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Cutting-edge WA oil and
gas industry courses



PROSPECT



The new year presents Western Australia with some tremendous challenges and opportunities.

Following an economically-volatile 2011, this year may present ongoing hurdles. For WA, which is dependent on the resources sector, a close watch will be kept on events in Europe and China.

While world events will have some impact on the WA economy, there's every reason to believe the State will continue its steady growth. The petroleum sector is seeing sustained gas demand from Asian countries', meaning more fields will likely be developed.

With so many major projects committed to, there will be strong investment and increasing employment opportunities. As reported in this issue, employment in the WA mining and resources sectors has broken the 100,000 barrier.

The State is leading the way when it comes to helping people find employment in the sectors, with this issue highlighting three world-leading oil and gas training programs.

The continued increase in resources projects contributes directly and indirectly to the State's growth.

Prospect looks at how work programs and millions of dollars spent on major projects filters through to dozens of local companies and thousands of workers.

Current developments will benefit the State for up to 50 years. The focus for the Government, through the Departments of State Development and Mines and Petroleum is on securing the future for generations to come.

The Government knows this is an important period in WA history. Now is our chance to increase our productive capacity. We are doing that with major expansions in LNG and iron ore, port and rail developments.

We're not about to let these opportunities pass us by.

Colin Barnett
PREMIER OF WESTERN AUSTRALIA & MINISTER FOR STATE DEVELOPMENT

Norman Moore
MINISTER FOR MINES AND PETROLEUM

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Cover photo: WA's world-leading resources industry training is epitomised by Challenger Institute of Technology's Daniel Hendon (2010 Student of the Year & 2010 Apprentice of the Year) on site at the Australian Centre for Energy and Process Training (ACEPT). See story, page 14



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Resources safety reforms gather pace

Mine safety

The Department of Mines and Petroleum (DMP) and the resources industry have seen momentous change during 2011.

Industry has bounced back from the slight shrinkage of employment statistics in 2010 to record employment levels and investment.

A number of major expansion projects are reaching the production stage, while new expansions are leaving the drawing board and creating additional employment opportunities. There is no reason to believe this trend will change.

State Mining Engineer Simon Ridge said such unprecedented growth brings with it significant risks, which must be diligently managed.

"These include an influx of less-experienced workers, which presents

a particular challenge to supervisors, trainers and safety and health representatives," Mr Ridge said.

"Employers also face the challenge of maintaining a stable workforce when individuals may be attracted to different rosters or newer camps, leading to the unwanted outcome of high staff turnover."

Mr Ridge said such factors can adversely influence safety performance. The mines inspectorate is also subject to similar pressures.

"During 2011, the safety regulator was able to recruit, train and graduate 22 new inspectors," Mr Ridge said.

"The next challenge is to use these additional resources productively."

The Reform and Development at Resources Safety initiative, commonly termed RADARS, is beginning to show results.

One example is the establishment of focus groups tasked with developing programs that address "big-ticket" items in the industry's safety lexicon.

"The inspectorate has actively sought input from stakeholders in the development of new approaches," Mr Ridge said.

"This covers issues such as submissions for high-voltage installations, working at heights underground and a risk-based framework for on-site atmospheric containment monitoring and assessment."

Focus groups are also involved in drafting guidance for topics as diverse as exploration drilling safety and the role of gendered behaviours in determining safety outcomes (i.e., toughness in mining).

The work of the focus groups is based on industry input and analysis of incidents.

“Such initiatives and the ongoing work of the focus groups will ensure a consistent and measured approach to real issues in the mining safety arena,” Mr Ridge said.

“Although the department has just completed phase 5 of the RADARS-related recruitment project, we will continue to seek suitable specialists in the fields of mining, mechanical and structural engineering to deliver the required level of regulatory services.”

Petroleum safety

The Petroleum and Geothermal Energy Safety Levies Act 2011 and the Petroleum and Geothermal Safety Levies Regulations 2011 commenced on 1 January 2012.

The cost recovery initiative has been introduced to ensure, to the greatest possible extent, a fair and equitable distribution of the cost of administering petroleum and geothermal energy safety regulation in WA state waters and onshore areas, with minimal administrative burdens for industry and the regulator.

Petroleum is a complex industry requiring high end technical safety assessments, inspections and audits to ensure the

safety and health of workers. Indirectly, safety requirements also protect the community and help ensure continuity of supply.

The revenue will enable DMP’s Resources Safety Division to fund existing activities, as well as expand services through the recruitment of specialist safety and risk analysts and other safety and health initiatives.

Current activities conducted by the Petroleum Safety Branch include safety and risk assessments; inspections and audits; investigation of accidents; collection and reporting of safety and health statistics; and provision of safety and health advice.

The revenue may also be used to implement new safety and health initiatives. This includes staff increases for the current program of enforcement work, such as inspections and audits, while addressing the increasing workload of the Petroleum Safety Branch from increased industry activity.

The funds are also vital in ensuring DMP attracts high-calibre staff with the necessary technical skills, experience and qualifications; within a highly competitive industry.

The department has also initiated competency-based training and development programs for all staff. This involves the attainment of diploma-based qualifications recognised across Australia that are also consistent with other safety inspectorates.

A dedicated team of experts has been formed to investigate serious incidents, across the resources industry. This will lead to targeted safety initiatives aimed at eliminating the root causes of avoidable incidents.

Enhanced data management and analysis systems will allow decisions about compliance and education work programs to be based on evidence and risk profiles.

DMP staff will also be able to access compliance and other databases remotely, allowing better use of their time and resources.

Dangerous goods safety

Work continues to progress amendments that will reduce the regulatory burden and streamline administrative processes associated with dangerous goods safety legislation.

Amendments to the explosives regulations are expected to be gazetted within the coming months, with changes to the regulations for storage and handling of non-explosives anticipated in 2012.

The licensing structure for dangerous goods sites in Western Australia is being overhauled. Amendments will include the introduction of a cost-recovery regime for the regulation of dangerous goods safety.

In response to requests from industry, there has already been a move from three-year terms to annual licensing, as allowed by recent amendments to the regulations, in preparation for licensing changes.

National harmonisation of OHS legislation

National harmonisation of occupational health and safety legislation is progressing, with assigned resources in the Resources Safety Branch preparing for its introduction.

DMP is preparing a set of drafting instructions for the Mines Work Health and Safety (WA) Bill (MWSH Bill). Once finalised, they will be submitted to Cabinet for approval.

Regulations accompanying the MWSH Bill are under consideration and will be developed further under the National Mine Safety Framework (NMSF), by a newly convened legislation working party, chaired by an independent person.

WA is committed to implementing harmonised mining OHS laws, which will be consistent or uniform with mining OHS laws in Queensland and New South Wales. This will provide a seamless mining OHS system across the three states.

It is anticipated that Western Australia will implement harmonised OHS legislation from 31 December 2012. ■



Cutting-edge database tops off department's year



Minister for Mines and Petroleum, Norman Moore launching Aster Map.

The Department of Mines and Petroleum (DMP) continues to play an important role in attracting private investment in responsible resources exploration and development. DMP is the State's lead agency in providing geoscientific information, along with the management of equitable and secure titles systems for the mining, petroleum and geothermal industries.

There were many highlights in 2011, from DMP's award-winning software and online systems, enhancements to approvals processes, new policies to protect the environment and people and progress on the State's first on-shore carbon capture and storage project.

Innovation in software and online systems

DMP makes freely available state-of-the-art computer software to improve public access to geoscientific information, delivered by the Geological Survey Western Australia (GSWA).

2011 saw the public launch of GeoMap.WA, which is a DMP developed award-winning desktop map-viewer application using Geographical Information System (GIS) technology.

GSWA has been gathering and disseminating important regional geoscientific information for over 100 years. The new software makes the valuable data more accessible to the community.

One of DMP's online database systems was rated number one in the world by the 2011 Fraser Institute's Global Petroleum Survey. Western Australian Petroleum and Geothermal Information Management System (WAPMIS) won the prestigious accolade against 135 other investment destinations.

In a world-first, DMP, in collaboration with the Commonwealth Scientific and Industrial Research Organisation (CSIRO), released ASTER (Advanced Spaceborne Thermal Emission and Reflection) satellite images covering the entire State.

These images provide exploration geologists with a new way of searching for mineral deposits, by providing basic information about the dominant rock and soil-forming mineral components. This ASTER project formed part of the Exploration Incentive Scheme, funded by Royalties for Regions.

New mineral and development projects

DMP continued to support the development of new mineral resources and innovative technology projects in 2011.

There have been significant efforts by industry and government to progress uranium projects. Investment in uranium exploration in 2010/11 reached a record \$100.7 million, which represents an increase of 76 per cent from the previous year.

DMP is the lead agency in facilitating the introduction of uranium, bringing together expertise of State and Federal Government agencies to ensure the protection of the environment. The production of this high-demand resource will bring significant social and economic benefits to the local community and the nation.

Oil and gas project developments

Throughout 2011 DMP contributed to achieving high levels of exploration and development. During 2010/11, \$2.4 billion was invested in petroleum exploration in the State, representing 73% of national petroleum expenditure.

Project developments have included:

- Approvals to support projects already sanctioned, including Gorgon and Devil Creek;

- Facilitating approvals for projects that achieved Final Investment Decision (FID) during 2011 including two LNG developments; Wheatstone and Prelude, as well as Pyrenees Oil, and gas developments - NWS Western Flank, Macedon and Halyard;
- Facilitated approvals for projects where FID was programmed, Ichthys and Finucane; and
- Several pipeline licence approvals to support this activity.

Balancing act

For continued economic prosperity for the State, it is paramount to ensure there is a healthy balance between environmental responsibility and resource development.

Ensuring the State is adequately protected upon closure or relinquishment of a mine has been ensured through the new guidelines for mine closure released in 2011.

Planning for mine closure must now be considered in the initial planning phase of the project. This allows companies to better plan for and manage mine closure and minimize unexpected problems when a mine is closed, resulting in better outcomes for the environment and company budgets.

A review of the environmental bonds system was undertaken in 2011, with extensive public consultation to ensure the new policy was adequate to meet industry, government and the community's needs. An announcement on the outcome of the consultation is expected in 2012.

With another year now in the rear-view mirror, DMP looks forward to the challenges and achievements ahead in 2012: to ensure that Western Australia is the destination of choice for responsible resources exploration and development, for the long-term benefit of the Western Australian community. ■

Vanadium mine's new lease of life

IT'S one of the State's newest mines ... sort of.

The Windimurra vanadium mine near Mount Magnet, 600km north east of Perth, has just produced its first output in eight years.

Discovered in the 1960s and built in 1999 at a cost of more than \$200 million, more than 13,000 tonnes of high-quality vanadium pentoxide was produced at Windimurra. The mine was closed in 2002 when vanadium prices fell as low as \$US7.73/kg and escalating operating costs put the project economics on shaky ground.

Windimurra Vanadium subsequently tried to restart the operation but had to call in administrators in 2009 after an \$80 million cost blowout, according to news reports.

A November 2009 agreement between Mineral Resources and the receiver and managers of Midwest Vanadium Pty Ltd resuscitated the project, but Mineral Resources stepped aside and Atlantic Ltd acquired 100 per cent of the project in late 2010.

The company engaged specialist engineers to assist in the production ramp-up to improve the performance of the crushing, milling and beneficiation plant.

The mine has a production capacity of 6,300 tonnes of contained vanadium per annum, up from a forecast of 5,700 tonnes, according to the company.

Demand is being driven by China, which accounts for nearly 40 per cent of world steel production and is increasing its demand for steel grades that use vanadium.

These figures should see the mine, which has a life of 28 years, producing seven per cent of the world's vanadium. (Production is dominated by China, South Africa and Russia).

"We are focused on production ramp-up from current opening levels towards production capacity over the next 15 months and I look forward to reporting on our progress," said Atlantic's managing director Michael Minosora.

The company will be undertaking \$14 million worth of modifications to the milling and beneficiation components this year, but a workaround will have minimal impact on the mine's aim of being at 65 per cent capacity.

Windimurra Vanadium also has a 15-year gas transportation contract in place, with gas the key fuel for the mine – something unique in the vanadium industry. The gas will be used to fire the existing rotary kiln and for the power station.

Roasting the ore concentrate with natural gas yields a higher-purity vanadium product than is produced by competitors, who use pulverised coal.

Atlantic also identified a haematite by-product revenue stream and has completed arrangements for an iron ore logistics chain. This included site preparations for iron ore screening, loading and transport and business approvals. A loading trial using containers was successfully trialled at Geraldton port in December 2011. Subject to customer confirmation, the first shipment from Geraldton Port is anticipated in the first quarter of 2012. ■

- Vanadium is used as an alloy for steel (85 per cent of use) and in smaller amounts for titanium. Example: the Beijing Olympic Stadium used 45,000 tonnes of steel. Wembley Stadium used 23,000 tonnes.
- World resources of vanadium exceed 57 million tonnes. Vanadium occurs in deposits of phosphate rock, titaniferous magnetite, and uraniferous sandstone and siltstone, in which it constitutes less than 2% of the host rock. Significant amounts are also present in bauxite and carbon-bearing materials, such as coal, crude oil, oil shale, and tar sands (Source: US Geological Survey, 2012).

Domestic gas supply strengthened

Western Australia's future energy needs have been strengthened through contracts with proponents of the Gorgon gas project.

The agreements will deliver substantial gas supplies to WA, which is more dependent on gas than any other State. Gas represents 56 per cent of the primary energy fuel source in Western Australia, which is significantly more than in the other States and Territories, where gas averages just over 20 per cent of the energy mix.

"These agreements provide long-term and reliable domestic energy supply, which will enable us to maintain a strong and vibrant economy in conjunction with an additional stream of energy security," said the Premier and Minister for State Development Colin Barnett.

"Energy security is vital to our State's ongoing growth and development, and the Government is ensuring it is doing everything possible to provide West Australians with a secure, reliable and sustainable energy future."

The supply agreements will be activated to coincide with Verve Energy and Synergy's gas supply arrangements expiring in or around 2015-16.

"These contracts are of strategic importance to the State and provide a firm foundation for Verve's and Synergy's gas portfolios, both of which are expected to grow significantly in the future," Mr Barnett said. "They provide supply tenure that will deliver energy security for decades."

Verve Energy and Synergy have entered into contracts for a combined 125 terajoules per day, for 20 years commencing in 2015.

Mr Barnett said the announcement of the supply agreements was timely, as the focus on major projects such as Gorgon delivering benefits to the community was always a priority for the government.

"With the State's vast supply of natural gas, WA has prospered, with both domestic gas use and exports contributing to our economic success," Mr Barnett said.

"While these are significant agreements vital to the reliability and security of domestic energy supply, the Government acknowledges there is still more to be done to ensure our growing demand is catered for. ■



Devil Creek Domestic Gas Plant.



