrace data, that the values could be slightly conservative.

Density Measurements

Density determinations were carried out by Coffey Partners International ("Coffey") in 1986 on six PQ and HQ diamond drill holes; 145 wet density determinations are available but moisture contents are available for only 71 samples. Average dry density for the main mineralised CZ unit is estimated at 1.6. MRT-Golder assessed that the density could be overestimated by around 5%. Block tonnages are based on the proportion of each lithology in a block multiplied by the applicable density.

Data Base

MRT-Golder carried out an extensive validation exercise on the Mt Weld data base. The data was generally found to be in good order and any errors identified were corrected. For resource estimation purposes the data base has been split into Code 1 samples from holes drilled post-1991 dewatering (200 holes including 194 air core RC holes and 6 diamond core holes) and Code 3 samples from 142 pre-1991 RC drill holes, where loss of fines may have resulted from high water flows. Comparison of pairs of samples within 12m of each other indicates that the older samples on average have been subject to a 6% upgrade; as a result Code 3 drill hole samples have only been used in the estimation of Inferred resources.

Conclusion

Although initial drilling and sampling was subject to some uncertainties due to the high water flows, later work post the 1991 dewatering appears satisfactory. The geological data collection appears to be generally comprehensive and to have been professionally undertaken. The continuity of geological supervision is a significant benefit. The database has been thoroughly reviewed by MRT-Golder. Density data appears somewhat limited and MRT-Golder considered that the density could be slightly overestimated; overall however the data is considered to provide a satisfactory base for the estimation of resources and reserves.

8.0 RESOURCES AND RESERVES

Standards and Definitions

The Mt Weld resources and reserves have been reviewed in accordance with the Australasian Joint Ore Reserve Committee ("JORC") Code requirements. The JORC Code differentiates between resources, which are effectively an inventory of mineralisation, and reserves, which represent that part of the resource which is planned to be mined, including mining dilution and mining losses, and for which the necessary mine planning and design work has been carried out.

A mineral resource is defined in the JORC Code as an identified in-situ mineral occurrence from which valuable or useful minerals may be recovered. Resources are classified as Measured, Indicated or Inferred according to the degree of confidence in the estimate. A Measured Resource is one which has been intersected and tested by drill holes or other sampling procedures at locations which are close enough to confirm continuity and where geoscientific data are reliably known. An Indicated Resource is one which has been sampled by drill holes or other sampling procedures at locations too widely spaced to ensure continuity, but close enough to give a reasonable indication of continuity and where geoscientific data are known with a reasonable level of reliability. An Inferred Resource is one where geoscientific evidence from drill holes or other sampling procedures is such that continuity cannot be predicted with confidence and where geoscientific data may not be known with a reasonable level of reliability.

An ore reserve is defined in the JORC Code as that part of a Measured or Indicated Resource which could be mined and from which valuable or useful minerals could be recovered economically under conditions reasonably assumed at the time of reporting. Reserve figures incorporate mining dilution and allow for mining losses, and are based on an appropriate level of mine planning, mine design and scheduling. Proved and Probable Reserves are based on Measured and Indicated Resources respectively. Under the JORC Code, Inferred Resources are deemed to be too poorly delineated to be transferred into a reserve category. In this report, reserves are quoted as a component part of the resource, rather than the resource being additional to the reserve.

Resources

Resource estimates are based on the drilling, sampling and assay data described above. MRT-Golder undertook a resource estimate in 2001, but the estimate was based on a relatively low cut off grade and a conditional simulation method. The Feasibility Study resource is based on an estimation undertaken by Hellman and Schofield using Ordinary Kriging ("OK"). H&S did not undertake a separate data review and validation, accepting the data base review undertaken by MRT-Golder. Geological modelling was carried out in conjunction with the project geologist, R K Duncan. Drill holes were plotted on east-west sections and major units interpreted, digitised and wire-framed. Nine principal geologic units were modelled, with the carbonatite regolith, the main ore zone, modelled as one unit, combining the CZ and LI lithologies. The wireframe geological model was intersected with a 10 x 10 x 3m block model and rock-type proportions allocated to each block. For resource and reserve estimation it was important to quantify the proportion of mineralisation occurring within each material type. The proportion of LI and CZ within each carbonatite regolith block was estimated by indicator kriging.

The geological database used for grade estimation of Measured and Indicated blocks comprised 194 air core RC holes and 6 diamond drill holes. An additional 142 holes drilled prior to the 1991 dewatering, where loss of fines due to high water flows was considered a possibility, were used only for estimation of Inferred blocks. The average drill hole spacing within the Measured and Indicated resource areas is approximately 20m; outside this area hole spacing averages approximately 80m.

Grade estimation is based on 3m down-hole composites, with any missing data set to a zero value. Variography was undertaken to define appropriate search dimensions and orientations. The mineralisation trends have relatively shallow dips with a slight elongation towards the northwest. Major oxide and contaminant grades were estimated for all blocks in the geological model using Ordinary Kriging. Measured resource blocks were based on a 30m search radii, using only post 1991 data. Indicated blocks were estimated on the same database, but with a 45m search. Estimation of Inferred blocks incorporated a 60m search and also allowed the use of pre-1991 data.

Based on an 8%TLnO cut off, H&S estimated the following resources:

Table 8.1

Mt Weld Resource Summary - 8% TLnO Cut Off

Unit	Category	Tonnage Mt	Grade TLnO%	Contained TLnO kt
CZ	Measured	0.84	17.0	143
	Indicated	1.45	14.4	209
	Meas/Ind	*2.29*	*15.40*	*352*
	Inferred	0.14	12.9	18
	Total	*2.44*	*15.2*	*371*
LI	Measured	0.20	13.9	28
	Indicated	0.69	14.5	100
	Meas/Ind	*0.89*	*14.3*	*128*
	Inferred	0.20	13.0	26
	Total	*1.09*	*14.1*	*153*
Total CZ/LI	Measured	1.04	16.4	171
	Indicated	2.14	14.4	309
	Meas/Ind	3.18	15.1	479
	Inferred	0.34	13.0	44
	Total	*3.53*	*14.9*	*525*
Total All Units	**Total**	**5.39**	**14.5**	**783**

Reserves

The reserve comprises that portion of the Measured and Indicated resource which is planned to be mined and on which appropriate mine planning and design work has been undertaken. The reserve tonnages and grades at Mt Weld are based on the in-pit resource obtained from Whittle 4X open pit optimisation studies after application of appropriate mining costs and pit slope parameters and after allowance for mining dilution and mining recovery factors (2% and 98% respectively). The reserve estimation work was carried out by Australian Mine Design and Development Pty Limited based on the H&S resource block model. AMDAD's optimisation studies indicated that 8% TLnO was the appropriate mining cut off grade.

At this stage of the project planning it is intended to ship and process only the CZ material. Only the CZ material is thus included in the Mt Weld reserves as shown in Table 2.3. The LI material within the open pit will be mined as waste, but will be separately stockpiled and may ultimately be processed subject to further testwork.

Table 8.2

Mt Weld Reserve Summary - 8% TLnO Cut Off

Unit	Category	Tonnage Mt	Grade TLnO%	Contained TLnO Kt
CZ	Proved	0.831	16.7	139
	Probable	1.249	14.6	182
	Total	**2.080**	**15.5**	**321**
LI incl in waste	*Measured*	*0.194*	*13.6*	*26*
	Indicated	*0.505*	*14.1*	*71*
	Total	*0.699*	*13.9*	*97*

Note - stripping ratio 6.7:1 (waste including LI); Lynas quotes 0.880Mt of LI in pit averaging 12.5% TLnO which includes Inferred material

BDA notes that in the resource estimation process the CZ and LI ores, based on drill hole logging, were not sufficiently continuous to allow wire frame modelling, and that kriging was applied to estimate the proportion of each ore type within each block. In the opinion of Lynas' geological staff, continuity is likely to be better in practice than currently indicated. Close-spaced grade control drilling will also assist in appropriate ore type classification and separation during mining. Nevertheless, BDA considers that this represents a grade and dilution risk and that separation of CZ ore from waste and other ore types could result in dilution levels in excess of current estimates. Lynas advises that samples have been classified on the basis of their principal lithology, and that the CZ bulk samples used for testwork would certainly have contained LI material, probably in a proportion similar to that which might be achieved through normal mining dilution. BDA accepts that this may be the case but cannot comment more definitively without a detailed examination of the drill hole samples and ore type distribution.

Conclusions

The resource and reserve estimation procedures appear appropriate and the work has been competently undertaken by recognised specialists. H&S has accepted the database validation work carried out by MRT-Golder. The drill hole logging did not allow wireframing of the CZ and LI units but the allocation of proportions into blocks is likely to give a reasonable overall estimate; the detailed distribution will be defined by grade control drilling during mining. BDA considers that the mining dilution and mining recovery factors used in the reserve estimation may be slightly optimistic.

9.0 MINING

The proposed mining operations are relatively modest in size, with annual ore production targets averaging around 120,000tpa initially, and will comprise conventional small to medium sized mining equipment in the form of hydraulic excavators and rear-dump trucks. Mine planning has been undertaken by AMDAD and schedules have been provided for the full nine-year life of the operation. Mining is planned in a series of three major campaigns, with the objective of providing a high degree of flexibility in blending the different ore types and providing some economies of scale in the use of the mining equipment and workforce. It is assumed that mining will be by contractor and that the employees will be accommodated in the nearby Granny Smith mining camp through an arrangement with Placer Dome.

Under the campaign scheme, approximately 5.2Mt of ore and waste will be mined in the first year (see Table 9.1), thereby providing approximately seven to eight years of plant feed (1Mt), all of which will be stockpiled according to ore type and grade for systematic reclaim through the planned blending programme. Mining on site will then cease for a period of four years, recommencing in the sixth year of the project at similar rates for an additional year of ore and waste mining (5.2Mt of waste and 0.7Mt of ore). The final campaign will be conducted in the ninth year, generating around 3.7Mt of waste and 1.3Mt of ore.

Table 9.1

Mt Weld Rare Earth Project Production Plan

Activity	Units	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9
Mining										
Waste	Mt	4.2					5.2			3.7
HG Ore	Mt	0.6					0.4			0.3
LG Ore	Mt	0.4					0.3			1.0
Total Ore	Mt	1.0					0.7			1.3
HG Grade	%REO	19.3					19.0			18.0
LG Grade	%REO	12.6					12.3			11.4
Total Grade	%REO	16.6					15.8			12.8

Mining will be conducted in 2.5m flitches, with close-spaced grade control drilling well ahead of mining. AMDAD has included dilution allowances of 2% and mining losses of 2%, both of which BDA would normally consider optimistic and would contend that figures of at least 5% for each parameter would be more realistic in practice. However, BDA is advised that the contacts with waste are generally planar, visual and predictable from exploration and grade control drilling and boundaries tend to be mineralogically defined. The bottom of the ore body is defined by an apatite zone, identification of which is assisted by the occurrence at its top boundary of a near horizontal band of black or dark brown manganese oxide staining or concretion. Lynas advises that the sides of the ore body are also well defined, with the exception of the northern boundary where there is a gradational drop-off of lanthanide grade. Based on this advice, dilution at the relatively low rates predicted and with the small-scale equipment proposed may be achievable, but BDA retains some reservations, subject to a more detailed examination of the ore distribution. For financial modelling and as a matter of prudence, BDA considers that mining grades should have a ±5% sensitivity applied.

Pit designs have been optimised using Whittle 4X software and appropriate allowances have been made for drilling, blasting and ripping according to the drill-hole information. It is noted that Wesfarmers has rights to the phosphate ore (the fresh carbonatite) within MWM's leases, which typically underlies the rare earth deposits. It is unlikely that this will have any material effect on the proposed mining.

Conclusions

The planned mining operations are relatively modest and will utilise conventional small to medium sized mining equipment. Mining will be conducted in three separate campaigns; this has the effect of introducing a high "working capital" or "work in advance" component to the site cash costs and involves three separate contractor mobilisations over the life of the mine, but provides the facility to blend the higher-grade ore types, which may be the most critical issue. The alternative would be to use a small fleet, mining steadily over the life of the operation, but this would also involve some significant long-term logistics expenses and higher unit operating costs. Based on Lynas' advice concerning the ore distribution, BDA considers that the mining dilution and mining recovery factors are generally acceptable but may be slightly optimistic.

10.0 PROCESSING

10.1 Overview

Other than crushing the ore at the mine site, all ore processing will take place in China. The proposed plant site for the physical upgrading and chemical treatment of the RE ore is located in the Linzi district of Zibo City, Shandong Province, China (Figure 1). Zibo City is located in the central part of Shandong Province about 210km from the eastern seaboard port of Qingdao, and 220km from the port of Longkou to the northeast. Jinan, the capital of Shandong province is located approximately 100km to the west and Beijing is located 350km to the northwest and is connected by a modern four lane highway.

Initially it was proposed to build the flotation concentrator at the mine site at Mt Weld, and truck and ship the concentrate. However, for cost and technology reasons it has been decided to locate the RE concentrator in China, adjacent to the downstream processing plant (the Cracking and Separation Plant).

An initial process design for a concentrator at Mt Weld, prepared by Lycopodium Pty Limited ("Lycopodium"), has been used as the basis for a detailed engineering study performed by the Metallurgical Design Institute of Shandong (MDIS) and completed in January 2005 (*MDIS Engineering Study for the Concentrator for a Generic Site in Shandong Province, PRC - 25 January 2005, Report No MW 04/23).* This study includes estimates of operating costs.

Detailed design work and engineering of the chemical processing of the RE concentrate in the downstream Cracking and Processing plant has been carried out by BZECC (*Feasibility Study on Cracking and Separation, June 2004*).

Market demand for high purity Cerium products and discussions with Rhodia, a major French chemical company with RE plants in China and France, has resulted in the addition of Ce(IV) extraction into the flowsheet for production of Cerium chloride or nitrate of 99.9% purity. It is planned to include two extraction lines, each with 2,300tpa capacity of Cerium oxide. The proposed flowsheet and capital and operating costs are given in a supplementary report (*Ce(IV) Extraction from Rare Earths Sulphate Solution - Jane Han and Mike Vaisey, January 2005*).

10.2 Mine Site Processing and Transportation

It is planned to mine the ore at Mt Weld in campaigns and transport the ore from the mine site to a processing plant in Zibo City in the Shandong Province of the Peoples Republic of China (Figure 1).

Site processing is relatively limited, comprising only crushing and stockpiling. Run of Mine material will be stockpiled at the mine site according to grade and lithology. Front end loaders will feed the ore to a transportable crushing plant. The crushing plant will comprise a simple bin, feeder and jaw crusher. Material will be crushed to approximately 100% passing 50mm. It is estimated that the ore grade for the first eleven years will range from approximately 17-20% REO with a ROM moisture content of about 12.5%.

Ore will be trucked in 8t kibbles to the rail siding at Leonora, where the kibbles will be transferred to rail cars and railed to the Western Australian port city of Esperance (Figure 1). At Esperance the ore will be transferred to ships for sea freight in approximately 30,000t lots to the port of Qingdao or Longkou in Shandong Province, in China.

10.3 Process Testwork

Flotation Testwork

The flotation process that was developed for the Mt Weld material evolved over a number of years with test programmes conducted by a number of laboratories for a number of project proponents. Essentially, there have been three distinct flowsheets investigated since the first work was conducted in 1989:

- *CSIRO flowsheet* - not particularly tolerant to fines but relatively simple to operate with lower operating costs when compared with the Lakefield flowsheet
- *Lakefield flowsheet* - more tolerant of fines but requires an elaborate combination of steps and reagents contributing to higher capital and operating costs
- *Chinese flowsheet* - developed in China by the Guangzhou Research Institute for Non-Ferrous Metals ("GZRINM") and has been proven to reduce losses from the fines and appears to be reasonably robust; this is the basis of the current project.

The samples used for the various test programmes were composites from drill hole intersections within the Mt Weld deposit. Six different sample composites have been created since 1999. In total these composites weighed approximately 55t and the grades ranged from 14.2% REO to 25.0% REO, averaging 17.0% REO. The minimum sample size was 2.3t and the maximum was 15.3t. Some variability tests were also conducted on some individual samples from the CZ and LI zones and minor lithologies.

Some mineralogy work was conducted on specific samples and size-by-size analyses were conducted. The results indicated that the REO bearing materials are of a secondary nature and the REOs occur as phosphatic intergrowths in hydrated iron oxides. Over 50% of the REOs occur in the -40μm size fraction. Almost all of the REO losses occur in the -9μm size fraction.

