



COMMONWEALTH OF AUSTRALIA

Official Committee Hansard

**HOUSE OF  
REPRESENTATIVES**

STANDING COMMITTEE ON INDUSTRY AND RESOURCES

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

THURSDAY, 11 AUGUST 2005

CANBERRA

BY AUTHORITY OF THE HOUSE OF REPRESENTATIVES



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

**Thursday, 11 August 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:** Mrs Bronwyn Bishop, Mr Cadman, Mr Martin Ferguson, Mr Haase, Mr Hatton, Mr Prosser and Mr Tollner

**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**

**GRANDEY, Mr Jerry, President and Chief Executive Officer, Cameco Corporation ..... 1**

**MATTHEWS, Dr Ron, Manager, Exploration, Cameco Australia Pty Ltd..... 1**



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**Committee met at 11.37 am****GRANDEY, Mr Jerry, President and Chief Executive Officer, Cameco Corporation****MATTHEWS, Dr Ron, Manager, Exploration, Cameco Australia Pty Ltd**

**CHAIR (Mr Prosser)**—I am pleased to declare open the first public hearing by the House of Representatives Standing Committee on Industry and Resources for its inquiry into the development of the non-fossil fuel energy industry in Australia. The committee is pleased to begin this program of hearings with representatives from the world's largest uranium mining company, Cameco Corporation, and that its CEO and president is able to be here with us in person. I thank you for your submission to this inquiry.

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 remind you that the giving of false or misleading evidence is a serious matter and may be regarded as a contempt of the 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. Would you care to make an opening statement to the committee before we put questions to you? Before you do so, I may have to leave the chair; my colleague Michael Hatton will take over—I might have a commitment in the House coming up at short notice.

**Mr Grandey**—Thank you. We are delighted to be asked to come down and talk a little about the uranium industry. I do not intend to get too much into all the issues that are being debated within Australia but I thought that, wearing the hat of the world's largest supplier of uranium and as a former Chair of the World Nuclear Association, I would give the committee a little bit of a sense as to what is going on within the industry, not only in North America but also globally. I will be more than happy to respond to any specific issues that you might have.

I am absolutely delighted that when I arrived in Canberra last evening you had put on a snowstorm for me; it made me feel quite welcome. I did not come prepared for it. In any event, I will tell you a little bit about Cameco. We are, as you alluded to, the world's largest producer. We produce in Canada. The bulk of our production comes out of the northern part of Saskatchewan.

**CHAIR**—I hate to cut into the start of your presentation, but there is now a division in the House, and all the members of the committee will have to go. I have a speech to make, but my colleagues will be back. I apologise for that.

**Proceedings suspended from 11.40 am to 11.53 am**

**ACTING CHAIR (Mr Hatton)**—The chair has had to make a speech in the House. We have now returned from our division, so please begin from where you were.

**Mr Grandey**—I was about to tell you a little about Cameco, to put it in context, and to indicate some of the experiences that we have had in business. We are the largest supplier in the world. We are vertically integrated. We produce the uranium concentrates and also do the refining and conversion, and we supply those services to utilities throughout the world. We do not engage in enrichment nor do we engage in fabrication. We own one-third of North America's

largest nuclear-generating station called Bruce Power. Our uranium goes through the various stages and is used, ultimately, in a power plant. There is a series of six plants where we produce nuclear electricity. As a result, we have tried to stay abreast of the entire industry. We describe ourselves as a nuclear energy company—something that most companies historically have been a little reluctant to talk about, but we are very proud of what we do.

We operate mines in northern Saskatchewan. This is the bulk of our production. Many of the issues that we have faced in Saskatchewan are parallel to some of the issues you have here in Australia. Northern Saskatchewan is very sparsely populated. There are 26 communities there that are largely aboriginal. Saskatchewan itself only has about one million people, so it is a large empty land. The ore deposits were discovered in the 1970s. We went through a great period of debate about the desirability of mining uranium. There were public inquiries and lots of public consultation. We had a socialist government that had a platform of being antiuranium, certainly, and antinuclear. This is a process that has gone on literally since the seventies and eighties and into the nineties. There has been a great debate as to the wisdom and desirability of promoting and developing Saskatchewan's uranium resources.

Today we find ourselves with the communities in the north—the 26 communities that I talked about—being very supportive. We employ about 1,500 people directly in the mining operations in the north. Sixty per cent of them would be residents of the north and 80 per cent of them would be of aboriginal descent. So a lot of the issues about aboriginal employment, bringing on aboriginal business, creating trucking and mining consultations and catering, and expertise and infrastructure within the aboriginal community are things that we have been working on over the course of about 20 years.

The government is still a socialist government today and it is quite supportive of the development of uranium mines. Indeed, it is supportive of trying to find ways of promoting more investment vertically within the province. We find by independent polling that the public today is about 80 per cent supportive of nuclear energy and uranium mining within the province. That has been an evolution over about 20 years of public consultation and effort and basically being a responsible corporate citizen. In the United States we have operations in Wyoming and Nebraska. Again, they are fairly remote areas, but you would find the level of public confidence and support much the same in those jurisdictions. In essence, we have found a way over time to take the politics out of uranium mining—something that we would like to see, obviously, in Australia.

The third area in which we are quite active in terms of uranium mining is Kazakhstan. Kazakhstan is a long-time producer of uranium. It was a producer of uranium when it was part of the Soviet Union. It has resources that are listed as No. 3 in the world. Today there are at least four uranium mines that are under development in Kazakhstan. Cameco has one of them. There are already three that were operating under the auspices of the Kasakh government. They are wholly-owned corporations. That gives you a bit of background about Cameco and our engagement worldwide in nuclear energy.

