



COMMONWEALTH OF AUSTRALIA

Official Committee Hansard

**HOUSE OF  
REPRESENTATIVES**

STANDING COMMITTEE ON INDUSTRY AND RESOURCES

**Reference: Developing Australia's non-fossil fuel energy industry**

WEDNESDAY, 2 NOVEMBER 2005

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**HOUSE OF REPRESENTATIVES**  
**STANDING COMMITTEE ON INDUSTRY AND RESOURCES**

**Wednesday, 2 November 2005**

**Members:** Mr Prosser (*Chair*), Mr Hatton (*Deputy Chair*), Mr Adams, Mrs Bronwyn Bishop, Mr Cadman, Mr Martin Ferguson, Mr Haase, Mr Katter, Miss Jackie Kelly and Mr Tollner

**Members in attendance:** Mr Adams, Mr Martin Ferguson, Mr Haase, Mr Hatton, Mr Katter and Mr Prosser

**Terms of reference for the inquiry:**

To inquire into and report on the development of the non-fossil fuel energy industry in Australia.

The Committee shall commence its inquiry with a case study into the strategic importance of Australia's uranium resources. The case study shall have particular regard to the:

- a) global demand for Australia's uranium resources and associated supply issues;
- b) strategic importance of Australia's uranium resources and any relevant industry developments;
- c) potential implications for global greenhouse gas emission reductions from the further development and export of Australia's uranium resources; and
- d) current structure and regulatory environment of the uranium mining sector (noting the work that has been undertaken by other inquiries and reviews on these issues).

**WITNESSES**

**DELANEY, Mr Bernie, Vice-President, Government Relations and Asset Protection, BHP  
Billiton..... 1**

**GREEN, Mr Steve, Sustainability Manager, Olympic Dam Development Study, BHP Billiton ..... 1**

**HIGGINS, Dr Roger, Vice-President and Chief Operating Officer, Base Metals Australia, BHP  
Billiton..... 1**

**YEELES, Mr Richard, Group Manager, Corporate Affairs, Base Metals Australia, BHP Billiton ..... 1**



**Committee met at 9.28 am**

**DELANEY, Mr Bernie, Vice-President, Government Relations and Asset Protection, BHP Billiton**

**GREEN, Mr Steve, Sustainability Manager, Olympic Dam Development Study, BHP Billiton**

**HIGGINS, Dr Roger, Vice-President and Chief Operating Officer, Base Metals Australia, BHP Billiton**

**YEELES, Mr Richard, Group Manager, Corporate Affairs, Base Metals Australia, BHP Billiton**

**CHAIR (Mr Prosser)**—I am pleased to declare open the ninth public hearing of the House of Representatives Standing Committee on Industry and Resources inquiry into the development of the non-fossil fuel energy industry in Australia. The committee has commenced its inquiry with a case study into the strategic importance of Australia's uranium resources. The inquiry was referred to the committee by the Minister for Industry, Tourism and Resources, the Hon. Ian Macfarlane, on 15 March 2005. The committee also records its appreciation of the opportunity to have visited the Olympic Dam operations in September as part of the inquiry.

Thank you for agreeing to appear and give evidence before the public hearing today. Although the committee does not require you to give evidence under oath, I should advise you that the hearing is a formal proceeding of the parliament. I further remind you that the giving of false or misleading evidence is a serious matter and may be regarded as a contempt of parliament. I also remind you that the committee prefers all evidence to be given in public; however, at any stage, you may request that your evidence be given in private and the committee will then consider your request. I now invite you to proceed with your presentation before the committee proceeds to questions, and I apologise for the delay.

**Dr Higgins**—That is certainly okay. First of all, I would like to apologise for the fact that it is only my name that appears on the slide up there. The final presentation was prepared by others who chose to leave their names off, but we are all here in equal capacities to represent the interests that we see of BHP Billiton in the uranium business. Olympic Dam has recently come into the BHP Billiton portfolio through the acquisition of Western Mining Corporation and, within BHP Billiton's portfolio, we sit within a group called the Base Metals Customer Sector Group. Base Metals CSG is one of the world's top producers of copper, silver, lead, zinc and now uranium.

As Base Metals, we are establishing an office in Adelaide. We have not had a corporate office for the Base Metals group in Australia prior to this—our Base Metals headquarters is in Santiago, Chile. We are establishing an office in Adelaide to have responsibility for Olympic Dam, for the expansion of Olympic Dam and for the Cannington silver-lead-zinc mine in North Queensland.

As you are aware, this inquiry was initiated before BHP Billiton's takeover of Western Mining's resources, which was finalised in August of this year, and in that sense, BHP Billiton is

new to the uranium business. Obviously, we are learning fast as we go along and we learnt some things before the acquisition, but please forgive us if in some cases we are still on our way up the learning curve in some of the finer aspects of the uranium business.

Prior to our acquisition of Western Mining, Western Mining Resources contributed to submissions to this inquiry by the Uranium Information Centre and the Minerals Council of Australia, and BHP Billiton endorses the submissions that those two groups made. In particular, BHP Billiton believes it is relevant to the committee's inquiry to make a few observations before we lead into a presentation on Olympic Dam specifically.

Nuclear power currently provides around 16 per cent of the world's electricity. As well as being cost effective and a reliable source of baseload power, the electricity is generated without direct emission of greenhouse gases at least at the generation phase, although there is some other energy used in the preparation of uranium to get into fuel rods. All credible projections of world energy demand and supply options indicate that uranium does have an important role to play in meeting the world's energy needs. We believe at BHP Billiton that the meeting of these needs will require a mix of fuels, fossil fuels, uranium and renewable energy sources.

We recognise that there are people who are opposed to the nuclear fuel cycle in its entirety but also recognise that a number of major economies—the United States, the United Kingdom, France and Canada, for example—derive a substantial share of their total energy from nuclear power, and it has been safe, reliable and cost effective for the most part.

The export of uranium produced at Olympic Dam is subject to the stringent multilateral and bilateral safeguards designed to ensure that it can be used only for peaceful purpose throughout its life cycle. Since our takeover of Western Mining, BHP Billiton has successfully integrated the Olympic Dam operation into the Base Metal Customer Sector Group. We have also completed a review of the work undertaken by Western Mining to plan for a future expansion of Olympic Dam. In the presentation, we will discuss where Olympic Dam is right now and where we see it going with the expansion in the future.

We believe that we can best assist your inquiry by addressing the context of the Olympic Dam operation and the potential for future development. We will be able to make some comments on the global demand for Australia's uranium resources and the importance strategically of those resources. Some members of the committee visited Olympic Dam in September. The presentation will perhaps cover a little bit of ground that those members have seen before but we will, nonetheless, give a brief summary of where we are and then we will be more than happy to answer your questions from there. We will go into the presentation and invite it to be an interactive discussion. Please, if any questions come up throughout it, we will take them as we go.

We will talk briefly in this presentation in the context of your terms of reference. We will include a small section on the Base Metals Customer Sector Group of BHP Billiton and two sections on Olympic Dam—where we are and where we expect to be.

*A PowerPoint presentation was then given—*



**Dr Higgins**—Olympic Dam is significant in the world uranium scene. It contains about 30 per cent of the world's known economic uranium and it is currently the third largest producing mine. The planned expansion would make it the world's largest uranium producer at about 20 per cent of annual production, and it would do that for a long life. However, Olympic Dam is primarily a copper mine. The grades of uranium in the ground at Olympic Dam would not support a uranium mine in its own right and the ore body is mined principally for its content of copper and gold, with uranium as a valuable by-product. If the copper were not there, it would not be economic to mine Olympic Dam for its uranium.

There are seven customer sector groups within BHP Billiton—I am sure many of you are aware of them—and the Base Metals Customer Sector Group is one of those. We produce copper, silver, lead, zinc and uranium. There are seven main mining assets within the group. In Chile there are currently two operating mines—Cerro Colorado and Escondida. Escondida is the world's largest copper mine at this point in time. In Peru, we have Antamina, which produces both copper and zinc in concentrates, and Tintaya, which produces copper in concentrates and as metal. Olympic Dam is now in the mix, producing copper, uranium, gold and silver. Cannington, in North Queensland, produces concentrates of lead and zinc, which contain a very large by-product of silver. Spence, which is also in Chile, is listed separately because it is under development at the moment. It will go into production at the end of next year. It is a greenfield development which will produce in round figures the same amount of copper per year as Olympic Dam currently produces.