© Apache Energy

Apache production technician Wayne Sorensen monitors the first official flow of domestic gas from Devil Creek, witnessed by Premier Colin Barnett (second from left), the US Ambassador Jeffrey Bleich (left), WA/NT Director of Santos John Anderson (rear) and Apache Managing Director Tom Maher (right).

Devil Creek boosts State's gas supply

New investment in domestic gas production will be increasingly important for Western Australia's economic future, Premier and State Development Minister Colin Barnett said as he opened the Devil Creek Gas Plant and Hub, 45 km south west of Dampier.

"As WA's third domestic gas plant, and the first new facility built in more than 15 years, Devil Creek has increased the State's domestic gas production capacity by 20 per cent," Mr Barnett said.

"By providing an additional, independent supply of gas, the Devil Creek plant will make a significant contribution to our energy security.

"Natural gas is critical to the State, as feedstock for industry, for household heating and cooking and as a major energy source for almost 50 per cent of electricity production.

"With WA's population growing strongly, and its mineral production and processing industries expanding, demand for natural gas is continuing to increase.

"In addition, future development of magnetite iron ore resources will create significant new energy requirements."

Mr Barnett said the State Government was committed to expanding domestic gas supply, both by requiring that 15 per cent of natural gas processed onshore was reserved for domestic use, and by supporting exploration and associated activities.

Mr Barnett congratulated the operator, Apache Energy, and its joint venture partner Santos Ltd for their ongoing commitment to WA.

"The Devil Creek project is a \$1.1 billion investment project and Apache estimates Australian content accounts for about 60 per cent of this," he said.

"This is Apache's second domestic gas plant in WA, and both partners are also involved in many of the other oil, LNG and natural gas projects currently underway that will see production accelerate during the next decade."

The opening of the new plant was akin to a double celebration for Apache, which has operated in WA for 20 years.

Mr Barnett said the opening of Devil Creek also marked a milestone in WA's emerging magnetite iron ore market.

"This project will provide natural gas to the Sino Iron project," he said. "It is the first, large-scale project to transform low-grade magnetite iron ore into an export product." ■

FACT FILE

- Devil Creek Project includes an offshore wellhead platform in the Reindeer field, a 105 km pipeline to shore and a gas plant.
- The project includes two trains with combined production capacity of 220 terajoules of gas per day (tj/d). WA's current domestic gas production capacity is about 1,000 tj/d.
- The project will also produce an estimated 1,000 barrels per day of condensate, to be processed as transport fuel at BP Refinery, Kwinana.
- The project has an expected life of 20-30 years.
- Devil Creek complements existing domestic gas production at Dampier (North West Shelf Venture operated by Woodside), Varanus Island (also operated by Apache).
- Future domestic gas plants include Macedon (operated by BHPB) and part of the Gorgon and Wheatstone projects (operated by Chevron).



Kemerton Industrial Park.

Industrial land in the “fast lane”

The rapid expansion of Western Australia’s mineral and energy production is creating significant opportunities for new investment in major industrial projects.

These include new export industries based on the State’s diverse resources and other types of industry producing inputs to meet the resources sector’s growing demands.

To help attract and secure this new investment the Western Australian Government is currently developing more than 7,483 hectares of “project-ready land” for heavy industry, at five key locations near existing, or planned resources export ports.

The Department of State Development is co-ordinating the work of a range of agencies to deliver the State Government’s Heavy Use Industrial Lands Strategy.

Christine Ginbey, the department’s Director, Strategic Industrial Lands, says the Strategy will ensure sufficient, suitable land is available for heavy industry in Western Australia.

“These will be buffered industrial areas to accommodate multiple projects, with good access to transport and export infrastructure, and, where possible, to services such as gas, power and water supplies and waste water disposal,” Ms Ginbey says.

“The aim is to significantly reduce risks and lead times, for new major projects, such as resources processing, advanced manufacturing and chemicals production.

“Structure planning for each industrial area will identify potential heavy industry sites, infrastructure corridors and provision for support industries, as well as any constraints on development.”

“It includes undertaking engineering and surveying work, including soil and hydrology investigations, identifying and resolving land interest and access issues, and preparing environmental and heritage management plans to meet State and Federal approvals requirements.

“This will allow future proponents to focus on obtaining approvals for their individual project, instead of having to undertake additional preliminary approvals.”

The department works with relevant local governments and Port Authorities to ensure consistent and connected planning strategies.

Other organisations contributing to the success of the Strategy include LandCorp, the State Government’s land and property developer; the Department of Transport; planning and environmental agencies; and energy and water utilities.

Ms Ginbey says under the Heavy Use Industrial Land Strategy three industrial areas are being developed in the State’s mineral powerhouse, the Pilbara:

The Boodarie Industrial Estate: The estate is within a few kilometres of the world’s largest bulk cargo port at Port Hedland, whose current throughput of more than 200 million tonnes per annum

(Mtpa) is expected to double within the next decade. The estate is appropriately zoned and buffered for resource processing projects, serviced with a natural gas pipeline and already has some road access. While Port Hedland is largely an iron ore export port, its hinterland produces other minerals including: salt, manganese, copper and chromite. More than 2,200ha is potentially available for heavy industry.

The Anketell Heavy Industry Area:

Planning is underway for a heavy industrial area, initially covering 568ha, to be developed close to the proposed new 350Mtpa iron ore port. The site, which is close to the existing Dampier port, and existing electricity, water and gas supplies, could potentially be expanded to 1000ha in future.

The Ashburton North Strategic Industrial Area:

Structure planning is underway for the area which is already the location for Chevron’s \$29 billion Wheatstone LNG Project and BHP Billiton’s Macedon Natural Gas plant. The estate, which could accommodate another full-scale LNG plant, will be developed for hydrocarbon-based processing. Hydrocarbon industries which could possibly be accommodated within the Estate include ammonia, ammonium nitrate, urea and gas-to-liquids production facilities. The initial planning focuses on approximately 1,500ha of heavy industrial area within the 8,000ha available for potential development.

Two other HUILS projects are located further south.

Oakajee Industrial Estate: Located 23km from the City of Greater Geraldton, the regional centre for the State’s Mid-West Region, this industrial estate is part of a multi-billion dollar project to develop a deepwater port, and rail linkages to open up a major new iron ore and mineral province. The Western Australian Planning Commission recently approved a Structure Plan that provides for a 1,000ha Strategic Industry Area, 196ha General Industry Area, 1,000ha Port Area and a Buffer in excess of 4,000ha.

The Kemerton Industrial Park: This 7,500 ha estate near the City of Bunbury in the State’s South West, was originally established in 1985 and is already the base for a diversity of industries including mineral and silica sands processing, chemicals, gases and electricity generation. Structure planning and an environmental approvals process are underway to identify optimal future development of the area, including 2,019ha potentially available for heavy industry. ■



© Minara Resources Limited

Mining employment in WA continues to grow

Total mining employment in Western Australia is close to reaching 100,000 and is growing strongly.

According to the ABS (latest data available), the mining sector had 101,000 full time employees in WA in November 2011, which represented a 18% increase year on year.

The figures follows the release of data showing a rise in mining exploration spending and a continuing strong oil and gas sector.

Department of Mines and Petroleum figures (which use a different formula for calculating employment) shows 92,565 people employed in the minerals and petroleum industries. The department says this is an 8.7 per cent increase over 2010, when the figure was 85,163.

WA Chamber of Minerals and Energy's director Damian Callachor says the challenge for the state will be in sustaining growth.

He says Western Australia still needs more engineers and electrical contractors.

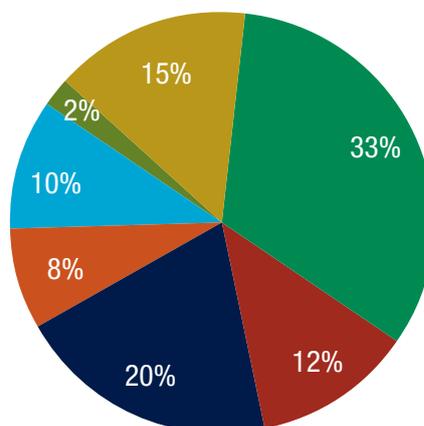
"In particular, there is a huge construction in relation to iron ore projects and some of the major gas projects in the Pilbara, so certainly the engineering and electrical disciplines will be a focus for the industry to grow," Mr Callachor said.

"Obviously there are expansion projects in the South West and the burgeoning iron ore industry in the Mid West is proving a great growth area as well."

Mr Callachor says a survey by the Chamber predicts a workforce of 120,000 by 2013. The International Business Times says WA mining magnate Gina Rinehart, the country's richest woman, estimated the shortage to be 150,000 positions.

The Times' web site also highlighted Manpower Employment's Outlook Survey, which found 32 per cent of employers in Australia's mining and construction sectors said they plan to hire more people in 2012. ■

Where the jobs are:



Iron Ore	33%
Alumina	12%
Gold	20%
Petroleum	8%
Nickel	10%
Heavy Min Sands	2%
Other	15%

Minerals and Petroleum Employment 2010-11

Source: DMP 2011



© Dampier Port Authority

Dampier Port, which will become part of the the Kimberley Ports Authority.

Ports reforms announced

The State Government will undertake the biggest reform of the State's ports in decades, to ensure the wealth generated by increasing commodity exports deliver greater benefits to the Western Australian community.

Under the plan, seven of the State's eight port authorities will be consolidated into four regional port authorities to improve efficiency and reduce red tape.

Premier and State Development Minister Colin Barnett said the plan was developed after a comprehensive review of the governance of WA ports undertaken by the Liberal-National Government.

"The current port governance model has served the State well since it was introduced by the Court Coalition government in 1995, but the growing demand for WA commodities meant it was time to review this model to ensure we provide our ports with the most effective framework for the future," Mr Barnett said.

"Since 2000, the value of WA's merchandise exports has risen by more than 300 per cent - from \$25.4 billion to \$112.2 billion - and our share of merchandise exports increased from 26 per cent to 46 per cent of the nation's total.

"There are currently 21 ports; and new ports will be constructed at Barrow Island's Gorgon project, Wheatstone, Oakajee, James Price Point and Anketell. It clearly makes sense to consolidate all these existing and future ports into an appropriately-managed regional port structure.

"Our ports facilitate the State's wealth and, by implementing a more efficient framework, the Liberal-National Government will ensure that more of the wealth being generated is returned to the community through improved health, education, police and other services."

The 13 smaller ports currently controlled by the Department of Transport would come under the jurisdiction of the regional port authorities, with Fremantle to remain a stand-alone port authority.

No decision has been made on which regional port authority will be formed first. The timing and extent of amalgamations will depend on current contracts and potential impact on port customers and industry.

Five future ports planned for the Kimberley, Pilbara and Mid-West will also come under the control of the four regional port authorities.

There will be extensive consultation with port customers and industry, with the State Government expecting to announce the first regional port authority in 2014.

Amendments to legislation to enable the phased consolidation would be drafted this year and presented to State Parliament in 2013, with a staged implementation to commence from 2014. ■

The ports

- Kimberley Ports Authority comprising the ports of Broome, Derby, Wyndham, Cockatoo Island, Koolan Island and the proposed port at James Price Point.
- Pilbara Ports Authority – Port Hedland and Dampier, proposed new ports at Anketell and Ashburton North; and ports at Cape Preston, Port Walcott, Varanus Island, Barrow Island, Airlie Island, Thevenard Island and Onslow.
- Mid-West Ports Authority – Geraldton, proposed new port of Oakajee and ports at Cape Cuvier and Useless Loop.
- Southern Ports Authority – Bunbury, Albany and Esperance.

State moves to capture and store carbon

The South West Hub Carbon Capture and Storage (CCS) Project is a leading initiative in the attempt to reduce carbon dioxide emissions in our State.

The project, being managed by the Department of Mines and Petroleum (DMP), has progressed to the drilling of the first data well, known as a stratigraphic well.

CCS or geosequestration involves capturing carbon dioxide (CO₂) emissions from industrial sources before they are released into the atmosphere. The captured CO₂ is then liquefied, transported by pipeline and pumped deep below the ground for permanent storage.

The purpose of the well is to gather more information about the suitability of the geological formations in the area as a site for geosequestration.

Other important data will be revealed from the well drilling, including geothermal gradients (rate of temperature change with depth), hydrocarbon formation and water resources. This data will provide a more complete picture of the State's geology.

The area of interest is the Lesueur Sandstone deep beneath the Swan Coastal Plain, located near the south west town of Harvey, approximately 150 km from Perth.

The location was determined from previous desktop studies and seismic analysis, suggesting the area may hold a suitable CO₂ reservoir (sandstone) and trapping mechanism (shale layer).

In order to improve knowledge of the geology within the project area, a 2D seismic survey was carried out in the Harvey and Waroona Shires during March 2011. The precise site of the 3,000 meter deep well (Harvey 1 Well) was determined following analysis of the seismic survey results.

Planning, designing and procuring services and equipment for the well has been on-going for the past 12 months.

As no wells currently exist in the area of interest, collection of data is important to acquire a sound understanding of the Lesueur Sandstone and the overlying Eneabba Formation.

Core samples (cylindrical sections of earth) taken from the well will be analysed to determine the presence of a lower shale unit in the Eneabba Formation, the sealing capacity of the shale if present and the injectibility of the



The Century Rig 7 at Harvey 1 Well.

Lesueur Sandstone. This will determine if the formation can trap the CO₂, how much it will hold and at what rate the liquid can be pumped down.

The Harvey 1 Well will take approximately 250 metres of core from four different depths, to gain an understanding of geology at different depths and potential CO₂ injection intervals.

The core is drilled and captured within nine metre lengths of aluminium casing. To maintain the integrity of the sample the core is not viewed directly on site but transported to Perth and cut into one metre lengths.

The core will be inspected by geologists and scientists from DMP's Geological Survey of Western Australia (GSWA) and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). Small sub-samples will then be taken for further laboratory analysis.

The core will then be stored at the GSWA Carlisle core library as a permanent record. Cores at the library are stored for use by the public, students or resource companies to investigate different strata's from areas around the State.

The South West Hub Project will be Australia's first on-shore carbon capture and storage project and is a joint industry and government partnership between DMP, Verve Energy, Griffin Energy, Wesfarmers Premier Coal, Alcoa Australia and Perdaman Chemicals and Fertilisers.

The South West Hub Project will complement the Gorgon CCS Project on Barrow Island. As a result of these projects, Western Australia is building world-leading capability in the area of CCS. ■



Increase in exploration approvals and online lodgement

The Department of Mines and Petroleum has experienced strong growth in the number of exploration applications.

In the past three years (2009-2011) the number of mineral exploration applications for gold and uranium alone increased from 1,698 to 2,691.

In 2011, DMP finalised more than 9,000 applications. This included 4,443 mineral tenure applications, 285 petroleum and geothermal tenure applications, and 3,174 environmental applications. DMP also finalised 1,104 pre-2009 mining tenure applications.