Our interest, obviously, in Australia is the large endowment Australia has in uranium. It came out of the exploration efforts largely in the seventies and eighties. In spite of all of the debate that has gone on worldwide and in Australia, we have maintained a fairly aggressive exploration program and the core competency. We have always believed that, firstly, the price of uranium



would go up and, secondly, that there would be a rediscovery of nuclear technology throughout the world. I think that in the last two years that positioning of the company has been vindicated in a number of ways. Today we do see a tremendous resurgence of interest in nuclear energy worldwide, hence an increasing appetite for the fuel, which is uranium, and a recovery of the price—it was around \$10 and today we are looking at about \$30 a pound. I will leave it with those introductory remarks. We are obviously interested in what is happening in the uranium debate in Australia. Out of all of it we hope that there emerges a clear direction, favourable or unfavourable, so that we who are bringing in investment have a good sense of where the long-term policy and positioning will be for Australia.

**ACTING CHAIR**—On behalf of the committee, I thank you for the quality of your written submission. Dr Matthews, before we go to questions would you like to add to Mr Grandey's statement?

**Dr Matthews**—I fully endorse Mr Grandey's statement. As Jerry has said, we have been here exploring for 10 years prior to the present upturn; we have persisted during that period. We have spent a consistent budget over those years. From our perspective, we are here for the long term, but we would like to see clarity on uranium and for Australia's future to be clearly identified. We feel that Australia has significant potential, and that should be harnessed. With the present interest in nuclear energy worldwide, Australia's uranium is a resource that should clearly be developed. We would like to see that moved forward.

**Mr MARTIN FERGUSON**—Putting aside your interest in Jabiluka, what have you spent since you started exploration in Australia a decade ago? I think your exploration has been principally in the Northern Territory and Western Australia. Have either of those governments sought to dissuade you from uranium exploration in that period?

**Dr Matthews**—We have spent roughly \$50 million in the Territory during that period, and around \$4 million or \$5 million in Western Australia. We have been in Western Australia almost as long as we have been in the Northern Territory. We have some tenements in one specific area; we have acquired some tenements in South Australia just this year. We have certainly received the full support of the NT government over the years. Some of the recent issues have been a little disturbing, but we are pleased to see some clarity coming so that we can move forward. As Jerry said, our position is that it will be business as usual. We are there to explore and to find uranium. We hope that, if we find something significant, we will get over all the hurdles. We basically want to keep clear of politics, but sometimes you cannot avoid it. It is a similar situation in WA in that you are allowed to proceed with exploring. The present government certainly does not support uranium mining, but our hope is that the position will change as some of the issues and misconceptions are resolved. We regard the whole of Australia as having potential. Our focus is on the NT and I think we have the interest and willpower to carry on there.

**Mr MARTIN FERGUSON**—Australia, like Canada, has pretty strong requirements for the export of uranium. The countries to which it is exported must be parties to the nuclear non-proliferation treaty, and there is also a requirement for bilateral agreements with Australia. We have just started more detailed negotiations with China. How do you see Kazakhstan's commitment to following through on the peaceful use of its uranium exports compared to the commitment of Australia and Canada, who are absolutely committed to that condition?

**Mr Grandey**—That is an interesting question which people often ask. For some reason, people assume that Kazakhstan is less committed to the International Atomic Energy Agency's overall regulatory regime. But, if anything, Kazakhstan is as stringent about compliance as Canada would be. Kazakhstan does not want to be viewed as a pariah in the international community. Having said that, as a Canadian based operator, we would do nothing other than adhere to Canadian standards, no matter where we produced the uranium. There have been plenty of overtures by countries that are not members of the NPT, Nuclear Non-Proliferation Treaty, to try to source uranium from other countries. Those countries, like Kazakhstan, have been steadfast in saying, 'We will not sell to countries that are not part of the NPT regime.' The bilateral agreement that Australia is now commencing negotiations for with China will follow a similar mould to what Canada and other countries like the United States have done with China.

Canada has a bilateral agreement with China, which allows us to sell uranium, and indeed we have historically addressed transfer of not just uranium to China but CANDU nuclear technology, which is the Canadian nuclear reactor technology. Two CANDU units were built in Quinshan, China, using Canadian technology and expertise. That was all done within the bilateral framework that allowed uranium to be sold as well. So the model is there. It probably took a year or so for Canada to ultimately negotiate with China. The US went through a rather lengthy negotiation to allow Westinghouse and General Electric to sell their technology to China. That is now permitted. So the models are there, I think, and the issues are fully developed. The diplomats that will be engaged will have some clear paths to follow, and it should not take too long to arrive at something that I think is relatively standard in the industry—the kind of bilateral agreements that are being talked about.

**Mrs BRONWYN BISHOP**—It is sometimes discussed that Australia is willing to sell uranium but not willing to use uranium. I am wondering how that is viewed internationally and in the markets into which we sell and whether, if we were opening up more mines, that would still remain a factor. As you are a part owner of a power station, would you also add a bit about the differing and superior technology that is used for nuclear power stations now that could perhaps remove some of the bogeyman image that has existed for the last 20 years?

**Mr Grandey**—I would like to talk about it in terms of the mythology that has grown up around the industry, because it makes a very interesting industry. There is no doubt, because Australia has the endowment and has been a large producer, even with all the debate that has gone on, that comments are made in the halls that they are willing to sell but they are not willing to use, and that is little bit hypocritical. But I do not think it is much of a factor in the appetite of users to source uranium from Australia.