The Mt Weld materials are relatively soft and incompetent as regards grinding parameters. The Bond Rod Mill Index was 13.9 kilowatt hours per tonne ("kWh/t") while the ball mill index was 12kWh/t.

Some preliminary tests were conducted looking at the possibility of using Wet High Intensity Magnetic Separation ("WHIMS") techniques, but with little success in affecting a separation between the REOs and the iron oxides. Roasting the samples before WHIMS testing improved results but the outcomes were still inferior to those achievable using flotation techniques.

GZRINM showed that a cleaner concentrate could be produced grading approximately 41% REO at an average recovery of 67%. With these encouraging results further work was undertaken; the best rougher recovery was 88.8% with a rougher concentrate grade of 24.4% REO. This rougher concentrate was upgraded with five stages of cleaning to 41% REO and a recovery of 67.9%. The best collector was determined to be a proprietary product labelled DQ2 which is assumed to be a fatty acid based reagent.

Water quality is known to be very critical when using REO flotation techniques. BDA is aware that fatty acid flotation of Michigan iron ores and bastnasite (fluorocarbonate RE mineral rich in cerium) found water treatment could result in an increase in recovery of up to 20% for equal or better grade. It was determined that the Linzi area water was not optimum for REO flotation and the use of treated water allowed about 16% higher recovery at the 40% REO grade. The preferred method of water treatment appears to be reverse osmosis ("RO"); water softening techniques had no material impact.

To provide some confirmation of the flotation test results it was decided to have the Australian company, Optimet, conduct a number of tests using the GZRINM approach, with GZRINM observing. Optimet experienced higher DQ2 consumption than reported by GZRINM, but otherwise results were comparable; the best result was a final concentrate of 38.7% REO and a recovery of 69.5%. Optimet's parent, AMMTEC, conducted a pilot plant test in 2003 with an average concentrate grade of 39.8% REO at 62.5% recovery to concentrate. Some important parameters determined from this work included:

- sequence and point of reagent addition was critical
- cleaning circuits had to be in closed circuit to maintain recovery
- High Intensity Conditioning techniques at the feed end of the circuit with the DQ reagents produce superior grades and recoveries along with lower DQ consumption.

A number of other tests were conducted to optimise the operating parameters. Scrubbing was trialled as a pre-concentration step and alternative to grinding, but with no success. A number of investigations were carried out looking at the pulp viscosity or rheology characteristics to provide information for pumping and mixing. As a result it was decided to design the grinding circuit such that grinding would be at 50% solids. Some laboratory scale thickening tests were conducted to determine the thickener design. Similarly, a number of investigations looked at filtration of the thickened pulps and determined that a plate and frame filter press was the optimum filtration unit.

Cracking and Extraction Testwork

Laboratory testwork for the sulphuric acid cracking of the Mt Weld RE concentrate was conducted by Gansu Rare Earths in 2002. This primary work demonstrated that the process was well suited to the Mt Weld material. Ms. Han Jiang or Jane Han, a process engineer for Lynas, was the lead engineer during these Gansu tests, while she was employed by that company. In addition a retired senior rare earths process engineer has acted as a consultant to Lynas during the development and engineering of the downstream process flowsheet.

Further laboratory testwork and some larger scale confirmatory tests in 2002-2004 were conducted at the laboratory of Australian Nuclear Science and Technology Organisation ("ANSTO"), Lucas Heights NSW, to optimise the process conditions and produce samples of RE carbonate. Ultimately, it was determined that RE chlorides were the preferred end product. The following reports summarise the major aspects of the testwork:

- *MW 02/26 (ANSTO C744)* - Acid Route for Rare Earths Recovery - Bench Scale Testwork
- *MW 03/54 (ANSTO C746)* - Acid Route for Rare Earths Recovery - Rare Earths Carbonate Bulk Sample Preparation and Radioactivity Deportment
- *MW 04/20 (ANSTO)* - Acid Route for Rare Earths Recovery - Effect of Seeding, Ageing, and Shear on the Precipitation of Rare Earths Carbonate

10.4 Flotation Concentrator

The initial processing step in China is based on the treatment of 121,000tpa of Mt Weld ore in a flotation concentrator. Based on ore delivered from Mt. Weld with about 17% rare earth oxides, the flotation plant is expected to achieve 63% REO recovery into a concentrate grading 40% REO. Based on this scenario, approximately 32,000tpa of concentrate will be produced for downstream processing. The flotation tailings will comprise approximately 88,000tpa of an iron oxide material (IOM) which it is proposed will be thickened prior to filtration, and then dried, milled, classified and packaged for sale. In the first instance it is to be sold to the nearby cement industry. Later it is planned to upgrade the material to meet specifications as a filler for the plastic and rubber industry.

The Linzi flotation concentrator will comprise a simple secondary crushing and single stage grinding plant followed by froth flotation utilising conventional and specific flotation reagents. The ore is classified as a low competency carbonate material. It has been determined that the ore has to be ground to 80% passing ("P_{80}") 38μm to allow efficient REO recovery into a reasonable concentrate grade. Flotation reagents are added along with significant heating to allow collection of the REO minerals into a froth flotation concentrate. One of the main processing advantages proposed by Lynas for the Chinese plant is the use of a proprietary flotation reagent which is essentially a fatty acid.

The flotation steps incorporate an initial rougher stage where the majority of the REOs are collected to a low grade concentrate. The rougher concentrate will be further floated or cleaned in five stages to provide the final 40% REO concentrate. The final concentrate will be thickened in a standard solids/liquid separation step utilising a thickener. The solids will be filtered and the filter cake product delivered to the downstream leaching and recovery steps.

As noted, Lynas' earlier concept was to build the concentrator at the mine site in Western Australia. It is now considered that integrating the RE concentrator and the downstream plant on one site will provide cost and operational benefits:

- integrated production from ore to final product under the same management will provide improved quality and environmental control
- no drying step for the RE concentrate is necessary, giving simplified concentrate handling within the plant
- the IOM in the concentrate tailings can be used in the nearby cement industry
- a single site will allow a centralised production and technical team, and common personnel for management, administration, maintenance, safety and environment
- common infrastructure can be shared such as laboratory, store, vehicles, maintenance equipment, power supply, RO plant and waste water treatment and common storage for reagents and consumables
- operating cost benefits will result from the lower Chinese costs for electricity, steam, reagents and water.

Process Design Criteria

Based on the Lycopodium process design for the concentrator, in November 2004 the Metallurgical Design Institute of Shandong (MDIS) was engaged to convert the process design to a plant design suitable for construction in China and to estimate the capital and operating costs.

The process design criteria are based on the pilot testwork completed by Ammtec and Optimet under the guidance of Lynas personnel. The mass balance for the determination of recirculating loads, the reagent additions and the scale-up factors were taken from Trial 11 of the pilot plant campaign. These assumptions were believed to provide a conservative assessment of the process. Aggregate performance for processes like concentrate thickening and filtration are based on testwork completed by vendors on samples generated from the pilot campaign. The key process design criteria are summarised in Table 10.1.

Table 10.1

Process Design Criteria for Concentrator Plant at Linzi

Parameter	Value	Units	Source
Throughput	121,036	t/a	Lynas
Ore Grade	17.0	% REO	Lynas
Operating Hours	8,000	h/a	Lycopodium/Lynas
Comminution			
ROM Top Size	100	mm	Lynas
Crushing Circuit Type	single stage	-	by design
Grinding Circuit Feed	15.1	Dry t/h	Calculation
Hydrocyclone Product, P_{80}	38	microns	Testwork
Flotation			
Rougher/Scavenger Stages	4	-	Testwork
Scale-up from Lab Residence Time	2.5	-	Lycopodium
Cleaner Stages	5	-	Testwork
Air Hold-Up	20	%	Lycopodium
Concentrate Product	4.1	dry t/h	Testwork
IOM	11	Dry t/h	Testwork
Concentrate Handling			
Thickener Specific Throughput	0.1	$t/m^2.h$	Testwork
Filter Specific Throughput	23.6	$kg/m^2.h$	Vendor
Filter Cake Moisture	<20	%	Testwork

10.5 Downstream Processing - Cracking and Extraction

The next step following the flotation recovery of RE concentrates is to extract the RE elements for sale. The extraction steps incorporate roasting with sulphuric acid, water leaching to separate the RE compounds from the insoluble impurities and solvent extraction processes to recover the various RE products in groups such as light, medium and heavy RE compounds or individual RE elements of high purity.

The plan is to treat about 30,000tpa of REO concentrates grading 40% REO and containing about 12,000t of REOs. The rate of recovery in downstream processing is 87% based on laboratory testwork. The planned product suite is as follows:

- cerium chloride or nitrate - production approximately 10,300tpa grading 45% REO
- LPN (lanthanum, praseodymium and neodymium) RE chloride - production approximately 12,000tpa grading about 45% REO
- SEG (samarium, europium and gadolinium) concentrate and heavy RE concentrate (HRE) - production approximately 460tpa containing about 98% REO.

Treatment Methods

The method used to decompose the RE concentrate is selected on the basis of the required product suite, the mineral type, grade and other features of the concentrate. The decomposition method also has to comply with regulations for the protection of the environment, including treatment of waste water, waste gas and waste solids. The objective is high recovery of REs and a process with optimal efficiency and cost structure.

Generally, the decomposition method for RE concentrates falls into one of three categories:

- the acid decomposition method
- the alkali decomposition method
- the chlorination process.

The acid decomposition methods involve the decomposition of the RE compounds by sulphuric acid, or hydrochloric acid or hydrofluoric acid. The sulphuric acid decomposition method is applicable to the phosphate (eg. monazite and phosphocerite) and fluoro-carbonate minerals (bastnaesite). The hydrochloric acid decomposition method is limited in application and only suitable for treating silicate minerals (eg. allanite and gadolinite). The hydrofluoric acid decomposition method is applicable to the decomposition of the niobate-tantalite minerals (eg. brown ytterbium niobium concentrate and samarskite).

The acid decomposition method has a strong capacity to decompose the minerals, is suitable for low concentrate grade and large grain size, and generally has a broad application range; the disadvantages are the severe corrosion characteristics and the generation of relatively large amounts of waste in solid, liquid and gaseous form.

The alkali decomposition method primarily involves sodium hydroxide decomposition and sodium carbonate calcination. The method is applicable to the treatment of RE phosphate minerals and fluoro carbonate minerals. Individual RE ores that are hard to decompose can be treated by the sodium hydroxide fusion method. The method is relatively simple and has wide application, but requires a high concentrate grade and relatively fine grain size; it may generate a large amount of waste water.

The chlorination process can directly decompose the RE concentrate into anhydrous RE chlorides, suitable for fusion electrolysis and preparation of RE metals.

Selection of the Cracking and Extraction Processes for the Lynas Project

For the Lynas project the concentrated sulphuric acid roasting process in combination with solvent extraction for the separation of RE elements has been selected. The principal reason was the broad acceptance of this process in China and the economy of the process. The process was found advantageous due to the adaptability to different grades of RE concentrate, the relatively low consumption of chemical raw materials, the high recovery of REs, the product quality requirements, and the costs for the treatment of waste water, waste gas and waste solids.

The basic steps for the selected process comprise:

- sulphuric acid cracking of the RE concentrate
- water leaching of soluble RE sulphates
- purification of the RE sulphate solution to remove iron, phosphorus and other impurities
- extraction of middle fraction and heavy fraction of the REs as SEG and HRE
- extraction of cerium for high purity cerium compounds
- extraction of light REs in chloride form as LPN.

The concentrated sulphuric acid decomposition method is applicable to the concentrate type, REO grade, low thorium content and low fluorine content of the Mt Weld deposit; the Mt Weld RE concentrate contains very little fluorine, which is favourable to the recovery of dilute sulphuric acid from the waste gas.

10.6 Roasting and Leaching Process

The roasting plant consists of the RE concentrate storeroom, mixing room, roasting kiln, and the waste gas and water circulation system. The main plant parameters are as follows:

- wet concentrate consumption - 108t/d
- concentrated sulphuric acid consumption - 141t/d.

RE concentrate is mixed with concentrated sulphuric acid and the reaction initiates in the rotary kiln at about 400-600°C. A good decomposition ratio will be obtained through the control of the mixing ratio of sulphuric acid and concentrate and roasting temperature:

- *Consumption of concentrated sulphuric acid* - the sulphuric acid is not only consumed in the decomposition of the RE minerals, but also in the decomposition of gangue. The consumption of sulphuric acid reduces with increased RE grade of the concentrate. Acid consumption in the treatment of the concentrate with a grade of 40% is more than double the theoretical amount, to make the reaction complete. The sulphuric acid may also be decomposed and lost at the reaction temperature.

- *Roasting temperature* - the roasting temperature needs to be controlled within an appropriate range to intensify the reaction between sulphuric acid and RE minerals, to convert the REs into soluble sulphates and to ensure impurities such as thorium, phosphorus, iron and calcium form pyrophosphates and insoluble sulphates and remain in the leach residue. If the roasting temperature is too low, the reaction speed will be slow, the decomposition will be incomplete and the thorium will be more soluble during leaching. If the roasting temperature is too high, the RE sulphates may be decomposed into the insoluble $RE_2O_3 \cdot SO_3$ or RE oxide, lowering the recovery rate of REs during leaching, together with volatilisation of sulphuric acid and decomposition loss.

- *Roasting time* - the degree of decomposition of the minerals is determined in accordance with the roasting time. Too short a time may result in incomplete decomposition and high acidity after leaching. Too long a time not only promotes the decomposition of RE sulphates, but also increases acid consumption and decreases of REO output.

The roasted solid decomposition product is discharged into an acid-proof agitated tank and leached with water. The solubility of RE sulphates decreases as the temperature rises, so the leachate is cold water or recycled liquid.

Water consumption in the leaching process is controlled according to REO concentration in the leachate. If the water consumption is too low and the concentration of the leached liquid of REs is too high, the entrained loss of REs in the filtration residue will increase, which is detrimental to RE recovery.

The solution is leached and agitated, and then allowed to stand; the solution is filtered after the slurry has settled. The existence of silicic acid and extremely fine calcium sulphate results in relatively difficult filtration and washing. As a general rule, it is necessary to promote the coagulation of the colloidal solids and to increase the filtration rate.

The filtered RE sulphate solution contains REs, iron, calcium, silicon, aluminium, magnesium, manganese, titanium and a small amount of phosphorus and thorium. If Fe/P<3 in solution, an appropriate amount of $FeCl_3$ is added to activate the following reaction, which can further reduce phosphorus content:

$$FeCl_3+H_3PO_4 \rightarrow FePO_4+3HCl$$

The solution is neutralised by adding MgO or CaO to reduce the pH to around 4.0-4.5 and after filtration is sent to the next process for extraction of the rare earths.

10.7 Extraction Process

Following the sulphuric acid treatment of the mixed RE concentrate, organic solvent extraction is used to extract the REs from the sulphate solution. There are several extraction agents which can be used to extract REs from sulphate solution including acidic organophosphates and amine-type extracting agents.

The proposed process employs the extractant 2-ethyl hexyl phosphoric acid (D2EHPA or P204) based on operating cost considerations and the fact that it is an established process. The basic extraction process steps are as follows:

- extraction of middle and heavy REs - SEG and HRE
- extraction of high purity cerium
- extraction of light REs - LPN RE

Extraction of Middle and Heavy REs - Neodymium/Samarium Group Separation

The first of the three extraction circuits separates the light REs in the water leach liquid, La, Ce, Pr, and Nd from the middle fraction Sm, Eu, and Gd and the heavy REs. The circuit extracts the middle and heavy REs to produce SEG chloride (Sm, Eu, Gd), HRE chloride (Y, Tb, Dy) and a raffinate termed LCPN sulphate, containing La, Ce, Pr and Nd.

The neutralised and filtered feed solution contains RE sulphate. An organic solvent and kerosene is employed for SEG and HRE extraction, followed by scrubbing, and then stripping the middle SEG fraction and the HRE fraction with HCl.

The heavy rare earth liquid from the extraction circuit flows into a storage tank. If the content of iron is low, the liquid can be pumped directly to the medium and heavy RE treatment process in the finishing chloride plant. If the content of iron is high, the liquid is delivered to a circuit to extract the iron. Precipitation of the SEG and HRE can be performed using oxalic acid or ammonium bicarbonate. The precipitates are calcined to produce concentrates in oxide form containing REO greater than 98%. The annual production of SEG and HRE concentrates is estimated at 460t REO.