Olympic Dam is Australia's largest underground mine and the world's largest known uranium resource of just on four billion tonnes of ore grading 1.1 per cent copper on average and 0.4 kilograms per tonne or 0.04 per cent of uranium. Located in central South Australia, Olympic Dam is over 600 kilometres from Adelaide and is north of the Iron Triangle. It is serviced by road. All transport, which I will come to in a moment, is by road at this point in time.

**Mr MARTIN FERGUSON**—Your proposal is for a rail connection, isn't it?

**Dr Higgins**—We will talk about that later. We are talking about that as part of the expansion project. I will dwell on this photograph for a little longer. It is perhaps a bit difficult to see the entire photograph of the site at Olympic Dam. The site is large and quite complex. At the lower end of the photograph are the shafts for the underground mine and the large core sheds, and then stockpiles of ore et cetera. Moving up along the line, which is essentially west in this photograph, is the processing plant, the smelter and the refinery. In the distance is the tailings ponds, where the waste is stored.

On the southern side—on the left-hand side of the photograph where you can see all sorts of roads and drill pads—is the area where much of the expansion drilling is taking place. I will talk a little about the amount of drilling that is going on. It is a very large site, spread over a huge area. The circuit is very complicated because of the mix of products—copper, uranium, gold and silver. We take each of those products to final product. So we produce copper metal, silver and gold in bullion and uranium as U<sub>3</sub>O<sub>8</sub>, uranium oxide. That is principally to ensure that the uranium is only in the uranium product and that no residual uranium is in the copper.

**Mr KATTER**—Do you refine copper there, or do you smelt it?

**Dr Higgins**—We smelt it and refine it there. We do both at Olympic Dam. We produce our final cathode and ship that.

**Mr KATTER**—How big is the footprint? How far is it from the bottom of that photograph to the top?

**Mr Green**—Top to bottom is about six or seven kilometres.

**Dr Higgins**—There is also a township. This is quite a dramatic photograph of it in the desert. It is a well-developed town, with a current population of about 4,000 people. It has very good community facilities for a town like that. It has regular air services from Adelaide, and it is 15 kilometres from the mine site.

**Mr MARTIN FERGUSON**—With a bigger work force for production, do you propose to house them in Roxby Downs, in surrounding farms, or are you going to fly them in and out?

**Dr Higgins**—When we come to expansion, I will talk more about that. But the short answer is that, at the moment, the majority of the work force live in Roxby Downs, with some in Woomera and some in Andamooka. Some people bus in and out from the Iron Triangle, and a small number fly in, fly out. As we go into the expansion and roughly double the work force, we suspect that most of those proportions will also roughly double. We are in a market where we simply cannot demand that people live somewhere, but there will be people for whom it is convenient to live in the town—and we encourage that. It is our preference that people live and work together; but it is not possible to get all the people we need that way, so there will continue to be something of a mix.

**Mr KATTER**—What is the size of your work force?

**Dr Higgins**—The total number of employees is around 1,200. There is roughly an equivalent number of permanent contractors who work for us.

**Mr HAASE**—Who owns the houses in Roxby Downs?

**Dr Higgins**—The majority are owned by the employees. We do own some. The town was developed by Olympic Dam, but there has been a program of allowing employees to buy either land or houses and to develop them.

**Mr HAASE**—So, if the mix in each category were to double, we would need to accommodate another 4,000 people in Roxby Downs. Would those houses be built by individuals? The company is not planning to build anything?

**Dr Higgins**—Frankly, we are still working on that. We would certainly develop land and make it available and then see what the best mix was.

There are two issues to demonstrate from this next slide. Firstly, there is the rate of growth of this project over its life. In 1988 it started out as a mine processing about 2.1 million tonnes from underground and, in 2005, we are working on 10 million tonnes from underground. It has been in continual growth since it was originally developed. Equally, copper has gone from about

45,000 tonnes of cathode per year to approximately 220,000 tonnes—it is roughly a five-fold increase. Uranium as U<sub>3</sub>O<sub>8</sub> has gone from 1,100 tonnes to about 4,600 tonnes.

**Mr KATTER**—What is the current price of copper and uranium?

**Dr Higgins**—The current price of copper is around \$US1.80 per pound, which is historically high. While it is very wonderful, we do not believe it to be sustainable. Uranium is not quite as simple to answer, because a lot of uranium is sold under long-term contracts, which is about \$15 a pound, while the spot market is about \$30. So the spot market is currently well above the long-term contract price.

**Mr KATTER**—And they are all US dollars?

**Dr Higgins**—Yes. A lot of growth is the one thing to demonstrate—and the expansion would continue that—and the other is the predominance of copper as the major product, with relatively small quantities of uranium. In the mix, uranium represents 20 to 25 per cent of revenue. Olympic Dam has been subject to environmental management systems and requirements throughout its life. There are a number of systems there, which Western Mining have put in place and which we endorse and are following. They include: registration and accreditation under the National Standards Association 14000 series; a three-year environmental management program under the indenture agreement, which is the agreement with the government of South Australia; annual environmental management reports to both the state and federal governments; and regular management meetings with those governments, with some of those meetings taken on site on a regular basis.

I will stop there. That is a very quick snapshot of what Olympic Dam is. It is a large multimetallic mine in a remote location, which has been successfully expanded since it started in 1988. My own involvement is measured in months, whereas some of these guys here have involvement measured in quite a few years—and I am relying on them to correct me when I get something wrong.

I will go now to the prefeasibility study for the expansion. Western Mining had done a lot of work on the prefeasibility study. I think it is fair to say that the expansion of Olympic Dam was one of a short list of major motivators for BHP Billiton's acquisition of Western Mining. The potential for the expansion was one of the key reasons that we were interested in acquiring Western Mining.

To progress this from where it is to a project, we need to identify what the total resource base is, and there is still a great deal of drilling going on and I will touch on that. We then have to select the single preferred 'go forward life of mine' plan and identify how that would be financed and what we need to put in place. We expect that prefeasibility study to be completed by the end of 2007. We have a target date of October 2007 for our documentation to go forward into our corporate governance processes for approval by the end of 2007 or early 2008. So we are in a prefeasibility study mode until then. Under BHP Billiton's capital investment procedures, the prefeasibility study is the predominant decision-making piece of work. We will follow that with a feasibility study, which will take only a year or so, and that will be mostly about refinement and optimisation of the work that comes out of the prefeasibility study. So late 2007, early 2008

is the point where essentially we will know the size and the shape of an expansion project at Olympic Dam.

I will compare the proposed development with the current development, and I will run through some of those numbers because they refer back to what we have talked to already. Currently, mine production is from an underground mine of about 10 million tonnes per year. The proposal is for mine production from an open pit of around 40 million tonnes per year—roughly a four-fold increase in the mining rate. Copper has increased from 220,000 tonnes of cathode per year to about half a million tonnes; uranium has increased from around 4,000 tonnes to 4,500 tonnes, where we are now, to about 15,000 tonnes; gold significantly increased, because some parts of the open pit have very high gold grades—that was particularly so in the early years—so we could go to half a million ounces, which would make Olympic Dam a significant gold producer; and, silver—the numbers are big, but the value is not enormous—increased from about 800,000 ounces to nearly three million ounces.

The population of Roxby Downs, which was referred to earlier, is around the 4,000 mark and is expected to approximately double. It is a very young town. The average age is around 27. There are lots of kids and it has the highest birthrate in South Australia. I was in Roxby Downs for a weekend event that we held two weekends ago, which was a sort of annual family day. There are hundreds of fit, healthy and happy kids in that town.

**Mr MARTIN FERGUSON**—What about keeping the families once the kids reach high school?

**Dr Higgins**—It is a challenge. There are good facilities in town, including a TAFE. We have some programs to try to encourage that, but it is a challenge. The number of kids coming through and getting through high school and wanting to go on exceeds the opportunities.

With respect to energy, we currently take about 120 megawatts from the grid, generated in Port Augusta. That number will significantly increase to about 420 megawatts. We are looking at the options for that. Most likely, it will continue to come from the grid, but the grid would need to be reinforced. We are looking at the possibility of bringing a gas line down from Moomba or from the northern corner of the state. It is a commercial decision. I am not sure whether it will fly. But we are having a look to see whether it is possible for some of the power to come from on-site power generation. Currently, we take 12 gigalitres of water per year from the Great Artesian Basin—I am not sure how you measure water in your terms; we were debating this at some length last night—but that is about 370 litres per second, if that is an easier number to understand.

