



COMMONWEALTH OF AUSTRALIA

SENATE

SELECT COMMITTEE ON URANIUM MINING AND MILLING

Reference: Uranium Mining and Milling

CANBERRA

Monday, 3 March 1997

OFFICIAL HANSARD REPORT

CANBERRA

SENATE

SELECT COMMITTEE ON URANIUM MINING AND MILLING

Members:

Senator Chapman (Chair)
Senator Margetts (Deputy Chair)

Senator Bishop	Senator Sandy Macdonald
Senator Ferguson	Senator Reynolds
Senator Lees	

Matters referred for inquiry into and report on:

The environmental impact, health and safety and other implications and effectiveness of security agreements in relation to the mining, milling and export of Australian uranium.

In considering these terms of reference the Committee is to take into account, and where necessary report on, the following issues:

- (a) The environmental impact of uranium mining and milling in Australia and the effectiveness of environmental protection and monitoring in relation to existing and previous Australian uranium mining operations.
- (b) The role of the Office of the Supervising Scientist in monitoring Australian uranium mining and milling activities;
- (c) The health and safety implications of uranium mining and milling for workers at mining and milling sites and mining operations;
- (d) The health, safety and other effects of uranium mining and milling on communities adjacent to mine and mill sites and communities on existing or planned transport routes for uranium ore and uranium waste;
- (e) The effectiveness of Australia's bilateral agreements with countries importing Australian uranium in ensuring that Australian-sourced uranium is not used in military nuclear technology or nuclear weapons testing activities; and
- (f) The volume and location of Australian-obligated plutonium currently in existence in the international nuclear fuel cycle (produced as a result of the use of Australian uranium) in what form it exists (for example, separated or in spent nuclear fuel) and its intended end use.

WITNESSES

BAKER, Mr Stephen, Friends of the Earth, PO Box A474, Sydney South, New South Wales 2000	1513
CROUCH, Dr Philip Charles, Senior Scientist, Radiation Protection Branch, South Australian Health Commission, PO Box 6, Rundle Mall, Adelaide, South Australia 5000	1669
FITCH, Mrs Jill, Director, Radiation Protection Branch, South Australian Health Commission, PO Box 6, Rundle Mall, Adelaide, South Australia 5000	1669
HARRIS, Mr Bryan Marcus, Director, Groundwater and Environmental Services, Department of Mines and Energy Resources, 191 Greenhill Road, Eastwood, South Australia 5063	1669
MATHEWS, Mr Roger Esmond, Chief Inspector of Mines, Department of Mines and Energy Resources, PO Box 151, Eastwood, South Australia 5063	1669
SCHNELBOGL, Mr Hans-Peter, PO Box 1223, Lismore, New South Wales 2480	1728
SWEENEY, Mr David, Friends of the Earth, PO Box A474, Sydney South, New South Wales 2000	1513
WELSH, Mr Thomas Campbell, Acting Deputy Chief Executive, Department of Mines and Energy Resources, 191 Greenhill Road, Parkside, South Australia 5063	1669
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SENATE
SELECT COMMITTEE ON URANIUM MINING AND MILLING

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Present

Senator Chapman (Chair)

Senator Bishop

Senator Margetts

Senator Sandy Macdonald

The committee met at 8.03 p.m.

Senator Chapman took the chair.

CHAIR—Tonight, the Senate Select Committee on Uranium Mining and Milling will be taking evidence on submissions from Friends of the Earth, Sydney, the government of South Australia and a private individual, Hans-Peter Schnellbogl. During its proceedings, the committee has held public hearings in Canberra on three occasions, and hearings have been held in Jabiru, Darwin, Perth, Roxby Downs and Adelaide.

During the public hearings, the committee has taken evidence on nearly half of the 110 submissions it received. Among those giving evidence have been all governments, Commonwealth, state and territory, involved in the current phase of the uranium mining and milling in Australia. We have also had evidence from several mining companies and mining industry organisations.

We have received submissions from the two unions which cover the mines now in operation. Both were invited to give public evidence and the Liquor, Hospitality and Miscellaneous Workers Union did so. Other witnesses have included 10 private organisations, with interests in environment, conservation, peace and nuclear energy matters. All Aboriginal bodies that lodged submissions have given public evidence. Other witnesses have included academics, small business and the Social Justice and Responsibility Committee of the Uniting Church of Australia.

The committee's hearings have accordingly involved the entire spectrum of interest and opinion about the mining and milling of uranium in Australia. The committee has had a close look at the three mines that operated under the three mines policy of the previous Labor government. It has also visited the location, though not the actual site, of the proposed mine at Kintyre in Western Australia. The committee's interest has been not only to appraise performance at the Nabarlek, Ranger and Olympic Dam mines but to assist the adequacy of regulatory arrangements and associated practices which will apply to prospective new mines.

The committee is scheduled to report at the end of this month. It should be emphasised that the committee's role is not to advise on whether existing mines should be expanded or new mines developed. This is the subject of statutory procedures embodied in Commonwealth, state and territory legislation. The committee's terms of reference direct it to report on environmental impacts, health and safety matters, and the international security and safeguards aspects of exporting uranium. When this evening's proceedings close, the committee will be devoting itself to the preparation of its report. The first witnesses this evening appear on behalf of the Friends of the Earth, Sydney, and their evidence is to be taken by telephone hook-up.

[8.06 p.m.]

BAKER, Mr Stephen, Friends of the Earth, PO Box A474, Sydney South, New South Wales 2000

SWEENEY, Mr David, Friends of the Earth, PO Box A474, Sydney South, New South Wales 2000

CHAIR—Welcome. The committee has before it submission No. 40. Is it the wish of the committee that the document be incorporated in the transcript of evidence? There being no objection, it is so ordered.

The document read as follows—

CHAIR—I now invite you to make an opening statement.

Mr Sweeney—Friends of the Earth Australia welcomes the opportunity to speak to this paper. The primary person who drafted this paper is John Hallam. John is currently engaged in work overseas and unfortunately cannot speak to this paper, which is something he would no doubt very much like to do. Steve Baker and I, along with John, are designated national spokespeople on these issues, and we will endeavour to speak to this paper and answer any questions that any of the committee may have regarding aspects and issues raised in this paper.

I will not go on too long but I will just put it again formally on the record that it is the position of Friends of the Earth Australia, and the different member groups that make up that organisation, just as it is the position of and Friends of the Earth International, which is active in 57 countries around the world, that nuclear power, uranium mining and all aspects of nuclear technology are unnecessary and unsafe. We are deeply concerned about proposals to expand Australian involvement in the uranium mining and export industry. We are deeply concerned about increasing Australian involvement in the international nuclear trade.

The reasons and the motivations for those concerns cut firmly across and fall firmly within the clear brief that has already been outlined by the chair regarding the concerns and the considerations of the Senate select committee. Environmental impacts, both site specific and global; occupational health and safety impacts, both on workers, local communities and those who reside near the waste dumps; and the international safeguard, security and proliferation aspects are all of great concern to the Friends of the Earth.

They have been concerns of Friends of the Earth for the 20-odd years that Friends of the Earth has been active in Australia. We have had a long history with this industry. We have had a long history with the operations of the Ranger mine, the Olympic Dam facility and others. We welcome the chance to speak and we welcome the chance to add our input into any process of decision making or shaping information for the public record in this stage, as we are looking at increased mining and the prospect of increased exports of this most dangerous of minerals.

CHAIR—Thank you. Is that all you wish to say at this stage?

Mr Sweeney—That is all we would care to say. The record of Friends of the Earth is clear. I am well aware that the senators have a pretty tight time line, so I will not take up too much of your time, but we would very much welcome any questions or comments that you would like to ask of us.

CHAIR—I will open the batting with some questions on what certainly is a very lengthy submission. Looking at the submission—and correct me if I am wrong—if I were

to summarise the position that you adopt, it would be the worst-case scenario. In other words, you are opposed to uranium mining and the use of nuclear energy because of what you see as the ultimate risk of those resources and the use of those resources.