In reality, all users—and Cameco would include itself as one, given our nuclear power investment—most importantly want to have a diversity of sources from which to draw uranium. Only a handful of countries are significant producers, including Canada, Kazakhstan, Australia, Niger in Africa, and Namibia. You can count on 1½ hands the number of significant countries that supply uranium. Most fossil fuels and oil and gas tend to be viewed as politically stable. I think the world welcomes the fact that Australia has the endowment it does, welcomes the fact that it has been a very reliable producer over the years and hopes that it will increase its involvement in the market. Ultimately the world would be delighted to see Australia at some point also decide to diversify its energy mix and not rely solely on fossil fuels but embrace the use of nuclear technology. That is a choice for Australia. It is driven by economics because you

have the resource in coal and that allows you very cheap electricity. Why would you give that up?

**Mrs BRONWYN BISHOP**—Exactly.

**Mr Grandey**—Coal will come under increasing scrutiny and begin to do what the nuclear industry has already done—that is, pay for its external impact on the environment. For 10 years the nuclear industry has fully paid the cost of its waste disposal, whereas fossil fuels today use the atmosphere as a sink and pay nothing for that. That is going to change in a five- or 10- or 20-year period. At that point in time you may find your economics of coal-fire generation changing in Australia. At the same time you will be finding new technology that the nuclear industry has created. People assume that we are living with technology that was developed in the 1960s and 1970s. Most of the existing plants are precisely that. They have been upgraded, modified and brought up to safety standards. But, like any industry—airplane, aircraft or automobile—we have moved on and created the next generation of nuclear power plants. There I would expect that the cost of construction will be considerably lower and it will be competitive with fossil fuels, but it will be a regional calculation. Again, it may be that Australia still turns to coal, depending upon the relative economics.

**Mrs BRONWYN BISHOP**—I think we certainly look at our coal in terms of making the by-product that goes into the atmosphere less and less. We are certainly looking at a lot of technology that can achieve that. I think we heard on a previous occasion that, for Australia to decide to go nuclear, it would actually be more cost efficient to use our coal. But, in terms of the mining of it, I take it that, because you have maintained your presence and maintained exploratory operations, should an announcement be made, you would be happy to begin the process straightaway?

**Mr Grandey**—In the mining industry we are just a bunch of eternal optimists, really. We are certainly not averse to taking risks. You would not be in the mining business or the exploration business if you did not understand calculated risk taking. I have—and I answered this question to the media a little earlier while everybody was out—this innate faith in the ability of mankind in Australia to come to rational decisions. I think over time, as you go through the debate, you will ultimately arrive at a point where you take the politics out of uranium mining and allow it to be just another commodity, and then we will be able to proceed with exploration and, ultimately, mine development like we do in Canada, the United States and elsewhere.

**Mrs BRONWYN BISHOP**—I found your comments about dealing with the aboriginal people in Saskatchewan most interesting, in that I think you alluded to the fact that the problems here could be similar to the ones you have already dealt with and got an acceptance rate for in Canada. Have you looked at our problems here, by keeping the operation alive, or is this an assumption?

**Mr Grandey**—No, I think there are parallels; there are differences. But, being active in exploration here, we have also tried to involve the communities that would be impacted by our exploration activities and ultimately, if we were successful, by the mining operations. So involving communities at the earliest stage is absolutely important. We have tried to engage and hire people from the local communities as well, to the extent that we can on a seasonal business, which is the way exploration is conducted in the Northern Territory. That experience would be

no different from the way we started out in Canada. In Canada there has been a very long period of effort towards education in the communities: of making sure that you had maths, science and some engineering introduced to the stage of the school curriculum where you could capture junior high and high school level students and of giving them opportunities and scholarships, of public education programs and of community involvement. We have eight-hour jobs at Cameco; we have 16-hour jobs in the community.

Literally, you cannot believe that it is going to change overnight. From our perspective, getting 60 per cent of our work force to come from the northern part of the province has been a 20-year exercise. But today we find in those communities 16 aboriginal owned businesses, from catering to underground mine development, trucking, civil construction and transportation. It really is astonishing what can be done if you have the proper model and apply the techniques. They are not unique to Canada, believe me. The mining industry has developed them all over the world.

**Mr HAASE**—Thank you for coming here today and enlightening us. It is a great opportunity. I am a Western Australian and passionately concerned with the current embargoes on uranium mining there. I believe the embargo on that mining persists because of a general public lack of understanding of the value of the resource at today's prices. I would like you to comment, to the best of your ability, on the value of the known resource of uranium in Western Australia. You supplied a scale of known resources. I wonder whether that is complete and what it reflects. In your opinion, is there a prospective country for the export of uranium from Western Australia? What might the volume of product be and at today's values what might it be worth? Can you comment on the economic effect of mining that resource over time, as far as the multiplier effect in the work force is concerned? The reason for asking these questions, as I have pointed out, is that there needs to be a greater awareness amongst Western Australians of the nature and value of the resource.

**Mr Grandey**—We will be entering the realm of wild speculation.

**Mr HAASE**—That is a reasonable precursor.

**Mr Grandey**—Clearly, Western Australia has what I would consider in the context of the world endowment some very nice, low or lower cost resources. My recollection is that, undeveloped, their size would be modest but of significant value at \$30 a pound, which is today's price for uranium. They are undeveloped for obvious reasons—legal impediments that have been faced—but they were all discovered in the last exploration cycle. The last exploration cycle literally started in the seventies and went into the early eighties, then the price of uranium went from \$40 a pound down to \$10 and indeed as low as \$7. Exploration, not just in Western Australia but throughout the world, came to a standstill. There has not been a major discovery of a uranium deposit of any size worldwide since 1988. That simply reflects not the absence of uranium in the world but the absence of a full two decades of exploration.