The increase reflects the high levels of mineral exploration and mining activity across Western Australia.

The department has published quarterly approvals performance reports since January 2009.

The reports provide information about the number of applications received, the percentage of applications assessed within target timelines and an analysis of approval performance.

This enables the department to monitor performance timelines, divisional workloads, identify emerging trends and proactively allocate resources where required.

A significant development in the approvals area has been the continued progress regarding online applications, particularly exploration Programme of Work (PoW) applications.

Online PoW applications were first introduced in mid-2010. In the first quarter following their introduction less than 20 per cent of PoW applications received were submitted online.

Last quarter, almost 70 per cent of PoW applications were submitted online. Feedback from industry regarding online applications has been positive.

Industry has embraced the changes, which allow for electronic lodgement of mining and petroleum paperwork, including Petroleum Environmental Proposals PoW applications.

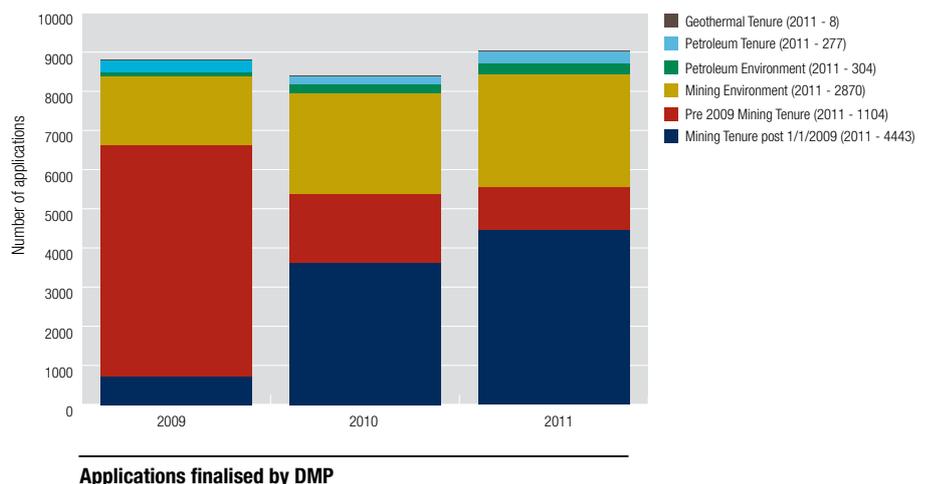
“Since the introduction of online lodgement, industry has quickly adopted the new technology,” said General Manager Environment Business Development Kaye Mulligan.

In view of this trend and the acceptance by industry, as of 31 May 2012, the department will only accept online applications for PoWs.

The department will continue to expand online applications into other areas in 2012.

“The next approvals document to go ‘high tech’ will be the Petroleum Environmental Proposals (PEP),” said Ms Mulligan.

“Until this latest online development, PEP applications were received by the department in hardcopy only. Given the remoteness of some parts of Western Australia, this lodgement method was no longer efficient.





21
YEARS



GOLDEN GECKO
Awards for Environmental Excellence

Golden Geckos a chance to stand out

“Online lodgement will improve efficiencies in the assessment process by avoiding information ‘double handling’, accelerating approvals and enabling staff to be focused on other aspects of operation.”

Companies need to set up an account to access the online submission portal.

When announcing the introduction of online applications last year, Mines and Petroleum Minister Norman Moore said the changes made transacting with business more efficient and convenient for resource companies operating in Western Australia.

*“The ability for companies to use this system will provide clear benefits for industry and the department,”
Mr Moore said.*

The department’s shift to online applications has improved assessment timelines, streamlined the application process and ensured the quality of the information supplied by proponents in applications is complete.

“This is a significant step in the approvals reform process and is another example of the State Government’s ongoing efforts to make WA one of the world’s most attractive destinations for investment in the resources sector,” Mr Moore said. ■

The Golden Gecko Awards for Environmental Excellence gives Western Australia’s resources sector an opportunity to showcase its innovative environmental strategies. Nominations for 2012 close on Thursday 5 April 2012.

“The Golden Gecko Awards recognise innovation, leadership and performance of environmental management in our State’s resources sector,” said Mines and Petroleum Minister Norman Moore.

The 2011 awards attracted an outstanding pool of nominees. The award was presented to a joint WorleyParson and Port Hedland Port Authority submission, for their world-first sedimentation scanning solution.

This innovative technology allowed real-time environmental monitoring of dredging impacts, which delivered previously unknown facts about the process of sedimentation.

The Golden Gecko Awards play an important role in inspiring innovative thinking, which may lead to advancements in environmental excellence. The unique environs of the State present unique challenges to resource sector environmental specialists. Often the solution to such a challenge is a new or improved environmental practice.

“Awards such as these encourage government and industry to work together towards a shared goal of responsible resource development for the benefit of all West Australians,” said Minister Moore.

“The Golden Geckos are an outstanding opportunity to recognise those leading the industry in innovative environmental practices. I encourage all eligible State mining and petroleum companies to apply.”

In 2011, two Certificates of Merit were also awarded to Compass Groups (Australia) and ATCO Gas Australia, formerly WA Gas Networks, supported by KD1.

Compass Groups was recognised for its unique approach to remote site catering. Compass uses central production facilities that minimise waste through the composting, livestock feed production and bulk food preparation, which reduce energy needs and emissions.

ATCO Gas Australia and KD1 completed a new gas pipeline with a high level of environmental conservation and management. The unique approach resulted in 40 per cent less clearing and no loss of black cockatoo habitat trees.

“Each project has shown a strong commitment to protecting and enhancing the environment. I encourage industry to continue to think innovatively, to improve environmental management outcomes for the State,” said Minister Moore.

“It is great to see companies going above and beyond what is expected by regulators to ensure responsible development in our biggest sector. I look forward to seeing the 2012 entrants.”

Entries must be submitted online at www.dmp.wa.gov.au/goldengecko before 4pm on Thursday 5 April 2012. ■



Students in the bridge simulator conducting rig moving operations.



DP Instructor showing student the Kongsberg K-Pos advanced trainer.

WA leads world oil and gas training

Western Australia's oil and gas industries currently employ almost 7,000 people, but investment in new LNG facilities worth more than \$73 billion is underway and production is predicted to treble during the next decade. The strongly-growing petroleum sector continues to demand skilled labour and expertise for a wide spectrum of production and processing operations. Also, growing interest in onshore shale gas and oil exploration and the potential for processing could produce a further boost in demand for skilled labour and expertise. LNG production is expanding elsewhere in Australia and in the Indian Pacific region, adding to the demand for skilled staff and quality training. In response, major private and public investment in new facilities, advanced equipment and simulation technology, is ensuring the State offers world-class skills development and training. Prospect looks at three facilities in Perth which are providing cutting-edge training to the industry.

Growing demand for industry operators

In early December 2011, the Norwegian Prime Minister visited Perth, to open the world's largest offshore simulator for marine specialist company, Farstad Shipping.

The company will use its new \$20 million facility to train crew for vessels servicing and supplying oil and gas projects, both in Western Australia's Carnarvon and Browse basin and elsewhere in Australia and the Indian Pacific region.

Jeff Knight, General Manager of the Farstad Offshore Simulation Centre, says Farstad Shipping (Indian Pacific) operates 28 ships servicing offshore oil and gas fields and employs about 660 crew members across in Australasian region.

He says almost half of the company's fleet operates in Western Australian waters.

"Offshore accounts for about 60 per cent of Australian marine activity, and Farstad represents about 40 per cent of that, so we are a fairly significant presence," Mr Knight says.

The company's facility, at Bibra Lake, south of Perth, features two full-scale vessel bridges, each surrounded by a 15m diameter projection screen dome.

A highly-realistic ocean simulation, complete with foredeck and populated

with offshore platforms creates a wide range of ocean conditions. (The simulation is realistic. To this writer the bridge deck appeared to be rolling with the waves).

The bridges are integrated fully with an engine room and a deck simulator, so whole 10 to 12 member crews can learn to work together more efficiently.

"Our emphasis is on teamwork and the simulator allows us to throw up some challenges, from rough conditions, to breakdowns in the engine room, for the crew to overcome," Mr Knight says.

During exercises crew members are fitted with a microphones and recorded on CCTV, so the debrief allows them to review and assess their performance, individually and as a team.

The Centre also includes simulators for an offshore oil rig crane, anchor winch and decks that would enable Farstad crews to train alongside offshore oil rig crew.

Together they could undertake cargo transfers and the more complex task of moving a rig, during which Anchor Handling ships raise the rig's 8- 12 anchors, then tow it to a new position.

"This is an opportunity to improve understanding between the ship and the rig about how each crew operates," Mr Knight says.

"As a captain of an anchor-handling ship I found that communications breakdowns were the most common cause of problems in these operations."

The Centre is also accredited to offer the Nautical Institute Dynamic Positioning training scheme.

Mr Knight says since October 2011, Farstad has trained 70 crew members have at the centre.

"The Centre aims to become centre for knowledge sharing across the industry," he said.

"Our emphasis is on efficiency, safety and skills. The simulation can be used to train crew members, from new employees to experienced masters.

"We plan to provide training for up to 600 students this year. About 400 of these will be Farstad employees, but other operators will be able to use the facility for developing the skills of their rig-based, or ship crews."

The facility will also offer programs to introduce students from educational and training organisations to the offshore maritime industry. ■

Real-life, real-time crisis training

While efficient marine operations remain vital to petroleum exploration and production, demand for skilled process operators is set to grow dramatically.

Australia's leading provider of process operator and plant maintenance training, the Australian Centre for Energy and Process Training (ACEPT), is close to commissioning a 3D animated model of its full-scale oil processing plant.

This will allow trainees located offshore, interstate or overseas to familiarise themselves with the plant.

Greg Guppy, Director of Training Services at ACEPT says the centre is constantly developing its technology and services to meet the sector's growing demand for employees with industry-recognised qualifications.

He says trainees learn to use a fully-equipped control room to operate the centre's processing plant and recover oil from a mixture of fuel, water and impurities.

Before operating the live equipment, trainees learn to use a process control system that is identical in operation to the plant, developed for ACEPT by

Honeywell, which also uses ACEPT to train its technicians.

Other students gain practical experience in areas such as mechanical fitting, maintenance and electrical instrumentation, with a full-scale plant as their training ground.

Mr Guppy estimates the plant represents a \$25 million investment, including equipment purchased and built by the centre and components donated by industry.

"At our plant, trainees are able to practice start up and shutdown, exercises that would be impractical and costly for a commercial, 24-hour processing operation," he says.

"It also allows our staff to engineer challenges for trainees.

"This is the only place in Australia that can create a real-life, real-time crisis situation."

As well as the processing plant, the facility includes gas dehydration plant

and has recently acquired a \$1.6 million, four-metre high, glass binary distillation column that demonstrates the principle of fractional distillation.

"Our industry management board is telling us very clearly that more operators are needed," Mr Guppy says.

"We provided training to about 800 students in 2011. Student contact hours funded by the State Government increased by 45 per cent on the previous year, and we expect participation to continue growing." who said.

"Our students include some straight from school, older people seeking a change of career and people with substantial experience in the industry who want to upgrade their skills, or obtain formal qualifications."

"A newcomer to the industry would undertake an 8-10 week course, while others with experience, may be able to complete their training in four to five weeks.

Continued page 16



Chilean scholarship students (L-R), Ruben Tellez, Eduardo Garcia and Boris Perez training at Challenger's ACEPT facility in Munster.

From previous page

"A small, but growing, number of overseas students are enrolling at ACEPT to acquire process operator skills to work in their own countries. Last year we trained students from Chile, India, Italy and the UK.

"We also provide training to secondary students undertaking vocational and educational training courses.

"Recently, refinery and processing plant employers have begun using the centre

to give engineers, newly recruited from university, hands on introduction to processing plant operations."

Mr Guppy said that while the centre was originally established to service the oil and gas sector, the State's mining and minerals processing industries have recognised that the skills sets developed at ACEPT apply equally well to their operations.

He said to meet the growing demand for training, ACEPT, which already operates for 49 weeks of the year, is this year preparing to run two shifts.

The development of a 3D animation of the plant will enable further extension of its capacity to provide high-quality training.

"As well as exactly replicating the plant's equipment and layout, the animation allows users to "look inside" individual components and see what is happening, or get a close up of valves and pumps," Mr Guppy said.

"Where students who live, or work, remotely are not able to take the time required for a full training course, we will provide training discs that include the animation and exercises."

They will be able to familiarise themselves with the plant and then come to ACEPT to complete their training in a much shorter time.

"As high speed broadband comes more available we will also be able to offer real time training using the animation."

ACEPT, based at Western Australia's Australian Marine Complex, a major centre of offshore, subsea and marine industry and technology, is part of the Western Australian Government's Challenger Institute of Technology. ■



Students and advanced skills lecturer Seamus Clifford on the processing plant at Challenger Institute of Technology's Australian Centre for Energy and Process Training (ACEPT).

\$10m Perth complex a regional hub

General Electric's newly-opened \$100 million Oil & Gas technology and learning complex will support the development of local service and maintenance skills for upstream oil and gas processing equipment.

The complex, at Jandakot, also in Perth's southern suburbs, is both the company's first Australian service centre for upstream oil and gas operations, and GE's Australian regional training hub (see Prospect June -August 2011, p8-9).

The complex includes a service centre with advanced workshops equipped to commission and service key components of LNG processing trains, such as turbines and compressors, as well as equipment for subsea production, drilling and mining.

The complex also includes a \$10 million technical centre of learning and development, that GE will use as the regional training centre for its own staff, as well as a wide range of skills development and training for the petroleum and related services sector.

GE Energy has joined with petroleum companies and training organisations, including ACEPT, in a Community of Technical Best Practice initiative, which



Western Australia's Minister for Mines and Petroleum Norman Moore (right) joins General Electric Oil and Gas President and CEO Dan Heintzelman to officially open Stage 1 of the GE Oil and Gas facility at Jandakot.

has funding and support from the Australian Federal Government, and is expected offer more than 4,000 training days in 2012.

This initiative will see the learning centre provide industry-recognised training in areas such as electronics and equipment testing and maintenance and specialised and boilermaking and welding. ■

Groundbreaking starts Wheatstone project



© Chevron

Premier Colin Barnett (left) and Roy Krzywosinski, Managing Director, Chevron Australia, do the honours at the Wheatstone groundbreaking.

Premier and State Development Minister Colin Barnett hailed the start of site works for Chevron's \$29 billion Wheatstone LNG project as an exciting milestone for Western Australia.

Mr Barnett attended a groundbreaking ceremony on the State Government's Ashburton North Strategic Industrial Area, near the small Pilbara coastal town of Onslow.

The Premier congratulated Chevron and its Wheatstone Joint Venture partners Apache, KUFPEC and Shell on their commitment to the project.