Is it not fair to say that any type of resource or facility, or even machinery, that one might use in one's life, in production, in whatever, has an element of risk attached to it, and that our aim ought to be to minimise that risk and manage that risk so that we get the benefits that are achievable from that particular item, but minimise the risk associated with it?

Given the development of technology that has occurred over a fairly extensive period since uranium and nuclear energy was first discovered and first used, what do you say to the argument that that risk is manageable, that it is capable of being minimised and that, given the benefits that can be achieved from nuclear energy, particularly in countries that do not have the same access to other sources of energy that Australia has—and particularly with regard to minimising the greenhouse effect and other environmental dangers of other energy sources—there is a place for uranium in our fuel and energy cycle?

Mr Sweeney—Our response to that would be that the opposition of Friends of the Earth Australia to all involvement in the nuclear fuel cycle is not just on the worst-case scenario, it is not just on what happens if there is another Chernobyl scenario, but it begins with the site specific impacts of Ranger and Olympic Dam and, from them, it moves on. Those concerns might be a degree of risk concentrated at every stage of the international nuclear cycle.

When it comes to the question of risk, you are indeed correct to say that every industrial application and occupation involves a degree of risk, as does nearly every aspect of our lifestyle. I suppose what it comes down to is looking from an arms-length distance at a number of factors. The questions on those factors would be: what is the extent and the likelihood of risk? What is the reason for the risk? What is the net benefit of the risk? Are there alternatives to the hazardous or risk-laden operation? What is the length of the risk?

If you look at any, and if you look at all, of those criteria, it would be the position of FOE Australia—that being the acronym that is probably a time-saver for Friends of the Earth—that on extent, on likelihood, on reason, uranium mining and nuclear technology does not stack up. On the growth of alternatives that can meet that need—and I grant that you did raise the question of countries that do not have access to the same multiplicity of power sources that Australia enjoys—I draw the committee's attention to the fact that even after 50 years of, in many ways, a monopoly on many of the finer scientific minds of the international community, and billions of dollars worth of subsidies and technical resources allocated to it, the nuclear industry, in the form of nuclear energy, contributes less than five per cent of the global energy mix. So I think that the importance of nuclear power in the global energy mix, and the consequent assault on the ability of alternatives,

is something that needs to be questioned and challenged.

All of this is put into stark relief when we look at the final factor, which is the length of the risk. The decision that we are making as a society with this technology is a decision that we can, as a society, make with a fair amount of comfort as regards risk for ourselves. We can assess, here and now—me in Melbourne, and you in Canberra—whether or not there is a net benefit or a net cost on a risk basis, and we can make that assessment. We can make it so long as our forums are democratic and they have the mechanisms for a whole range of stakeholders to have their input.

We can make that decision for our society, but where Friends of the Earth draws the line very firmly is that we cannot make that decision for societies for tens and, indeed, hundreds of thousands of years to come. The creation of radioactive waste, which is an assured outcome of any involvement in the nuclear industry, precludes future generations' options and leaves for them a legacy of high level, very hot, very toxic radioactive waste. That degree of risk precludes nuclear power as a sustainable or efficient energy option for our society.

CHAIR—Is it not reasonable to conclude that, given the development of technology over the last two or three decades with regard to not only the handling of mining and mine rehabilitation, but handling of nuclear waste, in the future it is likely that there will even be further technological developments that will make that handling even more secure than it is now?

Mr Sweeney—There is no doubt that there has been, over time, an increase in the technical efficiency and the technical ability to deal with all industrial applications, and that includes nuclear applications. There is no question of that. There is no doubt, also, that, over time, there has been a corresponding awareness, an increase, in the extent of risk posed by these applications.

If we look at the industrial applications and mechanisms and methods used in the nuclear industry of four decades ago, they are radically different from the ones of today, and the ones of today are far superior in relation to the ones of four decades ago. But if we look at the medical knowledge, if we look at the permissible exposure levels of four decades ago, they are greatly reduced four decades later when we know more about the effects of this material that we are dealing with.

So we are saying there is no technology and there is no industrial application that can make an inherently dangerous industry non-dangerous. We must accept that this industry is, from source, a dangerous industry and quite a unique industry. It is not like other mining operations in Australia. It is not like other power generations elsewhere. It is a unique and inherently dangerous industry.

While shielding and changes in technology—a whole range of mechanisms and

ways—can reduce the risk in part, the long-term reality is that we are seeing an increase in the amount of fissile material in the world. We are seeing an increased understanding of the dangers—individual, societal and genetic—of that fissile material, and we are also looking at time spans which the material needs to be isolated from intrusion—from water systems, from people, from vegetation, from animals—for periods of hundreds of thousands of years.

I think it would be the height of technical audacity for us to say in 1997 that we can guarantee that for 100,000 years we will have a capacity to ensure that this material is isolated and confined from the wider environment. I believe that that degree of technical audacity will ensure that we are not able to reach our self-appointed goal, and the costs of not reaching that would be very high.

So, while we agree that there are technical innovations, we would also point to the industries where there are technical innovations on an equally or more exciting level which provide an answer to what is the need for nuclear power. We would point to those industries and the vast increases in the growth of renewable and sustainable energy systems and what they can actually deliver on the ground.

We would say that is the technology to be developing and increasing and turning Australia into a centre of excellence for. We would ask the committee to note that view rather than pinning our hopes on technology overcoming an inherently dangerous industry.

Mr Baker—May I point out as well, on the idea of technology coming up with the answers, that there is no technology at present that can deal with nuclear waste that will be around for half a million years or more, but we have got scientific evidence that the half-life of permissible dose rates is decreasing at a rate of about 12 years. In other words, about every 12 years since the mid-1930s the dose rate which has been permissible for communities—these are not workers, but communities in general—has halved about every 20 years in terms of what is considered to be safe.

That is something that we know now. Through prediction, we can say, ‘If this continues, we will see dose rates reduce significantly over the very short-term future.’ We do not have any technologies to deal with nuclear waste which will be around for 500,000 years. It would be silly to make management decisions about technologies that we do not have now and that, we would say, we are unlikely to ever produce.

CHAIR—I note that you advocate the development of a national regulatory structure based on the creation by the federal government of a federal uranium regulatory authority under the Atomic Energy Act. Given the degree of expertise that has been developed within state government regulatory bodies, particularly in South Australia but also in the Northern Territory and to a degree in Western Australia, what additional gain would there be in establishing a federal body that would, in effect, have to build up its expertise from scratch, as against retaining the state bodies which already have a

significant body of expertise and which certainly would appear to have proven themselves as effective regulatory organisations?

Mr Sweeney—With respect to a national framework to regulate this industry, it is certainly not the intention nor, hopefully, the consequence of such an initiative for the expertise that has been built up in a state or territory agency to be lost. The idea would be to codify that expertise so that it is applied uniformly across the country wherever operations are taking place. It also means that there is a national perspective on this.

There are national issues involved in uranium mining and milling, the storage of waste, and the handling of existing waste from facilities in Australia such as the Lucas Heights material. There is a whole raft of issues that need a national approach rather than the sectional approach that can be taken by state or territory governments for their perceived interest. It is clear that they will respond to the political realities and frameworks in constituencies in that particular state and territory, and that need not always be in the long-term national interests of decision making or policy.

We are saying that the long-term implications of any involvement in the nuclear trade are so significant that it should be as broad as possible, as bipartisan as possible, as national as possible and as open as possible. We have existing structures which are not open and which do not facilitate societal debate on an issue that is a legitimate area for significant societal debate. For example, I point to the existence of the Indenture Act in South Australia. There are clauses in the Indenture Act which govern the operations of the Olympic Dam mine which, from a national perspective, are quite simply unacceptable. There are clauses about confidentiality and about the non-provision of information. There are also clauses saying that the South Australian government cannot apply firmer regulations on environmental, occupational health and safety or a whole range of other issues than the ones that currently exist in the indenture as it stands. There is a whole bevy of things like that. There is also the political reality, which, I think, is another issue.