**Mr KATTER**—It is 12,000 megalitres.

**Dr Higgins**—That is correct. That number, again, will increase. At the moment, all that water comes from the GAB, from bore fields in the southern quarter of the Great Artesian Basin. That will increase to 48 gigalitres per year which, I believe, is around 1,500 litres per second and that could come from a number of sources. We are currently looking at options for the GAB or at some other aquifers which are regional and not connected with the Great Artesian Basin. We are also looking at coastal desalination in the Whyalla area and the possibility of pumping desalinated water inland.

**Mr KATTER**—What is the distance involved?

**Dr Higgins**—The distance that pipe covers is about 300 kilometres.

**Mr Green**—It is 330 kilometres to Port Bonython and the GAB extension would involve similar distances.

**Dr Higgins**—Currently, about one million tonnes of freight are moved in and out by road. That number would increase to 2.2 to 2.5 million tonnes per year, and we are looking at a couple of possibilities there. One possibility is an intermodal connection at Pimba—which is on the existing railway and about 100 kilometres or so from the mine site—or extending a rail link about 100 kilometres or so from Pimba into the mine site. Again, that is part of the prefeasibility work that we will be assessing over the next year or so.

Currently, all exports go via Port Adelaide. They come down by truck to Adelaide and out of Port Adelaide. We have made our first shipment of uranium oxide from Darwin, using the railway to Darwin, and we also expect the use of that to increase over the years, particularly if we put a spur line in to Olympic Dam from Pimba.

I will say just a few words on the process we will go through. Obviously, we have a governance process within BHP Billiton. We need to achieve timely approvals both from external bodies, the state and federal governments, and from our own board for an expansion project that has to be operationally viable. We need to assess the long-term security of supply of our inputs and of uranium and copper—gold does not figure in it too much—of market trends and so on, and the flexibility to build something that can be expanded and contracted, if necessary, to match market requirements. We are spending a lot of time—and we will touch on it a little further—on the level of local and regional community benefit, support and acceptance. The environmental impact study for this project has kicked off. Steve is managing that, on our behalf, using a series of consultants. We expect that to run through to the end of next year to complete the EIS requirements. Of course, it has to pay, so we are assessing the options against BHP Billiton's criteria: the cost of money and the net present value and so on. That is all part of the prefeasibility scope.

**Mr MARTIN FERGUSON**—Just out of interest, can you give a ballpark figure of the costs accompanying the prefeasibility, with exploration and so on, before you get to the execution phase?

**Dr Higgins**—The prefeasibility will cost us about \$300 million. We will probably spend another \$100 million after that on the feasibility, so we will probably spend about \$400 million. It is not uncommon for a major project to spend in the order of 10 per cent of its costs—in our system, anyway. We are rather more front-end loaded than some organisations. We spend more money before making those final decisions to ensure that we have it right—that we know what we are building and we know what the certainty is around the estimates. But it is not uncommon for a project like this to require 10 per cent of its capital to be spent before a decision to proceed is made. We are looking at a project estimate in the \$4 billion to \$5 billion range for total capital investment.

**Mr MARTIN FERGUSON**—US?

**Dr Higgins**—Australian dollars.

**Mr KATTER**—Is the bulk of that for drilling?

**Dr Higgins**—So far?

**Mr KATTER**—It is extraordinary that you would spend that much money on a feasibility study, unless there was drilling.

**Dr Higgins**—The drilling is about \$130 million or so.

**Mr MARTIN FERGUSON**—There is the design, I guess.

**Dr Higgins**—We are also committed to putting an underground exploration drive from the underground mine into the heart of the ore body; that will take nearly another \$30 million. That is needed so that we can get some big bulk samples out.

**Mr HAASE**—What distance?

**Dr Higgins**—We will put in about 2½ kilometres of underground drive to do that.

**Mr KATTER**—That explains it.

**Dr Higgins**—Then there is the engineering work and the consultants that go with it.

**Mr KATTER**—I am happy; thank you.

**Dr Higgins**—It all adds up. But it is not an uncommon number for a major development to get up to those sorts of percentages of total. I have some key dates here. We will get to the prefeasibility tollgate, which I mentioned earlier, in late 2007. We also expect to get the EIS and, hopefully, the necessary approvals wrapped up by the end of 2007. We then look at it taking about another year—the end of 2007 through to 2008 or perhaps into early 2009—for the prefeasibility; that is mostly engineering design work. We then have a four-year execution phase. Mostly that is around pre-stripping the mine.

As has been mentioned, we would be turning this from an underground mine into an open pit. The mineralisation starts at about 300 metres below surface. So, to get to open pit, we have to take that 300 metres off. There will be about one billion tonnes of rock to be pre-stripped before we get to the mineralisation. That governs the execution phase of four years, during which time we will be building the plant. So we would expect to produce first metal from the expanded facilities in the year 2013 and it will go on for a long time after that. It is a very long-life business.

**Mr MARTIN FERGUSON**—Plus you will need to continue production in some way or another during this period.

**Dr Higgins**—During that period, the underground will continue to operate, through the existing processing facilities, at about the 10 million tonnes rate that it is operating at now. Once

the open pit starts up, we would expect the underground progressively to diminish from 10 to maybe five million tonnes. We would expect to run the underground and the open pit in parallel for seven or eight years, as the open pit ramps up to its full production and the underground starts to ramp down.

**Mr HAASE**—What is the proposed total depth of the open cut at the completion of work?

**Dr Higgins**—There are about 300 metres of overburden and then—

**Mr HAASE**—That is what I was getting at. It is a third of your depth and you have a typical mineshaft.

**Dr Higgins**—Yes.

**Mr HAASE**—What is Newman?

**Dr Higgins**—At the moment, Newman is around 600 on the high wall; that is my assessment. Escondida, which is the large copper mine in Chile, is around 650, nearly 700 on the high wall. It is a very large mine.

**Mr Green**—Chuquicamata is 850.

**Dr Higgins**—Chuquicamata is another large open pit in Chile, which is not ours, and that is 850. It is one of the largest open pits around. We have a number of procedures in place for contact with federal and state governments here. There are six-monthly environmental consultation committees. At the state level, we have regular ministerial contact as well as a steering group, which meets quarterly, which Richard and I, for example, attend on a regular basis. There is a task force, which also meets quarterly, which is more of a working group, which Richard, Steve and others regularly attend.

Having a quick look at this—I will not spend a lot of time on it and some of you may have seen it before—the pink area with the white outline is where the underground workings are currently. The yellow and green principally to the south and south-east are where the new mine would go. The green is the open pit. The yellow is an example of our looking at trying to do this underground. As yet, we have not completely discarded going underground for the expansion, although we expect that it will be an open pit. That shows the dimensions of that.

**Mr MARTIN FERGUSON**—Do you have a percentage type figure for the cost differential between underground and open pit?

**Dr Higgins**—It is significant. To get a tonne of ore out by underground mining can be anywhere—depending on the circumstances, of course—between \$20 and \$30 a tonne. With an open pit, once it is open and you have got through the original bit, you can probably do a tonne for \$2.

**Mr HAASE**—Once it is open?

**Dr Higgins**—Once it is open, yes. There is a large capital expenditure in the front.

**Mr MARTIN FERGUSON**—Historically, open pits are safer than underground.

**Dr Higgins**—Yes, they are. In general, accident rates in open pits, almost in order of magnitude, are lower than underground.

**Mr MARTIN FERGUSON**—That is significant then.

**Dr Higgins**—This, again, is a computer generated picture of the open pit. It is roughly three kilometres around and across the middle in each direction and about a kilometre deep. With that one, we have put the pit outline over the centre of the City of Adelaide. You can see Adelaide's famous green belt around the inner city area. That is about the size that this open pit would be at the surface and it will be a kilometre deep. I think we calculated that a kilometre deep is about 10 or 12 Santos towers—for those of you who know the Santos tower in Adelaide. It goes down a long way.

**Mr HAASE**—In comparison, it will challenge the super pit.

**Dr Higgins**—It will challenge it significantly. We have done a lot of drilling—Mr Katter raised the question of drilling. So far we have about 1,800 kilometres of drill core and we have another 400, nearly 500, to go. It is a large drilling program. We still have not defined the limits of the ore body in all dimensions. It is still open to the south in a couple of areas, so we are not quite sure where the southern boundary of the mineralisation is, and it is still open at depth. Depth is important because, if you go deeper, you have to lay back the sides of the pit and the pit gets larger the deeper you have to go. So a lot of work has been done and there is still a lot to do.

**Mr Green**—The yellow bit is the part where, to get to the ore, it will take the first four years. That is the first four-year pit and then it goes back from there.