I have no doubt that Western Australia—with the presence that we see; the uranium finds that have been made there—has very good potential and, at \$30 a pound, I would suspect that it would be of considerable value to develop in Western Australia. Parties were close to developing when the prices of uranium were high in the eighties, and then it all got put on a shelf when prices collapsed to \$10 a pound.

Public acceptance is something that the industry has struggled with for its entire history. Generally, I found that we cannot spend enough money. The industry itself does not have enough money to influence public opinion a whole lot, particularly when media and public leaders are not disposed to report both sides of the story. Historically, people have been fearful of even talking about nuclear energy as the media attention that we get is largely negative—one-sided, if you will. I think that is driven partly by the performance of the industry. Historically, we have had our share of problems. All of that has made it very difficult for a real, rational public debate to take place.

I found in Saskatchewan that the best way of addressing public opinion is to stay out of the headlines, to put your head down and run a very clean operation, and to take opinion leaders to the mine, let them see what the impact actually is—not what it is reported to be or assumed to be—what kind of environmental performance standards we comply with and footprint the size of the energy, compared with the land disturbance. Over time, that has done more to create the 80 per cent public acceptance that we find in Saskatchewan. Similarly, in the US, generally, public support for nuclear energy today is 76 per cent. That is a huge change from even five years ago, and it is not a function of public relations campaigns; it is a function of the US industry operating their plants extremely well and extremely safely, and staying out of the headlines.

**Mr HAASE**—Could you comment on the comparative prices per kilowatt hour of electricity in the US? Is it a varying scale depending upon location and energy source? Is that something you are aware of?

**Mr Grandey**—I am, in a macro way. Energy prices in the US would be moderately higher than in Canada. So in Canada the average price has been about \$Can50 per megawatt hour, 5c per kilowatt hour. In the US it is maybe 10 or 20 per cent higher depending on the region and on whether it is regulated or deregulated. You have all those issues in the US, state by state.

**Mr HAASE**—Are you referring to the cost price to the producer of electricity or to the consumer of electricity?

**Mr Grandey**—This is the price to the consumer of electricity.

*Mr Tollner interjecting—*

**Mr Grandey**—Not in Canada and not in the United States. I think that is a comparative charge. If you were to add transmission to it then you would be adding another \$7 to \$10 a megawatt hour—at least in Canada. I am not entirely sure about the US. What I see are the prices we receive as a generator at Bruce Power compared to what we could receive if we could sell into the US market, with transportation taken out of it.

**Mr HAASE**—We can perhaps get this information elsewhere, but it is important information.

**Mr Grandey**—To answer the second part of the question very quickly: from a cost perspective, nuclear power has been the lowest cost generator of electricity in the United States for four years running, marginally under coal, with one exception—that is, hydro-generated electricity, which has the least cost, but of course that is pretty fixed and finite in terms of what it can do. So nuclear would be second above hydro and coal would be third.

**Mr HAASE**—Does that includes capital costs over a fixed period or not?

**Mr Grandey**—That is an operating cost figure, not a full cost-recovery figure.

**Mr HAASE**—Operating cost only—one would expect it would be much lower.

**Mr Grandey**—Operating, maintenance and fuel costs would be included, so the sunk costs of either coal or nuclear would not be part of that calculus.

**Mr HAASE**—Nor are capital costs part of that calculation.

**Mr Grandey**—Other than ongoing maintenance capital.

**Mr MARTIN FERGUSON**—The cost comparisons include decommissioning costs up front with respect to nuclear power stations. The issue is that, when you do a real cost comparison of also the cost of greenhouse gases from coal-fired power stations, the debate on costs can change dramatically. The truth is that I actually agree with Bronwyn. For Australia it is a question of the economics of nuclear power versus coal-fired power stations, but, when you do the cost comparisons internationally, at the moment there is a serious question about coal-fired power stations. The impact of greenhouse is not factored into the real comparisons, whereas the cost of decommissioning plants is.

**Mr Grandey**—I made an earlier comment that the nuclear industry, for a decade or longer, has put into its costs equation the full life cycle cost of waste disposal, including decommissioning. So, in my numbers that I was reciting earlier were the cost calculation in the United States or Canada, where the cost of decommissioning, the cost of fuel, waste disposal and the cost of what it takes to produce that uranium and sell it to the utility would all be included, unlike your point, where fossil fuel fired facilities do not account for all of their waste.

**Mr MARTIN FERGUSON**—That is correct. That is why the debate to date on relative costs is a false debate in terms of the international debate.

**Mr TOLLNER**—Would it be better to look at the European example where they have a carbon trading system? Would that take more into account the cost of greenhouse?

**Mr Grandey**—The effort of putting a carbon tax in place is to do precisely what is being talked about, and that is to say, ‘What is the external effect of using the atmosphere as a sink?’ Whether it is \$10 a tonne of carbon or \$100 a tonne of carbon, I do not think anybody really knows, but that is where the world is headed—not in the near term but in the longer term perspective.

**Mr MARTIN FERGUSON**—That is where we are heading, because we are going to have to invest in clean coal technology, which is going to add to the cost of coal-fired power stations in Australia.

**Mr Grandey**—And I ought to say that in today’s energy-hungry world these are great issues to talk about and everybody ought to be on a level playing field, but this world is going to need sources of energy, be they fossil fuel or uranium or gas, big time. So it is not one against the

other, and it never should be; it is: how do we satisfy an insatiable appetite for energy that is growing rapidly and how do we do that responsibly?