Let us look at the supervising agencies that exist around the Ranger mine. The Northern Territory Department of Mines and Energy has a significant supervisory role but it also has a mandate, a clear brief in its charter, and it is reinforced regularly in its political funding, its allocation, its access to cabinet and more, that says that it is to facilitate the mining industry in the Northern Territory. That is a difficult brief to, on the one hand, ensure the higher standard of environmental protection in an area such as Kakadu National Park but, on the other hand, to be told to go out and facilitate uranium operations in the country.

We say that those sorts of things are contradictory. They are clearly against international and national best practice, and they are just downright, inefficient and silly. We would be far better taking the expertise that has developed, often despite frameworks rather than because of them. We would be far better taking that expertise and codifying it in a national regulatory approach—and give it some regulatory teeth, rather than an

advisory committee—so that it takes a responsible national approach to what is a significant national and international concern.

CHAIR—In practical terms, what do you think will be achieved by establishing another layer of bureaucracy at the federal level, in effect to second-guess or supervise what is already being done at the state level? Will that not simply be another level of bureaucracy that in practical, down-to-earth terms does not achieve any more?

Mr Sweeney—The short answer to that would be that there are clear shortcomings in the monitoring regimes and the regulatory regimes of the existing operations. There are clear shortcomings and limitations in the operations at the moment of the federal body, the OSS. It does not have a significant role at Roxby. It has an advisory role that has been progressively downgraded since the Taylor report and significantly downgraded since the change between the Commonwealth and Northern Territory working arrangements for the Ranger mine. It now has to find 30 per cent of its money from outside sources. As the committee will no doubt be aware, it has had budget cuts in the order of 25 per cent. It is not doing primary research. It occasionally does a ‘tick a box’ exercise, known as the environmental performance review.

These things are not conducive to creating a public sense that Australia’s largest national park is being well managed from the threat of uranium mining, and it is a threat. Friends of the Earth, as the committee will be aware, has tabled a document that lists 40 cases where there have been incidents, links, spillages, accidental releases, technical divergences, irregularities, call them what you will, from the Ranger mine. That is in the existing framework. If that framework gets further weakened, there are further pressures put on that framework—and they are pressures now.

With direct application for a new mine in Kakadu, with direct application for a new mine in the Western Desert and with the expanded uranium exploration that is happening, now is the time that we should be codifying, increasing and resourcing these organisations. It is certainly not the time to be devolving them back to state or territory control, and cutting away their resources and telling them to look for outside agencies to supplement their funding. We are not acknowledging the change in international understanding. We are not acknowledging the fact that this is hardly a revolutionary concept; it is hardly a particularly anti-nuclear concept.

The position of the Friends of the Earth Australia is not that this would make uranium mining acceptable, justifiable or good but that we currently have operations and now we have a major push by the industry to get more operations. Codifying and increasing resources would be the minimum responsible position from any government, from whatever political ilk, to make. We are dealing with a long-term major problem. In the US, the UK, Western Europe, we have the Department of Energy, the Nuclear Regulatory Commission and the Nuclear Industry Inspectorate. There is a whole bevy of organisations in other countries that serve the role that we are suggesting that such a national body in Australia would serve.

So we are hardly saying, 'Let us map out a new plan, a new template for environmental protection.' We are saying, 'Let us at least codify these often parochial and conflicting interests, and ensure that environmental protection and workers' health is not compromised.' We are not saying that that would make this industry okay; we are saying that, given that the industry is existing, it would be a minimum and it should happen on a national level.

A national government has a duty of care and is elected by and responsible to the entire Australian people, not to one small part of it or to one solo stakeholder in it. We should be able to appeal to it for the greater good of 'the common wealth'. Our common wealth is the health of our workers and the health of our environment. Both of those, in the view of Friends of Earth Australia, are being compromised under the current system. We are very keen to see genuine talk and societal movement towards a system that attempts to address these current failings.

Mr Baker—I would like to add to two small points to that. One of the reasons that we are suggesting such a national body is precisely for efficiency because, at the moment, with so many different state governments and state departments being in charge of different aspects of these mines, it creates inefficiency. That is one of the reasons why we believe that a national code, a national organisation, should be set up. Secondly, the level of expertise at the national level does already exist and there is certainly something there to build on, and that is through the Office of the Supervising Scientist.

CHAIR—Is it not fair to say that those nations that you have referred to, and given examples of where they have a national regulatory system, have a large and quite diverse nuclear industry or a range of nuclear industries, in contrast to Australia where all we have is several uranium mines and, even if it expands, maybe no more than half-a-dozen or so uranium mines?

So we only have one sector of the industry—we do not have the diverse nuclear industry structure that they have in other countries—and, furthermore, the states do have a duty of care and they can, given that limited nature of the industry in Australia, quite adequately ensure that appropriate standards are maintained. Is that not correct? You are not dealing with the full range of the nuclear industries that there are in other countries.

Mr Sweeney—That is a fair comment insomuch as Australia is different from the UK. We do not have Sellafield, we do not have that whole range, but at the same time we have the largest number of spent fuel rods from any research reactor anywhere in the world. At the same time, we have a major remediation and rehabilitation program happening on a former atomic test site which is costing the Commonwealth \$120 million that is taking place now.

We have extensive exploration. We have mining operations. We have the ongoing rehabilitation of closed uranium mines. We have a national push to establish a low to

intermediate waste dump. We have memorandums of understanding for nuclear technology with half the nations in the region. If you look at the whole raft of nuclear issues in this country we are facing, it is a very fair call to say that in this country we need to get more systematic and devote more resources to ameliorating the effects of the nuclear industry.

Whilst we do not have domestic nuclear power production for civil power use, we do have the HIFAR reactor, we do have a push by ANSTO to have a replacement reactor, we do have nuclear medicine and industrial applications, so there are a range of sectors that need to be covered.

The other issue is that, given that we are facing a push for expanded uranium operations, you say the argument is that surely they should be able to monitor one aspect. First of all, we would argue that it is far broader than one aspect, although the single largest waste stream is, as you pointed out, that aspect of uranium mining. However, there are many other aspects.

We would also say, 'Does it not make more sense to have a transferable and applicable, in any context, body of knowledge, expertise, regulation and ruling, rather than have a hotchpotch—looking after uranium operations in one place, another uranium operation in another place, another uranium operation in a third place and cleaning up Maralinga in a fourth place?' It would make sense if we are to be involved in this industry—which we are; if we are to talk about expanding this industry—which we are; and if we are to try and clean up the messes of nuclear colonialism of the old days, if we are to try and clean up the messes of 1,500 fuel rods sitting in southern Sydney; that we actually have a commitment to do that in the most efficient, practical and nationally minded way possible.

Senator MARGETTS—You mentioned the indenture agreement that restricts access to information. What kind of information do you think should be available to the community that is not available now?

Mr Baker—I guess that is where I would come in, being from South Australia.

Senator MARGETTS—Sorry, I should have prefaced that with the indenture agreement in relation to Roxby Downs.

Mr Baker—Yes. The sorts of problems that we have with the indenture relate to what has sometimes been used as commercial-in-confidence, which does not allow certain information to be made public. There are clauses within the indenture which prevent either the government—the South Australian government, in this case—or the company itself from releasing information without the permission of the other party.

If the parties show goodwill, they will release that information. What we are saying is that that is well and fine provided that happens, but we are not sure that is always

happening. There is information in regard to such things as the amount of water that is being used, the amount of tailings that are used, information to do with how that tailings material is being managed, information to do with the cost of repairing damage when there is such a thing as the tailings leak that occurred in 1994.

All these types of information, we believe, should be made public because we believe that the public should know the environmental and economic costs, as well as what we are told are the benefits from the operation of that mine. We think that that information should be made free and available to the public without them having to go through the process of attempting to get it through freedom of information and such processes as that.

To give an example: we are unaware of the actual effects of a draw-down that is being caused by removal of water from the Great Artesian Basin on a number of mound springs. We believe that there are reports that suggest that, over a 50-year period, the draw-down effect may be greater than what we have been led to believe by the company itself. We are told that effects could be felt as far away as the Dalhousie mound springs.