**Mr KATTER**—Is that a proposed new pit?

**Mr Green**—Yes, it is.

**Dr Higgins**—There is no open pit there at the moment. Moving to infrastructure, you will realise that water supply is a significant issue generally for Australia, South Australia and the mining industry. We have mentioned the numbers; here they are listed in megalitres per day. Thirty-two megalitres per day is the current usage from two well fields in the GAB, which are between 100 kilometres and 200 kilometres to the north of the mine, which have good quality water. We do undertake recycling. Because of the complicated circuit, perhaps we are not recycling as much as we would like to and are actively looking to see how we can increase our recycle by tapping into the circuit at different points to pull water back out into site. We do recycle as much as we reasonably can, but we also evaporate water. We do desalinate already at Roxby for some plant processes and for the township; it is a little less than half the total.

I want to mention the pastoral bore capping, and I am sure you all will have heard of this before. We have, both in our own right and in conjunction with government, supported to the tune of several million dollars programs to cap pastoral bores in South Australia. Collectively, those programs have resulted in reduced water being extracted from the GAB of about twice what we use. We consider that our contribution to that is about equal to what we use. So, while



we take 32 megalitres a day out of the Great Artesian Basin, by working with the pastoralists helping to cap bores, to put covered piping in rather than open drains and generally to avoid losses, we believe that we are about in balance in our total effort in relation to the GAB. That is, the water extracted is roughly equivalent to the water saved by a more judicious use of water on the pastoral properties. It has been a good program. We do the same sort of thing in North Queensland with the Cannington guys; we have done quite a bit of work there as well, helping the people to more effectively use the water that comes out of the GAB.

**Mr MARTIN FERGUSON**—What percentage of your water would you currently produce through desalination?

**Dr Higgins**—All the water comes out of the GAB and we desalinate about 40 per cent of it for where we need that quality of water. That is for the processing plant and for people's consumption.

**Mr MARTIN FERGUSON**—It seems that one of the biggest environmental issues is to answer the water question.

**Dr Higgins**—Yes, it is a big issue. We have done a lot of work on it. We will need to expand our water use from 30 to about 130 megalitres per day. For that reason, we are looking at three principal sources. One is further use of the GAB, the second is other aquifers in the region not connected to the Great Artesian Basin and the third is a desalination plant in the Port Augusta area to supply the total demand. Quite a substantial plant is needed to get up to that rate of 1,500 litres per second. In a sense, we sort of pioneered this a little—although I do not want to overemphasise that. We are currently involved in the construction of a 500-litre-per-second desalination plant in Chile for exactly the same reasons—to support Escondida. That will come on line around the end of this year and, ultimately, we expect to double the rate to 1,000 litres per second.

**Mr MARTIN FERGUSON**—If you put that plant in place, would it be solely for your own use, or would you look to sell into a market?

**Dr Higgins**—In my opinion, it would be a shame if it were a sole-use facility, and we need to make progress with those discussions. But there is great pressure on water resources in that part of Australia. There is great pressure on the Murray River, which supplies a lot of water and not just to Adelaide but all the way down the Yorke Peninsula and beyond. To have a desalination plant that was simply one source going to one use would seem to me to be a lost opportunity. But a lot of work has yet to be done on making that work.

**Mr MARTIN FERGUSON**—In terms of energy to put the gas pipeline on, would you seek to sell into the grid or just for your own purposes?

**Dr Higgins**—We would take from the grid. We do not want to be in the business of gas pipelines, so we would tap the grid and have other people supply us with it. We would not even want to buy the pipeline particularly.

**Mr MARTIN FERGUSON**—So you would do a commercial arrangement in some way.

**Dr Higgins**—We would do a commercial arrangement. We would purchase gas reticulation as we do with power.

**Mr KATTER**—What sort of price have you come up with for desalination—\$300 a megalitre?

**Mr Green**—We went out to the market and the market came back. The price out the gate of a desalination plant was between 80c to \$1 20 per kilolitre. That is \$800 to \$1,000 per megalitre.

**Dr Higgins**—Is that operating cost?

**Mr Green**—That is our capital and operating cost.

**Dr Higgins**—Obviously, it is quite expensive water when compared with anything else. That is why I say to do that on a stand-alone basis would seem to me to be a lost opportunity.

**Mr MARTIN FERGUSON**—Some years ago this option was looked at with Esperance in terms of supplying the Kalgoorlie area. It is roughly the same distance—300 kilometres.

**Mr HAASE**—One hundred kilometres more. You said ‘out the gate’.

**Dr Higgins**—Out the gate.

**Mr HAASE**—So the wheeling or the transportation would be additional to that.

**Dr Higgins**—Yes.

**Mr HAASE**—It could be 400 kilolitres desalinated into Kalgoorlie at somewhere around \$1 80 to \$2 per kilolitre.

**Mr Green**—Yes.

**Mr HAASE**—So you are talking paddock figures. What energy source were you considering for the desalination process?

**Dr Higgins**—It would require additional power generation in South Australia to support the expanded mine, including a desalination plant. But, again, we are not looking to get into the power generation business.

**Mr HAASE**—Does part of your analysis for this expansion include looking at renewable energy sources, such as solar, for desalination?

**Dr Higgins**—We are looking at it. The demand is—am I right, Steve—30 megs?

**Mr Green**—About 30 megawatts.

**Dr Higgins**—That is pretty large for a solar plant. We are looking at it within the EIS context.

**Mr HAASE**—Carbon block technology is interesting when it comes to water desalination.

**Mr Green**—We have talked to a range of different people who have come to see us, but we are still in the evaluation stage.

**Mr HAASE**—I am sure you are.

**Mr Green**—It is interesting that people have a perception that desalination is energy intensive. While it requires energy, currently water from the River Murray pumped over to Whyalla is about three kilowatts per kilolitre. If you have a very efficient desalination plant, it can be better than that.

**Mr KATTER**—Will the desalination plant operate in the inlet at Port Augusta?

**Mr Green**—No. It will probably be closer to Whyalla. Inlets do not have the same current and dispersion. We have looked at brine discharged into the gulf and have done the modelling on a discharge point at Port Bonython, at the petroleum plant that is there. You can discharge there and have no impact 100 metres from the discharge point. Because of the currents and the depths, it is a viable point. Further into the gulf, it is too salty and there is not enough current and dispersion.

#### **Proceedings suspended from 10.04 am to 10.19 am**

**Dr Higgins**—We are nearly at the end of this part of what we have to say. Prior to the break, we were talking about water and I think we covered most of the issues we wanted to talk about on that. A good way to look at that is in the straight lines. The Olympic Dam operations are right in the middle or the upper middle. You can see bore fields A and B, which we currently have, and proposed bore field C, which is one of the potential sources for new water, which is about 300 kilometres away. That makes it about the same distance away as Whyalla, where a desalination plant might go. They are the options we are looking at. Yes, the desalinated water is relatively expensive. There is no great elevation difference; it is only 100 metres above sea level into Olympic Dam. So, while there is a long pipeline, we would not be pumping it up mountains if we were to go that way. That is just a perspective on where things are.

**Mr KATTER**—There would be a bit of pumping, wouldn't there?

**Dr Higgins**—There would be some pumping to overcome the pipe resistance.

**Mr KATTER**—How many metres are you above sea level?

**Dr Higgins**—It is 100 metres above sea level at the mine site. Moving on to energy supply: currently we have the capacity for up to 240 megawatts. Anything we need in terms of fuels other than power goes in by road—if we need some gas, distillate or fuel oil et cetera in the process. A gas line from the Moomba area is under consideration. We would not want to own and operate that. We would want somebody else to do that and to deliver gas to us. Also under consideration is a new transmission line, which presumably would come from Port Augusta.

**Mr KATTER**—Where is your nearest power station? I am trying to get to load losses and those sorts of things.

**Dr Higgins**—It is in Port Augusta.

**Mr KATTER**—Is that big enough to do the job you need it to do?

**Dr Higgins**—It is not big enough for the expansion. It would need to be expanded or something similar to that—

**Mr KATTER**—Is it coal fired?

**Dr Higgins**—It is coal fired.

**Mr KATTER**—What sort of expansion are you talking about? What do you need—300 megawatts or so?

**Dr Higgins**—That is correct: an additional 300 megawatts in round figures.

**Mr KATTER**—What does it supply at present?

**Dr Higgins**—To us, it is about 120, but in total it is about 300, as I recall. So it would need to be roughly that. Again, we would go to the market and buy power. We do not want to be in the business of owning power stations. There are some questions about the grid and its robustness. It is linked very loosely to the eastern states grid with, I think, only one connection point and there are issues that would have to be addressed.