**Mr HAASE**—I am very concerned about the current attitude towards waste disposal. I think this is the element that creates so much of the hysteria presently and I believe is part of the stumbling block for getting public opinion behind uranium mining in Western Australia. Given that you are involved in both production and utilisation, would you comment on the modern-day disposal of uranium, depletion and energy waste?

**Mr Grandey**—Looking, I presume, at nuclear energy specifically?

**Mr HAASE**—Yes. Not energy production generally.

**Mr Grandey**—Spent fuel or high-level waste?

**Mr HAASE**—Yes, the use of spent fuel.

**CHAIR**—What Mr Tollner wants in the Northern Territory!

**Mr Grandey**—I am not going to get into that debate. That question comes up all the time and it is part of the mythology of the industry.

**Mr HAASE**—This is your great opportunity.

**Mr Grandey**—It is part of what people talk about as the Achilles heel. My retort to that is that it is really the industry's strongest asset. Usually when I say that I get the same kind of look that I just got from the panel—their eyes get fairly big and they go: 'What the hell are you talking about?' If you look at what we describe as spent fuel, it is a solid, to begin with, so it is fairly easily contained, measured and controlled. If you take a look at all the nuclear waste ever generated in Canada's history—that is 40 or 45 years of electricity generation—all of that waste today is stored at the plant site in very, very small containers. If you put it all together—which it is not, because it is individually stored at the plants today—it would be about the size of a basketball arena and maybe 10 feet deep. So you are talking about a very, very small amount of material that has produced 35 to 40 years of electricity. It is just an astonishing fact, I think. It is very heavy and, yes, when it comes out of the reactor it is highly radioactive. But, not unlike any human endeavour, nuclear energy produces a waste and it needs to be dealt with. Over time that highly radioactive spent fuel decays quite rapidly. So in 100 years, 200 years, the level of radiation in spent fuel will be about equal to what we find in our Cigar Lake or McArthur River ore body.

**Mr HAASE**—I do not know what that level is.

**Mr Grandey**—We put workers in our mining environment without even coming close to any of the international radiological exposure standards, so it is well below. But as long as you practise good mining practices—there is a level of radiation there, otherwise it would not be useful, but from being highly radioactive it comes back down to a point where it is much like the level of radiation at one of our ore bodies, which occurs naturally.

**Mr HAASE**—What is the process that you engage during that 100- to 200-year period of time?

**Mr Grandey**—Today the conventional process is to keep it in water, in a spent-fuel pool—a big swimming pool—for five, 10, 20 or 30 years, depending on the capacity of that pool. Water is a very effective shield for the radiation that is coming off the spent fuel. It is as easy as that to control. Once it has reduced its level of radioactivity it can be taken out of the pool—generally after five years—put into concrete cylinders and stored that way. There is no reason why that could not go on—and this is the debate in Canada—for 50 years, 100 years or 200 years, because the volumes are so minuscule.

**Mr HAASE**—And the nature of that water and the security of that water?

**Mr Grandey**—There is not a security issue vis-a-vis the water. There more recently has been a security issue about the vulnerability of the spent-fuel pools to acts of terrorism. There is a large study under way by the industry and by the Nuclear Regulatory Commission about the susceptibility of these spent-fuel pools to acts of terrorism.

**Mr HAASE**—In light of this very rational, very reasonable explanation of, relatively speaking, a safe process, how does the world body of opinion today modify itself? What is the current public attitude of bodies such as Greenpeace?

**Mr Grandey**—I think the mythology still persists. This is an intractable problem. There is no solution to it. It is the Achilles heel. Having participated in the debate in the US and in Canada, I can tell you that those people that are adamantly opposed to this industry—and they are out there, obviously—do not want a solution to the nuclear waste issue at all. If there is found to be a solution—technically it is not a problem; it is a political solution—then in their mind there is no longer any argument against the use of nuclear energy. So you will find that segment of the population adamantly against any solution whatsoever, even though in Canada and the United States there has to be ultimately a solution for the waste that has been created to date.

**Mr HAASE**—You put that quite succinctly. I have just one more question. Is there an explanation then in your mind as to why such environmentally concerned bodies would reject on the one hand the clean use of uranium versus global warming on the other hand?

**Mr Grandey**—It is not a rational one. The interesting thing is that in the last two years icons of that environmental movement, the people that founded Greenpeace, the people that founded the Gaia theory—that the earth is a whole earth organism—the founder of the *Whole Earth Catalog* and people that literally the environmental movement was founded on and grew up around have come out now very strongly pro nuclear. The reason they have come out that way and very publicly—*Reader's Digest*, the *Wall Street Journal* and the *Washington Post*—is the notion that greenhouse gas, the Kyoto effect, is a much more serious threat to humankind than the minuscule quantity of nuclear waste. They have commented, 'Why have we ever been concerned about it?' It is a non problem, given its size and all the things I have just described.

I will add just one thing. Ninety per cent of the energy is left in the spent fuel after it comes out of the reactor. So in 200 years when we run out of uranium cost-effectively, if that is the kind of horizon, in my own view spent fuel will be a tremendous resource. Hence it ought to be kept



in storage. The French already have the technology, and so do the British, to reprocess. It happens to be 10 times as expensive to do that than buying a pound of uranium from Australia. But that will change over time and we will find that that energy is a very valuable resource.

**Mr HATTON**—Part of the core problem is that there is a history there—Three Mile Island as well as Chernobyl. There is also a continuing problem with the state of the other Soviet reactors that were old technology. Can you give us a picture of just what the situation is with those old Soviet reactors and what work has been done to try to make them safer and what the situation is in the United States in particular in terms of making their reactors newer, technologically safer and more efficient?