As long as we do not have free access to all the documents we can only suppose that that is the case. If it is the case, then the public should know about it. If it is not the case, then we should have access to these documents so that we can actually see that that is the truth. At the moment we do not have access to that information and that causes some distrust of the whole industry.

Senator MARGETTS—You have probably seen or heard some of the *Hansard* in relation to the issue just mentioned, the issue of draw-down of water. If the company has given the committee information that it has got minimal impacts or that the draw-down of water is only a very small percentage of the total of water that is produced by mound springs, why would you then have concerns about the level of draw-down? What would be missing, in your opinion, from any information the company gave about percentages? Is there any problem with that kind of data that causes you concern?

Mr Baker—It is the sort of information that you can use to avoid what we would see as the real issue. It is like using averages when what we are actually looking at are peak events—not only peak in terms of in time but also in space. The draw-down effect is one which is localised to around where the bore sites are. You get a cone of depression around that site.

Certainly, the amount of water that is removed by the bore field is less than the amount of water that is entering the system, but the localised pressure deficit that is caused by removal of the water creates a cone of depression around that site which affects the mound springs in the vicinity of that. It will also, we would presume, affect any bores which are used for the pastoral industry in that region.

By saying that we are actually taking out a very small percentage of the water that is entering the system, that does not give you any information as to what is happening locally. It also does not tell us what happens at peak times or at times when there is a low pressure through the system because the water that is arriving in the area is not the amount that is usual, if you like. Will this have a greater effect over a greater region? We do not know this sort of information.

Many scientists here who have worked on those mound springs have made the comment that until we know the dynamics of these water systems, until we actually know more about the dynamics of the Great Artesian Basin, we should not be removing water, particularly at the rate at which the expansion of Roxby Downs is likely to remove water—at somewhere between 33 megalitres and 42 megalitres per day.

These sorts of rates are far in excess of anything that we have modelled. We are told that the company has modelled this, but we do not know exactly what they are basing that information on. Their information must be as lax as the information that is available to other scientists who have worked on these mound springs. So, unless they have access to some information we do not know about, then we can only assume that they are looking after their own interest rather than allowing for what we would say is the best principle in this particular case—the precautionary principle.

Senator MARGETTS—There seems to be a fairly wide gap between the economic benefits and otherwise of uranium mining as predicted by industry or environmentalists, and in some instances we could say they are diametrically opposed. Would you like to comment on this issue of benefits or otherwise of the industry?

Mr Sweeney—Senator, I think from our experience the feeling would be that in developing its economic models industry has been consistently over-optimistic in how the nuclear industry will be. At every point they have projected that markets will be stronger, demand will be greater and reactor usage and power production through nuclear electricity will be greater than what it actually is.

The other thing which is fundamental in the costings and the whole economics of this industry is the whole question of externalities. The industry sees them as things which are secondary or things which do not count for the direct economic equation. What we are dealing with here is an industry that will cost billions: it will cost billions in lost opportunities; it will cost billions in damage to the country; and it will cost billions in monitoring. Even if nothing goes wrong, even if it is possible to repackage these vast volumes of waste on a regular basis, it will cost absolute billions.

Currently 220,000 cubic metres of radioactive materials is leaking and seeping out of the Energy Resources of Australia's Ranger tailings dam every year—220,000 cubic metres every year; 1,000 every working day. That is happening now after 15 years of operation and while there are hundreds of workers around the area and while there is a

Northern Territory department of mines and an Office of the Supervising Scientist supposedly maintaining rigorous standards. That is happening now.

What is going to happen in 60 years time when ERA no longer exists as a corporate identity, they have dug up the uranium and they are gone? That is still going to be there. It is still going to be a problem. That is one example of an industry that has this problem all around Australia and all around the world.

They do not factor in these costs. They do not factor in the opportunity costs. How do you measure in the forcible relocations resulting from Chernobyl? How do you measure in the fact that the former Soviet Union's breadbasket is now effectively off limits? Those sorts of costs are not factored in by the industry. We have a segmented, compartmentalised approach which looks at whether Western Mining Corporation, WMC, will gain this much more, whether ERA will gain this much more or how BNF, British Nuclear Fuels, did this week. That is not the way to assess this industry.

So we would say that, one, the models use inappropriate economic models. That critique was raised, indeed, in the Jabiluka EIS submission; the EIS was critiqued on its economic basis. Two, they have consistently been over-optimistic. They have consistently believed that the light on the hill is generated by nuclear power or it is just about to be. Three, they have not factored in the long-term costs of maintaining radioactive waste, of decommissioning nuclear reactors and the whole raft of costs that are associated—reclamation, rehabilitation, decommissioning and maintaining waste. So we would say that on every level their costings are not only inappropriate but also deliberately misleading and that the economics of this industry, in a real sense, just do not stack up.

Mr Baker—I would add that, even when you do not take into consideration problems of waste management for periods of up to half a million years and when you do not look at issues such as the Chernobyl or Three Mile Island accidents and what that costs both in human terms and in environmental terms—for environmental I would include the economics of that—you could just look at the supply and demand equations, the basic economics. The fact is that what we have seen from supply and demand is that the spot price is so volatile that there is an inability to predict where the economics of this is going to go in the future.

Certainly we can say that, based on what has happened in the past, the price of uranium is going to be volatile still. When we look at that supply and demand we know that there is certainly an oversupply of the product. We believe that the models are showing that the demand is actually starting to peak now and is likely to decrease over the foreseeable future, so we are going to see greater amounts of uranium and material available—especially through the decommissioning of weapons grade material in both the West and the old Russian bloc—and we are going to see a decrease in the amount of reactors being built in time, so we believe that the demand will be falling.

The supply, if we start opening up more uranium mines—we are not the only country that is talking about opening more uranium mines or increasing production—will increase, and that can only lead to a reduction in the price of this product. Therefore, economically, it does not even stack up when we do not even take into account those other issues, such as decommissioning and waste management and the problem with reactors after they have reached 30 years and we have to decommission them.

Senator MARGETTS—You mentioned the problem with Olympic Dam's tailings. Are you suggesting, or are you clearly making the statement, that the problem with the leaking tailings is not over?

Mr Baker—By our estimates, given the rate of extraction that is going on at Roxby Downs and what they are planning to do and given the life of that dam, the amount of tailings that will be produced at that dam site will be of the order of 250 million, 260 million tonnes. That is about equivalent to, or a little bit more than, what is currently in the USA and Canada put together, and they are having major problems with tailings management as well as major problems of leakages—you have dust problems and radon gas problems at a lot of those old tailing sites.

Take a look at that amount of material and the associated liquids that come through it—because it comes out as a slurry, you are looking at a massive increase in the amount of liquid that is going to be entering that system. Over a very long period of time—40 years of the mine's existence plus the 500,000-plus years that the tailings are going to be sitting up there—and when things like the greenhouse effect and increased rain events in that region—which are most likely—are factored in, we believe that the leakage from that dam, as it occurred in 1994, is going to be minimal compared with what is likely to occur in the future.

Senator MARGETTS—Sorry, I will just interrupt there. I was thinking in the context of the recent expenditure on lining for the liquor ponds—are you suggesting that that has not solved the problem and, if so, why are you suggesting that?

Mr Baker—I do not think it has solved the problem, simply because of the amount of time that we are talking about. How long are these liners meant to last? The fact is that the liners in their own right must have a life time, and I do not believe that it is anywhere near the life span of these tailings.

Senator MARGETTS—Is it true that Friends of the Earth was predicting that Olympic Dam's tailings dam was going to leak?

Mr Sweeney—It is true. In the original submission made by Friends of the Earth Australia to the original Roxby Downs and Olympic Dam EIS, we predicted that there would be significant leakage of material, particularly tailings liquor. We predicted that there would be corners cut and that impermeable barriers in the dams would not be put in

place. The sad thing that I recall, as we said at the time, is a media release going out from Friends of the Earth Australia saying that sometimes there is no joy in being proved right, and that is exactly the case.