Extraction of Cerium (IV) from RE Sulphate Solution

In early 2005 Lynas decided to include the extraction of cerium from the light RE sulphate solution in the Linzi cracking and separating plant. It is considered that separating the cerium from La, Pr and Nd will enable an expansion of capacity and deliver high valued end products to the RE markets.

It is proposed that the cerium will be oxidized to Cerium (IV) with potassium permanganate and extracted from the RE sulphate solution with D2EHPA, and then re-extracted to produce a high purity cerium chloride or nitrate solution. The cerium chloride or nitrate solution can be transferred to other processors, or can be treated for the chemical precipitation of cerium hydroxide or carbonate.

The process technology is the same as employed by other processors in China for the extraction of Ce from sulphate solution. The largest plant operating with this process has a capacity of 1,400tpa CeO_2. Advantages of the Ce(IV) extraction technology include:

- lower overall operating costs for the separation of the REs to individual elements, which is primarily a function of reagent consumption
- low volume of wastewater and no ammonia consumed in the Ce(IV) extraction process.

The capital cost of the Ce(IV) extraction unit is higher than for the more conventional Ce(III) extraction with P507 (organophosphate-type extractant), due to the lower concentration of the RE sulphate solution, which necessitates larger equipment. Conversely the size of equipment required for the downstream separation of La, Pr, and Nd is smaller due to the absence of Ce, and capital cost is lower.

According to Lynas, compared with the P507-HCl system employed by most Chinese processors for the treatment of mixed RE carbonate, the total RE separation costs of the proposed flowsheet are approximately 10% lower when Ce(IV) extraction is employed in the RE sulphate system. The specific cost of the Ce(IV) extraction model is higher than for the P507-HCl system, however larger savings are achieved in the extraction of the non-Cerium REs primarily due to the easier separations achieved in the absence of Cerium.

Whilst the Ce(IV) extraction technology proposed has been demonstrated at commercial scale, in BDA's view other technologies for the oxidation and selective extraction of cerium are worth consideration. The proposed process is sensitive to the price for $KMnO_4$ and this reagent requires relatively large tankage to provide adequate residence time for the reaction. Alternative processes employing electrolytic oxidation or other chemical oxidants may offer some operating and capital cost benefits, but are considered higher risk by Lynas at this point in time.

The feed to the Ce(IV) extraction circuit is the RE sulphate raffinate. Ce(III) is oxidized to Ce(IV) and is readily extracted and separated from the RE(III) elements and impurities. The Ce(IV) in the organic phase is reduced and is stripped from the organic by acid. The stripping solution can either be hydrochloric acid or nitric acid to produce high purity Cerium chloride or nitrate.

The Ce(III) oxidation step is critical and the reaction is relatively slow, requiring extended mixing times and large mixer capacities.

Extraction La, (Ce), Pr, Nd RE Chloride

The raffinate from the Ce(IV) extraction section contains the low cerium LPN REs. This liquor is neutralised using magnesia and then filtered prior to extracting the remaining light REs and converting them to chlorides.

10.8 Product Finishing

Ce Nitrate and Ce Chloride

Depending on market requirements, the Ce(IV) extraction line can produce strip solutions of cerium chloride or cerium nitrate, and these products can be sold to downstream processors. Alternatively, and with additional processing, cerium oxide, CeO_2 and cerium carbonate, $Ce_2(CO_3)_3$ can be produced. The cerium nitrate can be treated to make cerium hydroxide $Ce(OH)_4$ (low chloride) and cerium ammonium nitrate $Ce(NH_4)_2(NO_3)_6$.

The Ce nitrate or Ce chloride strip solution liquor is separated from the precipitated solids using filter presses; the filter cake is washed and then transported to the waste solid site.

Crystallised Ce nitrate or chloride products are obtained after evaporation of excess water from the solution. Crystallised cerium chloride has a REO content of 45%; the REO content of cerium nitrate exceeds 38%.

The RE industry has typically employed extraction lines with a scale of production capacity of 1,500tpa CeO_2 per line using light fibre reinforced plastic ("FRP") sheeting. This construction method limits the volumetric capacity of the mixer-settlers due to the lack of strength of the light FRP sheeting used in construction of the tank walls and cover and to support the mixer unit. As the tank becomes larger a stronger tank is required. To achieve a capacity of 2,300tpa CeO_2 per line the proposed tank design will use a heavier FRP and a stronger structural design with ribbing to overcome these structural and fabrication constraints. This is important because if the volumetric capacity is too small, the scale will not be economic.

LPN or LCPN RE Chloride

The LPN RE chloride is neutralised and filtered to remove the solids and recover the liquid. The filter cake is transported to the waste solids site.

Crystallised $RECl_3{\cdot}nH_2O$ products are obtained after the RE chloride solution is evaporated, concentrated and cooled. The crystals of RE chlorides form a pink or grey-white solid, of which the REO content exceeds 45%. After cooling with six axial flow fans, the crystallised material is packed for transportation.

Dependent on market demands, both LPN RE chloride and LCPN RE chloride can be produced by the same procedure.

Production Tonnage

The final products and quantities are summarised in Table 10.2.

Table 10.2

Tonnage of End Products from Year 2

	Material (tpa)	REO (tpa)
Cerium(IV)Extraction - Ce Nitrate, Ce Chloride (45% REO)	10,300	4,600
LNP Chloride, LCPN Chloride (45% REO)	12,000	5,400
SEG Oxide, HRE Oxide (98% REO)	470	460
Total		**10,460**

Lynas is targeting 4,600tpa of cerium REO production from two production lines, each with a capacity of 2,300tpa. Based on the typical size and construction of mixer-settlers in the Chinese RE industry, a capacity of 1,500tpa per line is the norm. Lynas proposes to design, engineer and construct more robust units will allow the increased capacity.

10.9 Waste Treatment

Solid Waste and Deportment of Radioactivity

The waste solid following the leach of the roasted concentrate consists primarily of iron phosphates (40% Fe_2O_3, 39% phosphates); the remainder is mostly calcium sulphate with barium sulphate and a small quantity of Al, Mn, SiO_2 and RE and a trace of thorium (ThO_2). The annual amount of waste solid totals 27,300t, comprising the leach waste of 18,500t, calcium sulphate waste of 8,600t and barium sulphate waste solid of 190t. The total α radioactivity of the solid waste is estimated at 5.0×10^4 becquerel per kilogram ("Bq/kg"). Both the concentrate and the solid waste are classified as non-radioactive substances.

The waste solids will be delivered to the waste storage facility located 10km from the plant site and will be stored in a special pond with leak protection, and regularly covered with soil.

Liquid Waste

The volume of raffinate produced in the extraction process is about $70m^3/h$, and contains various process chemicals including H_2SO_4, NH_3, oil, F, $MgSO_4$, Cl, $CaSO_4$, Fe and P, suspended matter and a small amount of oil. After settling, the oil phase is collected and reclaimed. Limestone or magnesia is used to neutralise the remaining waste water, and filtration removes the calcium sulphate waste solid. The resulting waste water with a pH of approximately 7 is sent to Qilu Chemical Industry Waste Treatment Plant for further treatment after which the water quality is suitable for discharge to the ocean outfall system.

Waste Gas Treatment

The exhaust gas from the rotary kiln from the high-temperature roasting contains a large amount of sulphuric acid mist, and is treated for the removal of SO_3 and dust. A sulphuric acid recovery system will be installed to reduce costs and to ensure that the tail gas reaches environmental discharge standards.

The total discharge volume of the tail gas is approximately $12{,}924Nm^3/h$ (normal cubic metres per hour). Unlike most Chinese RE concentrate based on bastnasite, the Mt Weld concentrate contains virtually no fluorine. By using natural gas as the energy source rather than coal the tail gas contains negligible HF and SO_2. The tail gas passes through a water jacketed cooling tower to settle the dust, a dilute sulphuric acid spray to reclaim the SO_3 and a fine mist eliminator to eliminate any sulphuric acid mist. The gas finally passes through a 60m fibreglass reinforced plastic chimney of 1.2m diameter. The temperature of the discharged air is less than 50°C, the dust content is less than <100 milligrams per litre ("mg/L"), the content of sulphuric acid mist is less than or equal to $65mg/Nm^3$ (<0.84kg/h) and the fluorine content is less than 15mg/L.

The reclaimed dilute sulphuric acid is used for re-leaching of solids in the extraction process. The concentration of the reclaimed acid is about 30-35% and the annual reclamation is about 9,000t, accounting for 20% of the total consumption of sulphuric acid.

Conclusions

BDA has not investigated the makeup of the metallurgical samples in detail; nevertheless, given the number and overall mass of the samples, there is every reason to expect that the samples tested should provide a reasonable level of representivity.

Flotation ore treatment of the REO material shipped to China from Mt. Weld appears relatively straightforward but relies on the use of a proprietary fatty acid collector together with conventional reagents. BDA concurs with the proposed flowsheet incorporating relatively fine grinding and flotation techniques to produce an REO concentrate. The testwork has been conducted by reputable laboratories in a professional manner. A sufficient number of bench-scale tests and pilot scale tests have been conducted to allow reasonable confidence in the final metallurgical flowsheet and metallurgical performance. There is a requirement to use RO treated water to optimise flotation performance and this is consistent with experience elsewhere; the use of the reagent DQ2 also appears optimum.

BDA notes that the confirmatory flotation testwork at Optimet did not achieve the projected recoveries at the target 40% REO grades. The GZRINM tests reported recoveries of 69-71% at the target REO grade of 40% while Optimet achieved a best result of 38% REO and recoveries between 66-70%. The Feasibility Study is based on concentrate grades of 40% REO and recovery of 63%; these parameters are similar to the AMMTEC pilot plant results.

Based on a review of the Feasibility Study reports BDA considers that there are no major process-related problems with the proposed downstream processing of the flotation concentrates. Nevertheless, there are *certain aspects of the downstream processing that requires close control. For example, the bench testwork illustrated that roasting temperature and time controls were critical to avoid production of insoluble RE compounds. Similarly, $KMnO_4$ control should be further investigated as $KMnO_4$ does work well but a slight loss of control can render the product off specification. Also, crud formation from aluminium and silica is a common occurrence in SX operations and the means of treating the crud while minimising metal losses is a critical component.*

Acid roasting and water leaching of the Mt Weld flotation concentrate is reasonably straightforward. The technology follows conventional practice in China and is similar to the process used at Mountain Pass in the USA. BDA notes that, ideally, with a plant that incorporates complex processes such as roasting, cracking, solvent extraction and product precipitation, design should be based on some pilot scale testwork. BDA accepts that pilot plant studies for SX are generally impractical and do not provide the more critical information such as the effect of impurities and recycle streams. Precipitation processes are relatively straightforward and design could be based on bench scale tests unless there are some specific product particle size criteria that must be maintained within tight limits. Management of waste solids, liquids and gases appears to follow appropriate standards. These unit processes do not contribute to operational risk providing proper control is exercised.

Lynas has been assisted by Chinese engineering personnel who have had considerable industrial experience in design, construction and operation of all aspects of cracking and SX operations including $KMnO_4$ cerium extraction. Lynas advises that it has further strengthened this group with recruitment of an additional three experienced rare earths operations engineers for the design phase.

Lynas is targeting 4,600tpa of cerium REO production, or 2,300tpa per line. This is in excess of the typical maximum in the Chinese RE industry of 1,500tpa per line. However, Lynas plans to construct more robust reinforced mixer-settler units to provide the increased capacity.

Given the number of unit operations BDA suggests that the initial ramp-up period could take longer than projected to achieve the planned output and quality. For operational flexibility BDA suggests that a generous allowance be made for interstage process storage.

11.0 INFRASTRUCTURE

11.1 Background and Location

The Mt Weld mine site is located in the North-Eastern Goldfields of Western Australia, approximately 32km southeast of Laverton, and 10km east of the Placer Dome Granny Smith gold mine (Figure 1). The ore will be trucked from the mine site to Leonora, approximately 160km. The road from the mine site to Laverton is largely unsealed, but the Laverton to Leonora road is a good quality sealed road. The ore in 8t kibbles will be loaded onto rail cars at Leonora and railed about 550km to the Western Australian port of Esperance.

The ore will be shipped in bulk carriers from Esperance to the port of Qingdao in Shandong province in the Peoples Republic of China (Figure 1). Individual shipments will be up to 30,000t. The ore will be trucked from Qingdao approximately 210km to the northwest to the Lynas RE processing plant located in the Qilu Industry Park in the Linzi district of Zibo City.

The QIP infrastructure is extensive and generally more than adequate to service the process plant which is not a large operation in comparison with other plants within the industrial park. Services, utilities and consumables required for the operation are generally available from local suppliers.

11.2 Mine Site Facilities

No significant infrastructure is required to be provided by Lynas at the mine site. Mining and primary crushing will be on a contract basis and the contractor will provide services for his personnel and equipment, including power, water, fuel and accommodation.

Power will be provided from temporary diesel generators. Water will be sourced from a borefield at the mine site, currently being operated by the nearby Granny Smith Gold Project. Provisional arrangements have also been made for the mining contractor to access accommodation facilities at the Granny Smith Gold Project.

11.3 Australian Road, Rail and Port Facilities

The major off-site infrastructure facilities required in Australia are those necessary to facilitate transport of ore from the mine to Esperance on the south coast of Western Australia and to load the ore onto ships at Esperance for transport to China. These comprise:

- Mt Weld mine site roads and the road from the mine to Laverton (approximately 35km) - the existing roads are unsealed and will be upgraded as part of the mining and trucking contract to facilitate ore haulage by road trains.
- Road from Laverton to Leonora (approximately 120km) - this is a sealed road already used by road trains for haulage of ore, mine supplies and agricultural products; no additional upgrade is required other than the possibility of a diversion around Leonora to keep the ore trucks away from the town centre and residential areas.
- Leonora rail siding and train loading facilities - the rail siding is currently equipped to handle the loading of 8t kibbles with nickel concentrate onto flat-bed rail cars; Lynas intends to utilise the same system which should not require any material upgrading or addition to current facilities.
- Rail line from Leonora to Esperance (approximately 550km) - the rail line is operated by Westrail, a State Government authority, and is currently used to transport both mining products and agricultural produce.
- Esperance Port - the port currently handles the shipment of a number of bulk mineral products and has appropriate unloading, storage and ship loading facilities; no additional facilities are required for the proposed Lynas operation, although with discussions ongoing with one or two other projects considering export of product through Esperance, the Port Authorities are considering construction of some additional bulk storage facilities. The port is well able to handle the size shipments (up to a maximum of 30,000t) being considered, but there may be some benefits in adopting a more frequent shipping schedule of somewhat smaller consignments.

11.4 Chinese Road and Port Facilities

Ore is to be transported by ship from Esperance to the port of Qingdao in the Shandong province of the Peoples Republic of China and trucked from there to the process plant which is located in the Qilu Industry Park in the Linzi district of Zibo City. Zibo City is about 210km from Qingdao.

It is proposed that shipping will be in Handymax-sized ships with a capacity of approximately 30,000t. However, there is a fairly regular traffic of somewhat smaller vessels between Esperance and China and there may be some benefits in shipping somewhat smaller loads when capacity is available. The Port of Qingdao is a large modern all-weather port with world class unloading and transfer facilities operated by a Chinese state-owned enterprise. It has a loading and unloading capacity of more than 100 million tonnes per annum and is well equipped to handle the relatively minor tonnage of ore required to be transported for the Mt Weld Project.

The main road between Qingdao and Zibo City is a high quality restricted access tollway. Roads within the City of Qingdao are high quality urban highways. A local Chinese freight forwarding company will be contracted to arrange for ship unloading and trucking of the ore to the process plant. Trucking will be in 40t standard highway trucks.

Roads within the QIP are generally high quality although, because the process plant site is located on the fringe of the main industrial park, the final kilometre or so of access road within the industrial park road network is currently narrow, unsealed and poorly maintained. It is proposed that the access road will be upgraded in accordance with an agreement with the QIP under which QIP and Lynas will share the costs.

11.4 Process Plant Power, Water, Steam Supply and Communications

The installed power demand for the process plant is approximately 7,240kW with a power consumption of 35.4MkWh. Electricity will be purchased from a local supplier and supplied via a 10kV supply line.

Estimated water use is 134m^3/hr or approximately 1,100,000m^3 per annum. It is planned to obtain raw water from an established bore located at Xinxia about 5km from the plant and to mix this water with water recycled from the concentrator plant. The bore has a maximum capacity of 300m^3/hr. The process requires that the raw water be treated to remove calcium and magnesium. A reverse osmosis treatment plant is to be constructed to remove these elements from the borefield water and the recycled process water. The borefield will also provide water for domestic use.