**Mr Grandey**—You are absolutely right; this industry, not unlike others, has had its technical problems—such as Three Mile Island and Chernobyl. I would argue that the Chernobyl reactor was a Soviet designed reactor that never would have been licensed in the West. It was on the wrong side of the physics equation, in terms of shutting itself down naturally. Nevertheless, public perception is that we had these two technical failures, and we did; and we have been living with that and responding to it as an industry since they occurred in 1979 and 1986.

In Europe, and particularly in Eastern Europe where you have Soviet designed reactors, some of the same design as Chernobyl, there has been a tremendous effort by European and other Western countries to make them safe, to retrofit them to bring them up to Western standards. That has been under the umbrella of the IAEA and Euratom. So today the conclusion has been that those that remain operating—and a number of them have been shut down—are as safe as those Western style operators that are operating in Europe. A number of them, however, are scheduled to be phased out and shut down as a condition of accession to the European Union. In Lithuania, Bulgaria and Hungary these phase-outs will occur between now and 2007. So the technology that would be viewed as Soviet technology that cannot meet Western standards will be largely phased out, but in the interim it has been upgraded considerably.

That has also been done in Russia, but not under the same oversight—it has not had the international oversight; it has been done by the ministry of atomic energy. But Russia has been spending a great deal of money upgrading their facilities to Western standards as well. Russia had actually built nuclear technology in Finland, China and India that operated as well as any Western technology. The conventional view of Russian technology today is that it is as safe as, if not more robust than, some of the Western technology dating back 20 and 30 years. They are a very talented and capable people.

In Western Europe and in the US you now have a new generation of ‘passively safe reactors’ that are beginning to be certified by the regulatory agencies. Westinghouse is the first one to have gone through that. They have one-third fewer pumps, they use gravity instead of depending on mechanical devices for safety features and these kinds of things. The standards in the industry are quite high. The expectations, as they should be, are quite high. Like any industry, as I said earlier, it is continually striving to invent better technology and I think it has. You will see that technology already built in Japan; Finland has ordered a new technology plant; France has just announced that they will replace all of their current fleet with the EPR, which is the new technology, beginning in 2020. China has done likewise. It is no different from aircraft and automobiles; you learn from your past mistakes.

**Mr TOLLNER**—I was in France recently and their view is that the Achilles heel of the nuclear industry is not so much the storage of nuclear waste. Their view is that eventually nuclear will become well and truly accepted as a safe and reliable way of producing power. They look down the track and they say, ‘When we have accepted this in our world, how do we then say to countries like North Korea and Iran that we have this wonderful way of generating power that is reducing the cost of energy but they are not allowed to have it?’ Could you comment on that?

**Mr Grandey**—If we go back in history to the Atoms for Peace initiative in 1953 and Dwight Eisenhower’s speech, people were quite concerned about the application of nuclear technology in weapons and wanted, ultimately, to harness the benefits of nuclear power for the benefit of mankind. So the bargain that was struck was that all countries that elected peaceful use of nuclear technology would have access to it and would forgo the weapons applications. And that has worked, I think, pretty well for the last 50 years. There are a few glaring examples where it has not worked well, North Korea being one, and perhaps Iran. South Africa at one time had a weapons program but gave it up. Brazil had a weapons program but gave it up. Now you have got a few that are outside the fence, while the rest of the world community is subscribed to that so-called compromise of not developing weapons but having the benefit of nuclear technology, and yet the benefit side of it has really not been made available to the rest of the world.

So this is a real dilemma for the vision: how do we as developed countries fulfil that obligation? And it is not just energy; it is medicine and industrial applications. They have forgone development of the weapon. How do we hold up our side of the bargain and make sure the international regime stays in place? I would submit it has worked very well but not perfectly, and the French are observing, as I would, that we have to be very diligent about North Korea and Iran and bring them back into the NPT but live up to our side of the bargain too and say, ‘If you want the civilian applications, we’re there to help.’

There is a great debate going on now over ElBaradei’s proposal. The International Atomic Energy Agency and the US that have come out and said to Iran specifically but also to the world as a whole—and here, I think, is something of direct relevance to Australia: ‘We’ll guarantee fuel for your civilian program if you want to develop it. We won’t play games with it’—and there have been games played with people in the past—‘and we’ll help you advance your civilian nuclear energy program, but you sign on to the supplementary part of the NPT which says you’ll categorically not develop a weapons program and you will submit to external scrutiny.’ And that is happening—not in Iran right now; there are negotiations in Iran. But that assurance of supply of fuel is something that Australia could play a remarkable role in because of the endowment that you have—likewise, Canada.

Part of it goes back to something that would be supersensitive, though. That is, you really do not want to leave spent fuel in a country, because it could be reprocessed and usable plutonium could be extracted, although that is debatable. So if you provide the fuel then be prepared to take it back. You would need to provide some international repositories—again, for a very small amount of material worldwide. But I think the world is ultimately going to gravitate towards assuring fuel supply and having a few repositories to which the waste can be taken back and stored in for future use.

**Mr TOLLNER**—Just getting back to the subject of uranium, you mentioned in your opening remarks that you want to see some sort of clear direction from policy makers in Australia, one way or the other. Can you outline what you mean by ‘clear direction’? Policy achievements, regulatory achievements, government support: what is it that you are actually looking for? What is your wish list, Mr Grandey?