"Wheatstone is creating enormous employment and industry participation opportunities for the State and transforming Onslow, as well as cementing WA's status as a major global energy provider," Mr Barnett said.

Chevron estimates Wheatstone will create 6,500 direct and indirect jobs at peak construction, 300 new operational jobs as well as delivering an estimated \$17 billion to Australian and Western Australian businesses and services over the life of the project.

"Western Australian-based companies have already secured contracts worth nearly \$500 million since the final investment decision was made in late September 2011. To date, contracts have been awarded for engineering, construction, accommodation and air services," the Premier said.

"The construction of a \$1.2 billion domestic gas plant to feed 15 per cent of the gas from the Wheatstone operations into the State's energy market is also a very important component of the overall

project. This helps ensure a safe, secure and reliable supply of gas to meet the State's energy requirements into the future."

Construction of the project would take about five years, with first gas planned for 2016.

Mr Barnett said Wheatstone would deliver significant benefits for the local community with Chevron, its partners and the State Government spending approximately \$250million on community and public infrastructure in Onslow, including the upgrade of the town's water and electricity supplies.

George Kirkland, vice chairman, Chevron Corporation, said: "We're constructing a facility that will benefit generations. Like Gorgon, it will produce energy by redefining what technically-complex, environmentally-responsible projects look like in the 21st century."

Other community benefits include:

- a \$20 million contribution, with \$10 million from the Joint Venture and \$10 million from the State Government under Royalties for Regions, to a community development fund
- more than \$66 million for community infrastructure including an airport upgrade and construction of a new ring road, community swimming pool, library and visitors' centre
- a further \$120 million plus for public infrastructure including road upgrades, waste and water management and upgrades to health, education and emergency services facilities.

Wheatstone is the second major new LNG processing site to begin construction in the Pilbara since the Liberal-National Government came to power in 2008. Wheatstone and Gorgon combined account for \$72 billion worth of new investment in the LNG industry in this State.

The project includes development of offshore gas fields, a 225 km pipeline, port facilities and an initial two LNG trains with a combined capacity of 8.9 million tonnes per annum (mtpa).

"Wheatstone represents part of a major step forward in the operations and scale of WA's LNG industry," Mr Barnett said.

"This project together with the LNG projects currently under construction and the existing North-West Shelf operations will boost WA's current LNG production from 17 mtpa to 45 mtpa within the next few years.

"This will also position WA as the world's second-biggest supplier of LNG and well on the way to increasing WA LNG production to more than 60 million tonnes a year by 2020."

The Wheatstone groundbreaking ceremony was held two years to the day from the ceremonial groundbreaking for the Gorgon project on Barrow Island. ■



The challenge of China

China is going through the most rapid transformation in its history. Accompanying that, the Department of State Development's office in that country is also undergoing a "transformation", though of a less-dramatic type. Regional Director of 17 years B.J. Zhuang has retired, with the Shanghai office to be run by Nathan Backhouse.

Building relationships ... the department's new Regional Director in China, Nathan Backhouse, who returns there as the country enters a new growth phase.

Moving to China is almost like a homecoming for Nathan Backhouse, who spent five years in China as a diplomat with the Australian government, working in the mining and commodities area.

"I guess, the prospect of being involved once again out in the field in China was too hard to resist," said Nathan, who

also has worked as a consultant the mining sector in Mongolia and Korea and as a lobbyist for the Australian Chamber of Commerce with a China focus.

The "I'm a bit rusty" Mandarin speaker took up the reins in Shanghai in early February after 14 months as the Department's Director of International Trade and Investment.

Nathan will be working alongside local staff representing various WA government departments, including education, agriculture and tourism. His role is to support WA companies seeking to enter the Chinese market and to foster Chinese investment in Western Australia.

The life and times of B.J. Zhuang

He could be regarded (literally) as "part of the furniture". He's certainly witnessed tumultuous times.

From an economic viewpoint, B.J. Zhuang (known everywhere as B.J.) has seen it all when it comes to China and Western Australia.

B.J., who has been with the Department of State Development for 21 years, recently decided to retire and is currently on an extremely long break.

He graduated from East China Normal University in 1987. This meant the former English major student's "learning" years occurred during the Chinese Cultural Revolution (1966-1976).

Now able to find time away from the constant grind of life as the department's representative (Regional Director of the Western Australian Trade Office in China) in Shanghai (and his many mobile phones) B.J. can take time to reflect on a brilliant career.

"My first job was an interpreter and tour operator with the Shanghai Branch of China International Travel Service in the section looking after Australian and New Zealand visitors," he said.

"In 1984, I was seconded to work as the head interpreter for the newly-established Australian Consulate General in Shanghai. In fact, I was the first locally-engaged staff at the consulate.

"One of the major activities during my three year there, apart from two thirds of the federal cabinet, including PM John Howard, who visited China during the period, was the Channar Iron Ore joint venture negotiation to support Shanghai Baosteel development.

"In 1987, the then WA Government decided to set up the Overseas Relations Office and I was offered work with the WA Government.

"I went to Perth in late September 1987 as the Adviser to the Overseas Relations Office attached to the Department of Premier and Cabinet.

"I did my MBA at UWA for two years (1988-1989) while working one day a week plus university holidays at the Overseas Relations Office during those two years, before formally becoming a WA public servant from the beginning of 1990.

"The Overseas Relations Office was initially located on the second floor of 197 St Georges Terrace when it was a part of DPC. Later, when Bob Fisher became the head of Department of Trade, we moved to London House to be part of that department, before moving again in 1990 to SGIO building as part of the Ministry of Economic Development. Then that became the Department of Commerce and Trade in 1994."

B.J. has worked with a raft of governments advised many Western Australian companies on their

strategies in China. He has also seen the transformation of China to world economic powerhouse and the current rapid growth of WA through its supply of resources to China.

"I've been very lucky to serve the state at the time when the world has become smaller due to globalisation and China has been quickly returning to economic importance in the world," he said.

He has many major achievements but lists the following as his most memorable.

"First, there was WA's sister state/province relationship with Zhejiang," B.J. said.

"I was involved in establishing the relationship 25 years ago and expanding the relationship since then.

Exchanges and cooperation between the two sides have covered areas of trade and investment, parliament exchanges, sister cities, education, sports, police, arts and culture, public servants' exchange, agriculture and food, health, work safe and chambers of commerce on both sides.

The success of the relationship was well recognised in China as a model for others to learn from, with WA receiving a Chinese national government award at the China International Friendship Cities Conference last year.

“China is not an easy market to enter, so it needs people on the ground to facilitate access,” Nathan said.

He sees his major task as strengthening current, and building new, relationships, based on the Chinese system of Guanxi (pron. gwan-shee) – a complex set of relationships and something many Australian companies take time to adapt to.

Nathan sees his return to China coming at the start of a new cycle of development, one where China will become even more internationally focussed in more ways than one.

“Traditionally they have been reluctant to finance their companies with debt,” said Nathan. “They would only use equity. But that’s changing as we start to see the rise of private entrepreneurs: people who do not come from within government-controlled companies.

“This means they will be more receptive to things like forward contracts and other advanced financial products.

“Right up to the end of the 1990s, the Chinese were internally focussed, so they would satisfy demand internally,” he said. “But now they are sourcing from overseas, and they are moving to having a fully international focus.

“At a consumer level, this is reflected in the way they now want to wear brand-name clothing, and drive overseas-badged vehicles.”

Nathan sees a steady growth in the resources sector, but with prospects of some diversification.

“We have always been good at selling our raw materials, but I see a strong market for us to sell our knowledge and technology, particularly in the fields of exploration,” said Nathan.

“There are abundant minerals in China, but often at great depth. This is where we can take a lead and promote our expertise.”

While he sees the dynamics of business in China changing, becoming more fluid and dynamic, Nathan says the basics of the role remain.

“At the end of the day, the department’s role is to add value to the WA economy, whether it’s by attracting Chinese investment, or helping WA companies establish themselves in China.

“We have an excellent reputation in China: it’s my job to build on that.”

“There was China Southern Airlines Flying College in Perth, recalled B.J. “I assisted in the establishment of the college in 1993. Since then more than 1,000 pilots from Asia’s largest airlines have been trained at two airports in WA.

“When it comes to resources, I have been involved in initial introduction of or facilitating most major investments from China into the WA resources sector in recent years.

“I was directly involved in the promotion of LNG to China and the success in winning the supply contract of China’s first LNG project in Guangdong in 2002, worth A\$25 billion at that time.”

For his services, B.J. was admitted as a Member of the Order of Australia in 2004 for that.

While B.J.’s future will be a little less hectic, he is keenly watching what will be an ongoing rapid expansion of the Chinese economy.

“China is going through the transition from the previous command economy to market economy with unprecedented economic growth,” says B.J.

“The main challenge is to understand the differences and work with partners on both sides to bring cooperation to fruition and on a win-win basis.”

B.J. remains philosophical about what lies ahead.



B.J. (left) explains the mysteries of iron ore to Wu Bangguo, Chairman of the Standing Committee of National People’s Congress and now the second most important leader in China. He visited the Pilbara in May 2005.

“Minerals and petroleum are resources but they themselves alone can’t bring wealth to WA,” he says.

“The next big cooperation with China will be in agribusinesses, on food safety and security.

“WA can learn the lessons from our iron ore cooperation with China to date, because we were not ready for China’s steel industry massive growth from 2003. So WA’s agricultural and food sector should get itself ready for China now.

“Tourism will also be growing strongly and again WA needs to quickly upgrade our capacity.

“Given China’s manufacturing capacity and WA’s R & D capabilities, both sides have great potential for cooperation in R & D sector, particularly in mineral & petroleum sector and the bio technology sector.”

There are many tales about B.J., mostly relating to his near-legendary status as a workaholic. Someone said they once saw him getting out of a limosene with three mobile phones. However, B.J. refutes this. “No, I do not have three mobile phones. Although, when I am in Perth I often have one additional phone from the department in order to save costs,” he said.

B.J. is remaining in China and taking up a position with an Australian mining company in mid March.

“I am a Chinese but first-generation migrant to WA and therefore I see myself as a Western Australian,” he says.

“I will go back to WA eventually. My son is studying medicine at the Australian National University and I hope he will live in Perth when he graduates.”

See you soon, B.J. ■



Premier opens new Singapore office

The Premier and Minister for State Development Colin Barnett opened the government of Western Australia's newest overseas office recently.

Located in the Suntec Tower in the heart of the Singapore central business district, the Government of WA Trade and Investment Office was officially opened on 15 March.

This catalyst for the new office came from a three-day visit by Mr Barnett to Singapore in October 2010.

"There has always been a strong bond between Western Australia and Singapore, so this is a fantastic opportunity for both our economies to benefit from closer economic ties," Mr Barnett said.

"Singapore and WA are naturally complementary. WA is a world-scale resources economy with enormous potential for growth, while Singapore, one of Asia's best-performing economies and a major global trading centre, is rapidly expanding its role as an investment centre.

"A growing number of international investment brokerage companies are establishing a presence in Singapore, while in their own right, Singaporean businesses and government bodies hold overseas investments with a net worth of almost \$500 billion.

"As a small island city state, Singapore is strategically linked in terms of land and sea hubs.

"Annual trade between Western Australia and Singapore is worth more than \$5 billion, and Singapore is an especially significant market and investor in for Western Australia's food production," he said.

"Western Australia is home to 30 per cent of Singapore-born Australian residents, many thousands of Singaporean professionals and business leaders have studied in WA and our universities maintain strong education and research links.

"Singapore is also our second largest source of international visitors and an important investor in tourist accommodation.

"We have opportunities to strengthen these relationships and develop new partnerships in areas such as film and sport and recreation.

The office will be managed by the former CEO of Tourism Western Australia and Eventscorp, John Osborn, who also received the Australian Sports Medal for his contribution to Australian sports' management.

"The office will be a conduit for WA exporters wanting to get their products into South East Asian markets, and as a source of advice for Asian investors" said John.

"WA will certainly benefit, as our research shows Singapore firms are interested in exploring investments and business opportunities here, particularly in oil and gas and logistical services and infrastructure." ■



John Osborn.

WA among world's best mining and exploration destinations

Western Australia's international standing as a destination of choice for investment in the mining industry has been strengthened by the 2011-12 Fraser Institute survey results.

This year WA was among the top 20 mining jurisdictions in the world, with the State ranked equal 11th of 93 jurisdictions - up six places from last year in the internationally-respected survey. WA's overall score was 81.5, equal with the Northern Territory.

Mines and Petroleum Minister Norman Moore said he was not surprised by the pleasing results, despite the recent progress of the Federal Government's mining and carbon taxes.

"WA's reputation as the nation's leading State when it comes to attracting exploration and mining has been solidified again, thanks to the hard work of the State Government and the Department of Mines and Petroleum," Mr Moore said.

"The State Government's reforms to the approvals process have offered greater transparency and certainty for industry and this was reflected in the latest survey's results."

South Australia was 19th spot with a score of 75.3 out of 100, while Queensland gained 10 spots to take 28th position with a score of 65.5, followed by Tasmania in 30th and New South Wales in 32nd. Victoria ranked lowest in 44th spot with a score of 52.1.

In another category, Mineral Potential Assuming Current Regulation – Land Use Restrictions, the survey also ranked WA as the most attractive Australian jurisdiction for mineral potential. ■



Mines and Petroleum Minister Norman Moore.





© Rio Tinto

New Pilbara project to generate 600 jobs

The State Government has cleared the way for a rail and power supply project in the Pilbara, estimated to be worth more than \$400 million and which will generate up to 600 jobs.

The project was overseen by the Department of State Development, whose Project Facilitation Team managed approvals for iron ore expansion projects in the Pilbara, worth a combined total of almost \$10 billion in the final half of 2011.

Premier Colin Barnett said the Government granted Rio Tinto a special railway licence for a 53 km railway line and approved a 220 kV electricity transmission line to connect the new Hope Downs 4 mine to the existing Hope Downs 1 infrastructure.

The Hope Downs 4 mine is being developed by a joint venture between Rio Tinto and Hancock Prospecting Pty Ltd, and will be operated by Rio Tinto. The rail and power project will be funded, built and operated by Rio Tinto.

“These approvals are the final step for development of the 15 million tonne per annum (Mtpa) Hope Downs 4 iron ore mine, at an estimated total cost of more than \$1.2 billion,” Mr Barnett said.

“The new mine will create about 1,500 new jobs and Rio Tinto expects first production to commence in the second quarter of 2013.