With regard to the question of whether the situation has been satisfactorily dealt with now, we had meetings with senior Western Mining Corporation management in September 1996 where the question was asked: what has happened to that five million cubic metres of tailings liquor, where has it gone? The answer came back—give them some points for corporate honesty—‘We do not know.’

If there is a situation where the company that is monitoring its own operations, providing its information to the state government and only providing it further than that if its goodwill allows it to or if it deems it politically appropriate, then we would say that that problem is a long way from over. That material is out. That particular five million cubic metres of nuclear genie is out of the bottle.

I would very much reinforce what my colleague Steve Baker said inasmuch as any impermeable liner is going to be finite. In effect, radioactive waste is infinite. There is going to be 680 hectares, 260 million tonnes and after a while the numbers, the figures and the charts become a bit meaningless. It turns into a bit of a litany. According to the Office of the Supervising Scientist, 680 hectares of material is a hazard for hundreds of thousands of years. It is a very dismal scenario which is hardly addressed by corporate assurance and by putting in a liner.

Senator MARGETTS—Some industry representatives would suggest that the costs that have been predicted in terms of monitoring radioactive waste are not realistic because, once you rehabilitate an area—and you can put five metres of topsoil at the top of a tailings dam and rehabilitate it with plants and trees—there is no longer any need to monitor it. Would you comment on that?

Mr Sweeney—We are deeply concerned by any such approach, Senator, and we would say that such an approach looks at only one pathway of exposure of those tailings and the radioactive material that they contain. That pathway is through dispersal by dust. There are so many other pathways. There is erosion. There is movement into underground water. There is a whole range of seepage avenues. There is intrusion by vegetation or by burrowing animals, biodispersal. There is a whole bevy of ways that this stuff can get out and about into the wider environment.

To say we can chuck five metres of reasonably heavy-duty clay on top, then chuck a metre of soil and plant some eucalypts and walk away from a problem that is a distinct and direct hazard to people in the country for hundreds of thousands of years, all that is indicative of is the company’s commitment to its short-term profits, taking a small amount of private profit and leaving the rest of us with a vast amount of public cost. It is unacceptable. It is unacceptable on every criteria. It is unacceptable for people and for the

environment, and it is just not on.

We are currently watching a situation where we are looking all around the country at a push for new mines. This is no news to any of you senators. You have been to half of the places. You have heard the stories all round the place and basically you know that. What we are looking at is a strong push for more mining. We are looking in the territory, for example, at the push for the Jabiluka mine. That is being viewed in isolation from the Ranger mine, and yet the Jabiluka mine is going to be a hole where ore is going to be accessed, trucked down to Ranger, as you know, and processed at Ranger.

It is the contention of Friends of the Earth Australia that the Ranger mine already, on tailings management and on water management, is under direct and demonstrable stress and that any operations at Jabiluka would put that, which is in crisis, over the edge into critical. It is not being addressed. In the EIS it gets a few cursory pages. It says there will be no tailings dam on site, it is not a problem—and yet it is a problem because tomorrow, Tuesday, Ranger starts chucking a pipe over the edge again and releasing water from retention pond 4.

It has already sent letters of notification to traditional owners that that is what it intends to do, and it starts again. We can say there is a process and a dispersal mechanism and a whole formula for those sorts of things. Two years ago they wanted to dump water from retention pond 2 and it was only legal avenues by Aboriginal people that stopped them.

What I am saying is that they are currently now pushing for that. If the senators look at the submission put in by some of the Commonwealth agencies and also by the Northern Land Council to the recent Jabiluka EIS process, people are saying that the Ranger mine—Energy Resources of Australia—is deliberately underrepresenting the extent of the ore body it wants to access at Jabiluka so as to avoid inconvenient questions about tails. It wants to rehabilitate the existing Ranger tailings dam in situ.

That is against the clear direction of the Ranger environmental requirement. It is against international best practice. It is against the commonsense that says that, in a tropical area, if you have an earthen structure it is going to wash away. It might not be in 10 years, it might not be in 100 years, but certainly 1,000 years down the track it is going to wash away.

There have been Aboriginal people living in that country for 60,000 years at least. Hopefully, they want to live there for another 60,000 and other people want to either visit or have a look around that country for another 60,000 years. We do not want in a hundred years or a thousand years, because Energy Resources of Australia found it expedient in 1997, to sacrifice that. That is the irony in this whole business because, as times change, so does the corporate approach.

At the start of this decade Energy Resources of Australia—and it will be no surprise to those members of the committee that are members of the ALP and recall the ALP conferences where this issue was debated ad nauseam, should we have a limitation or not—was working to actively undercut the Jabiluka mine going ahead.

When Pancon owned Jabiluka, ERA could not bag it enough. That is true. Richard Knight, who was then ERA's chief executive, the Philip Shervington of the early 1990s, said that as expansion of the uranium industry takes place the result will most likely be an extension of the depressed market and price cutting between local producers. A few years later when their name is on the deed of ownership, it was all totally different: 'We cannot afford to ignore the economic bonanza. We owe it to our kids to allow Australia to dig up this midas mineral.' The whole thing is just outrageous.

Richard Knight is currently the head of development for the North Group. It would be very interesting to see if half a dozen years down the track his economic analysis, which was so piercing at the time, has changed. If we look at the book, *Jabiluka: The Battle to Mine Australia's Uranium* by Tony Grey—and he has made more money out of uranium royalties from his book than he ever did out of his company—it says clearly that ERA, again, again and again, was working with government and was working with environment groups to stop the development of Jabiluka.

So what we have is a demonstrated history of companies that will undercut other companies, companies that will overestimate or underestimate their reserves, and companies that will demonstrate lip-service to the environment and then walk away from it. It is a company and an organisation and an industry that has built up a culture of secrecy and denial. It has built up a culture of self-interest and self-regulation. All those things put together, with an inherently dangerous and long lived industry, is a very deep concern—not just for Friends of the Earth but to a crew of environment organisations and, also, if you look at all of the polls, the majority of the Australian community.

Sorry to be longwinded, but it is a longwinded answer to a very longwinded and very real problem. It is not acceptable, in our view, for a company to make those assessments on narrow political or economic indices and then walk away from the reality, which is a long-term threat to people in country.

Senator MARGETTS—Given the lateness of the hour, I wonder if I could just put a question that you might consider taking on notice. Given the range of proposed uranium mines around Australia at the moment, some of which have had environmental impact statements or draft environmental impact statements and others that have not, would you be prepared to take on notice and provide to the committee some specific comments about the adequacies or otherwise of environmental impact statements for the proposed expansion for Olympic Dam, the Jabiluka proposal and any others that you feel that you would like to comment on?

Mr Sweeney—We would welcome opportunities to have input into the committee or any other appropriate forum on these matters. We believe that, in many ways, environmental impact assessment, rather than being seen as an honest assessment of a project's merits or costs and whether it should go ahead or not, is seen as an exercise in trickery and semantics to get approval.

We are also deeply concerned that senior officers with the Commonwealth Environment Protection Agency told us early in this Jabiluka process that, once an EIS is out, 99.7 per cent of projects get approved. It does not ring true to me or to Friends of the Earth Australia that 99.7 per cent of projects would sail through all environmental hurdles. We believe that it is being increasingly seen as just an exercise in public assurance rather than an exercise in rigorous criticism and critiquing and analysis or the basis for a decent industrial or resource policy in this country. It is ad hoc and ridiculous and we are sacrificing too much. We would welcome input or providing our analysis or our critique of this process to the committee.

Senator MARGETTS—Given that the committee is due to report at the end of March, I am just really talking about sort of dot point critiques. Of course, I realise that you do a lot on voluntary resources and you are not funded in any real or meaningful way, so I am not suggesting that you have to re-write a report, but I just thought there might be something on a brief format that you might be able to provide to us.

Mr Sweeney—Yes, Senator. That is eminently possible and it is something that we will undertake. And the other thing is that we welcome your acknowledgment, and that is particularly the case post the latest round of GVCO funding. We welcome that acknowledgment that so much work for the Australian environment and around these issues is done through voluntary nature and goodwill. Whilst that is good work and effective, we would also say—to come to our earlier comments about environmental protection—that the Commonwealth needs to act to ensure that it is not just goodwill that ensures we hand over a decent Australia to the next generation.