**Mr Grandey**—Where do I start! Fundamentally, and I said it earlier, I would simply like to take it out of politics. I would like to see a regulatory regime that Australia already has in place that, as we have in Canada or in the US or in Kazakhstan, really is a federally chartered regulatory oversight so that the standards, wherever you are doing business and exploring and trying to develop a uranium mine, would be the same. It is a mineral of strategic importance from an energy perspective and from international atomic energy perspectives. So having federal oversight is, I think, something that ought to be considered—making it a federally managed and regulated mineral. You take it out of the jurisdiction-by-jurisdiction issue.

Then, if I can come into Australia and conduct my exploration in non-sensitive areas—that is, not Kakadu National Park—that are open to mineral exploration and development, if I am lucky enough to discover something, I will understand the regulatory environment. I can proceed with the public consultation, the mine design and the environmental impacts and ultimately get a licence for the activity and then proceed to develop it and sell it into the international market.

Canada does all of that. It is apolitical. If I perform according to the standards, which are quite high, then there is no question that I will be allowed to proceed with mine development and ultimately sale under that regime of oversight that I have to live with—which is not just Canada but the International Atomic Energy Agency as well, which visits all of our refineries, conversion plants and power plants five or six times a year.

**Mr TOLLNER**—Dr Matthews, I am not aware of whether you have seen the submission that this committee has received from the Gundjeihmi association. Have you had a chance to read that?

**Dr Matthews**—I have. I admit that I have not read it in detail, but I did have a look at it.

**Mr TOLLNER**—And you would be aware of some of the claims that are being made in that submission, which I think tend to fly in the face of your experiences in Canada with the Indigenous people there. Do you see that there has been a massive blunder made by ERA and North’s in the past in dealing with Aboriginal people? It seems to me that the traditional owners there are saying that uranium mining has delivered them nothing apart from a whole heap of problems.

**CHAIR**—You may decline to answer that, if you so wish.

**Dr Matthews**—I do not particularly want to answer that. I think that would not be prudent at all.

**CHAIR**—Not as a part-owner!

**Mr CADMAN**—How effective do you think nuclear generation of electricity would be in combination, say, with a desalination plant?

**Mr Grandey**—How feasible would it be?

**Mr CADMAN**—Yes.

**Mr Grandey**—The Russians did it in Kazakhstan along the edges of the Caspian Sea, where the city at the time called Shevchenko and now called Aktau required potable water and electricity. Those plants—both of which are shut down today, for good reason—did both. I think, as you look in the crystal ball, in the future you will see more and more of that, but I think it will take a different generation or a different style of nuclear technology. You may have heard about what is being developed in South Africa: it is called the ‘pebble bed technology’. It is really a high-temperature gas-cooled reactor, not a light-water one. It does not use water as a moderator or as a coolant; it uses helium gas. Light-water reactors operate at low temperatures because at high temperatures you have problems with water disassociating and with corrosion. But, if you have a high-temperature reactor and you are using helium gas, you overcome that problem and your reactor operates at a much higher temperature. That higher temperature would allow you to use it for desalination, would allow it at the same time to generate electricity with a waste heat at a high temperature and ultimately, if you look way down the road, would allow you to produce hydrogen out of the disassociation of water, if we ever go to the hydrogen economy. So my sense is that for desalination you are going to want to turn to the high-temperature gas-cooled reactors, which are maybe five years away from commercialisation.

**Mr CADMAN**—For the prospect of moving ahead, what would be the disadvantages of using current technology?

**Mr Grandey**—It operates at a relatively low temperature—though it is still quite hot! I think the efficiencies are not much better than you can get with fossil fuel generated power.

**Mr CADMAN**—So the cost of establishment versus that with fossil fuel will be higher and therefore—

**Mr Grandey**—The capital cost.

**Mr CADMAN**—if you amortise over the whole program, the cost may be significantly higher.

**Mr Grandey**—The fuel costs are clearly going to be much lower. The advantage of nuclear energy is that it does not make a lot of difference to the cost of the electricity, whether it is \$10 a pound or \$30 a pound. That is a real benefit of nuclear technology. The equation that you are engaged in is: what is the assumed life of the facility over which you are going to amortise the capital investment and what are the relative fuel costs going to be in Australia? Your coal is quite cheap; I cannot speculate on natural gas. I think that is the trade-off. Thus far, outside of the Russian experience there has not been much desalination done with any technology except reverse osmosis, which is very high-cost.

**Mr CADMAN**—That would be the most relevant current technology, would it?

**Mr Grandey**—Yes.

**Mr CADMAN**—Is a proposal for a nuclear plant as a basis for desalination in Australia a speculative proposal?

**Mr Grandey**—I think it ought to be looked at. In that discussion they should look too at the next generation of reactors—the high-temperature gas-cooled reactor.

**CHAIR**—Can you clarify once again when you think the pebble bed technology will be in operation?

**Mr Grandey**—I can only tell you what the South Africans will say. The Chinese have built one as well and, of course, there is work being done in the US on them. Within five years the South Africans hope they will have been through the prototype and developed a commercialised model.

**Mr CADMAN**—I just noticed a projection by the IAEA where they forecast a declining proportion of the world's energy being supplied from nuclear sources. Do you agree with that projection?

**Mr Grandey**—I do agree with that. The reason is that today, at 16 per cent of the world's electricity supply, we are on the cusp of adopting and licensing the next generation of nuclear reactors, but nobody is yet building them. We are going to go through a period where nothing but gas and coal facilities will be built—and maybe a little bit of hydroelectricity like the Three Gorges project. The world is going to build lots of coal and gas fired facilities, and that means that, even though there will be more nuclear power plants built in the world—in China, India, Russia and the US—its percentage contribution is going to decline until the world gets serious about greenhouse gas emissions.