Heating will be provided by purchase of steam from a neighbouring power station or acid plant. Steam will also be required for the process. Steam consumption will be about 158,000tpa and will be distributed at 400kPa.

Communications will be through a conventional telephone network connected to the local Chinese national telephone system.

11.5 Buildings and Accommodation

Plant site buildings necessary to support the process plant operation are to be constructed at the site. These include office buildings with associated dining, bathroom and toilet facilities, a gatehouse and a central control room. No specific accommodation and transport to the process plant site for the process plant workforce will be provided by Lynas. Adequate worker accommodation and transport is available in Zibo City and nearby centres.

11.6 Waste Facilities

Solid waste from the process plant will be disposed of at a dump site at Fengjia, approximately 10km from the plant site. The dump will require some limited site development works and the construction of an access road to a standard adequate for the proposed dump trucks. Waste water and sewage will be treated in the existing QIP water treatment plant.

11.7 Reagent Supply

The extraction plant involves a relatively complex metallurgical operation with significant reagent requirements. The reagents will be sourced from various Chinese vendors, many of them located in the QIP. Overall, the reagents contribute about 105,000tpa of the material transported to the plants, with sulphuric acid and hydrochloric acid constituting the bulk of the requirement.

Conclusions
Overall infrastructure requirements are relatively modest and generally well catered for by existing facilities. Transport infrastructure in Australia is generally in place and operational and is being used to transport other mine products. The required utility facilities for the process plant are readily available in the QIP. Connection to supply facilities and construction of access roads is not expected to present any significant technical difficulty.

12.0 ENVIRONMENTAL, LICENSING AND APPROVALS ISSUES

12.1 Western Australia

BDA has not undertaken any legal due diligence on ownership, tenement or licensing issues. The following notes are based on information provided by Lynas.

Mining Tenements

The schedule of tenements applying to the Mt Weld Rare Earths Project and adjoining exploration areas are shown in Table 12.1. BDA has not conducted due diligence on these titles, but has been advised by Lynas that the tenements are in good standing.

Table 12.1

Mining Tenements

Licence	Area (ha)	Grant Date	Expiry Date	Holder
M38/58	931.95	16/11/84	25/11/2026	Mt Weld Mining Pty Ltd - Lynas Corporation Ltd
M38/59	861.90	26/11/84	25/11/2026	Mt Weld Mining Pty Ltd - Lynas Corporation Ltd
M38/326	103	27/11/91	26/11/2012	Mt Weld Mining Pty Ltd - Lynas Corporation Ltd
M38/327	103	27/11/91	26/11/2012	Wesfarmers CSBP Ltd - Lynas Corporation Ltd
L38/98	64.50	20/11/03	19/11/2006	Mt Weld Mining Pty Ltd - Lynas Corporation Ltd

Note: ha=hectare

The proposed RE project (Central Lanthanide Deposit) open pit area lies within M38/326 which was granted on 27 November 1991, for an initial term of 21 years. Wesfarmers has contractual rights to the phosphate ores within the lease and within mining leases M38/58 and M38/59, but this material lies below the residual weathered zone which hosts the RE ores and should have no impact on Lynas' planned project development.

Wesfarmers CSBP owns Mining Lease M38/327 which covers the Crown Tantalum-Niobium Deposit; however, MWM has contractual rights to the non-phosphate ores within this lease area.

Development Approval

The Mt Weld RE project was formally assessed in 1992 as a Public Environmental Review ("PER") and environmental approval was granted by the WA Minister for the Environment and Heritage in November 1992 (Assessment No. 611). The project concept was subsequently altered and subjected to another PER in 1998 (Assessment No. 1194), with the subsequent approval and extensions expiring in May 2004. Further changes to the project, which included an increase in the proposed scale of operation and the removal of the secondary processing concept, were approved in May 2003. In late 2003, Lynas applied for a three-year extension to the Environmental Approval, and this was subsequently approved in January 2004. This current Approval expires on 17 May 2007 unless site operations have already substantially commenced.

In December 2004, Lynas again applied for approval of the project with 'non-substantial' changes which included deferment of construction of a concentrator at the Mt Weld site and inclusion of transport of rare earth ore or concentrate through the Port of Esperance. Approval for this change was granted on 8 February 2005.

At the present time, Lynas retains the necessary environmental approval for development of the Mt Weld RE project including an option to construct a concentrator at the mine site and the export of concentrates. Once Lynas has decided on the final form and schedule for the project, and made the decision to commence development, a statutory Notice of Intent and Works Approval application will need to be submitted to the Department of Environment and the Department of Industry and Resources ("DoIR") for approval prior to the commencement of site works.

Rehabilitation Bond

A statutory requirement of the WA DoIR is the deposit of a site rehabilitation bond prior to the commencement of mining operations. This bond is largely determined by the area of site disturbance and rehabilitation unit costs. The bond is eventually discharged by approval of DoIR at the completion of mining, site decommissioning and final rehabilitation. The anticipated bond for the current proposed operation is estimated by Lynas to be approximately A$1.0M. Actual costs for progressive rehabilitation and final mine decommissioning and closure are not available at this stage of planning.

Groundwater Resources Access

Access to the groundwater resources of the Mt Weld carbonatite is provided through an agreement between Lynas and Placer Dome. Groundwater Well Licence ("GWL") No. 59529 issued by the W.A. Department of Environment allows for the extraction of up to 4 gigalitres per year. Based on the currently planned projects of Lynas and Placer Dome total extraction is not expected to exceed 25% of the approved amount. Water requirements for the Mt Weld project are anticipated to be approximately 30ML/year.

12.2 Peoples Republic of China

Land Tenure and Tenements

The plant site area encompasses just over 42km^2 in the Qilu Industrial Park near Zibo City. Lynas has entered into the following land tenure and land use agreements:

Table 12.2

Agreements In-place Relevant to Land and Water Use Rights

Agreement	Purpose	Details
Qilu Industrial Park (QIP) Land Agreement for Plant Site	Access to Land in QIP	Lynas and QIP - 19 October 2005
Zibo QIP Ratification	Project Approval	QIP Approval (Govt District Equivalent) - 5 April 2005; Document # LY519, MW 05/17.
Certificate on Land	Land acquisition for Plant (133,332 m^2)	ZCD & CC Ltd and Linzi Land & Resources Bureau for land owned by Dongxia and Shangzhuang Villages of Xindian Sub District, Linzi District - 18 January 2005; Document #LY522
Comprehensive Utilisation of the Solid Residues	Access to solid waste storage site	Lynas (Shandong) Chemet Limited and Fengjia Village Committee - 22 December 2005; Filing #LNSD200512
Development Consent	Planning Approval for Plant (133,332 m^2)	ZCD & CC Ltd and Zibo City Urban Planning Bureau for land owned by Dongxia and Shangzhuang Villages of Xindian Sub District, Linzi District - 11 April 2005; Document #LY520
LOI on Water Supply	Guaranteed Water Supply	Guaranteed min 250m^3/hr water supply for 30 years; Lynas and Xixia Village Committee, Xindian, Linzi. - 23 January 2005.

Note: ZCD & CC = Zhongxing Communications Development & Construction Company Limited

Development Consent

For the plant development and construction in the QIP, approvals are required only at the municipal level, the nature and cost of the development precluding the need for provincial level approval. The primary government approval of the project is acceptance of the Lynas Environmental Impact Review (EIR), prepared by the Zibo Technical Studies Institute of Environment Protection (ZEPI), an Institute associated with the Zibo City EPB. The approval process comprises three steps. The first step is the submittal and approval of the EIR; in the case of the Lynas project, there have been two submissions:

- the first EIR was for a 30,000tpa RE Smelting Plant, prepared for Zhongxing Communications Development & Construction Company Limited in June 2004 - approved 25 June 2004
- the second EIR made additional provision for a concentrator as part of the plant development; this EIR was considered by an Expert Panel and subsequently approved by Zibo City EPB on 3 March 2005.

A parallel step was the preparation of the EIR Land Survey by Zibo Feitian Geologic Investigation Limited Co., resulting in the production of a *Land Survey Report for the Zibo Cracking Project - May 2004*, and updated in January 2005. This report covered geological, hydro-geological, geotechnical, soils and environmental impact studies for the project site. In addition, a public information and participation programme which entailed a series of meetings with village officials and polls of local citizens who may potentially be impacted by the project (105 persons returned a completed questionnaire) was completed as part of the EIR process in June 2004. The programme was conducted in accordance with the provisions in the Management Regulations for Environment Protection for Construction Projects as well as various other regulatory provisions. The Villagers' Committees from the villages of Dongxia, Xixia, Fengjia and Shangzhuang were consulted about the project; some 90% of respondents to the questionnaire supported the project.

Secondly, prior to construction being permitted to proceed, a number of construction permits must be obtained. Applications are to be accompanied by detailed engineering design information. Lynas is in the process of incorporating recommendations from the EPB's Expert Panel, which includes identification of the standards that must be complied with, into these designs. Processing of these permits, takes from about one to four weeks.

The final step in the approval process is an audit of the commissioned project's compliance with the Environmental Protection requirements and approved Plant Design and acceptance of the Environment Protection Plan that will provide environmental guidance during the plant's operational phase. Lynas can proceed with plant construction and development during compilation of the Environment Protection Plan prior to receiving final EPB approval for the Plan. Before Lynas moves to full production mode, it needs an audit of its facilities carried out by the EPB to confirm compliance with its approved Environmental Protection Plan and Plant Design. Until this Compliance Certificate is granted the production rate can be restricted until such time that any EPB identified shortcomings and/or deficiencies are rectified. Normally the outstanding issues are successfully negotiated and forced plant closures due to non-compliance are rare. Lynas does not anticipate any difficulties in obtaining the necessary approvals.

The Environment Protection Plan for the development will include measures to achieve conformance with World Bank guidelines relevant to the project.

Table 12.3

Status of Major Environmental and Development Approvals

Approval Required	Authority	Current Status
Environmental Impact Review of RE Cracking Plant ("EIR1").	Zibo City EPB	Approved by EPB on 25 June 2004; EIR studies programme by ZEPI completed in June 2004
Environmental Impact Report for RE Concentrator and Cracking Plant ("EIR2")	Zibo City EPB	Approved by EPB on 3 March 2005; EIR studies updated by ZEPI submitted to EPB on 3 February 2005; Document # ZHH (2005) 4
Compliance Certificate (including Environmental Protection Plan).	Zibo City EPB	Audit by EPB following plant commissioning required prior to issuing of the Compliance Certificate; the issuing of the Compliance Certificate (which includes acceptance of the Environment Protection Plan) provides full environmental approval for operation of the plant.

Note: EPB -Zibo City Environmental Protection Bureau

Water Quality Management

Surface Water

Zibo City is surrounded on the east, west and south by mountains which cause the surface and ground waters to drain into a central basin, forming an almost independent hydrological unit. The Xiaoqing river is the main surface water feature draining the region with the Zi and Wuhe rivers as its major tributaries. The Zi river to the west and another tributary, the Xiaofu river, to the east, are relevant to the plant site. The plant site is located on a cleared hill to the south of Dongxia Village; it is underlain by Ordovician Limestone which slopes away to the north, with surface water flowing towards the Zi River.

The Xiaoqing River originates near Jinan and flows through Binzhou, Zibo, Dongying and Weifang before emptying into the Bohai Sea. The Xiaoqing River and its tributaries, which all vary greatly in terms of volume and flow rate with the seasons, are all polluted to some extent by chemicals (particularly ammonium nitrate and chloride) and petrochemicals and have a high Chemical Oxygen Demand. The water quality of the main rivers in the vicinity of the project site do not comply with the PRC *Environmental Quality Standard for Surface Water* (GB3838 – 2002) for these parameters.

The total water consumption for the project is estimated at about 3,170 cubic metres per day ("m^3/d"), of which approximately half will be recirculated. Make-up water is proposed to be sourced from nearby wells owned by Xixia Village; a Letter of Intent has been signed with Lynas to cover supply options. The area is well supplied with groundwater, so alternative supplies would be available if required.

The estimated annual industrial waste-water discharge from the plant site is 585,000tpa or 1,950 tonnes per day ("t/d"), including the sewage effluent, (average 150t/d) and contaminated water from the stockpile and other affected areas. Clean rainwater will be diverted away from the site. All of the waste water discharge will be treated in the Qilu Water Treatment Plant ("QWTP") and discharged to the Bohai Sea via a 60km pipeline that discharges into the Xioaqing River system. The QWTP has the obligation to meet water quality discharge standards, rather than the RE plant, although Lynas has agreed the plant waste water quality parameters with QWTP. It is not anticipated by the company that the quality of the Xioaqing River will be materially impacted by the plant discharge.

It has been recommended by ZEPI that the concentrations of ammonium nitrogen in the wastewater stream directed to the QWTP not exceed 95mg/L and that the flows of waste water not exceed $75m^3/hr$. Lynas advise that every effort will be made to reduce ammonium nitrogen levels in the waste water and reuse this water rather than send it for treatment.

The waste solids storage site, some 10km from the plant site, is located in an inter-montane depression. The synthetically lined disposal structure will have an area of about 5 hectares ("ha") and depth of up to 20m. The site will incorporate measures to divert any surface water and prevent any leakage of contaminated waters.

Groundwater
The area underlying the QIP and the surrounding area is reportedly the best source of underground water in the region, particularly to the northeast and north of the plant area from where it is proposed that the project's water supply will be sourced. The Xixia Village Committee has signed a Letter of Intent with Lynas to cover supply of water from wells on its land. A permit to extract the water will be required from the Water Resources Bureau. BDA understands that the Village Committee would apply for and secure the permit.

The waste solids disposal site will be lined with a synthetic liner to prevent any contaminants entering the regional groundwater system, while any surface waters will be diverted around the site. These measures are expected to ensure no ground or surface water seepage occurs from the containment area.

In line with the provisions of PRC's "Technical Guide to Environmental Impact Evaluation" (HJ/T2.1 – 2.3: 1993) ground water will be monitored for "pH, permanganate index, total hardness, total dissolved solids ("TDS"), sulphate, chloride, Fe, Hg, arsenic, hexavalent chrome, cadmium, fluoride, ammonium nitrogen, total number of bacteria and coliform group". A number of monitoring wells are proposed at both the plant and waste disposal sites. Currently the groundwater quality for wells at the plant site and at Fengjia Village is relatively good, in line with the PRC *Quality Standard of Ground Water* (GB/T 14848 - 93) Type II, however coliform and bacterial levels make the water undrinkable. At nearby Chaomi Village, not only are the micro-organism levels high, but values for total hardness, sulphate and TDS are also in excess of the standard's requirements. Chaomi and Fengjia Villages are close to the Waste Solids Disposal site.

In line with the directions of the Zibo City EPB the standard for pollution discharge affecting underground water quality to be adopted by the project is *Standard of Underground Water Quality (GB/T14848-1993)* III grade.

Air Quality Management

The main issues of concern relating to air quality, identified during the environmental review process are, Total Suspended Particulates ("TSP"), and sulphur dioxide (SO_2), ammonia (NH_3), and hydrochloride (HCL) gas emissions. The PRC Ambient Air Standard (GB3095 – 1996) makes provision for a maximum value of $0.3mg/m^3$ for TSP and $0.15mg/m^3$ for SO_2, however there is no specific provision to cover NH_3 or HCL. The maximum permitted concentration limit for hazardous atmospheric gases affecting dwelling areas was therefore evaluated under the old (now replaced) *Hygienic Standard of Industrial Enterprise Design* (TJ36 - 79). Due to the existing elevated levels of ambient HCl and NH_3 gases in the region, resulting from the cumulative effects of the region's petrochemical enterprises, the concentrations of these two gases exceed the standard levels for ambient air. It is expected that the emissions of TSP (PM_{10}) (particulate matter up to 10 microns in size) and SO_2 will meet the Ambient Air Standard requirements.

The discharge volume of waste gas is 6.949008×10^8 Nm^3pa (normalised cubic metres per annum). The discharge volumes for SO_2 and particulates are estimated at approximately 58tpa and 22tpa respectively, which will comply with the total pollutant control objectives (of 60 and 30tpa respectively), assigned by Zibo City EPB. The discharge levels for sulphuric acid mist, fluorine (including associated compounds), HCl and ammonia are anticipated at approximately 4.2, 0.3, 0.1 and 0.1tpa respectively. According to the EIR (2005) the gaseous discharge from the plant will comply with the required Class 2 standards in "*Integrated Discharge Standards of Atmospheric Air*" (GB 16297 – 96) and Class 2 standards in Table 2 of "*Industrial Kiln Atmospheric Pollutants Discharge Standards*" (GB 9078 – 96).