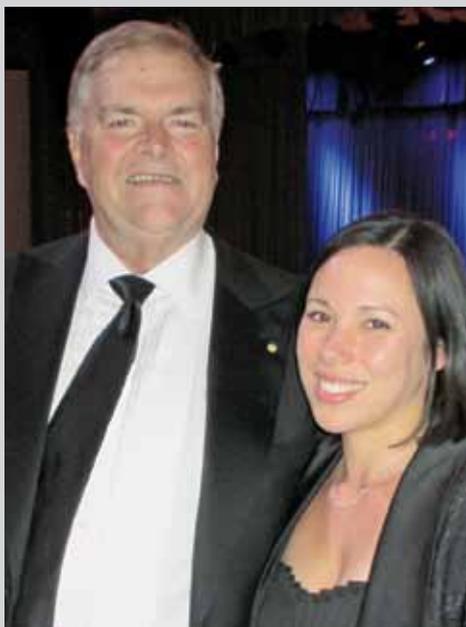
“Following Hope Downs 4 receiving environmental approval on January 31, 2011, the company and Government agencies have worked together efficiently to develop detailed proposals, and finalise approvals, for the mine, rail and power supply components.

Approval for the new mine was granted under the Iron Ore (Hope Downs) Agreement 1992 in July 2011 and the rail and power supply components were approved under the Iron Ore (Hamersley Range) Agreement 1963 in December 2011.

The Premier said the State Government granted the approvals and special railway licence after consideration of impacts of the rail and power infrastructure on affected land holders and on the environment. ■



© Rio Tinto



Sarah Woods with Australian Ambassador to the US, Kim Beazley at the recent G'Day USA promotion. Both went to the same school, Hollywood High.



The Department of State Development (DSD) recently occupied centre stage, literally, at a major promotional event, G'DAY USA, recently. Heading the small delegation, which was a joint effort between several government departments, was former graduate officer, Sarah Woods.

Graduate career led to international stage

The arts, culture and investment were the focus of this year's G'DAY USA, held in several US cities.

In a partnership between DSD, Tourism WA, Screen West and the South West Development Commission, Western Australia took centre stage alongside other State agencies to foster interest and investment in Australia.

Held across seven cities, Western Australia focussed its energy for a week on Los Angeles and Houston activities, which included tourism development, a digital industry seminar a black-tie celebrity gala and an energy conference.

The variety of promotions enabled a wide range of the State's industries and regions to show their wares to industry heavyweights and the media.

"It was a well-balanced range of activities, which certainly gained us some tremendous media exposure," said delegation coordinator, Sarah Woods, from DSD.

"We had to maximise our efforts, so we were careful to select a good mix of what we offer in WA, from the arts, to technology and resources."

Capping off the event was a presentation Sarah made to a Houston resources conference, Energy in an Evolving World: Sustainability, Reliability, Affordability – Continuing the Conversation.

In the presence of more than 200 energy executives and industry leaders, Sarah delivered a 20-minute insight into WA energy industry and investment opportunities.

Judging by the number of business cards she received after the presentation, it was a triumph.

"The US promotion certainly was a career highlight," said Sarah, who has a double degree in commerce and political science and is undertaking her Masters in international relations.

Her attendance was the culmination of four years' of work within the department, where she is now Manager of the Europe and the Americas desk in the International Trade and Investment division.

In her time with DSD, Sarah has worked in social impact, community consultation, industry and resources policy development and project management. Prior to that she spent two years with the Department of Premier and Cabinet, undertaking a graduate training program.

Each year the department, in conjunction with the Department of Mines and Petroleum and Department of Commerce, offers a number of places for graduates, who undertake an 18-month training program in various areas. Competition for places is keen; the rewards great.

"The training and support the department provides is exceptional and certainly equipped me to organise the US mission."

"I just don't think I'd get the same opportunities elsewhere," Sarah Woods said. ■

Windfall for local companies



© Chevron

Local jobs and supplier opportunities are being created during the building of the Accommodation Construction Village on Barrow Island.

Western Australia's massive resource projects are creating more than just jobs at the point of extraction.

There's a flow-on effect to many local companies, which is becoming more evident as major projects continue their relentless march towards completion.

The \$43 billion Gorgon Project and \$29 billion Wheatstone Project in the northwest of WA are prime examples.

The two Chevron-operated projects are providing opportunities and economic benefits on a scale never seen before in Australia.

According to the company, they will generate almost \$50 billion in expenditure on Australian goods, services and jobs and will bolster government revenue by more than \$60 billion through various tax streams.

During peak construction, Gorgon and Wheatstone Projects together will create an estimated 16,500 direct and indirect jobs in Australia.

Gorgon is one of the world's largest natural gas developments and the largest single-resource projects in Australia's history. It will develop the Gorgon and Jansz/lo gas fields, located within the Greater Gorgon area, about 130 kilometres off the north-west coast of Western Australia.

Gorgon includes the construction of a 15 million tonne per annum Liquefied Natural Gas (LNG) plant on Barrow Island and a domestic gas plant with the capacity to provide 300 terajoules per day to supply gas to Western Australia.

The Gorgon Project is operated by an Australian subsidiary of Chevron and

is a joint venture of the Australian subsidiaries of Chevron (approximately 47 percent), ExxonMobil (25 percent), Shell (25 percent), Osaka Gas (1.25 percent), Tokyo Gas (one percent) and Chubu Electric Power (0.417 percent).

The Project remains on track to deliver \$20 billion in Australian Industry Participation expenditure during construction. To date, about \$15 billion has been committed to Australian industry for work as wide-ranging as helicopter services and installation of a 90 km domestic gas pipeline.

Chevron in Perth now directly employs about 3,000 people – a dramatic increase from about 500 only five years ago.

There are more than 2,800 jobs that have been created on the construction site at Barrow Island. Overall, since

construction began, about 5,000 Australian jobs have been created (more than 90 per cent in WA through about 350 Australian based contracts on ProjectConnect).

The Installation of the domestic gas pipe from Barrow Island jetty to the mainland, to tie-in to the existing Dampier to Bunbury Natural Gas Pipeline is worth \$300 million. As part of the contract, a joint venture spearheaded by WA company Clough has undertaken to target five per cent Indigenous workforce participation and two per cent (of the onshore portion) to be performed by Indigenous businesses (sub-contractors and suppliers).

The Australian Marine Complex in Henderson, south of Perth, is buzzing with Gorgon activity. For example, the Leighton-Saipem Consortium has a \$1 billion contract to design and construct massive concrete caissons and other marine structures that will support the 2.1 km LNG jetty at Barrow Island.

Even larger is the \$2.7 billion contract with a joint venture that includes Clough Projects Australia Pty Ltd and Hatch Associates Pty Ltd Group, which will coordinate the Engineering, Procurement, and Construction Management for downstream components and logistics.

There are at least another 15 large-scale projects with high Australian Industry Participation guaranteed to flow through other Australian businesses.

While “sister” project Wheatstone is only just starting to ramp up, the flow-through effects are being felt, with John Holland being awarded work for construction of accommodation, Skywest winning the fly-in fly-out air services and Monadelphous construction, operation support and associated services.

In a development which will grow local capacity and capability, a joint venture between Thiess and Belgium’s Besix SA won a \$260 million contract for Wheatstone.

The joint venture will construct the breakwater and materials offloading facility, creating more than 300 jobs, with of the work based in Onslow.

Thiess managing director Bruce Munro said 80 per cent of the work under the contract would take place in Australia.

The contract is Thiess’ second win at Wheatstone, having previously secured a micro-tunnelling deal from Chevron.

The accompanying table provides an insight into the scope of major Australian Industry Projects (AIP) involved for Gorgon. All figures are approximate (supplied by Chevron). ■

GORGON AIP CONTRACTS SNAPSHOT

(Some of approximately 350 contract awards to Australian-based companies.)

Company	Work	Cost	Notes
Hertel Modern	Paint insulation and fireproofing. Cryogenic insulation and fireproofing on the gas processing plant	\$90m over 3 years	Malaga workshop, one of the largest sheet metal fabrication facilities in WA, will cut and prepare most of the materials, install on-plant equipment and modules at Henderson waterfront and then complete final installation and interconnections on site at Barrow Island. 200 local jobs, including 20 trainee positions.
Ertech	General services	\$50m over 12 months	Barrow Island roadworks, earthworks, civil, mechanical, electrical and building works. Work for about 60 people.
AGC Industries	Pipe spool fabrication	\$50m	Fabrication, storage, coating and testing of 8,200 pipe spools. 100-150 people will be employed.
Thiess	Site preparation	\$500m	Earthworks, drainage, roads, permanent in-ground services, minor concrete works for the preparation of the plant site, administration area, airport runway, utilities corridor and causeway.
Monadelphous	Civils and underground	\$85m	Installation of onshore pipelines, cables and tubes on Barrow Island. 145 employed.
Sinclair Knight Mertz	Marine monitoring	\$113m	Monitoring of the marine environment around Barrow Island during and after marine facilities construction work.
Toll Holdings	Supply base and logistics	\$180m	Receipt, warehousing and movement of goods once they are delivered to Barrow Island, as well as waste removal and cleaning services.
Thiess, Decmil, Kentz	Construction village	\$520m	Design, manufacture, delivery and commission of a 4,000 bed Gorgon construction village.

Taking shape ... an aerial view of the Construction Village on Barrow Island.





Burrup fertilizer plant rebadged

The future of the Burrup liquid ammonia plant has been assured after a year-long “auction”, run by Burrup Holdings’ receivers.

US company Apache Energy has acquired a 49 per cent interest in Burrup Holdings, while existing stakeholder Yara International increased its ownership to 51 per cent.

Yara will become the plant’s operator after a transition to ensure continued safe operation of the plant.

Jorgen Ole Haslestad, Yara’s president, said a technical ammonium nitrate (TAN) plant, to be built next to the liquid ammonia operation, will be 75.5 per cent owned by Yara, with Apache holding the remaining stake.

Mr Haslestad said Yara would rename the business, in an effort to leave behind the controversy associated with the former operation.

“We will re-name it Yara Pilbara, as we move to establish Yara standards of corporate governance,” he said.

Apache, a leading producer of natural gas for the domestic Western Australia market, currently operates the Harriet joint venture, which has supplied natural gas to Burrup Fertilisers since the plant commenced production in 2006.

With a capacity of 850,000 metric tons annually, the plant is one of the world’s largest ammonia facilities, producing six per cent of the total world output of tradable ammonia.

Apache’s Australia region vice-president Thomas Maher said the investment decision was spurred by the company’s desire to stabilise the project and secure the WA market for Apache’s gas.

“This new ownership structure will stabilize the Burrup project after a period of significant uncertainty, and secure a long-term economically viable market for our natural gas production in Western Australia,” said Mr Maher.

“This ownership stake provides a means to increase the value of our Australian gas reserves.”

“We are pleased to be associated with Yara, which is one of the world’s largest producers of ammonia fertilizers and has a long-term off-take agreement for Burrup’s production,” Maher said.

The plant has been operating as usual since the receivers stepped in.

At the time of its opening in April 2006, the plant the world’s largest greenfields ammonia plant. The plant was developed over a four-year period by Indian-based Burrup Fertilisers Pty Ltd at a cost of about \$700 million. ■



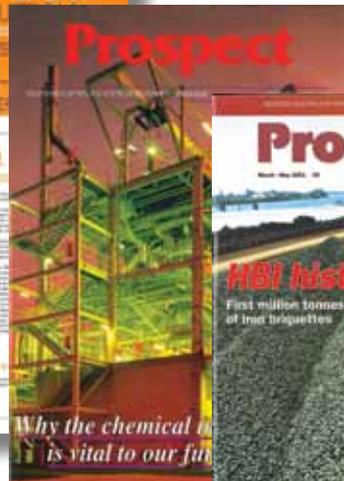
Aerial shot of the Burrup liquid ammonia plant.

Flashback

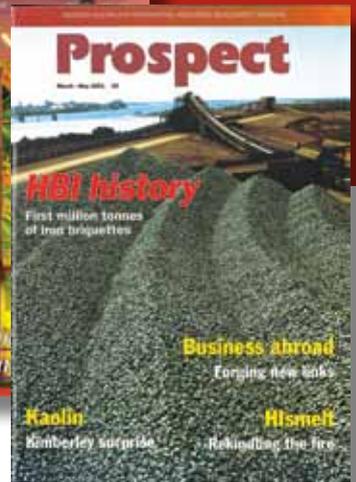
In this new column, we'll take a look at what was happening 10, 20 and 30 years ago.



1981



1991



2001

Slim pickings, March 1981

At only 12 pages, the magazine had a limited audience. The front cover said: "Quarterly bulletin for senior management".

Issued by the Department of Resources Development, the then Minister Peter Jones wrote about the release of a report on "the potential for increased processing of Australia's minerals and resources".

There was mention of "normalising" company towns, with Newman in the Pilbara (pop. 6000, currently 7000) becoming the responsibility of the East Pilbara Shire Council. Negotiations were proceeding for similar action at Dampier, Wickham, Tom Price and Paraburdoo.

There was an article on population, with 1.27 million people living in WA and the State's population experiencing steady growth of between 8.3 and 10.6 per cent between 1975 and 1980.

In other news:

- Four companies received permits to explore for oil and gas in the Canning Basin.
- Tenders were about to be called for the supply of major items and equipment for the Dampier to Perth natural gas pipeline.
- WA's gold and mineral production for the calendar year 1980 was \$2.6 billion.
- The Bank of New South Wales and Commercial Bank of Australia merged. The Wales offered \$700 million for the CBA, making it the biggest merger in Australia's history.

- The WA government was about to advertise for developers to set up a \$10 million supply base at Exmouth to service off-shore oil and gas projects.

A new Department, March 1991

Ian Taylor was the then Minister for the newly-created Department of State Development, which brought together the work of five former departments. The first Chief Executive Officer was John Morhall.

The front cover of an advertising-laden, 32-page Prospect pointed to the chemical industry's importance, with a picture of CSBP and Farmers' sodium cyanide plant at Kwinana. A report was underway into the economic impact the industry in the Kwinana area. Several articles looked at various industries at Kwinana, including lime, caustic soda processing and a titanium dioxide pigment plant.

In oil and gas news, the Harriet gas project was predicted to come on line in 1992, and Woodside was set to announce the go-ahead of the Cossack oil field.

Focus on regional development, 2001

Labor had just been returned to government after eight years in opposition. Clive Brown was the Minister and Prospect had bulked out to 44 pages, still containing advertising.

The new government had created a \$75 million Regional Development Fund to "enable regional towns and communities to support new industry development".

Featured articles included a focus on a proposal by Energy Equity and Woodside (in conjunction with Western Power) to provide gas-fired power generation for the Kimberley towns of Broome, Fitzroy Crossing and Camballin.

Still in the Kimberley, the potential of mining kaolin (a light-coloured clay-like material used in making crockery) was being explored.

Austel was touting its \$3 billion investment in an integrated iron and steel project near Cape Preston. The plant would produce pellet and briquetted iron.

Construction of a \$16 million island breakwater at Jervoise Bay, south of Fremantle was well underway.

The State's trading partnership with South Korea was strengthening, with two-way trade worth \$3.2 billion, compared to \$1.4 billion a decade earlier.