**Mr KATTER**—To return to the water issue: is that Lake Frome in the picture beside you?

**Dr Higgins**—No. The large one there is Lake Torrens.

**Mr KATTER**—If my memory serves me correctly, that is only about 20 metres above sea level. It might even be a bit less.

**Mr Green**—It is less than that.

**Mr KATTER**—Would a small cut in from Port Augusta into that lake deliver seawater all the way up to Olympic Dam? That would seem to be a hell of a lot cheaper than building pipes and everything else and would supply a long-term benefit. You would also have enough water there to produce salt, which is a very highly prized product. You get terrific evaporation rates there. Dr Bradfield dreamed it up. He built the Sydney Harbour Bridge and just about everything else you see in Sydney and Brisbane.

**Mr MARTIN FERGUSON**—He is looking for a job as a consultant!

**Mr KATTER**—Dr Bradfield actually drew up that scheme. It was a modification of one of his other schemes. I am not being clever about it; it is just a moment of history. I have run that

past you but, if I were the Premier of South Australia, I would just tell you to do it. I would give you a few quid to encourage you.

**CHAIR**—This is another one of those statements that is not a question.

**Mr KATTER**—There is another issue. We are not particularly happy about how much water they are taking out of the GAB. There is some method in my madness.

**Dr Higgins**—We have touched on energy; I think we are done there. We would need a new transmission line. I will move to other logistic issues. This is an interesting one: at the bottom of the map there, Pimba is where the existing rail line is, and Pimba is on the line both to the west and to the north. The division is to the west of Pimba. Pimba is adjacent to Woomera and Roxby is due north of that by about 100 kilometres or so. It falls into the category of a good thing, but of course the case has to be made as to whether that works commercially. It would traverse the Woomera prohibited area, which is an issue that would have to be addressed. We think there is a case for approaching some funding sources for that—to put more cargo on rail—because that would also enable the Adelaide-to-Darwin rail link to be used much more effectively, by coming down to Pimba and then joining the Adelaide-to-Darwin link. We are working on it. It would take quite a lot of traffic off the road. It would take nearly 2½ million tonnes off the road each year, which is a truck every 20 minutes or so in each direction. So there is a truck roughly every 10 minutes if we do not do it.

**Mr KATTER**—Why are you going south, not north? If the product is heading north, why is the railway line going south?

**Dr Higgins**—That is the nearest link to an existing rail, to Pimba. It goes some distance out to the west of that before it turns north. We do use both Adelaide and Darwin. We predominantly use Adelaide at this stage. We have port facilities and storage facilities on the dock at Port Adelaide.

**Mr KATTER**—Do you export through Adelaide as well?

**Dr Higgins**—Almost all of it. We are doing some through Darwin at the moment, and we are trying to work that up into a more viable operation that has some benefits for access to the Asian markets.

**Mr MARTIN FERGUSON**—If that stacks up with the expansion, that potentially could be one of the first things you did.

**Dr Higgins**—There has been a debate about how much of it we could get in order to facilitate construction freight as well. So, yes, if we could get it into a good option, it could be one of the first things that we would do so that we could then use it for at least the back half of construction freight as well. We have debated that.

**Mr Green**—About 4½ million tonnes in construction materials. It would be useful.

**Mr MARTIN FERGUSON**—It is the obvious thing to do.

**Mr KATTER**—In the sugar mills, we move about five million tonnes a year 30 or 40 kilometres. We have just a tiny little track, and it is done in six months. I do not know why you blokes want to build these massive bloody railway lines all the time.

**CHAIR**—It is weight.

**Mr KATTER**—No, Geoff. We move five million tonnes. These blokes will not be moving five million tonnes a year.

**Dr Higgins**—No. We move about 2½ million tonnes.

**Mr KATTER**—But we move five million tonnes a year on the tracks at Ayr, south of Townsville, and it is moved in six months.

**CHAIR**—But the point load is not quite the same.

**Mr KATTER**—No-one else is using this track except them.

**Dr Higgins**—We have not decided what this link would be at this stage, except that we would want it to be compatible with the north-south line so that we did not need to tranship from one set of carriages to another.

**Mr KATTER**—But a ‘toy train’ still carries five million tonnes and carries it at about one-tenth the cost of the normal railway lines.

**Mr ADAMS**—If we put a lake in there, we could use channels!

**CHAIR**—Roger, please proceed.

**Dr Higgins**—I will move quickly on to the town of Roxby, which we mentioned earlier. This is a bit of a different version of the same photograph, but you can see the existing town, which is the white dots showing the houses. You can see two levels of development: the one outlined in green shows the development if it went ahead as an underground mine on a smaller scale, and the red line shows how large the town might need to be if we went for the full open pit, which is what we are anticipating at this stage. So the population would roughly double. We would be responsible for land development and would release the land for sale so people could build their houses. There are two builders who live and work in Roxby now and build houses for people. There is a little industry there already. Obviously a lot of work needs to be done on the master plan and the community facilities, if they are going to support twice the population that is there now.

In addition to that, in relation to the accommodation for 3,000 to 4,000 construction workers during construction, I suspect that number is low. That is an average over the four-year period, and I suspect that it would peak at something like twice that. So we would have a short-term peak, which would be a real crunch. We would be moving people in and out of rooms pretty fast, but over the four-year period the average accommodation requirement would be for between 3,000 people and 4,000 people, so it would make a significant community. We do need to relocate the airstrip for Roxby Downs, which is currently on the edge of the proposed pit—not a

good place for it to be. One of our camps is also right next to the airport, so they would be part of the infrastructure development of the expansion. In doing that, we would upgrade the airstrip from its current size. I do not think you would build a regional airstrip these days that could not handle a 737, for example, and the current one cannot.

**Mr MARTIN FERGUSON**—Gove had to do the same thing recently.

**Dr Higgins**—The last point is on land access. We are in negotiations with the native title claimants. There are three groups, none of whom live in the area. It is important to note that there are no Aboriginal communities which actually live any closer than Port Augusta, but there are three groups that have claims in the area, somewhat overlapping. We are working with them now. We have signed a sort of terms of reference for the discussions. Most of us went up to that a month or six weeks ago, and met with the communities. So we have a framework for discussions, which we expect to take about a year to conclude. We are looking for a life-of-mine agreement with those groups. Richard might want to expand on that a little bit because Richard is leading the negotiations.

**Mr Yeeles**—In fact, we had all the groups up in Olympic Dam a couple of weeks ago with their legal advisers. They wanted an understanding of where this open pit would go and the sort of impact it would have on the land. We showed them that. We showed them where the waste rock dump may go. I must say, the negotiations so far have been conducted in a very cooperative spirit. The groups are obviously interested in the benefits that may be available to their communities from what we would hope to finalise as an Indigenous land use agreement. We are very optimistic that over the next 12 months we will be able to put something in place which will deliver what we need in terms of land access, and also give to the community some sustainable benefits in terms of training and employment programs and other benefits.

**Mr HAASE**—Was this a heritage analysis of the site?

**Mr Yeeles**—Heritage is one issue that has to be resolved. There will be a lot of already recorded archaeological sites in the area that will have to be disturbed.

**Mr HAASE**—Do you continue to carry out surveys using Indigenous claimants?

**Mr Yeeles**—Yes. We have already undertaken extensive heritage surveys over the last 20 years on the special mine lease at Olympic Dam.

**Mr HAASE**—I am interested for general reasons. Can you tell us what you are paying per person for heritage clearance?

**Mr Yeeles**—We pay a fee of \$300 per person. That is a standard fee here in South Australia.

**Mr HAASE**—It is as high as \$500 in the Pilbara right now. That was from BHP Billiton, as a matter of fact, so you would know.

**Mr Yeeles**—There is a standard rate in South Australia that is generally acceptable to all the Aboriginal groups.

**Mr MARTIN FERGUSON**—What type of existing agreement have you got with the native title owners?

**Dr Higgins**—It is a reasonably simple one at the moment, but again I will let Richard speak. He has been involved with it for many years.

**Mr Yeeles**—We reached agreement with the three claimant groups at the time of the last expansion in the late nineties. It is an agreement which essentially deals with how we manage heritage issues. When we came to negotiate that agreement, it struck us that the Aboriginal groups did not have their own resources to be able to administer themselves. They were expecting to have a negotiation with us, but they did not have things like their own office. So part of the agreement we have with them is to fund their administrative needs and we provide them with annual funding through that agreement. That is the sort of thing we would expect to translate into the new agreement.