It has been recommended in the EIR that a sampling port be installed on all waste gas exhaust masts in accordance with the requirements outlined in "*Measuring of Particles and Sampling Method of Gaseous Pollutants in Exhaust Gas from a Solid Pollution Source*" (GB16157 – 1996).

In summary, it is anticipated that the project will contribute substantially to daily average SO_2 concentrations near the plant, but as noted above, will meet the Ambient Air Standards, and will contribute little to TSP levels.

Noise and Vibration Issues

In line with the direction from the Zibo Environmental Protection Bureau, the standards for environmental quality that are being adopted with respect to noise are *Standard of Noise in Industrial Enterprises (GB 12348 – 90)* and *Standard of Environmental Noise in Urban Areas* (GB3096 - 93), both at grade 2. The key ambient noise monitoring parameter for this operation will be measured LeqA levels (energy equivalent level held constant). The particular standard limiting values are 60dB(A) for the daytime and 50dB(A) for the night-time.

Lynas advises that the devices in the plant creating significant noise will primarily be the blower fan, air compressor, vibration feeder, bucket conveyor, water-cooling tower and material transfer pump. Lynas will address each of these potential noise or vibration sources by appropriate design and plant layout in the industrial yard and by engineered noise control measures. Where appropriate, acoustical enclosures or other appropriate noise attenuation measures will be installed, together with a policy of selecting and installing equipment with consideration to noise and vibration levels. The noise impact on neighbouring habitations is not expected to be an issue.

Lynas has carried out a comprehensive noise assessment of the proposed operations and derived predicted noise values for most areas of the proposed operation and various mitigative measures have been incorporated into the project to reduce noise levels. It is anticipated that the project will comply with the above mentioned ambient noise and health standards.

Iron Oxide Material

The physical beneficiation of the ore to RE concentrate involves milling, classification and flotation operations. The tailings stream from the concentrator is rich in iron oxide, a material that is suitable as a filler for use in rubber, plastic and cement production, together with other potential applications in the iron-making industry. This iron oxide material (IOM) will be filtered, dried, milled, classified and packaged prior to sale to downstream users. The remaining solid wastes from the plant mainly comprise cracking plant leach wastes, calcium sulphate and barium sulphate wastes. Neither the ore nor the waste streams are classified as radioactive material, according to the Chinese, Australian, or international codes, hence the handling of ore and waste materials will not be subject to radiometric regulatory requirements.

Solid Residues Management

The waste solids storage site, some 10km from the plant site, is located in a topographic depression, with an area of about 5ha and a depth of up to 20m. This site is owned by FengjiaVillage, with whom an Agreement has been signed for not only waste storage, but as a possible future business partner if an alternative use/market for the material can be developed.

The waste solids storage site will be lined with a synthetic liner to prevent leakage, and covered. Acidic leachate is not expected to be a problem with this waste material. Lynas intends to undertake further research into alternative uses for this stored waste and will retain ownership of the material as it is expected to retain some material value.

Lynas advises that the Fengjia waste solids storage facility will accommodate approximately 160,000m^3 equivalent to approximately 288,000t of wet solids. As the site will receive approximately 39,000t of wet solids waste from the plant per annum, its projected life is about seven years. When the site is full, the land will be covered with soil, rehabilitated and re-used. Research into alternative uses for the wastes will be ongoing.

Geotechnical studies of both plant site areas indicate they are structurally appropriate for this type of development. The Land Survey Report states that "Zibo City is an area with low seismic probability" and the China Seismic Intensity Zoning Map (1990) published by the State Seismic Administration, depicts the disposal site as "basic seismic intensity VII" (ie. some protection measures will be required, but these would be minimum level requirements).

Chemicals Storage and Management

Large quantities of chemicals and materials will be handled during beneficiation operations and this may increase the likelihood of accidents, personal injuries and environmental contamination related to materials handling. Lynas proposes to handle all chemicals in a manner specified by the Material's Safety Data Sheet which is usually supplied by the manufacturer. Petroleum products are to be stored on the surface, or partly below surface level, in approved above-ground storage tanks or storage racks. Normal spill prevention, control, and counter measures are to be applied to these products along with secondary containment.

Lynas has proposed that any chemical stored in the industrial yard or load-out facility in above ground storage tanks in quantities greater that 500 gallons, will be provided with secondary containment in the event of a tank rupture or leak. Diesel fuel storage will be in a fuel storage containment area which will have secondary containment provisions and an oil/water separator system.

Ecology (Flora and Fauna)

In general, the extensive and pervasive farming practices in the project areas have eliminated any special flora or fauna that may have previously existed in the proposed plant or waste storage areas.

Environmental Management

Once the project is commissioned, an Environmental Management and Monitoring Programme will be implemented, as described in the EIR. Monitoring wells at both sites will monitor water quality and "anti-seepage" performance. Vegetative planting of up to 35% of the Plant site is proposed.

The EIR recommends that a radioactive monitoring instrument be purchased to monitor the radioactivity of both raw materials and waste solids, the latter to ensure compliance with the *Standard for Identifying Hazardous Waste* (GB5085.1~5085.3 – 1996).

The EIR recommends that an Environmental Risk Management Plan be formulated to include provision for emergency organisation, response procedures and emergency facilities. The EIR also recommends the minimisation of stores of hazardous chemicals on site, enclosure of bulk materials in storerooms, and environmental management for transport vehicles.

The environmental baseline studies and impact assessments conducted on behalf of Lynas appear to have been completed by competent organisations and fulfil the requirements stipulated for air quality, surface and ground water quality, noise, and community impact studies.

The EIR and related studies, central to the primary government environmental approval for the project, have been prepared by ZEPI. BDA is of the opinion that these studies fulfil the requirement for both Environmental and Social Impact Assessments under the Equator Principles for a Category "A" designated project.

Lynas has committed to implementing an Environmental Management System ("EMS") based on the ISO14001 EMS Standard. A Monitoring and Reporting programme will address each of the areas covered in the EMS, including air emissions, water quality, noise and occupational health. This commitment will fulfil the requirement under the Equator Principles for an Environmental Management Plan to be prepared in line with the environmental assessment conclusions.

Occupational Health and Safety Management System

Lynas has proposed the implementation of an Occupational Health and Safety Management System ("OHSMS") which will be based upon OHSAS 18001, ILO-OHS 2001 or an equivalent internationally recognised standard.

Lynas is committed to conforming with various IFC/World Bank Guidelines, including the IFC OH&S guideline. Lynas also plans to tailor its OHSMS to incorporate the requirements of PRC Standard GB/T28001-2001which cover OH&S. The programme was conducted in accordance with the provisions in the Management Regulations for Environment Protection for Construction Projects and Lynas' commitment to implementing such an OHSMS, is regarded as Best Practice by BDA and will fulfil the requirement under the Equator Principles for OH&S provisions.

Socio-Economic Issues

Community Consultation
A public information and participation programme entailed a series of meetings with village officials and polls of local citizens who may potentially be impacted by the project; 105 persons returned a completed questionnaire. The Villagers' Committees from the villages of Dongxia, Xixia, Fengjia and Shangzhuang were consulted about the project; some 90% of respondents to the questionnaire supported the project.

Community Benefit
The proposed operation will employ more than 500 individuals in a wide variety of capacities. Most employees will be drawn from the existing industrial workforce in the Zibo City area, however, some 20% of skilled employees will also come from other regions. It is anticipated that most of the new families will relocate to Zibo City, which has the ability to offer a better standard of living than the surrounding villages.

Conclusions
From the licensing and consenting information provided to BDA by Lynas, BDA is of the opinion that all the necessary development consent and licensing requirements under Western Australian legislation have already been obtained to enable the proposed development to proceed. Once Lynas has decided on the final form and schedule for the project, and made the decision to commence development, a statutory Notice of Intent and Works Approval application will need to be submitted to the Department of Environment and the Department of Resources and Industry for approval prior to the commencement of site works. BDA can see no reason why these remaining regulatory approvals will not be obtained in a timely and satisfactory manner.

BDA has not conducted legal due diligence or title searches as part of its review. Lynas has advised that all material tenements are in good standing. Also, BDA has not conducted legal due diligence on issues regarding Native Title.

BDA is of the opinion that all the necessary development consent and licensing requirements required under the Chinese development consent processes are recognised by Lynas and are being acquired in a timely manner. Lynas recognises that there is a residual risk associated with obtaining Environment Protection Bureau (EPB) compliance approval for the Environmental Protection Plan and Plant Design. Until this Compliance Certificate is granted at the completion of construction, the production rate could potentially be restricted until any EPB identified shortcomings and/or deficiencies are rectified. Lynas does not consider, however, that any of the environmental or OH&S standards required to be met by the project will create a problem for the design, construction or operation of the project.

13.0 PRODUCTION PLANS

For the mining operation, the production plan consists of three separate years of operation, with ore and waste mining being campaigned under three separate campaigns. Ore will go to one of several stockpiles, according to grade and ore type, and waste will be stockpiled on a long-term external dump. While the campaign methodology requires three separate contractor mobilisations, the approach is probably reasonable, given the relatively modest annual ore requirements, the remoteness of the area and the ongoing cost of maintaining and appropriately servicing a workforce for long-term small-scale operations, provided there are no ore quality or metallurgical deterioration issues when subjected to up to five years exposure on stockpiles.

The Feasibility Study presents a production plan which covers 18 years of operation. The production rate of 12,000tpa of RE products increases to 15,000tpa after Year 4 based on a 'de-bottlenecking' exercise. The processing plan beyond Year 9 is similar to Year 9. The production plan shown in Table 13.1 incorporates a one year ramp-up for ore treated and a two year ramp-up period for metal production.

Table 13.1

Mt Weld Rare Earth Production Plan

Activity	Units	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9
Mining										
Waste	Mt	4.2					5.2			3.7
HG Ore	Mt	0.6					0.4			0.3
LG Ore	Mt	0.4					0.3			1.0
Total Ore	Mt	1.0					0.7			1.3
HG Grade	%REO	19.3					19.0			18.0
LG Grade	%REO	12.6					12.3			11.4
Total Grade	%REO	16.6					15.8			12.8
HG Metal	t	101,000					69,400			48,600
LG Metal	t	47,900					42,000			117,600
Total Metal	t	158,900					111,400			166,200
Processing										
CZ Ore	t	90,000	121,000	121,400	132,900	153,700	174,000	173,000	187,800	220,300
Conc. @ 40%	t	23,600	31,400	35,900	41,900	44,900	44,900	44,900	44,900	44,900
REO Production	t	7,900	10,500	12,000	14,000	15,000	15,000	15,000	15,000	15,000
Iron Tails	t	66,400	90,800	85,500	91,000	108,800	129,100	128,100	142,900	175,400

Note: production schedule for Years 10-18 based on similar schedule to Year 9

The planned final products and quantities are summarised in Table 13.2.

Table 13.2

Tonnage of End Products from Year 2

	Material (tpa)	REO (tpa)
Cerium(IV)Extraction - Ce Nitrate, Ce Chloride (45% REO)	10,300tpa	4,600
LNP Chloride, LCPN Chloride (45% REO)	12,000	5,400
SEG Oxide, HRE Oxide (98% REO)	470	460
Total		**10,460**

Lynas is targeting 4,600tpa of cerium REO production, or 2,300tpa per line. This is in excess of the normal maximum in the Chinese RE industry of 1,500tpa per line which is primarily based on the maximum size of the mixer-settler units. However Lynas plans to design, engineer and construct more robust reinforced units which will provide the increased capacity.

Conclusions

The proposed production schedule appears reasonable. The actual mining schedule may differ from that proposed but the mining component is relatively straightforward. Ore grade will be a critical component of the REO production schedule. The schedule incorporates a ramp-up component but given the complexity of the processing stages BDA considers the ramp-up period optimistic. The planned capacity of the cerium production lines will exceed Chinese norms but appears achievable. There is no detail provided regarding the de-bottlenecking activities, but funds are provided in the capital estimate under Deferred Capital.

14.0 CAPITAL COSTS

14.1 Estimate Summary

Mining contractor costs for the pre-strip and first ore campaign are included in initial capital costs. All Mt Weld mining operations will be by contract and it is intended to house the workforce at the nearby Granny Smith mine site operated by Placer Dome. It is not intended to buy any mine-specific equipment or infrastructure, as all requirements will be provided by the contractor. The mining operating costs are based on preliminary estimates from three contractors; the rates proposed appear reasonable and within the expectations and experience elsewhere in West Australia. Drill and blast costs average A$0.63/t and mining costs use a base of A$1.25/t, with increments for depth and haulage distances. While these prices are in the range expected, there is obviously some exposure to fuel prices and BDA would recommend that, at this stage and until firm contracts are in place, it would be prudent to allow ±10% on the mining costs. Mining costs over the life of the operation, including Owner's costs and contract mining, total approximately A$36M. Mining costs for the initial campaign total approximately A$15.3M; the cost of the second and third mining campaigns has been estimated at A$10.6M and A$9.3M respectively. These costs have been included in deferred capital.

Capital costs detailed in the Navigator Financial Model and reported in the Feasibility Study use the currency in which they occur, Australian dollars for Australian operations and RMB Yuan for China operations. These currencies are converted to US dollars at an exchange rate of US$1.00 = A$0.73 and US$1.00 = RMB8.01 until the end of 2006 then US$ = RMB7.44 for 2007 and beyond. Table 14.1 summarises the estimated capital costs. The concentrator capital costs have been estimated by a Class A Chinese design institute, the Metallurgical Design Institute of Shandong (MDIS), and the Chinese cracking and separation plant costs have been estimated by the Chinese engineering company, Baiyan Zhengang Engineering and Consulting Company (BZECC).

Table 14.1

Lynas Capital Cost Summary

Cost Centre	Cost A$M	Cost RMB M	Cost US$M
Australian Costs			
Mine Development	14.4		
Site Processing and Infrastructure	0.9		
Site Rehabilitation Bond	1.0		
Australian Total	**16.3**		**11.9**
Chinese Costs			
Concentrator and Infrastructure		59.4	
Cracking Plant and Infrastructure		137.0	
Owner's Costs and EPCM		33.3	
Chinese Total		**229.7**	**29.5**
Contingency			
Australian Contingency - 15%	2.4		1.8
Chinese Contingency - 15%		34.5	4.3
Total Project Cost	**18.7**	**264.2**	**47.5**
Deferred Capital			17.2

Note - exchange rate US$1.00 = RMB7.79;A$1.00 = US$0.73; Deferred Capital comprises two further mining campaigns (A$20M or US$14.6M) and a RMB20M (US$2.6M) de-bottlenecking allowance in Year 3

A more detailed breakdown of the capital costs is shown in Table 14.2.

Table 14.2

Lynas Capital Cost Details

Cost Centre	Cost A$M	Cost RMB M	Cost US$M
Australian Costs - Mt Weld			
Mt Weld Infrastructure	0.90		
Mt Weld Rehabilitation Bond	1.00		
Mt Weld Pre-Strip and Initial Mining Campaign and Mine Development	14.35		
Mt Weld Total	**16.25**		**11.86**
Chinese Costs - Zibo			
Plant Site Land Acquisition (acquired Oct 2005)		0	0
Flotation Plant			
Treatment Plant		33.92	
Infrastructure		14.21	
Engineering and Construction Management		7.07	
Owners Costs		3.04	
MDIS Minor Equipment Contingency		1.17	
Total Flotation Plant		*59.41*	*7.60*
Downstream Plant			
Treatment Plant		106.38	
Utilities and Water Treatment		12.96	
Site Infrastructure and Connections		7.28	
Engineering , Construction Management and Procurement		25.01	
First Fill		10.37	
Preproduction Labour		3.00	
Owners Costs		5.32	
Total Downstream Plant		*170.32*	*21.90*
China Total		**229.72**	**29.49**
Contingency			
Australian Contingency – 15%	2.44		1.78
Chinese Contingency – 15%		34.46	4.32
Total Project Cost	**18.69**	**264.18**	**47.45**

Note - exchange rate US$1.00 = RMB7.79;A$1.00 = US$0.73

BDA has broken down the Lynas estimate for initial capital costs into a conventional Direct and Indirect Cost project structure. The cost breakdown is shown in Table 14.3.