Prospect reported that in the past 10 years, more than 15 mining, technical, economic and marketing programs between WA and China had been completed, saying "China's industrial growth is expected to be quite spectacular".

A fourth Japanese power utility (Tohoku Electric) signed up for supplies from the North West Shelf LNG project.

The then CEO of Apache Energy, Jim Bass, said "the offshore oil and gas fields of Western Australia have the potential to be of global importance".

The Albany windfarm was nearing completion. ■

AGRICULTURE

East Kimberley - Ord - Ord/East Kimberley Expansion Project WA STATE GOVERNMENT

The State Government has committed \$301 million to increase the existing amount of irrigated land in the Kununurra region by adding 15,200 hectares in the Weaber Plains. This funding will provide the construction of irrigation channels, roads and off-farm infrastructure to service the future needs of the region's growing population and sustain economic growth. The Commonwealth Government has committed \$195 million of funding for social and common use infrastructure in the East Kimberley region. Construction is well underway and some of the infrastructure projects are now complete. The package will be fully implemented by June 2013.

Expenditure: \$506m.

Employment: Construction: 971

INFRASTRUCTURE

South West Region - 17 kilometres north east of Bunbury - Kemerton (HUILS - Heavy Use Industrial Land Strategy) WA STATE GOVERNMENT

Kemerton Industrial Park, located 17km north of Bunbury, is the main strategic industrial area in the South West region and the nearest regional heavy industrial site to Perth. It is designed to supplement the Kwinana Industrial Area, only 90 minutes away by road. The estate comprises 7,543ha of land, including 2,019ha of industrial core, 293ha support industry area and 5,231ha buffer areas. It is accessible to the Port of Bunbury by road and planned rail link and is serviced by major road links to the metropolitan area. Under the Heavy Use Industrial Land Strategy, the Government is progressing Kemerton towards project ready status by undertaking environmental, heritage and planning approvals for the estate. Work towards progressing approvals commenced in 2009 and is anticipated to be completed in 2012/13, by which time the structure plan and zoning adjustments will also have been completed.

IRON ORE

Mid West Region - Extension Hill Hematite Mine MOUNT GIBSON IRON LIMITED

Mount Gibson Iron has developed a 3Mtpa hematite mining operation at Extension Hill, 260km south east of Geraldton. The ore is trucked to a rail head near Perenjori then railed to the port of Geraldton for export.

Expenditure: \$73m.

Employment: Construction: 150; Operation: 100

Pilbara - FMG Chichester - Iron Ore Mine, Rail and Port Development FORTESCUE METALS GROUP LTD

FMG Chichester operates iron ore mines at Cloudbreak and Christmas Creek in the Chichester Ranges of the eastern Pilbara, serviced by a multi-user railway and port facilities at Port Hedland. FMG Chichester is currently ramping production up to 120Mtpa from the Chichester Ranges.

Employment: Construction: 2500; Operation: 3200

LITHIUM

Great Southern Region - Mount Cattlin Lithium Project, Ravensthorpe GALAXY RESOURCES LIMITED

Galaxy Resources Limited commenced commissioning of the Mt Cattlin lithium concentrate processing plant in September 2010. The mine and the mineral plant will produce approx. 137,000tpa of spodumene concentrate on completion of the ramp up phase. Preparation of a mining proposal for the Stage 2 mining area including a community consultation programme has commenced. Galaxy started exporting its product to China in the first quarter of 2011. In China, Galaxy will produce

17,000tpa of battery grade lithium carbonate. A large proportion of this will make its way into the growing markets of China and Japan.

Expenditure: \$75m.

Employment: Construction: 100; Operation: 75

OIL & GAS DEVELOPMENTS

Carnarvon Offshore Basin - Cossack/Wanaea - OKHA WOODSIDE ENERGY

The Okha floating production storage and offloading (FPSO) facility is located 34km east of the North Rankin A platform and is moored to a riser turret between the Wanaea and Cossack oil fields. The Cossack, Wanaea, Lambert and Hermes (CWLH) fields are connected by flexible flowlines to subsea wells which have produced over 424 million barrels of oil since production began in 1995. The Okha, a recently converted FPSO, is expected to produce 30,000 barrels of oil per day when reaching a steady state of operations and has a storage capacity of 925,000 barrels. Crude oil is offloaded from the vessel via a flexible line to bulk tankers moored astern, while a pipeline exports LPG-rich gas from the Cossack and Wanaea fields to the North Rankin A platform, before being transferred to the Karratha Gas Plant for processing. The Okha began production in September 2011 as part of the A\$1.8 billion CWLH Redevelopment Project to support ongoing safe and reliable production from the CWLH fields.

Expenditure: \$1.8b.

VANADIUM

Windimurra - Windimurra Vanadium Project ATLANTIC LIMITED

Atlantic successfully commissioned and achieved first ferrovanadium production at its Windimurra vanadium project in January 2012. The company is now in the process of an accelerated production ramp-up at the plant, with full production of 6,300 tonnes per annum of contained vanadium targeted in the first quarter of the 2013 calendar year. Atlantic is engaging with specialist engineering groups to assist in the production ramp-up. Atlantic last year announced a 30% increase in the JORC-compliant Ore Reserve estimate for its Windimurra vanadium project to 128 million tonnes. This prompted an upward revision to the potential mine life of Windimurra to 28 years.

Expenditure: \$600m.

Employment: Operation: 130

AMMONIUM NITRATE

Kwinana - Ammonium Nitrate Facility Expansion CSBP LIMITED

In December 2011, the Wesfarmers Board gave final approval to proceed with the expansion of CSBP's ammonium nitrate production facility at Kwinana from its current capacity of 520,000tpa to 780,000tpa. CSBP received environmental approval for the expansion in October 2011. The expansion involves the construction of an additional nitric acid plant and ammonium nitrate plant, together with an upgrade of the existing prilling plant and other infrastructure work. Early site works have commenced and tenders for a second round of long-lead equipment items have been issued. Current project timelines indicate the expansion will be completed in the first half of 2014.

Expenditure: \$550m.

Employment: Construction: 300; Operation: 10

BAUXITE

Worsley/Boddington - Alumina Refinery - E & G Project Expansion to 4.7Mtpa BHP BILLITON WORSLEY ALUMINA PTY LTD

BHP Billiton announced in May 2008 the go-ahead for the A\$2.5 billion Efficiency and Growth (E&G) expansion project at its Worsley alumina refinery.

The expansion project will lift capacity of the refinery from 3.5Mtpa to 4.7Mtpa through expanded mining operations, additional refining capacity and upgraded port facilities. Construction is ongoing and first production is scheduled for Q1 2012.

Expenditure: \$3b.

Employment: Construction: 1500; Operation: 200

HEAVY MINERAL SANDS

Keysbrook - Heavy Mineral Sands Mine MATILDA ZIRCON LIMITED

Matilda Zircon is proceeding to develop a mineral sands mine located near the township of Keysbrook, approximately 70km south of Perth. It has ore reserves of 41Mt, containing 1.2Mt of heavy mineral concentrate. The project is expected to produce 80,000tpa of leucoxene products and 12,000tpa of zircon over its eight year mine life. In October 2009, the Keysbrook project received environmental approval from the Minister for Environment. In October 2011, Matilda Zircon announced that the Shires of Murray and Serpentine-Jarrahdale approved the project subject to conditions, most of which had already been mutually agreed with the company. The Shire approvals now allow Matilda Zircon to complete detailed planning and engineering to enable construction to start in 2012, with first production planned for early 2013.

Expenditure: \$50m.

Employment: Construction: 35; Operation: 30

IRON ORE

Mid West Region - Karara Iron Ore KARARA MINING LTD (GINDALBIE METALS LTD / ANSTEEL JOINT VENTURE)

The Karara Iron Ore Project is Karara Mining's cornerstone production project in the Mid West region. Construction commenced in November 2009. Karara will deliver some 10Mtpa of iron products by Q3, 2012, comprising 8Mtpa of high grade magnetite concentrate and blast furnace quality pellets and 2Mtpa of Direct Shipping Ore hematite. The Project is underpinned by a world-class JORC-Code compliant resource base comprising a 977 million tonne magnetite reserve, a 2.518 billion tonne magnetite resource, a 10.9Mt hematite reserve and a 16.2Mt hematite resource.

Expenditure: \$1.975b.

Employment: Construction: 1500; Operation: 500

Pilbara - BHPB - Inner Harbour Expansion - Port Hedland BHP BILLITON IRON ORE PTY LTD

In March 2011, BHP Billiton announced approval of US\$7.4 billion (BHP Billiton's share US\$6.6 billion) of capital investment to continue production growth in the company's Western Australian iron ore operations. It will deliver an integrated operation with capacity in excess of 220 million tonnes per annum. The investment includes \$2.3 billion (BHP Billiton's share US\$1.9 billion) to increase total inner harbour installed capacity to 220Mtpa with debottlenecking opportunities to 240Mtpa. The project is currently on schedule (overall project is 42 per cent complete) and on budget.

Expenditure: \$2.3b.

Pilbara - BHPB - Port Blending and Rail Yard Facilities BHP BILLITON IRON ORE PTY LTD

In March 2011, BHP Billiton announced approval of US\$7.4 billion (BHP Billiton's share US\$6.6 billion) of capital investment to continue production growth in the company's Western Australian iron ore operations. It will deliver an integrated operation with capacity in excess of 220Mtpa. The investment includes US\$1.7 billion (BHP Billiton's share US\$1.4 billion) to optimise resource and enhance efficiency across the BHP Billiton WA iron ore operation supply chain. The project is currently on schedule (overall project is 13 per cent complete) and on budget.

Expenditure: \$1.7b.

Pilbara - Hope Downs 4 Iron Ore Mine RIO TINTO IRON ORE

Rio Tinto and its joint venture participant, Hancock Prospecting Pty Ltd, are currently developing the Hope Downs 4 iron ore mine at an estimated capital cost of US\$1.2 billion. The new open-cut mine will have a production rate of 15Mtpa of high quality iron ore. The development of Hope Downs 4 also involves the construction of a 53km railway line to connect to the existing Hope Downs 1 rail spur and the construction of a 220kV electricity transmission line to connect to the existing Rio Tinto power network. The US\$425 million railway and power project will be funded, constructed and operated by Rio Tinto. All government approvals have been obtained, with first production expected in Q2 2013.

Expenditure: \$1.6b.

Employment: Construction: 2100; Operation: 720

Pilbara - Jimblebar Iron Mine Expansion BHP BILLITON IRON ORE PTY LTD

In March 2011, BHP Billiton announced approval of US\$7.4 billion (BHP Billiton's share US\$6.6 billion) of capital investment to continue production growth in the company's Western Australian iron ore operations. It will deliver an integrated operation with capacity in excess of 220 million tonnes per annum. The investment includes US\$3.4 billion (BHP Billiton's share US\$3.3 billion) to increase installed mining and processing capacity at Jimblebar mine to 35Mtpa with incremental debottlenecking opportunities to 55Mtpa. The project is currently on schedule (overall project is 21 per cent complete) and on budget.

Expenditure: \$3.4b.

Pilbara - Solomon - Pilbara - Solomon Hub Stage 1

FORTESCUE METALS GROUP LTD

Fortescue is progressing with construction of its proposed 60Mtpa iron ore mine at Solomon and supporting infrastructure. The Solomon Hub is planned to initially involve at least two mining areas, two processing plants and a 137 kilometre rail link to Fortescue's existing Christmas Creek to Port Hedland rail line. The proposed mining areas and rail corridor for the Solomon Hub are within Unallocated Crown Land and active pastoral leases and approximately 70 kilometres north of Tom Price in the Hamersley Ranges. First production is anticipated by mid 2012.

Expenditure: \$4b.

Employment: Construction: 1000; Operation: 3000

Yilgarn - Koolyanobbing Iron Ore Upgrade CLIFFS ASIA PACIFIC IRON ORE PTY LTD

In September 2010, Cliffs approved an upgrade of its Koolyanobbing iron ore operations from 8.5Mtpa to around 11Mtpa. Koolyanobbing is located 50km north east of Southern Cross and also includes the Mt Jackson and Windarling mines. The improvements consist of enhancements to the existing Kalgoorlie-Esperance rail infrastructure, an increase in rolling stock and upgrades to various other existing operational constraints. These improvements are well underway and are expected to be fully implemented in the second half of 2012. The development of the Mt Jackson J1 deposit, which contains 30Mt of iron ore reserves, is due to be completed in Q1 2012 and is expected to contribute to the increased production at Koolyanobbing.

Expenditure: \$320m.

IRON ORE PROCESSING

Pilbara - Cape Preston - Sino Iron CITIC PACIFIC

CITIC Pacific Mining is constructing the Sino Iron project at Cape Preston, 100 kilometres south west of Karratha. The magnetite iron ore project will include a concentrator, 6Mtpa pellet plant, 25km slurry pipeline, combined cycle 450MW power station, new port and trans-shipment facilities, and a 51GL desalination plant. At full production up to 27.6 million tonnes of magnetite concentrate and

high grade pellets will be exported each year. Ore production from the first and second, of a planned six production lines, is expected to commence in August and December 2012.

Expenditure: \$5.2b.

Employment: Construction: 4000; Operation: 500

NICKEL

Ravensthorpe - Ravensthorpe Nickel Operation FIRST QUANTUM MINERALS AUSTRALIA NICKEL PTY LTD

FQM Australia Nickel (FQMAN) acquired the Ravensthorpe Nickel Operation (RNO) from BHP Billiton in February 2010. FQMAN plans to return RNO to sustainable production by late 2011. RNO is an open cut mine and hydrometallurgical process plant that produces a mixed nickel cobalt hydroxide intermediate product. The modifications are within the plant's existing footprint in the materials handling area, including crushing, conveying and stockpiles. FQMAN aims to produce 39,000tpa nickel metal for the first five years after recommencement and 28,000tpa nickel metal over the current anticipated mine life of 32 years.

Expenditure: \$190m.

Employment: Construction: 200; Operation: 500

OIL & GAS DEVELOPMENTS

Carnarvon Basin - Pluto LNG Project WOODSIDE ENERGY

Approved for development in July 2007, the project will process gas from the Pluto and Xena gas fields, located about 190km north-west of Karratha in Western Australia, into LNG and condensate. The Pluto and Xena gas fields are estimated to contain 4.8 trillion cubic feet (Tcf) of dry gas reserves and an additional 0.25Tcf of contingent resources. The initial phase of the Pluto LNG Project comprises five subsea wells on the Pluto gas field connected to an offshore processing platform in 85m of water. Gas will be piped about 180km to the onshore plant in a 36-inch pipeline. Onshore facilities at the Pluto LNG Park include a single LNG processing train with forecast production capacity of 4.3 million tonnes a year, in addition to storage facilities and an export jetty. First LNG cargo is targeted for March 2012.

Expenditure: \$14.9b.