**Mr MARTIN FERGUSON**—The first one leading up to 1988 would have been pretty ordinary in terms of what is now expected, wouldn't it?

**Mr Yeeles**—Of course, that was pre-Mabo and everything else.

**Mr MARTIN FERGUSON**—It was pre-Mabo, yes.

**Mr Yeeles**—In those days it was mainly heritage that had to be dealt with.

**Mr MARTIN FERGUSON**—What are you achieving on Indigenous employment today? What is current employment?

**Dr Higgins**—We are doing two things. We do have a number of people who work for us from the communities. They are mostly, as I say, not from the area, so they commute from Whyalla like most others. It is not a huge number. What we do instead, and what we try to focus on, is job readiness programs. We bring people in to the site, run them through training programs so that they have tickets to operate heavy equipment—to operate a forklift or a crane—and are therefore available. If they choose to apply for jobs, they are then qualified to apply for them. We put a lot more people through the job readiness programs than actually come back and apply for jobs, but we do have a program to make sure people are in a position to compete in the market for jobs.

**Mr MARTIN FERGUSON**—What are the barriers to getting them to actually start in employment?

**Dr Higgins**—It is their choice as to whether they actually want to come to Roxby Downs and live there, compared with living with their communities in Port Augusta, and not a lot of them choose to do so.

**Mr MARTIN FERGUSON**—With Honeymoon, some of them actually live in their communities and just come to work for whatever the period is—eight or 10 days.

**Dr Higgins**—And we also have some of that. Again, we do have people who bus in from Port Augusta on a four-by-four sort of a roster.



**Mr Yeeles**—They live much closer, though.

**Mr ADAMS**—With regard to the native title agreement and heritage issues, has there been any discussion about the long-term situation post mine in relation to access? Has the long-term heritage of that area as far as it relates to Indigenous people been one of the aspects of that discussion that you will be having?

**Mr Yeeles**—We are talking here about quite a long period—the mine life is 70 years plus. We have not got to that amount of detail yet.

**Mr KATTER**—Even on this expanded production, it is still 70 years?

**Mr Yeeles**—Yes. One of the issues to recognise is that history would suggest that there was never any permanent settlement of Aboriginal groups in this area; it is a very dry area, with no permanent water. Probably at most, over time, Aboriginal groups would have passed through the area, but they would not have had permanent occupation. That said, I am sure the issue will come up as part of the negotiation. Post mine, the land will have to be rehabilitated to a point where there can be general public access again.

**Mr ADAMS**—Has long-term monitoring of employees been considered by the company?

**Dr Higgins**—We have quite an extensive program of monitoring employees, including those who need to wear badges on a regular basis and those who regularly have check-ups. It depends a little bit on the exposure. There are two areas we focus on more intensely than others. One is sections of the underground mine.

**Mr ADAMS**—Yes. Very good. I saw that when I was there. I mean somebody who is with you for five or 10 years and then leaves. Has there been any talk with government about having long-term monitoring—say, for that person to go to a GP once every year—so that we build up a long-term history of people who have worked in uranium mining?

**Dr Higgins**—I actually do not know the answer to that question.

**Mr Green**—The radiation limits are set at a point that that is not required. If you are below those limits, the risk factor is equivalent to being a bricklayer or a painter. The same would apply if you were a bricklayer and you ceased employment with a construction company. Would the construction company then follow you for the rest of your life? The same theory applies. I think the discussions come up every two to five years, but there has been no recent discussions on that.

**Mr ADAMS**—It is one of the issues that is used against uranium mining. If we are ever going to put it to bed, we need to have long-term monitoring of people who have done, say, 20 years in Olympic Dam and are then monitored once a year for the next 20 years of their life. If we did that, we would clean that issue up. I think that could be done pretty cheaply through a GP or whatever.

**Mr Green**—I guess I would argue the point about it being cheap. We have had thousands of people come through Olympic Dam over the years. Every taxidriver has an uncle's cousin who has worked at Olympic Dam at some point. It is quite an administrative nightmare to try and

track people, even while they are working for us. We spend a lot of resources doing that while they are there. For them to be tracked when they leave employment and disappear to wherever in the world would be very difficult exercise.

**Mr KATTER**—With all due respect, you could take one in 20 or one in 100 and provide them with a free check-up once a year. They may not take it up. The cost to the company would be fairly negligible.

**Mr Green**—Discussions with the government—

**Mr KATTER**—It helps us to sell this out there in the marketplace.

**Mr Green**—Ultimately it is the decision of the government. We supply all the information now for all our designated employees every quarter to the government. That has been ongoing for the last 20 years.

**Dr Higgins**—It is a fair point for us to take on board.

**Mr ADAMS**—It is an issue. We have had asbestos and the issues that have revolved around that. It is an issue that is going to be alive and it is an issue that we could look at finding a solution to.

**Mr KATTER**—In the two books I read on Nagasaki and Hiroshima—there was heavier radiation, obviously; they dropped an atomic bomb there—within two months the people were back there and there were no anomalies with those people who moved back there, except a slight rise in the incidence of thyroid cancer. This was in a heavily irradiated situation. I would not be scared about if I were you. But most certainly, for people who want this to go ahead and are positive about the industry, it would help. I cannot see how that would cost any money.

**Dr Higgins**—Thank you. We will take that on board.

**CHAIR**—What is your forecast for demand for uranium? Pull out your crystal ball. What is your forecast in the out years for price?

**Dr Higgins**—I do not know how well-calibrated our crystal ball is just yet. We have been in the uranium business for a period measured in months, and we have a major piece of work going on around that at the moment. There are a couple of things. Clearly, energy demand is going to increase worldwide, and I think everybody accepts that that is substantial. All of the current energy sources are likely to increase along with that—fossil fuels, renewables and uranium—but we anticipate that uranium as a proportion is likely to increase. That is not to say that the others are decreasing in any way—they are all increasing—but as a proportion we expect uranium to increase.

The current production of Olympic Dam is around 4,000 or 4,500 tonnes of U308. The expansion would take it to 15,000 tonnes. That would make it the largest mine but would probably make it a smaller component of the total uranium demand worldwide. We think there will probably be a 60 per cent increase in use over the next decade or so, but it is a bit of a guess. It depends a lot on a couple of things. Most of the power stations that exist could actually be

ramped up somewhat. Building new nuclear power stations is a long process. If anything is started now, it will probably be 2010 or 2012 by the time it goes through the processes, whether it is in the US or Europe. We see significant increase in demand in that sense, but over a relatively long period.

Prices are very high now at the spot, but a lot of uranium is sold on long-term contracts. The reason for that is that the cost of fuel in nuclear power generation is not a very high proportion of the total cost, and the generators are not particularly sensitive to the actual cost of uranium in their calculations. That means that a decade ago they were quite prepared to sign long-term contracts at significantly above the spot price, because they were more interested in security of supply than they were in the price. The price was not really driving the economics of nuclear power generation.

In the meantime, demand has grown and mine output has not grown all that much, so the spot is now above the long-term contract price, and again the generators are not particularly worried about paying a high spot, because even now, at \$30 a pound on the spot, it is not a very high proportion of the total cost of operating nuclear power stations. It will, however, bring other uranium producers into the business—if not in Australia then certainly in other parts of the world—so we expect supply will rise to meet that. We anticipate that spot prices could increase in the short term, as some other mines come online, but this \$20 to \$30 range, which is where they are now, is where they are likely to be. That is a very good price compared with the past. A lot of long-term contracts are at around the \$15 mark, as they are from the time when spot was \$7, \$8 or \$10. I suspect a bit of that will continue. Long-term prices will be rather more stable in the \$15, \$20 or \$25 range, and spots will fluctuate depending on the short-term supply and demand question. Having said all that, it is really crystal ball stuff—I qualify that.

**CHAIR**—Thanks. BHP owns the Yeelirrie deposit in Western Australia.

**Dr Higgins**—We do.

**CHAIR**—Do you have any view on the longer term or shorter term development of that mine?

**Dr Higgins**—We have a suspended state agreement with Western Australia on Yeelirrie. It is a significant deposit in Australian terms. It is probably the third largest deposit in Australia. We work in all of the states and we follow the rules and policies of the states we work in. At the moment, opening Yeelirrie is not an option. Our desire is to retain our agreement or some form of agreement that, should that become developable in the future, we would be the logical people to develop it. That is where we sit right now.