Table 14.3

Initial Capital Cost Estimate - Direct and Indirect Cost Breakdown

Cost Centre	Estimated Cost A$M	Estimated Cost RMB M	Estimated Total Cost US$M
Direct Costs			
Mining	15.2		11.1
Concentrator Plant		33.9	4.4
Cracking and Separation Plant		105.6	13.5
China Site Infrastructure		27.8	3.6
China Off-Site Infrastructure		7.7	1.0
Direct Cost Subtotal	**15.2**	**175.0**	**33.6**
Indirect Costs			
Implementation Indirect Costs	0.0	26.6	3.4
Owner's Costs	1.0	5.3	1.4
Pre-Production Costs		17.7	2.3
Contingency	2.4	39.6	6.8
Indirect Cost Subtotal	**3.4**	**62.5**	**13.9**
Total Project Cost	**18.7**	**264.2**	**47.5**

Note - exchange rate US$1.00 = RMB7.79;A$1.00 = US$0.73;

14.2 Mine Development Costs

The estimate of direct costs of the mine site works as advised by Lynas is set out in Table 14.4.

Table 14.4

Mine Site Capital Cost Estimate

Cost Centre	Estimated Cost A$M
Mine Development	14.34
Load Out Ramp	0.30
Mine Site Infrastructure	0.55
Mine Site Subtotal	**15.19**

Note: see Table 14.3

The Australian mining contractor costs are based on a 2005 proposal from an independent mining contractor and the costs for the associated infrastructure facilities are based on indicative budget prices assembled in 2005 by Lynas site personnel from local suppliers and contractors. The capital cost estimate includes the whole of the cost of the initial mining campaign. The costs of the second and third mining campaigns are included in the Deferred Capital Costs.

14.3 Concentrator Plant

The estimate of direct costs of the Concentrator Plant as advised by Lynas are set out in Table 14.5.

Table 14.5

Concentrator Plant Capital Cost Estimate

Cost Centre	Estimated Cost RMB M
Civil Works	10.83
Crushing	1.33
Milling	2.40
Flotation	3.78
Concentrate Dewatering and Drying	0.69
Water Treatment	13.88
Reagents	0.40
Ventilation, Dust Control, Heating and Piping	0.61
Concentrator Subtotal	**33.92**

Note: see Table 14.3

The capital costs for the concentrator were estimated in the third quarter of 2004 by a Chinese design institute, the Metallurgical Design Institute of Shandong (MDIS). The estimate is based on published Shandong Province Material and Operation Rates applied to quantities taken from preliminary layouts and design sketches for the civil, structural and building works, budget prices for equipment and factored allowances for piping, electrics and the installation of equipment.

The Water Treatment Plant estimate was prepared by Omex, Lynas' preferred water treatment plant contractor and is based on a detailed equipment list, budget prices and factored installation allowances.

The Iron Ore Material Plant is not planned to be constructed as part of the initial project. Lynas advises that it may be added at a later date.

The methodology used for these estimates is considered to be reasonable for feasibility study purposes, subject to acceptable allowances being included elsewhere in the estimate for indirect costs, contingency and the escalation in costs since the estimate was prepared.

14.4 Cracking and Separation Plant

The estimate of direct costs of the Cracking and Separation Plant as advised by Lynas are set out in Table 14.6.

Table 14.6

Cracking and Separation Plant Capital Cost Estimate

Cost Centre	Estimated Cost RMB M
Roasting	23.65
Water Leach	12.26
Extraction	25.18
RE Chloride Post Treatment	14.10
Cerium IV Extraction	29.17
Waste Water Plant	1.23
Cracking/Separation Plant Subtotal	**105.58**

Note: see Table 14.3

The capital costs for the cracking and separation plant facilities were estimated in mid 2004 by a Chinese engineering company, Baiyan Zhengang Engineering and Consulting Company (BZECC). The estimates are based on budget prices for equipment, factored allowances for the installation of equipment and published Shandong Province Material and Operation Rates for the civil, structural and building works.

A review of the BZECC study was undertaken in October 2004 by Mr Xiao Benhua, a Chinese consultant with extensive experience in the Rare Earths Industry. He updated the capital cost estimate to take into account some adjustments to the process flow sheet and the movement in prices since the BZECC estimate was prepared.

The Cerium IV Plant estimate was prepared by Lynas in January 2005 using similar methodology to that used for the BZECC estimate.

The methodology used for these estimates is considered by BDA to be reasonable for feasibility study purposes, subject to acceptable allowances being included elsewhere in the estimate for indirect costs, contingency and the escalation in costs since the estimate was prepared.

14.5 China Site Infrastructure

The estimate of direct costs of the site infrastructure at the process plant site as advised by Lynas is set out in Table 14.7.

Table 14.7

Site Infrastructure Capital Cost Estimate

Cost Centre	Estimated Cost RMB M
Site Works and Roads	1.74
Water Supply	0.29
Instrumentation and Process Control	9.75
Vehicles	0.18
Power Supply	7.37
Communications	0.10
Service Buildings	5.51
Heating	1.19
Other Infrastructure	1.71
Subtotal	**27.83**

Note: see Table 14.3

The Instrumentation and Process Control item includes an allowance estimated by Lynas for laboratory equipment.

The capital costs for the site infrastructure associated with the concentrator and the cracking and separation plant were estimated in 2004 by MDIS and BZECC respectively using similar methodology to that used for the process plant facilities. The methodology used for these estimates is considered by BDA to be reasonable for feasibility study purposes, subject to acceptable allowances being included elsewhere in the estimate for indirect costs, contingency and the escalation in costs since the estimate was prepared.

14.6 China Off-Site Infrastructure

The estimate of direct costs of off-site infrastructure in China as advised by Lynas is set out in Table 14.8.

Table 14.8

Off-Site Infrastructure Capital Cost Estimate

Cost Centre	Estimated Cost RMB M
Access Roads	1.42
Water Connection	2.00
Natural Gas Connection	1.50
Power Connection	0.80
Communications Connection	0.05
Solid Waste Facilities	0.41
Steam Connection	1.50
Subtotal	**7.68**

Note: see Table 14.3

The capital costs for the off-site infrastructure associated with the concentrator and the cracking and separation plant were estimated in 2006 by Lynas on the basis of indicative prices advised by QIP and local suppliers.

The methodology used for these estimates is considered by BDA to be less rigorous than that normally used for feasibility studies and for that reason the estimate for off-site infrastructure should be subject to a higher level of contingency. In addition BDA considers that an allowance needs to be made for the EPCM activities associated with the provision of these off-site facilities. These issues are addressed below.

14.7 Indirect and Other Costs

Implementation

The estimate of the implementation indirect costs as advised by Lynas is set out in Table 14.9.

Table 14.9

Implementation Cost Estimate

Cost Centre	Estimated Cost A$M	Estimated Cost RMB M
Mine Site EPCM	0.30	
Concentrator EPCM		6.88
Cracking and Separation Plant EPCM		19.50
Commissioning Indirects		0.12
Greening		0.20
Furniture		0.05
Subtotal	**0.30**	**26.58**

Note: see Table 14.3

The EPCM costs have been estimated by the various consultants who estimated the direct costs. The implementation indirect cost is approximately 15% of the direct costs for the Chinese facilities, with a nominal allowance only for the Australian facilities and initial mining activities. BDA suggests that for a complex project such percentages are low. In particular no EPCM costs appear to have been included for the water treatment plant, the Cerium IV Plant and the off-site infrastructure in China.

BDA considers that more reasonable allowances for implementation indirect costs are 20% of all Chinese direct costs, 20% of Australian infrastructure direct costs and 3% of the initial Australian mining costs for establishment and administration of the mining contract. Increasing EPCM costs to those levels would add approximately US$1.4M to the capital cost estimate.

Owner's Costs

The estimate of Owners Costs as advised by Lynas is set out in Table 14.10.

Table 14.10

Owners Cost Estimate

Cost Centre	Estimated Cost A$M	Estimated Cost RMB M
Owners General Management		3.67
Owners Project Management	0.03	
Insurances and Fees		1.41
Bonds and Licences	1.00	0.25
Subtotal	**1.03**	**5.33**

Note: see Table 14.3

The Owner's Costs have been generally estimated by Lynas. No specific allowance has been made in the project costs for Owners engineering or technical personnel, legal costs or office costs and overheads; however, Lynas advises that these costs are included in the corporate budget and General Management costs. Land purchase costs are excluded as the required land purchase has already been completed. The total of Owner's Costs excluding insurances, bonds and licences is approximately 1.5% of the total of the direct costs. BDA suggests that for a complex project, such a percentage is low. BDA considers that a more reasonable allowance for Owner's Costs excluding insurances, bonds and licences is 3%. Increasing these costs to that level would add approximately 4M RMB or US$0.5M to the capital cost estimate.

Pre-Production Costs

The estimate of pre-production costs as advised by Lynas is set out in Table 14.11.

Table 14.11

Pre-Production Cost Estimate

Cost Centre	Estimated Cost RMB M
Operations Personnel, Costs and Expenses	3.36
First Fills and Consumables	11.96
Spares	2.34
Subtotal	**17.66**

Note: see Table 14.3

The pre-production costs have generally been estimated by Lynas, with first fills costs estimated by the process plant engineering groups. Allowance has been made only for commissioning spares. No allowance appears to have been made for an inventory of operating spares or for insurance spares. BDA suggests that the question of spares should be further investigated by Lynas. BDA considers that a reasonable allowance for an on-going spares inventory is 5% of the concentrator and cracking and separation plant equipment costs. These equipment costs are approximately 100M RMB. A reasonable allowance for an on-going spares inventory would add approximately 5M RMB or US$0.6M to the capital cost estimate.

Contingency

The Lynas estimate includes allowances which can be categorised as contingencies as shown in Table 14.12.

Table 14.12

Project Contingency

Cost Centre	Estimated Cost A$M	Estimated Cost RMB M
Australian Operation		
Escalation and Contingency	2.44	
Chinese Operation		
Concentrator and Cracking/Separation Plant - Escalation and Contingency		33.66
Owners Escalation and Contingency Allowance		0.80
Minor Equipment Contingencies		5.15
Subtotal	**2.44**	**39.61**

Note: see Table 14.3

Contingencies of 1.17M RMB and 3.98M RMB (5.15M RMB) have been allowed for minor items of equipment for the concentrator and cracking/separation plant respectively; these allowances have been calculated by the process plant engineering groups and amount to approximately 2.0% of the total direct costs.

The escalation and contingency allowances have been included by Lynas as a flat 15% allowance. Data provided to Lynas from the Chinese engineering groups indicate that costs of construction have increased by about 5% since the estimates were prepared which is generally consistent with increases in construction cost indices for Australia over the same period. On that basis the notional allocation of these allowances is 5% for escalation and 10% for contingency.

While BDA considers that such allowances should generally be explicitly included in the various sections of the capital cost estimate, it notes that the total contingency and escalation allowances for the Australian and Chinese operations is about 20% of the direct costs; the contingency allowance is more than 15% of the direct costs. Overall, BDA considers that the contingency allowances are reasonable.

Escalation

As noted in the discussion of contingency above, allowance has been made in the Lynas estimate for 5% escalation in costs since estimates were prepared. On the basis of data on Chinese costs of construction provided by Lynas from the Chinese engineering groups and Australian construction cost indices such an allowance appears to be reasonable.

Accuracy

BDA considers that the capital estimate qualifies as a feasibility-standard estimate with a probable accuracy of ±15-20%.

Working Capital

The question of working capital is addressed in the Lynas financial model. Depending on the marketing arrangements to be entered into by Lynas a specific allowance for initial working capital should be made. An allowance of the operating cost for the time it takes for revenue to be received after the operating cost is incurred would be a normal provision.

Overrun Allowance

Any capital cost estimate is only as reliable as the information on which it is based. Historically, in the case of process-based projects of this type, once more detailed engineering design is undertaken, the bulk quantities, particularly for concrete, structural steel, piping and electrical tend to increase, often in excess of the individual contingency allowances. In addition there may be contractor claims and other costs associated with delays in construction and commissioning or delayed ramp-up. The current level of activity in the resources and construction sectors in Australia and in general construction activity in China has led to material increases in costs, particularly of steel (which has been factored into the estimate), and shortages of well-qualified construction personnel, which has also had cost and time impacts. A combination of these factors can result in cost increases during construction, not uncommonly beyond the total capital allowance. In recognition of this trend BDA recommends that a cost overrun allowance be established of around 10% of the estimated capital cost, in this instance of around 40M RMB or US$5M.

Deferred and Sustaining Capital

Allowances have been made in the Lynas Financial Model for deferred capital to be expended on the second and third mining campaigns and for a de-bottlenecking campaign to be carried out when the plant is fully operational. No specific sustaining capital allowance is shown in the capital cost estimate provided by Lynas.

The cost of the future mining campaigns has been estimated at A$10.6M in 2011/12 and A$9.3M in 2014/15 using the same bases as the initial mining campaign. The allowance for de-bottlenecking is a nominal 20M RMB giving a total deferred capital of approximately US$17.2M.

Lynas advises that an allowance for expenditure which would normally be characterised as sustaining capital has been included in the operating cost estimates under ongoing plant maintenance costs.

Conclusions

The Feasibility Study estimating methodology for the direct costs components is considered generally reasonable. However, there is no document which brings all the individual components together on a consolidated basis with a single consistent estimation methodology and a number of areas, generally of indirect costs, warrant further analysis.

BDA has noted areas where additional allowances are likely to be necessary. Allowing for suggested increases in EPCM Cost and Owner's Costs and including an allowance for critical spares in the Pre-production Costs increases the estimate by approximately US$2.5M from US$47.5M to approximately US$50M. .

BDA considers that the estimation accuracy of the capital estimate after these increases is around ±15-20%.

BDA recommends an overrun allowance of 10% of the initial capital cost, amounting to approximately US$5M.

15.0 OPERATING COSTS

The project operating costs are detailed in the Navigator Financial Model, and are summarised in Table 15.1. Due to the campaign mining approach, mining costs are accounted for in capital costs and it is a little misleading to use an annual average cost; however the unit cost equates to A$12.70/t (US$8.80/t at US$0.73/A$) of ore mined over the life of the operation. In addition to the contractor mining cost, Mt Weld operational costs include a crushing contractor cost, Mt Weld site operations, transportation costs, and royalties which average approximately A$84/t of ore mined (US$60/t), of which around 70% relates to the cost of transport.

The estimated operating costs of the Linzi concentrator are based on the MDIS study of 2004 and were obtained from an Excel Spreadsheet REV 7, 30 November 2005 provided during the April 2006 site visit. For the operating costs of the down stream processing in the Linzi cracking and separation plant an Excel Spreadsheet Rev 7, dated October 2005 was provided during the visit. Compared with the REV 6 data, more accurate figures were provided for consumables and power costs; the operating costs for the IOM treatment and the RO water treatment were provided as separate estimates.

The process operating costs in China were estimated by BZECC with a quoted accuracy of ±10% and are summarised in Table 15.1. The operating costs are based on treating 121,000tpa of ore grading 17% REO producing 32,400tpa concentrate at about 40% REO. The ore is assumed to have 12.5% moisture. Costs for treatment in the flotation plant and in the downstream plant and including the shipping costs total approximately US$200/t of ore. Including the Australian costs the unit costs total US$260/t of ore treated or approximately US$3,000/t of REO produced.

Table 15.1

Mt Weld Rare Earth Project Operating Cost Estimate at 10,500tpa REO (Year 2)

Cost Centre	TPA	A$M	A$/t	RMBM	RMB/t	US$M	US$/t
Production Parameters							
Ore Treated/Shipped	*121,000*						
REO Concentrate Produced	*32,400*						
REO Produced	*10,500*						
Australian Costs							
Total Australian Cost		10.190		59.210		7.440	
Unit Cost /t Ore Treated	*121,000*		84.20		490		60
Shipping and Transport to Plant							
Sea Freight and China Transport				24.250		3.050	
Unit Cost /t Ore Treated	*121,000*				200		25
China Processing Costs							
Concentrator, Cracking, Separation				168.250		21.137	
Unit Cost/t Ore Treated	*121,000*				1,390		175
Total Cost				**251.710**		**31.627**	
Total Cost/t Ore Treated	*121,000*				**2,080**		**260**
Total Cost/t REO Produced	*10,500*				**23,972**		**3,012**

Note - exchange rate US$1.00 = RMB7.96;A$1.00 = US$0.73; based on ore throughput of 121,000tpa and concentrate production of 32,400tpa; Australian costs include crushing, road and rail ore transport to port, port charges and royalties, but not mining costs which are included in capital; China Processing Costs include cost of production of HRE, SEG, LPN and Ce Chloride (25%) and Ce Nitrate (75%)

Reagents and consumables account for approximately 40% of the costs, transport accounts for 27% and energy and water represent 14%. Labour and maintenance comprise 5% and 3% of the total costs respectively; maintenance costs are estimated at 5% of equipment costs. These percentages do not take into consideration the mining contractor costs, which are treated as capital costs. If included in operating costs, mining represents around 3-4% of total costs.