Employment: Construction: 5000; Operation: 300

Carnarvon Offshore Basin - Barrow Island - Gorgon Project GORGON JOINT VENTURE

The Gorgon Joint Venture (GJV) made a final investment decision on the \$43 billion Gorgon Project on 14 September 2009. The GJV's foundation project on Barrow Island includes a three train LNG development capable of exporting 15Mtpa and a domestic gas project capable of delivering at least 300 terajoules per day of gas to the mainland. The development on Barrow Island also includes potentially the largest commercial geosequestration project in the world. The project obtained State and Commonwealth environmental approval in August 2009. The project is based on gas from both the offshore Gorgon and Jansz/lo gas fields. On-island activity commenced in late 2009 and the major construction work for the processing plant commenced in 2011.

Expenditure: \$43b.

Employment: Construction: 5500; Operation: 300

Carnarvon Offshore Basin - North Rankin - North Rankin Redevelopment WOODSIDE ENERGY

In March 2008 the North West Shelf Project participants approved funding of the A\$5 billion North Rankin Redevelopment which will recover remaining low pressure gas from the North Rankin and Perseus gas fields, and extend the field life to around 2040. The project involves the installation of a new second platform North Rankin B with gas compression

facilities, low pressure separators, utilities and accommodation. North Rankin B will be connected by two 100 metre bridges to the existing North Rankin A platform and on completion both platforms will be operated as a single integrated facility known as the North Rankin hub. The North Rankin Redevelopment project also includes the necessary connections to North Rankin A and some refurbishment of the North Rankin A platform. North Rankin B is scheduled for start-up in 2013 and will support the North West Shelf Projects onshore gas requirements to supply future customer commitments.

Expenditure: \$5b.

RARE EARTHS

Mt Weld - Rare Earths Mine LYNAS CORPORATION LTD

The Mt Weld deposit is located about 35km south of Laverton and contains an estimated resource of 23.9Mt at an average grade of 7.9% for 1.9Mt rare earth oxides (REO). The development includes an open pit mine and a concentration plant, located 1.5km from the open pit mine. The first feed of ore into the 33,000tpa concentration plant occurred in May 2011 and the plant was officially opened in August 2011. The concentrate will be bagged and containerised on site, and trucked to the Port of Fremantle for export. It will be shipped to a \$400 million processing plant in Malaysia, which will have an initial production capacity of 11,000tpa REO scheduled to commence in Q2 2012 subject to Malaysian government approvals. Phase 2 will involve the expansion of the Mt Weld concentration plant to produce around 66,000tpa of concentrate, which will be required to meet the Malaysian processing plant's expanded production of 22,000tpa REO. Lynas expects all construction works associated with the planned phase 2 production expansion in both Western Australia and Malaysia to be largely completed in 2012 and production output to ramp up to the targeted 22,000tpa of REO in 2013.

Expenditure: \$135m.

Employment: Construction: 145; Operation: 95

SILICON METAL

Kemerton - Silicon Metal Plant Expansion SIMCOA OPERATIONS PTY LTD

Simcoa announced in October 2009 its decision to expand the company's 32,000tpa capacity silicon metal plant at Kemerton. The first-stage expansion, involving installation of a third furnace, will increase the plant capacity to 48,000tpa and is expected to come online in Q2 2012. Providing world demand for silicon continues to increase strongly, a second-stage expansion, involving installation of a fourth furnace could take place by late 2013 and increase plant capacity to 64,000tpa.

Expenditure: \$100m.

Employment: Construction: 120; Operation: 40

AMMONIA/UREA

Shotts Industrial Park - Collie Coal to Urea PERDAMAN CHEMICALS AND FERTILISERS PTY LTD

Perdaman Chemical and Fertilisers Pty Ltd is developing a \$3.5 billion coal to urea plant at the new (to be developed) Shotts Industrial Park, near Collie. The plant will use proven coal gasification and fertiliser production technologies. Around 2.7Mtpa of coal will be used to produce approximately 2Mtpa of urea, primarily for export. The urea will be transported to Bunbury Port by rail. A 20-year off take agreement has been signed with Incitec Pivot. The company has received all its environmental and other approvals from both the Western Australian and Commonwealth governments. Construction is expected to commence in late 2012 with the first shipment of urea planned for 2016.

Expenditure: \$3.8b.

Employment: Construction: 2000; Operation: 200

AMMONIUM NITRATE

Pilbara - Burrup Industrial Estate Site D - Burrup Nitrates

BURRUP NITRATES PTY LTD

Burrup Nitrates Pty Ltd (BNPL), a joint venture between Burrup Holdings Ltd (BHL) of Australia and Yara International ASA of Norway, has conducted a feasibility study into the construction of a 350,000tpa Technical Ammonium Nitrate (TAN) plant to be located on the Burrup Peninsula. Ammonia feedstock will be supplied from BHL's subsidiary company Burrup Fertilisers Pty Ltd, which operates its facility directly adjacent to the proposed location for the new TAN plant. It is expected that all manufactured product will be sold into the Pilbara region. Regulatory approvals have been finalised and the company is aiming for operations to commence by Q4 2014.

Expenditure: \$600m.

Employment: Construction: 600; Operation: 65

GOLD

Kalgoorlie (330kms North East) - Tropicana Gold ANGGOLD ASHANTI/INDEPENDENCE GROUP JOINT VENTURE

AngloGold Ashanti, as Joint Venture Manager, has undertaken an intensive exploration and resource development program approximately 330kms north east of Kalgoorlie. Plans for the project are to develop an open-cut gold mine and nearby processing plant. So far, a resource estimate of 5million oz of gold has been identified with a mine life of at least 10 years. The feasibility study commenced in July 2009 and is ongoing. Environmental approvals were finalised in September 2010. Commonwealth environmental approval was received on 13 December 2010. The first phase of construction, 220km of road, an all weather airstrip and the accommodation village is now complete. The second phase involving plant construction will begin in early 2012. Gold production is planned for 2013.

Expenditure: \$700m.

Employment: Construction: 700; Operation: 400

HEAVY MINERAL SANDS

Happy Valley - Heavy Mineral Sands Mine BEMAX RESOURCES LTD

Located adjacent to the Bemax Gwindinup deposits south of Bunbury, the project will involve the mining of the Happy Valley North and South mineral sands deposits situated on private land and in State Forest. The two deposits contain over 750,000 tonnes of recoverable heavy mineral concentrate, with average production expected to be around 150,000tpa over a combined mine life of eight years. The concentrate will be trucked to Bemax's Bunbury Mineral Separation Plant for final processing. In February 2011, the EPA recommended that the Minister for Environment not approve the company's proposal to develop the Happy Valley mine. Bemax has lodged an appeal against the EPA's decision and the matter is currently with the Appeals Convenor.

Expenditure: \$35m.

Employment: Construction: 100; Operation: 30

Shark Bay - Coburn Zircon Project GUNSON RESOURCES LIMITED

Gunson proposes to develop the Coburn zircon project, located south of Shark Bay and approximately 250km north of Geraldton. It contains total ore reserves of 308Mt at an average grade of 1.2% heavy minerals, all of which lie within the portion of the project area that has received government environmental approvals for mining. The project is expected to produce 40,000tpa of zircon, 90,000tpa of ilmenite, 9,000tpa of rutile and 7,000tpa of leucocoxene. At the proposed mining rate of 17.5Mtpa, the Coburn mine life is estimated to be 17.5 years which could be extended by six years if the northern area receives government approvals for mining. In November 2011, a non-binding term sheet was executed with

a major East Asian industrial group for it to earn a large minority interest in the Coburn project. The due diligence process and the agreement of detailed documentation is targeted to be completed in February 2012.

Expenditure: \$180m.

Employment: Construction: 170; Operation: 110

INFRASTRUCTURE

Dampier Peninsula - Browse LNG Precinct WA STATE GOVERNMENT

The State Government is developing the Browse Liquefied Natural Gas (LNG) Precinct approximately 60km north of Broome. By focussing development at a suitable location the Precinct will minimise the environmental footprint of gas processing and any social impacts in the region while maximising opportunities for the local community to benefit from the development of the Browse Basin gas fields. On 30 June 2011, agreements were reached with the Goolarabooloo Jabirr Jabirr native title claimant group to secure land for the Precinct. These agreements, valued at more than \$1.5 billion over 30 years, contribute a range of benefits for Indigenous communities throughout the Kimberley region, while providing a strong governance role for the Traditional Owners of the land upon which the Precinct will be established. Benefits will be further expanded when additional LNG proponents commit to development in the Precinct. The Precinct will have the capacity to accommodate at least two LNG processing operations, with a combined capacity of up to 50Mtpa. Woodside Energy Limited, as a participant of the Browse Joint Venture, has committed to the Precinct as a potential foundation proponent. Browse Joint Venture participants are expected to make a final investment decision by mid-2013.

Expenditure: \$30b.

Employment: Construction: 6000; Operation: 400

Oakajee - Oakajee Midwest Development WA STATE GOVERNMENT

The Oakajee Port will include common user infrastructure (channel, breakwater, turning basin, navigational aids, provision for tug and pilot boat pens, port administration offices and roads and utilities) funded by the State and Commonwealth Governments and private use infrastructure (at least one Cape Class iron ore berth, as well as associated materials handling equipment and rail infrastructure) developed by Oakajee Port and Rail Pty Ltd. The Port will also include provision for a non iron ore berth in the future to provide import/export capability for value-adding industries in the Oakajee Industrial Estate. A northern railway will link the port to mines to the north-east of Geraldton and a southern railway will link to the mines in the south-east. The northern rail line will be operated by Oakajee Port and Rail through an open access regime.

Expenditure: \$4b.

Employment: Construction: 2000; Operation: 300

Pilbara - Ashburton North Strategic Industrial Area WA STATE GOVERNMENT

The State Government is developing the Ashburton North Strategic Industrial Area (ANSIA) as a hydrocarbon precinct in the Shire of Ashburton, 12km south west Onslow, to enable the development of natural gas projects and associated industries to exploit the gas reserves in the Carnarvon Basin and Exmouth Gulf. In addition to the industrial area with proponent sites and general areas, the ANSIA includes a port with common user facilities, and common user infrastructure corridors. The ANSIA estate is intended to cater for the development of hydrocarbon processing, storage and exportation, with the overall vision of creating an industrial estate that successfully and safely manages the varied land uses in the area. Three foundation proponents, BHP Billiton, Chevron, and ExxonMobil have been allocated land within the ANSIA. Chevron made a final investment decision in September of 2011 and construction has commenced. Gas to market

is scheduled for 2016. In Q3 2011, BHP Billiton commenced construction of the Macedon project, with gas production to commence in early 2013.

Pilbara - Anketell - Anketell Port and SIA (Strategic Industrial Area) WA STATE GOVERNMENT

The Anketell project includes establishment of a multi-user, multi-commodity deepwater port and associated strategic industrial area (SIA) at Anketell, located 30km east of Karratha. The port and corridor development will be a proponent-funded State owned Port managed by the Dampier Port Authority. The industrial land will fall under the jurisdiction of the Western Australian Land Authority. Three companies have expressed interest in developing facilities at Anketell: API Management Pty Ltd for its 30-40Mtpa West Pilbara Iron project, MCC Australia Sanjin Mining Pty Ltd for its 15Mtpa Cape Lambert Iron Ore project, and Fortescue Metals Group (FMG) for its 100Mtpa Central Pilbara project. Numerous other companies have expressed an interest in using the port facilities for bulk export.

IRON ORE

Great Southern Region - Southdown Magnetite Mine GRANGE RESOURCES LTD

The Southdown Magnetite deposit is situated 90km north east of Albany, near Wellstead. The Southdown Project is a joint venture between Grange Resources Ltd (70%) and Sojitz Resources & Technology Pty Ltd (30%). The Definitive Feasibility Study is due for completion during the first quarter of 2012, after which the Project partners will decide whether to proceed with the Project. In June 2011, an increase in mine production from 6.8 to 10Mtpa was approved. The Southdown Joint Venture continues to work and collaborate with relevant government agencies to refine its mine, port and associated infrastructure approvals, and to support the Great Southern community.

Expenditure: \$2.57b.

Employment: Construction: 2000; Operation: 600

Mid West Region - Extension Hill Magnetite Mine ASIA IRON

Asia Iron has primary environmental approval to produce up to 10Mtpa of magnetite concentrate, which will be transported by slurry pipeline to the port of Geraldton for export. The company is currently seeking secondary approvals. Asia iron is also undertaking an implementation study for the project and has appointed a project management contractor for project delivery.

Expenditure: \$2b.

Employment: Construction: 1000; Operation: 350

Mid West Region - Jack Hills Expansion CROSSLANDS RESOURCES

Crosslands commenced trucking 1.5Mtpa haematite from its Jack Hills operations to the port of Geraldton in December 2006. Jack Hills Stage 2 will involve an increase to 25Mtpa of haematite and beneficiation feed ore. The ore will be transported by a new railway to a new deepwater port at Oakajee. A bankable feasibility study for the project was finalised in June 2011.

Expenditure: \$2b.

Employment: Construction: 450; Operation: 350

Pilbara - Cape Lambert Iron Ore Project MCC AUSTRALIA SANJIN MINING PTY LTD

MCC Australia Sanjin Mining Pty Ltd is developing a 15Mtpa magnetite iron ore mine in the Pilbara and aims to ship its first ore in 2015 via the proposed multi-user 350Mtpa port at Anketell. The Project comprises a proven JORC compliant 1.9bt iron ore resource, a beneficiation plant, power plant, desalination plant, port facilities for exporting concentrate and other related infrastructure. MCC has completed feasibility studies for the port, power supply, water supply, accommodation and general

Projects Under Consideration

site infrastructure. The mine and processing studies are progressing. The company commenced native title negotiations with the Ngarluma Aboriginal Corporation in March 2010 and a preliminary native title agreement was signed on 17 May 2011. An environmental scoping document was approved by the EPA in August 2011.

Expenditure: \$3.7b.

Employment: Construction: 3000; Operation: 1000

Pilbara - FMG Central Pilbara Project (Solomon Stage 2 and Western Hub)

FORTESCUE METALS GROUP LTD

FMG's Central Pilbara project is located in the Solomon Stage 2 area (about 70km north of Tom Price) and the Western Hub (west of Solomon) in the Pilbara. FMG reports that to date, Solomon Stage 2 has identified resources of 1.1 billion tonnes, with a target of 2 billion tonnes, comprising channel iron, bedded Brockman and detritals iron deposits. Start-up production from Solomon Stage 2 of 20Mtpa is scheduled for late 2014/early 2015, with aspirations to expand to around 200Mtpa by 2017 (100Mtpa from Solomon Stage 2 and 100Mtpa from Western Hub). The project comprises mines, a new 250km railway linking Solomon Stage 2 mines to berths and ship loading facilities in the proposed 350Mtpa multi-user port at Anketell.

Expenditure: \$7b.