**CHAIR**—What sort of value do you put on that deposit?

**Dr Higgins**—I have no idea if we have actually tried to do that. It came with Western Mining as part of a package. It was not valued in that acquisition, because it is not possible to develop it. Frankly, I do not have a number for that.

**Mr HATTON**—We have had evidence recently with regard to fourth generation reactors. The indications as to those is that they are a lot safer than pre-existing designs although the evidence

has largely been that most of the safety problems with those have been worked out. We have also had associated evidence as to just what is happening now in the nuclear industry as to the reuse of existing fuels and the fact that, although demand is high for yellowcake, it is actually suppressed at the moment because there is so much reuse of formerly used fuels. I imagine that, in using a crystal ball on your projections, you have taken into account pretty closely the fact that there is an extended life for that fuel. Has any specific work been done on that?

**Dr Higgins**—That is work in progress which is not concluded. I guess most of the material coming into the cycle is actually coming out of the decommissioning of weapons programs. That will not go on forever, but that is providing a very significant part of the total supply. I am not sure of the number but something like 30 or 40 per cent of total uranium—

**Mr Green**—It is 40 per cent to be down to about 17 per cent in about 2020.

**Dr Higgins**—So that is a decreasing number over a period of time, but it is a significant part of the total supply chain.

**CHAIR**—So it is 40 per cent today, is it?

**Dr Higgins**—It is about 40 per cent of the total—

**CHAIR**—As I recall, it is between the US and Russia.

**Dr Higgins**—The projections see some extension of that and the process going on for some years after that. Perhaps it will be for quite some time after that but at a much lower rate.

**Mr KATTER**—So 40 per cent is reprocessed?

**Dr Higgins**—Forty per cent at the moment of the uranium going into fuel rods is coming out of weapons programs.

**Mr MARTIN FERGUSON**—They are secondary supplies.

**Mr KATTER**—So it is not out of the breeder reactors themselves?

**Dr Higgins**—That is a work in progress. I do not know the answer to that, but it is not a significant amount as I understand it at the moment. It is something which is developing. I think there is a commercial solution to that but it really is not working just yet.

**CHAIR**—I will suspend proceedings as a division has been called.

#### **Proceedings suspended from 10.46 am to 11.06 am**

**Mr HAASE**—We were talking about costs et cetera, but I was thinking more along the lines of my desire to debunk the argument that nuclear energy is not a solution to the increase in global warming and the creation of greenhouse gases. There is a very strong argument being pushed around currently that nuclear energy is not the answer to global warming. Can you

provide us with any information to clarify that situation—from your perspective as a uranium yellowcake producer?

**Dr Higgins**—As a yellowcake producer of about three months! No, it is not the solution, because I do not think there is one solution. I think more efficient carbon capture, better use of fossil fuels, more use of renewables as appropriate and more use of nuclear fuels are all part of the case. It is a fact, though, that a tonne of uranium generates about the same amount of energy as 20,000 tonnes of coal and that not a whole lot of energy, in relative terms, is used to turn that tonne of uranium into fuel rods—maybe two per cent. So a lot of energy can be produced from the nuclear fuel cycle without generating greenhouse gas. In Australia, of course, we do not have nuclear fuel, so any energy we use to mine uranium is carbon based fuel, pretty much. But on a worldwide basis the total amount of uranium currently produced—without the expansion out of Olympic Dam—is, if you move the equation over, worth about 40 per cent of Australia's greenhouse gas emissions. You have to take a global picture of it but about 40 per cent of Australia's current greenhouse gas emissions are saved, if you like—internationally, not in Australia—by virtue of the amount of uranium produced. So it is a major contributor, I think, and a legitimate part of the greenhouse gas debate, but there is no magic solution.

**Mr HAASE**—Perhaps you could comment on the validity of my suggestion. Part of the reason that nuclear energy use for electricity generation is accused of not being the solution to greenhouse gases and global warming is the current percentage of production, coupled with the fact that, especially in Australia, there is an attitude that generally restricts the production of uranium. There is a general hysteria about the use of nuclear energy. All of that information put into the equation projects a very low level of nuclear power generation; hence the suggestion that it is not the solution to global warming.

**Dr Higgins**—I will try and phrase an answer which gets around the multitude of points in there. The public perception of the words 'uranium', 'nuclear' and words like that, in my view—and it is perhaps a personal view—is driven by issues about safety and a couple of major nuclear power incidents over the years, Three Mile Island, Chernobyl et cetera; concerns about weapons proliferation; and concerns about long-term waste disposal. I do not believe it is essentially driven by the mining of uranium per se or the generation of energy by nuclear means per se. The issues in the public mind, in my view, are around those three things, and those three things probably need to be encompassed in any debate about nuclear fuel. They are not necessarily directly related to nuclear fuel because of the differences in the forms of uranium you need to move from the power cycle into the weapons cycle, for example. They are not connected, but that is what is in people's minds.

France produces something like 70 per cent of its total energy through nuclear energy. In North America the figure is in the 15 to 25 per cent range, depending on whether you are looking at the US or Canada. In the UK the figure is 30 per cent. So significant parts of very large economies are generated by nuclear energy. The total amount of energy produced in some of the Scandinavian countries is not enormous, but the proportion of nuclear energy is very high—for example, in Sweden it is 50 per cent. There are good examples of robust economies that use nuclear fuel and do it securely and safely. I think even Three Mile Island can be taken as an example of how well things can be done rather than how badly things can be done, because that accident was contained and managed. I think you could use that to make a case that, even when things go a bit wrong, this can still be a viable and safe way of generating energy.

In Australia, the perception is a bit different. We have large reserves of other fuel sorts—fossil fuel, gas, petroleum and coal. I think there is some potential for the areas of solar and wind energy to expand, although they are pretty small contributors to the total amount of power generation. So there is no commercial incentive—at the moment, anyway—in Australia to drive towards nuclear fuel here and, therefore, some people ask why we need to be in any part of the cycle if we do not need to be in the generation part of the cycle.

**Mr HAASE**—If I can pursue another part of the equation, we have already discussed the fact that 40 per cent of the nuclear energy that is being used in the world today is coming from ex-weapons grade material. I believe that situation has taken quite a bit of pressure off the question of high-level waste storage because of the recycling program. Do you know enough about the storage of waste to comment on what might happen post 2020, when, they say, we will have used up all of that weapons grade material that needs to be recycled? Will this change the equation in relation to the necessity for storage areas and the nature of storage?

**Mr ADAMS**—Do you mind if I add something to that question?

**Mr HAASE**—I am not sure if our answerer needs to have more burden placed on providing the answer. I would prefer that we do it one at a time.

**Mr ADAMS**—He has a doctorate; he can remember. We have heard about the fast breeder—

**Mr HAASE**—Just take no notice of him.

**Mr ADAMS**—and new reactors that can probably use more of the waste around the edges. Maybe that can come into that question as well.

**Dr Higgins**—There has been a lot of work on long-term disposal of waste from power stations, particularly in the US and in Sweden in terms of disposal in geologically stable formations at depth. There has been a lot of work on that. Sweden has got a big laboratory and some of our people have visited it. It is something we are trying to learn about. It is not something that we consider ourselves to be experts on at any point yet but we are concerned that we do get to understand it better. I think that that work is going to progress almost irrespective of whether the material is coming out of weapons programs, the decommissioning of weapons, or not. What is driving it at the moment is that virtually all waste from nuclear power stations is stored local to the power stations in temporary storages, underwater, and so on, and what is important there is that the quantities are not very great. This is not an industry that generates large quantities of waste and therefore local storage is pretty easy to do. You can build storages and they are a small part of the cost of building a power station and so the pressure has not been there at this stage to go beyond that, because there is time to work out an appropriate solution for long-term disposal. Storages for the wastes being stored now do not take up a big space. They are not very difficult to construct and they are secure as they are. So my view is probably that the pressure on the volumes of material has been enough to keep people researching and working at it and, in the case of Sweden, developing quite extensive underground laboratory facilities to test procedures. The US is working on the Nevada site at Yucca Mountain. There has not been so much a situation where there had to be an instant answer, because the volumes involved are not very great. I guess that continues in both aspects of the question. The imperative to this point has

been to get it right rather than to come up with something instantly, because the volumes of waste are not driving it.

**Mr HAASE**—Is there any present economic usage for domestic purposes of the spent fuel rods from the reactors?

**Dr Higgins**—I do not know that I can answer the question because I do not understand either where you are coming from or quite what the answer would be anyway.