While the data shown in Table 15.1 represents only a summary, a considerable level of detailed estimation has been undertaken. BDA has only undertaken a desk-top review of costs, but overall the estimates appear generally reasonable; however, BDA notes the following items:

- costs do not include 17% VAT
- reagents, electricity, water and transport comprise approximately 80% of operating costs
- maintenance costs for plant and infrastructure at around 2-3% of operating costs appear low; 4-5% would seem more appropriate
- Lynas suggests that revenue from the sale of approximately 88,000tpa of IOM to the cement or other industries will provide a credit against the processing costs of approximately RMB50/t.

Conclusions

BDA's review of operating costs is based on a desk top review only. The estimated costs appear generally reasonable although the estimate of maintenance costs appears low. Reagent, electricity, water and transport comprise approximately 80% of operating costs, with reagents accounting for approximately 40% and transport for nearly 30%. The variable costs for the combined processing operations represent about 80% of the total, which, even for such an intensive process-related plant, is a fairly high split. The total estimated cost to produce the REO products is approximately US$260/t mined or a total of about US$32Mpa which is equivalent to RMB252Mpa.

16.0 PROJECT IMPLEMENTATION

16.1 Implementation Strategy

Lynas has prepared a Project Management and Execution Plan which sets out in reasonable detail the proposed strategy and plan for establishing the project.

The implementation of the project requires the establishment of facilities in Australia necessary for mining, land transport to the port of Esperance and ship-loading of ore, the establishment of a shipping operation to transport ore to the Chinese port of Qingdao, the establishment of an operation in China to unload ore from ships at Qingdao and transport it to the proposed process plant site near Zibo City and the establishment of the ore processing operation in China including the design, construction and commissioning of the processing facilities at the plant site.

In general the Australian facilities and operations will be provided and operated by mining and transport contractors. Lynas will arrange for access to a water resource and for accommodation for the mining contractor's workforce. Implementation will require the establishment and administration of contracts for the mining and ore transport operations and for access to water and accommodation.

The establishment of the shipping operation to transport ore from Esperance to Qingdao will be included in a contract to be let to a suitably qualified shipping company. Implementation will require the establishment and administration of shipping contracts.

The establishment of the operation in China to unload ore from ships at Qingdao and transport it to the proposed process plant site near Zibo City will be included in a contract to be let to a freight forwarding agent at Qingdao.

The establishment of the ore processing operation in China, including the design, construction and commissioning of the processing facilities at the plant site, will be implemented using an Engineering, Procurement and Construction Management ("EPCM") contracting approach, the EPCM contracts being managed by an Owner's team, comprising Lynas personnel and experienced consultant engineers.

Lynas has researched the Chinese engineering and construction industry and has come to the conclusion that applying the disciplines of the chemical industry for the processing operation and moving away from a minerals industry focus will produce a better result. The research has shown that the chemical industry has a history of successfully building complex chemical plants to a high standard. It has also shown that the chemical industry in the QIP is supported by a large pool of capable engineering, procurement and construction groups.

Lynas' strategy is to use these capable Chinese groups to achieve a Chinese cost base. It proposes to follow the normal Chinese practice of completing basic engineering design ("BED"), at which point the design parameters are frozen, then completing detailed engineering design ("DED") before proceeding to construction. The work will be carried out under separate design, procurement, construction management and construction contracts let by Lynas. It is proposed that the process plant engineering be divided into two broad design packages to be carried out by separate Chinese Design Institutes ("CDIs").

16.2 Project Management

Lynas proposes that the execution of the project be managed by an Owner's Team overseen by an Owner's Project Management Committee ("PMC"). The PMC is to be chaired by Lynas' General Manager Operations and Technical Services and will report to the Lynas Chief Executive Officer. The PMC will comprise senior Lynas management personnel and specialist consultants.

The role of the PMC is to:

- monitor overall project schedule and budget
- approve variations outside of delegated authority of the Owner's team and within PMC approval guidelines
- review progress in engineering, procurement, construction and commissioning
- plan for operations.

The Owner's Team will directly establish and manage the EPCM contracts for the process plant. The team will comprise Lynas personnel and specialist consultants who will work with the CDIs, procurement and construction management groups, consultants, government bureaus and local interest groups.

The role of the Owner's Team is to:

- manage external relationships and obtain necessary permits
- deliver process design packages ("PDPs") to the selected CDIs to enable the BED work to be completed
- work with the CDIs during completion of the BED packages specifically in the areas of process design and equipment selection
- define the scope of the DED packages for the selected CDIs
- approve all procurement recommendations
- oversee the construction management to be carried out by a professional Chinese group acting as an agent on behalf of Lynas
- build an operational team including establishment of the organisation and systems, policies and procedures
- prepare and implement a commissioning plan for the plant
- monitor work to be carried out by others.

The main interfaces with Chinese groups will be through Lynas technical staff with Chinese engineering experience who will be members of the Owner's Team and work within an established Chinese framework. A representative from a western engineering company will be a member of the Owner's Team to provide engineering services and experience related to CDI management.

16.3 Australian Facilities and Operations

In general the Australian facilities will be provided by mining and transport contractors. Implementation will require the establishment and administration of mining and transport contracts. The contracts to be let are:

- *Mining Contract* - the mining contractor will be required to carry out site establishment activities, provide site infrastructure, mine the ore and waste, and crush and stockpile the ore.
- *Transport Contract* - the transport contractor will be required to load ore from the mine site stockpiles, transport the ore to Leonora and load the ore onto the rail cars for railing to Esperance
- *Rail and Port Contracts* - Lynas will have contracts with the rail and port authorities for railing the ore from Leonora to Esperance and for unloading the ore at the port, storage of the ore and loading onto ships.
- *Services Contract* - it is currently envisaged that Lynas will be responsible for the supply of water and workforce accommodation, but this responsibility could potentially be allocated to the mining contractor.

Preparation of contract documentation, calling of tenders or negotiating of prices and conditions and the preparation of recommendations to award will be undertaken by a project management consultant to be engaged by Lynas. Formally awarding contracts and administration of contracts after award will be undertaken directly by Lynas' Australian site management.

16.4 Shipping Operation

The establishment of the shipping operation to transport ore from Esperance to Qingdao will be included in a contract to be let to the selected shipping company. Preparation of the shipping contract documentation and the negotiating of prices and conditions will be undertaken by a project management consultant to be engaged by Lynas. Administration of the contract after award will be undertaken directly by Lynas' Australian management.

16.5 Ship Unloading and Chinese Land Transport Operation

The establishment of the operation in China to unload the ore from ships at Qingdao and transport it to the proposed process plant site near Zibo City will be included in a contract to be let to a freight forwarding agent at Qingdao. Preparation of the freight forwarding contract documentation, the negotiating of prices and conditions and administration of the contract after award will be undertaken directly by Lynas Chinese management.

16.6 Process Plant Facilities and Operations

Engineering

It is proposed that the processing site engineering be divided into two broad design packages with a separate CDI being appointed for each. These contracts will be:

- *Concentrator and Site Infrastructure Design Contract* - the concentrator and site infrastructure design contractor will be responsible for overall site design coordination and for the metallurgical aspects of the processing plant including the comminution and flotation circuits. The Shandong Metallurgical Design Institute ("SDMI", formerly MDIS), a sub group of Laiwu Steel Group is the contractor preferred by Lynas for this contract. SDMI have previously completed the engineering conversion and BED for the concentrator.

- *Cracking and Separation Plant Design Contract* - the cracking and separation plant design contractor will be responsible for the chemical aspects of the processing plant. Lynas has reviewed proposals from a number of CDIs for carrying out the BED and DED for the cracking and separation plant, and is in advanced negotiations with the preferred contractor.

Procurement

Lynas proposes to let a procurement services contract to a Chinese Tender Management Company ("TMC") to manage the process of procurement and assist with the preparation and administration of contracts. The TMC may be a stand alone Chinese organisation or a group within a Chinese project management group. The role of the TMC is to:

- prepare a procurement plan
- prepare tender bid documents
- pre-select contractors and sub-contractors
- review equipment and materials lists and quality specifications
- co-ordinate the tender bid process with vendors
- review bids and select preferred tenders
- inspect equipment and materials during fabrication and expedite delivery
- manage the warehouse
- supervise and check that the contractors and vendors deliver according to the contract and specifications
- control procurement documentation.

Construction

Lynas proposes to engage a professional Chinese project management company for construction management and supervision. Suitable organisations will have a licensed monitoring company which will be responsible for tracking construction progress and checking construction quality against technical standards and contractual requirements.

The preferred construction approach is to use local mid-sized First Class construction companies to carry out vertical packages, with one to be nominated as Head Contractor. Construction contractors will be pre-qualified to ensure that they meet Lynas' requirements. Lynas proposes only to include contractors having a good safety record and appropriate systems on bid lists. This is likely to restrict bidders to companies which have worked with Western clients on chemical plants, power stations or large steel mills.

Commissioning

A commissioning plan is to be developed by the Owner's Team, under the direction of the Lynas General Manager. The commissioning plan will include procedures for the final inspection of the plant at mechanical completion and detailed commissioning procedures for the plant for the dry and wet commissioning phases.

16.7 Project Schedule

A Gantt chart for the development activities in China and Australia has been prepared by Lynas. It shows the first commercial product being shipped in February 2008 and is based on the commencement of basic engineering for the cracking and separation plant in May 2006. Full production is scheduled to be achieved by the end of 2008. The BED and DED of the cracking and separation plant are the early key tasks on the critical path. Key milestones during project development are set out in Table 16.1.

Table 16.1

Development Schedule Milestones

Milestone	Date
Australian Operations	
Commence Grade Control Drilling	October 2006
Commence Pre-strip	January 2007
First Ore from Mt Weld	May 2007
First Shipment of Ore from Esperance	August 2007
Chinese Operations	
Concentrator	
Commence DED	April 2006
Commence Construction	December 2006
Mechanical Completion	September 2007
Wet Commissioning	October 2007
First Concentrate to Cracking and Separation Plant	November 2007
Cracking and Separation Plant	
Commence BED	May 2006
Commence DED	September 2006
Commence Construction	March 2007
Mechanical Completion	October 2007
Wet Commissioning	November 2007
First Commercial Shipment	February 2008

Conclusions

The implementation plan proposed by Lynas appears reasonable. Its success will depend to a large degree on recruiting and maintaining a well-qualified and experienced project management team in China.

The development schedule also appears reasonable although there may be some front-end slippage. Success in meeting the milestone dates will depend to a large degree on the diligence of the Lynas project management team in monitoring and overseeing the progress of the design teams.

17.0 STATEMENT OF CAPABILITY

This report has been prepared by Mr Malcolm Hancock and Mr John McIntyre, Directors of BDA, and Mr Rolly Nice, Mr Erwin Baumgartner, Mr Bob Sega, Mr Richard Frew, Ms Janet Epps and Mr Adrian Brett, Senior Associates. A summary of their professional qualifications and experience is included below.

BDA is a full service engineering and financial consulting firm, specialising in due diligence and Independent Expert reviews and valuations, Independent Engineer assignments and technical audits of resources, reserves, mining and processing operations and project feasibility studies. The parent company, Behre Dolbear & Company Inc., was founded in 1911 and is the oldest continuously operating mineral industry consulting firm in North America. Behre Dolbear has offices in Denver, New York, Toronto, London, Vancouver, Guadalajara, Santiago and Sydney.

Mr Malcolm Hancock (BA, MA, FAusIMM, FGS, MIMM, MGSA, MMICA) is Executive Director of BDA. He is a qualified geologist, with over 30 years experience of exploration and mining projects principally in Australia, Africa and South East Asia. He has extensive experience in the areas of resource/reserve estimation, reconciliation, project feasibility and development, mine geology and mining operations. Mr Hancock has been involved in the feasibility and assessment of many mining operations and has worked on both open pit and underground mines. He has been closely involved with the development of the BDA Independent Engineer capability and has managed and directed many of the assignments completed to date.

Mr John McIntyre (BE (Min) Hon., FAusIMM, CP (Min), MMICA) is Managing Director of BDA. He is a qualified mining engineer who has been involved in the mining industry for more than 30 years, with operational and management experience in base metals, gold and coal in open pit and underground operations. He has been involved in numerous mining projects and operations, feasibility studies and technical and operational reviews in Australia, West Africa, New Zealand, North and South America, PNG and South East Asia. He has been a consultant for 17 years, primarily involved in the management of BDA since 1994, and in the development of the independent engineering and technical audit role.

Mr Roland Nice (BSc, MAusIMM, MCIM, MAIME, MIEAust, Chartered Engineer) is a Senior Associate of BDA with almost 40 years as a professional metallurgical engineer. He has extensive experience in process engineering and operations, project evaluation, technical design and analysis. He has held senior management positions, including General Manager, Metallurgy (12 years) and Concentrator Manager (4 years). Mr Nice has been closely involved with the development and construction of gold, copper, non ferrous and base metal mines, including process plant design, as well as numerous other metallurgical projects. He has worked in Australia, South East Asia, Africa, South America and Canada.

Dr Erwin Baumgartner (PhD, MGÖCH, MGCORR, MFFG) is a Senior Consultant to BDA and a specialist in the areas of Chemistry and Material Sciences. He is Head of R&D at Carinthia Technical Institute, University of Applied Sciences at Spittal in Austria and lectures in Chemistry, Construction Materials and Material Sciences. He is a specialist consultant to the Chemical and Ceramic industries. He has worked previously for Treibacher Industry Inc as Production Manager and General Manager in the Rare Earths and Metals Division, with responsibilities for the glass, ceramic and catalyst industries in Europe and USA. He has made several visits to China and has consulted to Molycorp Inc on the Mountain Pass Operation in the USA. He has undertaken research at the Technical University of Berlin and post-doctorial studies at Virginia State University and University of Graz.

Mr Robert Sega (BEng. (Metallurgy), MAIMM, Chartered Engineer) is a Senior Associate of BDCI with more than 40 years as a professional metallurgist. He has extensive experience in process engineering and operations, and spent a significant part of his career as General Manager of the Mountain Pass rare earth operations of Union Oil Company. He is experienced in technical design and analysis for rare earth recovery processes and is well regarded as an expert in REO extraction.

Mr Richard Frew (BE Civil, MIE Aust) is a Senior Associate of BDA with more than 35 years experience as a planning, estimation and contracts engineer. He is experienced in contract management, feasibility study review, financial modelling, capital cost estimation, infrastructure, project controls and implementation. He has worked on a large number of projects providing management and project services to the owners or financiers. He has worked on major projects in Australia, the Philippines, Argentina, Mauritania, New Zealand and Romania.

Ms Janet Epps (BSc. (Geol), MSc. (Envir.)) is a Senior Associate of BDA with more than 30 years experience in specialist environmental and community issues management, policy development and regulatory consultancy services. Ms Epps has worked with the UN, World Bank, the IFC (including work in the Ombudsman's Office of the IFC in Washington) and the Multilateral Investment Guarantee Agency (MIGA), providing policy advice to governments of developing countries on designed projects and contributing towards sustainable development strategies. Ms Epps has been a pioneer in developing the sustainability concept as it relates to the mining industry and she has completed assignments in Australasia, South-East Asia, CIS, Africa and South America.

Mr Adrian Brett (BSc (Hon) Geol, MSc.(Envir.), M. Envir. Law) is a Senior Associate of BDA with more than 30 years experience in environmental and geo-science, including the fields of environmental planning and impact assessment, site contamination assessments, environmental audit, environmental law and policy analysis and the development of environmental guidelines and training manuals. He has worked in an advisory capacity with several United Nations agencies, including UNEP, UNESCAP, DDSMS, UNCTAD and UNRFNRE, as well as Australian government agencies. He has worked in Australasia, South-East Asia, Africa and South America.

18.0 STATEMENT OF INDEPENDENCE

Neither the Principals nor Associates of BDA have any material interest or entitlement in the securities or assets of Lynas, or any associated companies. BDA will be paid a fee for this report comprising its normal professional rates and reimbursable expenses. The fee is not contingent on the conclusions of this report.

19.0 LIMITATIONS AND CONSENT

This assessment has been based on data, reports and other information made available to BDA by Lynas and referred to in this report. Lynas has advised BDA that all relevant documentation relating to the project has been provided and that the information is complete as to material details and is not misleading. A draft copy of this report has been provided to Lynas for comment as to any errors of fact, omissions or incorrect assumptions.