CHAIR—Thanks very much for appearing before the committee this evening. We will look forward to those written responses. If there are any other matters that the committee wishes to explore with you in its further deliberations, we will also seek responses to those in writing. Thanks for appearing before us via the telephone link this evening.

Senator MARGETTS—Thank you.

Mr Sweeney—Thank you.

[9.03 p.m.]

CROUCH, Dr Philip Charles, Senior Scientist, Radiation Protection Branch, South Australian Health Commission, PO Box 6, Rundle Mall, Adelaide, South Australia 5000

FITCH, Mrs Jill, Director, Radiation Protection Branch, South Australian Health Commission, PO Box 6, Rundle Mall, Adelaide, South Australia 5000

HARRIS, Mr Bryan Marcus, Director, Groundwater and Environmental Services, Department of Mines and Energy Resources, 191 Greenhill Road, Eastwood, South Australia 5063

MATHEWS, Mr Roger Esmond, Chief Inspector of Mines, Department of Mines and Energy Resources, PO Box 151, Eastwood, South Australia 5063

WELSH, Mr Thomas Campbell, Acting Deputy Chief Executive, Department of Mines and Energy Resources, 191 Greenhill Road, Parkside, South Australia 5063

WHITWORTH, Mr Thomas Frank, Delegate, Environment Protection Authority, Acting Manager, Industry Services Branch, Office of Environment Protection, Department of Environment and Natural Resources, 77 Grenfell Street, Adelaide, South Australia 5000

CHAIR—The committee has before it your submission, which we have numbered 109. Is it the wish of the committee that that be incorporated in *Hansard*? There being no objection, it is so ordered.

The document read as follows—

CHAIR—Do you wish to make an opening statement?

Mr Welsh—There is very little I think it is necessary to say, so it is not my intention to make a further presentation and this will allow the maximum time for your committee to ask any questions.

Bearing in mind your reporting time frame, we have brought a reasonably large team and we will attempt to deal with your questions tonight. If we cannot deal with any of them, we will get back to you with written responses as promptly as we possibly can.

I think at this stage it is sufficient to say that the state submission sets out really to demonstrate that South Australia has an existing body of legislation which provides a comprehensive set of appropriate controls for the mining and milling of uranium. This legislation, we believe, is properly administered.

Further, the state's experience with Olympic Dam has shown that the mining and milling of uranium ores can be undertaken without unacceptable risks to the health of workers, the adjacent communities, or without unacceptable risks to the environment. I think with that opening statement, we will leave the rest of it to yourselves to ask questions.

CHAIR—Thank you, Mr Welsh. I might commence my question on that issue. I do not know whether you heard any of the evidence that was just given to us by telephone hook-up with Friends of the Earth Sydney, but in their submission and in some other submissions that we have received, it has been argued that the current state administration of uranium mining, of health and safety and all of the matters relating to the administration, management and monitoring of uranium mining, should be subsumed in a Commonwealth responsibility, that in fact a Commonwealth structure should be established to deal with all of those matters.

Senator MARGETTS—That is not so. That is not what was argued.

CHAIR—I think it is what was argued.

Senator MARGETTS—No, it was clarified and they said no, they could work in together and they did not argue that the state's expertise should be subsumed.

CHAIR—No, they want a Commonwealth structure to overlay the state's—

Senator MARGETTS—Yes, but they did not say that the other body should be subsumed. They specifically did not say that. They specifically said—

CHAIR—In that case, they want two bureaucracies to manage the system.

Anyway, they have suggested a Commonwealth structure should be set up. In that case it would be duplication effectively. I am just wondering what reaction you have to that proposal in terms of its necessity, what additional benefit might be achieved, if any, or what downside there might be to such a proposal?

Mr Welsh—We have briefly addressed it in our submission. I do not really believe there is a lot I can add. It is our contention that the existing state system is quite effective. We have yet to have pointed out to us any believable benefits of having additional input by way of some Commonwealth structure overlying it. I would add to that at this stage that we have provision for interaction between the state and Commonwealth by way of the consultative committee.

CHAIR—With the existing structure, do you believe there are any areas of unnecessary duplication or overlap that could be removed?

Mr Welsh—Not with the existing structure. I do not believe there is anything that needs to be modified.

CHAIR—Nothing to add?

Mr Welsh—I just do not believe there is any modification necessary. I believe that within the state system we have an effective, comprehensive and well-integrated management system. With the exception of acknowledging that these management systems do gradually evolve over time, I do not believe there are any immediately recognisable modifications that need to be made, at least of substance.

CHAIR—The committee has received criticism of the delay in Australia in adopting the new ICRP standard of 20 millisieverts. Has the South Australian government got any view on whether or not there was undue delay and whether it could have been better expedited?

Mrs Fitch—I do not believe there has been an undue delay. I believe that the Australian process for developing its standards ran in parallel with the international process for developing basic safety standards by the International Atomic Energy Agency and the World Health Organisation and other international bodies, including the International Labour Organisation.

The ICRP makes recommendations which it specifically says should be examined by national authorities for application in different countries. They accept that there will be a need for each country to see whether any modifications to its recommendations are necessary, and in any case to cast them into a more regulatory format. That is what was done in Australia in parallel with the international bodies—the IAEA, the ILO and the World Health Organisation. I do not believe there was any undue delay.

That process takes considerable time because of the need to get input from a lot of people—regulators, industry, workers and members of the public. Those processes and consultations were carried on in Australia. In fact, the Australian standard was finalised and adopted by the National Health and Medical Research Council and the National Occupational Health and Safety Commission before the international bodies I mentioned finalised and published their standard. However, we did know what was going to be in the international one because we had been examining drafts. Really, they went in parallel.

I would like to add something in relation to the Olympic Dam specifically. In the Olympic Dam indenture there is a requirement—in fact, the Olympic Dam operators have committed themselves to immediately adopt any recommendations of international bodies like the International Commission on Radiological Protection or of national bodies like the NHMRC. As far as Olympic Dam was concerned, there was an immediate move to adopt the new limits. That was required by virtue of the indenture. I believe the new limits were adopted at Olympic Dam well before they were adopted anywhere else.

CHAIR—Page 8 of your submission refers to a more structured program of annual independent audits having been implemented by Western Mining. Does the state government have any role in that independent auditing process?

Mr Welsh—Not at this stage.

CHAIR—How does that operate?

Mr Welsh—I think you will have to obtain detailed information from the company. We can provide you something in writing on that one, if you like.

CHAIR—Another issue raised by several witnesses and again earlier this evening is that of water being drawn from the Great Australian Artesian Basin by Western Mining. I do not think I am misquoting what they said tonight, which is that, even if the short-term prognosis on the use of that water is acceptable, the longer term use of it could or would create difficulties for the basin. Does the state government have any research or information on the long-term prognosis for drawing water from the basin?

Mr Welsh—The state government has done considerable work in looking at the expected performance of the Great Artesian Basin over extended periods. Brian, do you wish to add something of substance?

Mr Harris—The estimate of flow into South Australia from Queensland and the Northern Territory is in the range of 425 to 450 megalitres per day. Of that, the outflows at the moment are springs of about 65 megalitres a day. Pastoral bores are about 130 to 132 megalitres per day. With oil production at Moomba, we have around 22 megalitres per day. Currently from Olympic Dam we are drawing about 14 or 15 megalitres per day.

The balance, therefore, is about 200 megalitres a day, from memory, which is discharged in South Australia from the basin's natural discharge through upward leakage through the overlying shale layer. That leakage goes into very saline aquifer, which is seawater or worse quality. You see that there is a fair amount yet of capacity to take up in this development that Olympic Dam propose.

I should also point out that the pastoral bores of that flow are, as I said, 732 megalitres per day. At least 90 per cent of that flow is to waste because it flows into open bore drains. It waters the cattle, but it is lost by soakage and evaporation. Less than 10 per cent is beneficially used. So there are opportunities to increase the availability of water in the basin in South Australia by increasing the efficiency of use in the pastoral industry.