Employment: Construction: 4800; Operation: 2650

Pilbara - Outer Harbour Development, Port Hedland

BHP BILLITON IRON ORE PTY LTD

The proposed Outer Harbour Development, an iron ore export facility at Port Hedland, will include a four-kilometre jetty, eight-berth wharf, stockyards, rail loop and associated facilities. BHP Billiton Iron Ore's investment in the proposed Outer Harbour Development remains subject to market conditions, the receipt of all required government approvals and BHP Billiton Board approval.

Pilbara - Roy Hill Iron Ore Mine & Infrastructure

HANCOCK PROSPECTING PTY LTD

Hancock Prospecting is developing the Roy Hill iron ore project located 105km north east of Newman. This project is expected to come into production in 2014 and will produce 55Mtpa of iron ore for 20 years following ramp-up. The project includes mine development, mine processing infrastructure, a new 340km railway, and significant new port facilities at Port Hedlands inner harbour. Environmental approval for Roy Hill mine Stage 1 was received in December 2009 and environmental approval for Stage 2 was received in March 2010. All key approvals have been secured and major project works are expected to commence in 2012.

Expenditure: \$7b.

Employment: Construction: 1500; Operation: 750

Pilbara - West Pilbara Iron Ore Project

API MANAGEMENT PTY LTD

The Australian Premium Iron Joint Venture is proposing to develop the West Pilbara Iron Ore Project. Stage 1 of the project is based on the production of 30Mtpa of direct shipping iron ore from its Red Hill and Mt Stuart mine sites located 35-80km south west of Pannawonica. The ore will be transported by a new heavy haul railway for export via the proposed multi-user 350Mtpa port at Anketell. Subject to the successful completion of feasibility and environmental studies, and receipt of government regulatory approvals, the company anticipates that the first shipment of ore will occur in late 2014/early 2015. The EPA provided its report and recommendations for the mine and rail proposal to the Minister in August 2011.

Expenditure: \$4b.

Employment: Construction: 2000; Operation: 700

Pilbara - 120km northwest of Newman - Mining Area C - Iron Ore Mine

BHP BILLITON IRON ORE PTY LTD

The proposed Jinidi Iron Ore Mine Project is a greenfields iron ore mine. The Project will include the construction of open-pit mining and processing facilities, rail loading infrastructure and a rail loop, and associated non-process infrastructure. The proposed Project is to be located approximately 55 km north-west of Newman in the Pilbara region of Western Australia and 22 km east of the existing BHP Billiton Iron Ore Area C Mine. The proposed Project is subject to market conditions and all relevant government and BHP Billiton Board approvals.

Yilgarn - Deception Iron Ore Deposit

CLIFFS ASIA PACIFIC IRON ORE PTY LTD

Cliffs is proposing to develop an open-cut iron ore mine at the Deception Deposit, located approximately 150km north of Southern Cross. The new mine will be integrated into Cliffs existing iron ore operations at Koolyanobbing. The Deception Deposit contains an estimated 9.2Mt of iron ore and is expected to have a mine life of around 8 years. Subject to obtaining all government approvals, mine development is scheduled to commence from 2012 with first production expected from 2014.

Expenditure: \$35m.

OIL & GAS DEVELOPMENTS

Carnarvon Basin - Pluto Project Expansion

WOODSIDE ENERGY

The Pluto LNG Park provides the opportunity to consider both equity gas development and third party gas supply at the site. The foundation project investment in support infrastructure enables a significantly lower cost and de-risked expansion opportunity. As a brownfield development Pluto expansion will require a much smaller construction workforce compared to a greenfield development. Woodside has completed front-end engineering and design (FEED) for the next two onshore trains. Discussions continue with third parties regarding the potential to process Carnarvon Basin gas through additional trains at Pluto.

Carnarvon Offshore Basin - Macedon Domestic Gas Project

BHP BILLITON PETROLEUM (AUSTRALIA) PTY LIMITED

The Macedon gas field, about 90km west of Onslow, was discovered in 1992 during drilling of the West Muiron-3 well and is estimated to contain a gas resource of up to 600bcf. BHP Billiton Petroleum (Australia) Pty Ltd and Apache Energy Limited are currently progressing the necessary approvals for a domestic gas project for Western Australia. The development will involve a number of sub-sea gas wells connected to the gas field, offshore and onshore wet gas pipelines, an onshore gas processing plant 15km southwest of Onslow, and a sales gas pipeline connected to the Dampier-to-Bunbury Natural Gas Pipeline. Daily production is expected to be in the order of 200TJ. Construction has started in Q3 2011, with gas production to commence in early 2013.

Expenditure: \$1b.

Employment: Construction: 300

Pilbara - Wheatstone LNG Development

CHEVRON AUSTRALIA PTY LTD

Chevron is investigating the feasibility of an LNG project based on its Wheatstone and Iago gas fields, to be located at Ashburton North, near Onslow. The project will also process gas from sub-economic third party fields in the Carnarvon Basin. Chevron entered FEED (Front End Engineering Design) in July 2009 with a Final Investment Decision expected in the second half of 2011. Gas to market is scheduled for 2016. The project will initially have two LNG trains with an 8.9Mtpa capacity, expandable to five, and a 250 million cubic feet per day domestic gas plant.

Expenditure: \$23b.

Employment: Construction: 5000; Operation: 400

TIMBER

Mirambeena Timber Processing Precinct - Engineered Strand Lumber

LIGNOR LTD

Lignor proposes to develop an Engineered Strand Lumber ESL@/ Engineered Strand Board ESB@ plant located at Mirambeena, about 15km north west of Albany. The first stage Commercial Plant will be smaller than the second stage Commercial Plant in order to produce a range of products for certification to the Australian Building Code and overseas equivalents. The Plants will source most of the timber from the extensive eucalypt plantations in the Albany region. Lignor is finalising its design of the first stage Plant and anticipates construction to commence by Q3 2012, with product coming into the market by Q4 2013. Following successful results from the first stage Commercial Plant, construction of the second stage Commercial Plant is expected to commence by mid 2016.

Expenditure: \$273m.

Employment: Construction: 380; Operation: 125

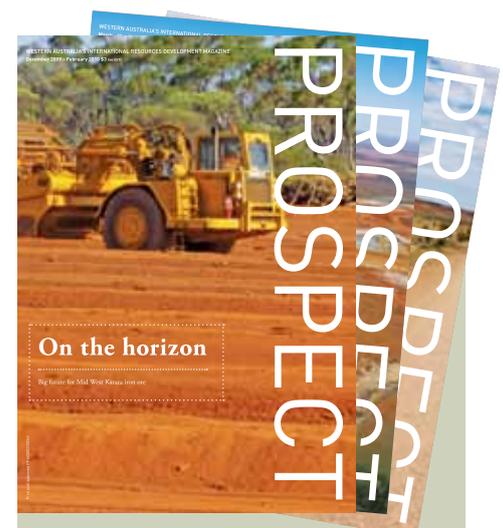
URANIUM

Northern Goldfields - Yeelirrie - Yeelirrie Uranium

BHP BILLITON YEELIRRIE DEVELOPMENT COMPANY PTY LTD

BHP Billiton proposes to develop the Yeelirrie Uranium Project in the North-eastern Goldfields, near Wiluna. The proposal entails open cut mining of shallow deposits of uranium ore, treatment in a plant to be established at the site, and development of associated infrastructure. The project will produce up to 3,500tpa uranium oxide concentrate over about 30 years. The uranium oxide will be transported to South Australia by road for export to overseas markets. The formal environmental impact assessment process was initiated in 2009 and the project Environmental Scoping Document was approved in June 2010. The project is ongoing.

Employment: Construction: 700; Operation: 300



Prospect Magazine is also available to view online.

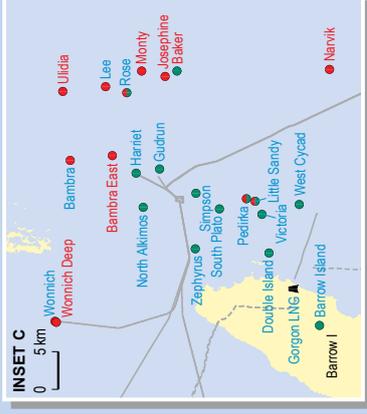
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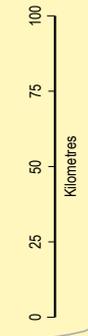
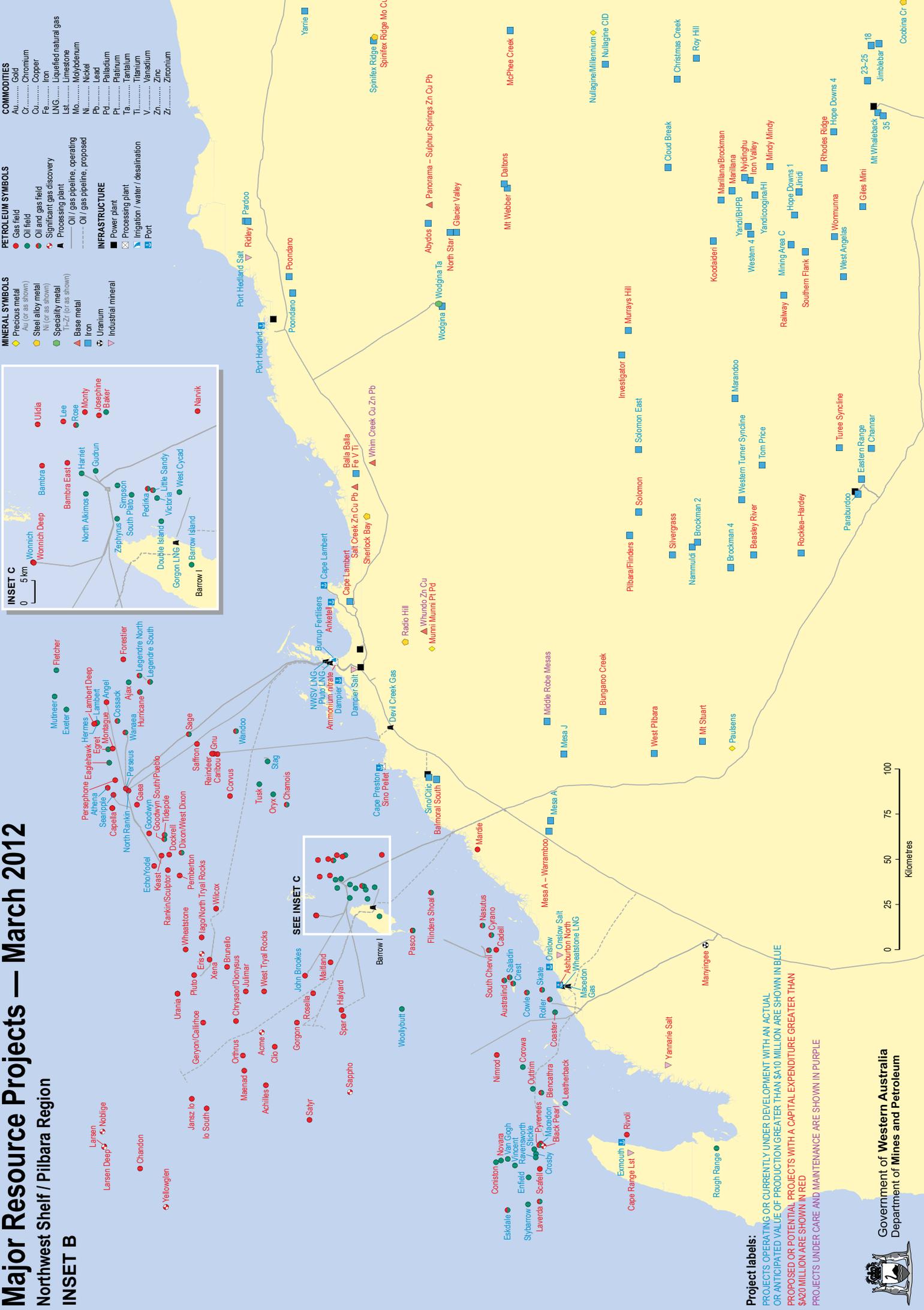
Major Resource Projects — March 2012

Northwest Shelf / Pilbara Region

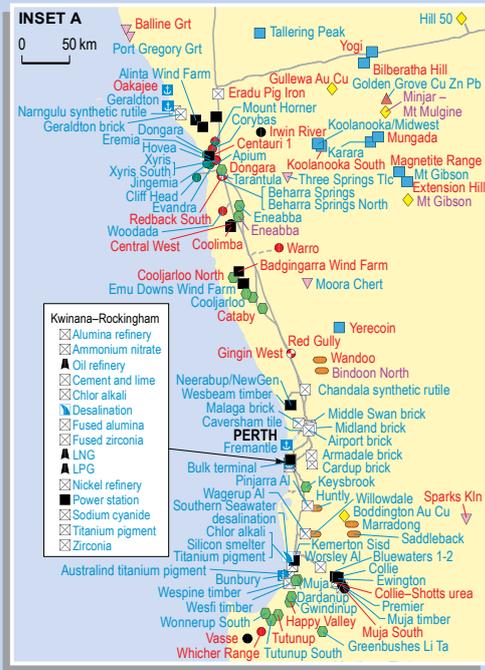
INSET B



- MINERAL SYMBOLS**
- Precious metal (Au (or as shown))
 - Steel alloy metal (Ni (or as shown))
 - Speciality metal (Ti-Zr (or as shown))
 - Base metal (Iron)
 - Uranium
 - Industrial mineral
- PETROLEUM SYMBOLS**
- Gas field
 - Oil field
 - Oil and gas field
 - Significant gas discovery
 - Processing plant
 - Oil / gas pipeline, operating
 - Oil / gas pipeline, proposed
- INFRASTRUCTURE**
- Power plant
 - Processing plant
 - Irrigation / water / desalination
 - Port
- COMMODITIES**
- Au..... Gold
 - Cr..... Chromium
 - Cu..... Copper
 - Fe..... Iron
 - LNG..... Liquefied natural gas
 - Lst..... Limestone
 - Mo..... Molybdenum
 - Ni..... Nickel
 - Pb..... Lead
 - Pd..... Palladium
 - Pl..... Platinum
 - Ta..... Tantalum
 - Ti..... Titanium
 - V..... Vanadium
 - Zn..... Zinc
 - Zr..... Zirconium



Major Resource Projects — March 2012



Project labels:

PROJECTS OPERATING OR CURRENTLY UNDER DEVELOPMENT WITH AN ACTUAL OR ANTICIPATED VALUE OF PRODUCTION GREATER THAN \$A10 MILLION ARE SHOWN IN BLUE

PROPOSED OR POTENTIAL PROJECTS WITH A CAPITAL EXPENDITURE GREATER THAN \$A20 MILLION ARE SHOWN IN RED

PROJECTS UNDER CARE AND MAINTENANCE ARE SHOWN IN PURPLE