BDA has reviewed the data, reports and information provided and has used consultants with appropriate experience and expertise relevant to the various aspects of the project. The opinions stated herein are given in good faith. BDA believes that the basic assumptions are factual and correct and the interpretations are reasonable.

BDA does not accept any liability to any individual, organisation or company and takes no responsibility for any loss or damage arising from the use of this report, or information, data, or assumptions contained therein. With respect to the BDA report and use thereof by Lynas, Transocean and Arbuthnot, Lynas agrees to indemnify and hold harmless BDA and its shareholders, directors, officers, and associates against any and all losses, claims, damages, liabilities or actions to which they or any of them may become subject under any securities act, statute or common law and will reimburse them on a current basis for any legal or other expenses incurred by them in connection with investigating any claims or defending any actions.

This report is provided to Lynas, Transocean and Arbuthnot in connection with the proposed AIM listing by Lynas and should not be used or relied upon for any other purpose. This report does not constitute a legal audit. Neither the whole nor any part of this report nor any reference thereto may be included in or with or attached to any document or used for any purpose without BDA's written consent to the form and context in which it appears. BDA hereby consents to the inclusion of this report in the admission document to be issued by Lynas in connection with its AIM admission and to the references to this report and to BDA therein in the form and context in which they appear and accept responsibility for our report for the purposes of regulation 13(1)(d) of the UK Public Offers of Securities Regulations 1995.

Yours faithfully

BEHRE DOLBEAR AUSTRALIA PTY LTD

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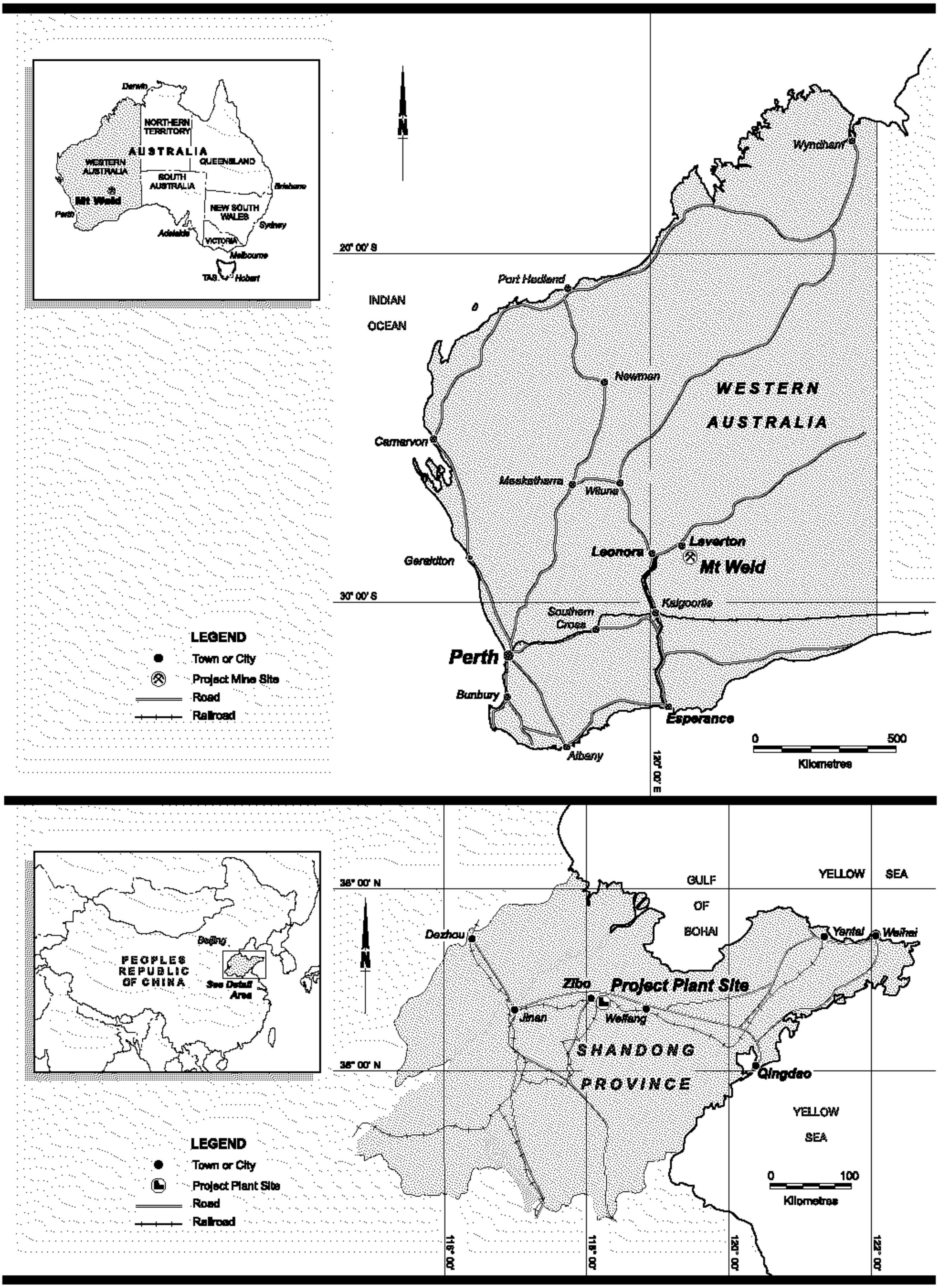
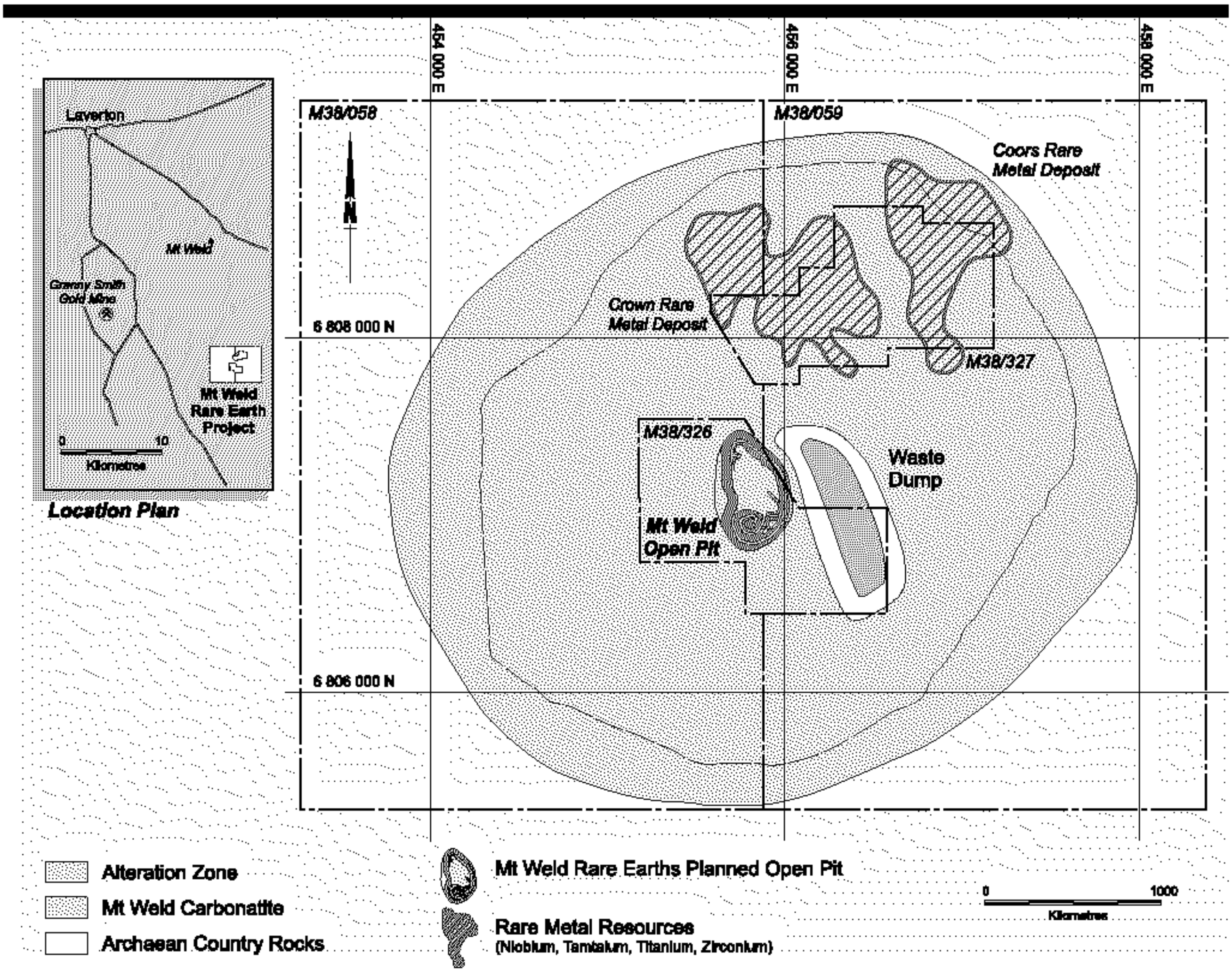
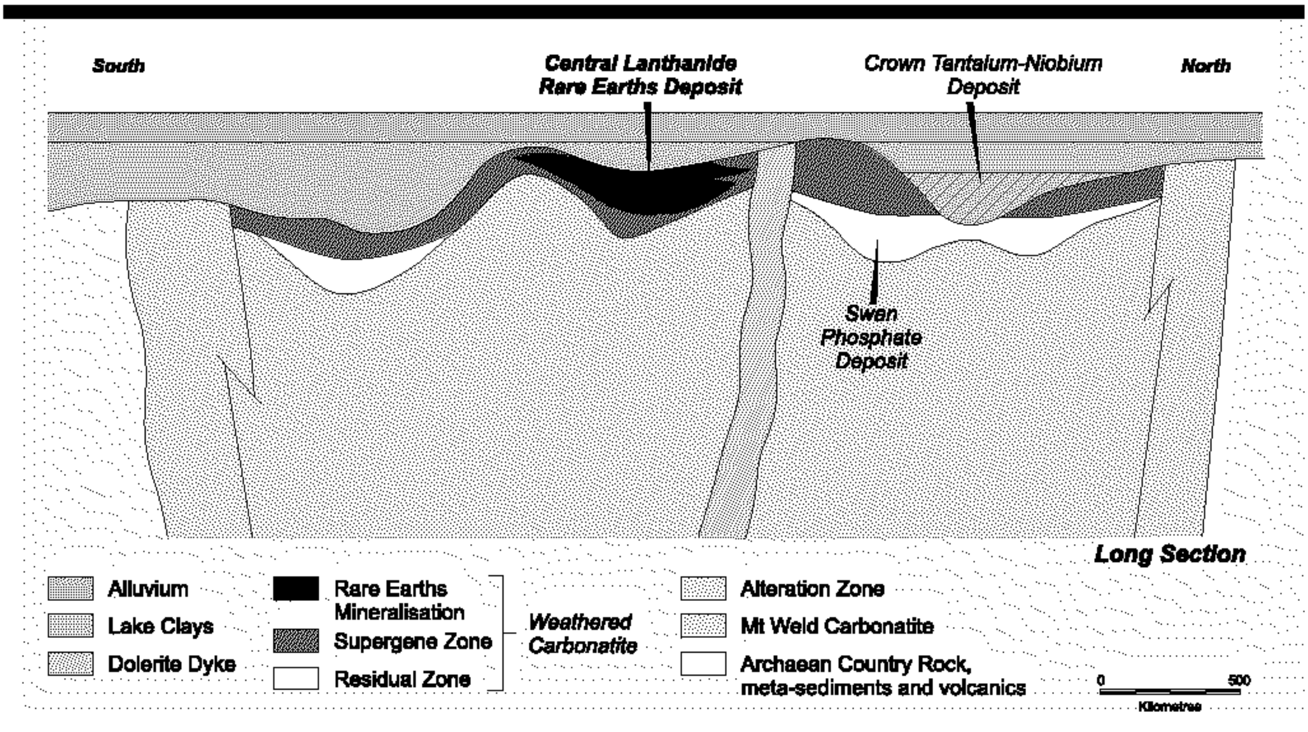


Mt Weld Rare Earth Project **Lynas Corporation Limited**

Figure 1 GENERAL LOCATION PLAN - WESTERN AUSTRALIA AND CHINA

Behre Dolbear & Company Inc.





Mt Weld Rare Earth Project **Lynas Corporation Limited**

Figure 2 MT WELD PLAN AND SECTION - WESTERN AUSTRALIA

Behre Dolbear & Company Inc.

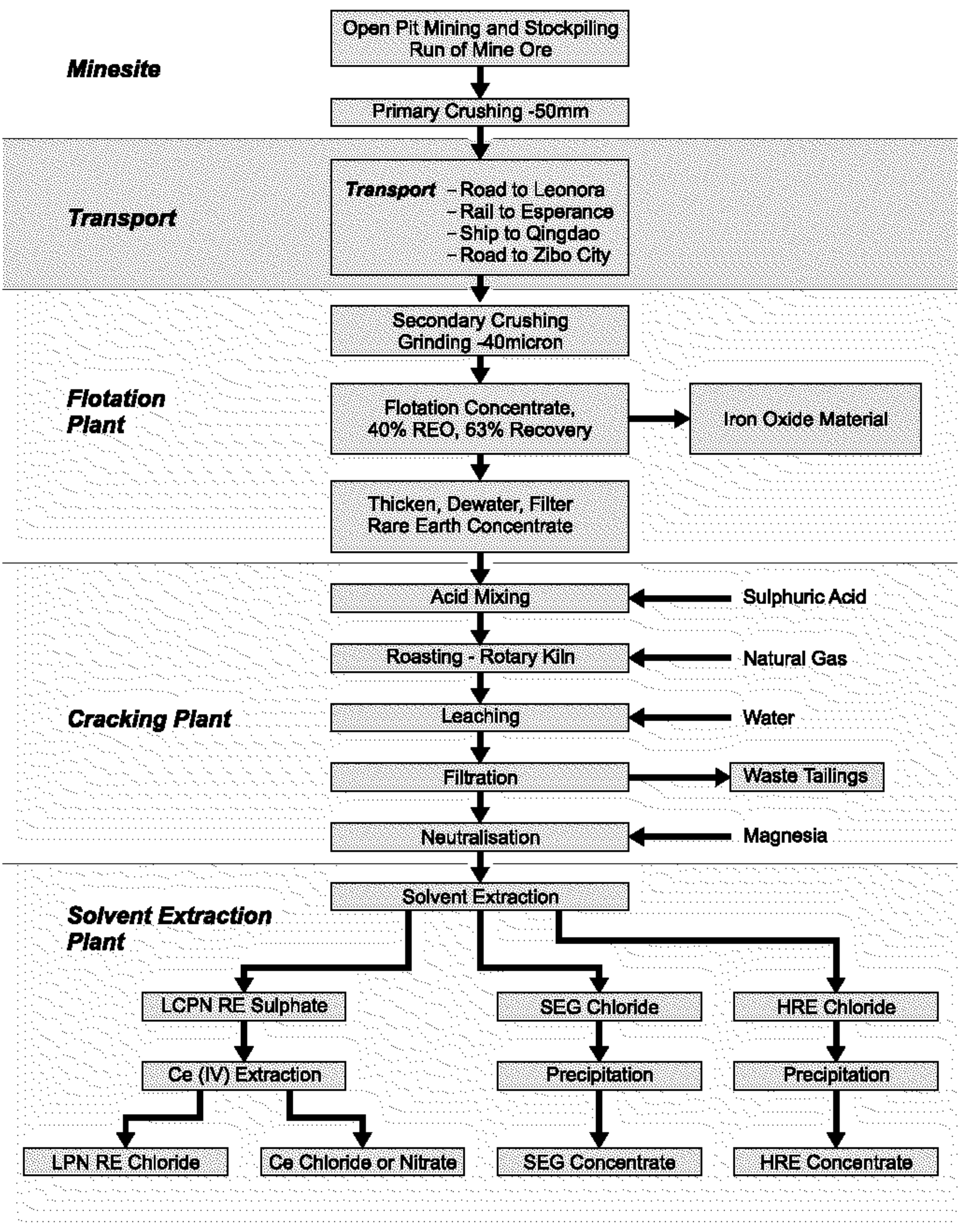


Figure 3 LYNAS RARE EARTHS SIMPLIFIED FLOWSHEET