Senator SANDY MACDONALD—You mentioned 55 megalitres a day at Alice Springs. Is that right?

Mr Harris—Sixty-five megalitres per day in springs, approximately.

Senator SANDY MACDONALD—In springs. Does the quality of the water in the Great Artesian Basin vary?

Mr Harris—Yes, it does. The best quality is found as it comes across the border from Queensland into South Australia. It gets progressively more brackish as it approaches the south-western margins of the basin.

Senator SANDY MACDONALD—Is it starting to get brackish when it gets to Olympic Dam?

Mr Harris—Yes, the water at Borefield A is brackish. Borefield B is of better quality but it will still be desalinated to some extent to make it—

Senator SANDY MACDONALD—Is the water north of Olympic Dam, where you say the better quality is, irrigatable water?

Mr Harris—No, it is not. The chemical composition of the water is that it is high in sodium and bicarbonates, and that has a very deleterious effect on soils.

Senator SANDY MACDONALD—But drinkable by humans?

Mr Harris—Yes.

Senator SANDY MACDONALD—You gave some figures about the flow-in—425 or 450 megalitres per day. How do you work that out?

Mr Harris—The figures were derived originally from work done by scientists at

the Australian Geological Survey Organisation here in Canberra for the basin as a whole and then reduced, as it were, or compartmentalised for flows into South Australia, with some additional re-working in recent years as more knowledge and information became available.

Senator SANDY MACDONALD—Does it vary at different times of the year?

Mr Harris—No, the flow-in is pretty steady.

Senator SANDY MACDONALD—The flow-in must be affected by the northern wet season or other seasonal effects?

Mr Harris—No, I would not think so. By the time the flow pattern reaches South Australia it would be very steady.

Senator SANDY MACDONALD—I am talking about the actual flow-in.

Mr Harris—Sorry. A very important area of the intake or the recharge to the basin—I think that is what you are referring to—occurs along the eastern margins of the basin where they crop out on the Great Divide. That would certainly be subject to seasonal intake.

Senator SANDY MACDONALD—The basin extends as far east as the Great Divide, the Liverpool Range, all through New South Wales and up through Queensland?

Mr Harris—Yes, it does. I think I understand the geography well enough. It is right up to the margins of the Great Divide and that is quite a fair way away from South Australia, so any—

CHAIR—I apologise. We must adjourn the hearing for several minutes while we attend a division.

Short adjournment

CHAIR—Had we completed on the water?

Mr Welsh—No, I think Mr Harris had a couple of other items to add, if I read it correctly.

Mr Harris—I think I left off about where the intake to the basin on the western margin is. It is a long way away from the South Australia border and by that time any sort of recharge pulses are well and truly damped out and you just get a steady flow across the border into South Australia.

Just another point about water conservation: we have had a program going interstate now for over a decade to repair uncontrolled artesian wells—to bring those flows back into control. Through that program, we have estimated we have saved round about 100 megalitres per day during that time, over the last, say, 15 years approximately.

Senator SANDY MACDONALD—Does all the water from the Great Artesian Basin come out under its own pressure?

Mr Harris—Yes, it does.

Senator SANDY MACDONALD—And in various places, that pressure has dropped or stopped. Is that correct? Are there are bores that no longer flow because of a fall-off in pressure?

Mr Harris—In South Australia, the impacts have not been as great, for example, as they have been in Queensland and New South Wales, where there have been much higher demands on the artesian flow and there have been those sorts of cases. In South Australia, we have suffered some loss of pressure over the 100 years or so it has been developed, but there have been no bores that have stopped flowing due to the general development in the basin at large.

Senator SANDY MACDONALD—You mentioned that you had stopped some flows that were out of control. Does the South Australian government have any compensation or encouragement to pastoralists, or to others, to cap their bores?

Mr Harris—To date, the state has repaired the wells and, because most of the wells are pastoral lease bores and stock route bores, it was decided that the best approach would be for the state to repair the wells and that has been the case. When private wells are drilled, though—and a number have been in more recent years—then it is the responsibility of the landowner who drilled the bore to keep that well in good repair.

Senator SANDY MACDONALD—With Olympic Dam, the aquifer or the actual GAB stops about 100 kilometres away, I understand.

Mr Harris—That is correct.

Senator SANDY MACDONALD—Where does that water go if it is moving from north to south?

Mr Harris—It is gradually being lost through upward leakage. The water is flowing horizontally through the aquifer layer and as it flows through it is under quite a lot of pressure. It is escaping very slowly—seepage upwards into shallow aquifers which overly the Great Artesian Basin itself. Those shallow aquifers then receive that water and go to evaporation and they are typically very saline.

Senator SANDY MACDONALD—Is the aquifer shale or sandstone?

Mr Harris—It is a sandstone and the layer above it is a shale.

Senator SANDY MACDONALD—Thank you.

Senator MARGETTS—Do you have means of finding out the age of the water?

Mr Harris—There has been some work done by the CSIRO and they have dated the water, at least as I recall, to the South Australian border when the techniques reach the end of their ability to date, and from there on to the South Australian border we have used hydraulic calculation to extend the travel time—about two million years.

Senator MARGETTS—Two million years. And the water that is being taken from wellfield A and wellfield B: do you know what the age of that water would be?

Mr Harris—It would be in that range that I quoted to you; wellfield B being a little younger than wellfield A.

Senator MARGETTS—Could I suggest that people who are mining for gas or coal could be told that there is a replenishment in terms of trees that die and the replenishment will happen over time. If you have got two million years for that water to be available, the replenishment rates over the usage rates do not necessarily relate to what will happen to that wellfield in the immediate or intermediate term, do they?

Mr Harris—I think you have got to be a little careful with the age of the water. That is a water particle that has entered on the eastern divide and taken a long time to travel—with an individual water molecule—across into the South Australian part of the basin. With pressure changes, as we see from wellfield A or even from pastoral bores and the experience we have in other parts of the basin, when you start to let water flow you feel the change in pressure that is caused by that flow due to extraction. It can be felt more quickly than it would, say, over a matter of tens of years, depending on how far away you are, but that does not necessarily reflect that the particles of water have travelled that distance.

To put it another way, if we were to, in a hypothetical case, commence extraction from a point and we could see the effects of that extraction through draw-down—say, 10 kilometres away—it does not mean that a particle of water has moved from 10 kilometres away into that bore. It is just the pressure change that is being felt there.

Senator MARGETTS—Would it be true to say that there is still a lot that is not yet known about the movement of water in the Great Artesian Basin?

Mr Harris—Like all ground water basins, a knowledge of them is derived with

time as we investigate and accumulate knowledge through conventional investigation techniques. We also gain a lot of information as the basin is used. It is the stress of the draw-down that is created when the basin is used that also gives us information about how the basin responds. From that we can extract or develop a better understanding of what its ultimate levels of safe extraction might be.

Senator MARGETTS—Is it also true to say that it was not expected that there would be mound springs dried as a result of the draw-down from wellfield A?

Mr Harris—I think that the initial assessment that was done by the computer modelling in wellfield A was reasonably accurate, given the knowledge that was available at the time. I think the springs that were expected to be impacted were impacted and a couple were affected a bit more than was expected. But that is the experience you gain from actually having the extraction and observing its response in the aquifer system. It is a very typical response.

The initial assessment can only be based on the best information available at the time and other complexities, like faults and so on, become available and are revealed over time as the aquifer is stressed in that area. That is a normal process for evaluating aquifer systems in the Great Artesian Basin or any other part of Australia, in my experience.

Senator MARGETTS—What I am trying to establish is whether the statements about replenishment and draw-down are a theoretical construct.

Mr Harris—No, they are based on analysis and measurements and on the best information that is available.

Senator MARGETTS—The water that is being drawn down is, as you say, measurable at two million years old. How far away are the eastern margins?

Mr Harris—It is a long way away.

Senator MARGETTS—How far?