**Mr HAASE**—You have spoken of the immediate local storage of spent fuel rods. I am wondering whether part of that total volume of spent rods is being reprocessed into something else for reuse as an energy source.

**Dr Higgins**—I understand that there is a little bit of that. Steve, do you have any better information on that?

**Mr Green**—I do not have the volumes. MOX fuel is a proportion of that but I am not sure of the percentages.

**Dr Higgins**—We can try to find some more information on that, if you like.

**Mr HAASE**—I do not believe that we have received an answer to that question and it bears directly upon the question of long-term storage and necessary volumes. Whilst we increase the number of nuclear power generation facilities and therefore increase the amount of temporary storage while waiting for a long-term solution, part of the argument will be that no-one knows what they are doing. I would like to think that some of this product would be recycled as an energy source and that we knew what that volume would be—

**Dr Higgins**—We will end up going back to the Nuclear Energy Association or the Uranium Information Centre or somewhere and there will be an answer to that question. I am sorry I do not know, but we will take it on notice and see if we can provide you with an answer to that.

**Mr HATTON**—The initiation of that line of questioning was that with the 40 per cent current use coming from weapons grade material, it is my understanding that that is largely from the Russians—that they are reusing theirs. The Americans have not—or there has only been a small amount. In terms of demand going forward, there is still a hell of a lot of material that the Russians have not decommissioned, which they could, given the number of nuclear warheads that they—and the Americans—have available. In terms of trying to work out demand going forward, have you been able to make any assessment of what the probabilities are with that or what the capacity is with the Russians and the Chinese and the Americans in terms of reusing that weapons grade material and what effect that may or may not have on the increased production coming out of Olympic Dam?

**Mr Higgins**—The short answer is that we cannot answer that. We have an internal group of people looking at the broad questions of the structure of the industry. We have quite a detailed knowledge of the structure of the iron ore and copper industries worldwide and so on. What we know about the uranium industry is that we are working on it at the moment. We do realise and appreciate that not all of the material that could be reprocessed from weapon-grade material is

currently in the program and therefore is likely to go on. Our understanding is that as a proportion of supply it will decrease but not stop. I really do not have a better answer, I am sorry.

**Mr HATTON**—I would like to broaden the question. You have just got into the uranium game but you have been involved in coal for a fair while. If you look at the problems arising from the use of carbon-based fuels—which is why we are holding this part of the inquiry and the other part that we are going to have—you will see that while there might be problems in the nuclear cycle, there are certainly demonstrable problems, not just in relation to greenhouse effects, from the use of coal and petroleum based fuels. There are problems which directly affect people's health, including the carcinogenic effect of the particulates and so on. One of the drivers has been to get cleaner coal coming out of Australia. Cleaner coal will not only serve health purposes more but also allow us to market that coal to our buyers in a more effective way. Can you tell me a little bit about how you see those problems and what you think of the effectiveness so far of the drive towards clean coal?

**Mr Delaney**—Just as a bit of background, we are participants in the COAL21 program of the Australian Coal Association. One of the objectives of COAL21 is to develop credible project proposals around RD&D so that we can have largish-scale pilot projects around clean coal demonstration plants. The Low Emissions Technology Demonstration Fund that was announced in the budget last year is a potential partner opportunity for the development of these demonstration plants for clean coal.

The second point I would like to make is that our company is also a participant in a couple of cooperative research centres—the CO<sub>2</sub> CRC and the CRC looking at carbon sequestration. With the combination of those things, along with work that is going on globally and the Carbon Sequestration Leadership Forum—which involves 20-plus countries, including the US—there is a lot of effort going into the reduction of emissions from coal, both in its production and in its use in the generation of electricity.

When we look at the IEA estimates—Roger referred earlier to the growth in global energy demand—we see coal between now and 2030 losing a little bit of market share, one per cent or something like that. I believe the IEA estimates of the market share go from 23 to 22 per cent; but that is still a significant part of the overall fuel mix. There is a lot of work going on around technology to reduce emissions from coal.

**Mr HATTON**—The key and fundamental question here is about the almost exponential increase in demand for energy. No-one sees that going away. In particular there is an increasing demand in China and India and they have gone partly for nuclear energy. But there has also been a pretty dramatic increase in coal-based energy generation. Do you have a view in relation to the new framework agreement that involves China, India, the United States and others, which has been created by those who did not sign up to the Kyoto agreement? That issue has had a bit of a run in parliament this week. How important do think that initiative is and how practical is it at this point of time in being able to move more advanced technologies that have been developed in the West to those rapidly developing economies?

**Mr Delaney**—As you know, it is an agreement between governments but as we understand it, the emphasis is meant to be on the practical. We hope it is. I think all participants in the energy



industry would look forward to making a contribution and working toward achieving the objectives.

**Mr HATTON**—Given what you have just said on the future demand for coal, what is the company's view, or your view generally, about the arguments in relation to greenhouse? Five years ago there was still a great deal of dispute and uncertainty about whether we were into the greenhouse effect. Does the company have a view now on what that science is and how established it is?

**Mr Delaney**—The first point I would make is that agreements like Kyoto, just like the partnership, are questions for government to resolve. I would like to mention some of the things our company does to reduce emissions. From an environmental perspective and also from the perspective of improving the energy efficiency of the fuels we use, we have a target—it is a published target and it is all on our company web site—to reduce the intensity of emissions. We have had a target since the late 1990s. All of our new projects which emit the equivalent of 100,000 tonnes of CO<sub>2</sub> or more must have a greenhouse management plan attached to them. Through scenario planning, these issues are considered in the investment decision-making process for capital. So the greenhouse effect is treated as a mainstream issue in terms of the conduct of the business.

**Mr HATTON**—What views do you have of the moves made by other companies and by energy users? How much adaptation has there been to the fact that we have a particular range of problems that are evident? That is where the key result is going to be, not what governments, producers or end-users do.

**Mr Delaney**—Most of the larger companies certainly have similar processes to ours in place in order to seek to reduce intensities of greenhouse emissions. If you look at most countries in the developed world—the OECD—and at what is going on in China, there are very active programs of various types. Even countries that have not signed up to Kyoto continue to do things.

**Mr MARTIN FERGUSON**—Which countries do you perceive as being the alternative suppliers of uranium and do you have any mining options in any of those countries as BHP Billiton?

**Dr Higgins**—We are interested in exploration but, no, we do not have options elsewhere at this point in time. In our exploration portfolio, more than we would have done some months ago, we would include uranium as a potential target mineral in our international exploration program. But we do not have any other prospects out there at this point in time. The information out there is that countries like Kazakhstan and perhaps part of Africa are potential sources of supply. We feel that, appropriately managed, Australia might be a good, reliable source of supply in comparison with some of those countries, given the level of arrangements and agreements in place between countries. But most uranium does not come from large, low-grade deposits such as Olympic Dam. Most uranium deposits are relatively small and they are uranium only. They might have a life of 10 years and they might produce 2,000 or 3,000 tonnes of uranium oxide a year. My guess is that the potential for there to be a proliferation of those small mines is quite high in countries where they can get into business pretty quickly.

**Mr MARTIN FERGUSON**—How many tonnes of coal do you export from Australia each year and what percentage comes out of Queensland? Do you perceive an increase in uranium mining in Australia as undermining your coal market?

**Dr Higgins**—We will have to get back to you with the numbers. I simply cannot remember the numbers, although most of it comes out of Queensland and some comes out of New South Wales.

**Mr Delaney**—We are talking about thermal coal for power generation rather than metallurgical coal. In Australia, we are relatively small in thermal coal. We have the Hunter Valley and some in Queensland. Compared with metallurgical coal, it is relatively small. We will get the numbers for you.

**Dr Higgins**—I think the energy demand is going to require the mix of fuels. We see thermal coal demand growing internationally—barely holding its market share percentage perhaps but growing nonetheless at about the same rate as energy demand. Perhaps nuclear will take a larger percentage, but all of the sources will grow. The mix is perhaps one of the things we can offer.

**Mr MARTIN FERGUSON**—Australia can walk and chew gum at the same time, so it can export both uranium and coal.

**Dr Higgins**—Absolutely.

**Mr Delaney**—And gas.

**CHAIR**—Thank you for appearing before the committee today. If the committee has any further questions we will contact you.

Resolved (on motion by **Mr Hatton**):

That this committee authorises publication, including publication on the parliamentary database, of the transcript of the evidence given before it at public hearing this day.

**Committee adjourned at 11.31 am**