**Mr CADMAN**—How long is that likely to last—20 or 25 years?

**Mr Grandey**—At a minimum, I think, given the lead times for planning in this industry.

**Mr CADMAN**—Then will it be nuclear or will we looking at hydrogen by then?

**Mr Grandey**—At that point potable water will be a big issue and hydrogen will be an issue, but hydrogen can only be produced cleanly with nuclear technology. I think then you will find a large expansion—

**CHAIR**—And tidal energy.

**Mr Grandey**—I am sorry?

**Mr CADMAN**—He is just freaked out on tidal energy.

**CHAIR**—Mr Ferguson?

**Mr MARTIN FERGUSON**—I have two issues. The first issue is additional work. It would be useful if you could prepare a paper on how you have achieved success with the indigenous community in Canada, in terms of health, education, employment and training and all that, and the legislative requirements for us to look at, because we have had mixed results from a resource sector point of view in Australia. Secondly, regarding waste disposal, have you examined the Australian synroc method?

**Mr Grandey**—I have not, no. I have heard of it but I have not examined it.

**Mr MARTIN FERGUSON**—It is under serious consideration in Great Britain and the US at the moment.

**Mr Grandey**—We will be more than happy to prepare that paper. I would say that, since you are engaged in this debate—and it will go on for a number of years—you are most welcome to come to Saskatchewan. I would advise coming in the summertime, but you are most welcome to come and visit a uranium mine. You could look at the regulatory environment and our aboriginal engagement programs and chat with our work force. You are more than welcome to do all of that.

**Mr HAASE**—I have a couple of extremely diverse questions. I do not know if you want to comment—and I do not know of the degree of your personal involvement with the aboriginal people of Saskatchewan as employees and their education—but I heard you comment about introducing sciences into the school curriculum. Could you make any comment on the frequency of school attendance at primary level of those same students? Do you have any experience of that?

**Mr Grandey**—It is a struggle. You are dealing with quite remote communities and a culture that has not embraced education as a value. They are also quite communal, so that the notion that you go to work, earn a pay cheque and your family benefits by that and not the entire community is an alien concept. We struggled mightily in the earlier days with people showing up for two or three days of work, getting paid and then having their brother-in-law show up in the next shift. We struggled with all of those issues and bringing along willing workers without the skills required in today's modern mining world. I firmly believe that the responsibility of providing education, at least to grade 12, in those communities is the responsibility of the provincial government. But money is limited.

**Mr HAASE**—My question specifically—I am sorry I camouflaged it so highly—is about the regularity of primary school attendance by the children and whether you could make any comment on that.

**Mr Grandey**—It varies by grade. In the lower grades you would find it quite high. I think about 20 to 30 per cent of the student population actually graduates from high school.

**Mr HAASE**—Thank you. That is valuable. You spoke earlier about high and low temperature reactors. Could you give the committee some indication as to what those temperatures are in either Fahrenheit or Celsius?

**Mr Grandey**—This will be speculation—it will be from recollection.

**Mr HAASE**—So we can understand the range.

**Mr Grandey**—I think 600 degrees Celsius for the typical light water reactor, and you are pushing 900 to 1,000 Celsius with a high-temperature gas cooled reactor. Is that about right, Ron.

**Dr Matthews**—Yes.

**CHAIR**—Dr Matthews, I note in your submission that you make the comment that 2004 saw a shift in global perception of nuclear energy. What do you put that down to?

**Dr Matthews**—Purely demand, the need for more product and a realisation—

**CHAIR**—Yes, but the community would not have changed their perceptions if it were just demand. I think the previous perception was that nuclear energy is unsafe. In reading your submission I took it you were saying that there has been a change in attitude by the community. Interestingly enough, a similar shift in attitude has happened here in Australia.

**Dr Matthews**—I think there I was referring to the mining community specifically.

**Mr Grandey**—Looking at the global community, and I am much more familiar with North America, I think you are beginning to say the same shift in Europe. Nothing focuses one's attention like \$50 or \$60 oil. Nothing focuses one's attention like having half the US defence budget dedicated to making sure that oil continues to flow. All of a sudden, security of supply—and uranium is quite advantageous in that regard—becomes a tremendous benefit. People begin to talk about nuclear energy and then you introduce them to all of the environmental benefits as well. All of a sudden people begin to talk about it positively and not negatively. In North America opinion leaders from both sides of the aisle, Democrat and Republican in the US or Liberal and Conservative in Canada, talk about the benefits and the necessity of having a mix of the energy being nuclear. That has changed public attitude.

**CHAIR**—What role do you think governments can play in better educating the broader community with regard to the benefits of nuclear energy?

**Mr Grandey**—To begin with, do not be afraid to utter the 'N' word. Talk about nuclear; talk about it in much the same way—

**CHAIR**—Jerry, this committee is not afraid of it.

**Mr Grandey**—It has its share of problems technically—admit it. Say that the industry, like all industries, is out improving itself. And then talk about the recognised cost benefits, security of supply benefits and environmental benefits in the context of an open public debate, with full transparency. To move it forward really will require not only the industry to do it—and to perform well—but opinion leaders as well to lead the way.

**CHAIR**—As there are no further questions, I thank you for appearing before the committee today. Would you like to make any further closing statement?

**Mr Grandey**—No, other than to renew my invitation to visit Saskatchewan. You are welcome at any time. We will follow up in response to the question and the request that was made. As I said at the beginning, I am most appreciative of being able to come down and express my views about what goes on globally and our interest in Australia.

**CHAIR**—Thank you very much for appearing.

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

That this committee authorises publication of the transcript of the evidence given before it at public hearing this day.

**Committee adjourned at 1.01 pm**