Mr Harris—About 1,500 kilometres, I guess. The fact that the water is old and can be dated as old does not mean that recharges are not going on now. In fact, what we base the analysis on is the fact that we can construct, from our observations and wells, a flow field of water from the intake areas into South Australia—a steady flow of water—whose flow can be estimated by hydraulic measurements and used as the basis for estimating availability or yield into South Australia.

Senator MARGETTS—I guess we can only hope that it is an accurate model.

Mr Harris—I think you have to approach these things conservatively—we

certainly are—and evaluate and monitor with time and make adjustments, if we have to make any adjustments, as they become clear.

Senator MARGETTS—In relation to water, there have been some scientific critiques of your models, have there not?

Mr Harris—Yes. The models are developed as a cooperative venture between the states. There is cooperation between the states in which the basin occurs and the Commonwealth through the Australian Geological Survey Organisation. At the moment the model is being redeveloped again. It is an event you do every so often. The states are sharing in that by supplying the information. That will form another benchmark for us to reassess and refine our estimates of ground water availability.

CHAIR—We heard again earlier this evening and also in other evidence that in relation to the economics of uranium mining, those who postulate that the economics of it are good and beneficial for the community do not take into account the total costs of uranium mining; they just take a narrow view of the costs and benefits rather than a broader view of the total cost to the community. What is your response to that allegation?

Mr Welsh—The benefits that are derived from mining in South Australia at Olympic Dam are pretty well known. The costs in so far as they can be quantified are also pretty well known. The margin between the costs and the benefits is quite huge. I would have great difficulty accepting that there was any question over the costs and benefits. I can rattle off the general benefits if you wish, but the information is readily available.

CHAIR—No, that is fine.

Senator MARGETTS—So the information is readily available from the companies?

Mr Welsh—Yes, the major benefits that arise from Olympic Dam are available either through the company or from ourselves. I can run through the main features of it here.

Senator MARGETTS—I think we have heard them. Is it compulsory that all designated radiation workers wear a TLD badge?

Dr Crouch—No, it is not.

Senator MARGETTS—Can you give an explanation?

Dr Crouch—TLD badges only measure one part of radiation field—that is, the gamma rays. There are designated employees—people who get a significant radiation dose from pathways other than gamma rays.

Senator MARGETTS—So if I were to be more specific, is it compulsory that all designated radiation workers who are designated for their exposure to gamma radiation are required by law to wear a TLD badge?

Dr Crouch—I am not sure if I understood your question correctly. People are designated if their total radiation dose is significant. For some of those, although their total dose is significant, the amount they get from gammas is very small. For those people there is really no point in wearing TLD badges.

Senator MARGETTS—So which kind of workers might they be?

Dr Crouch—Smelter workers. From memory, only a few per cent of their dose is from gammas.

Senator MARGETTS—How about underground mining workers?

Dr Crouch—They would wear TLD badges.

Senator MARGETTS—Is it compulsory?

Dr Crouch—It is part of the radiation protection monitoring program, yes.

Senator MARGETTS—Are there any breaches of this requirement in South Australia?

Dr Crouch—We are not aware of any significant breaches. Some people lose their badges or something of that nature, but the policy is that people wear the badges.

Senator MARGETTS—So you do not know any uranium mines, for instance, in South Australia for which the wearing of a TLD badge is optional?

Dr Crouch—Underground, you mean?

Senator MARGETTS—Yes, that kind of limits it in South Australia.

Dr Crouch—You mean wearing them underground?

Senator MARGETTS—Yes.

Dr Crouch—No.

Senator MARGETTS—So it is your understanding that at Roxby Downs the wearing of a TLD badge is compulsory for underground mine workers?

Dr Crouch—Yes.

Senator MARGETTS—If you were to find that a mine was acting in breach of this requirement, what fines or punishment would exist if, for instance, Western Mining Corporation were in breach of that requirement?

Mrs Fitch—Under the Radiation Protection and Control Act, which is administered by the South Australian Health Commission, there is a licence to mine and mill radioactive ores. One of the conditions of that licence held by the Olympic Dam Corporation is compliance with the specified radiation monitoring program. If there is non-compliance, the act lays down penalties which can be enforced.

Senator MARGETTS—Are they enforced?

Mrs Fitch—We have not become aware of any breach of this particular requirement, or of any other for that matter. So no penalties have been enforced so far, but the provision is there in the act.

Senator MARGETTS—Who exactly is responsible for monitoring compliance?

Mrs Fitch—The South Australian Health Commission audits the results of the company's monitoring. That is not to say that we always have authorised officers at the site, but we do monitor and audit the results of the company's monitoring program.

Senator MARGETTS—What is your opinion of Australian Radiation Laboratories in their role of assessing radiation doses?

Mrs Fitch—Do you mean specifically in relation to mining?

Senator MARGETTS—Yes, uranium mining.

Mrs Fitch—I am not aware that they have any statutory role in monitoring radiation doses for uranium miners.

Senator MARGETTS—Sorry, I did not think I used the word 'monitoring'; I meant perhaps reporting on or measuring.

Mrs Fitch—They provide a personal monitoring service for gamma radiation monitoring which is used in South Australia and in many parts of Australia. They provide TLD badges and they measure the radiation received by the badges. I believe that they are competent to do that.

Senator MARGETTS—Do you have any comment on the disagreement that exists between Western Mining Corporation and Australian Radiation Laboratories in relation to

how radiation dosage should be measured?

Mrs Fitch—I am not aware that any disagreement exists in the way that gamma radiation is monitored and measured. Are you referring to gamma radiation or some other—

Senator MARGETTS—Perhaps you could let us know whatever disagreements exist between Western Mining Corporation and Australian Radiation Laboratories in relation to ways radiation is measured.

Mrs Fitch—I am not aware of any disagreement, except perhaps that there may be a difference of opinion in the conversion factors that are used for radon daughter or radon progeny monitoring to convert those values into a radiation dose. Perhaps Dr Crouch might say something more about that.

Dr Crouch—I think there is some scientific discussion between Australian Radiation Laboratories, Western Mining and ourselves as to which is the appropriate factor to use.

Senator MARGETTS—As the overseeing body for uranium mining in South Australia, has this affected the working relationship between Australian Radiation Laboratories and Western Mining?

Mrs Fitch—We do not have any knowledge of the working relationship between Australian Radiation Laboratories and Western Mining in this respect.

Senator MARGETTS—In relation to whether or not Western Mining allows it to be optional for workers to wear TLD badges or otherwise?

Mrs Fitch—I think we may be mixing up—

Senator MARGETTS—I know you are talking about a different sort of radiation. If there is a disagreement between Australian Radiation Laboratories and Western Mining, I am just wondering whether or not this might be behind Western Mining's not making it compulsory for designated workers to wear TLD badges.

Dr Crouch—I do not know whether it is appropriate for us to speculate on that, is it?

Senator MARGETTS—I did ask you about compulsory wearing of badges and you said it was compulsory. You were not aware that there were any areas of designated workers.

Mrs Fitch—I think it is important that we make this clear. As far as the TLD

badges which measure gamma radiation are concerned, the monitoring program, initially at Olympic Dam, which was approved by the South Australian Health Commission, involved every designated worker wearing a TLD badge. That went on for some years.

A couple of years ago—I would have to check on the exact date—that program was re-evaluated and it was realised that there were a number of workers who were consistently getting very low gamma radiation doses. These were not the underground miners; they were some of the workers in the metallurgical plant on the surface.

So Western Mining applied to the regulatory authority, which in this case is the South Australian Health Commission, for approval to discontinue the personal monitoring on some of those workers with very low doses and to estimate their doses by means of others in the work group who were wearing badges where there was a great deal of consistency among a particular work group. That was approved by the South Australian Health Commission. At that point some of the workers ceased to wear individual badges. However, they still have their gamma doses estimated by means of the dose for the work group that they are in. These are only people whose gamma radiation dose is below one millisievert per annum. If any of those workers requests a badge, they are given one.

Senator MARGETTS—Does the dosage of radiation from radon and radon daughters differ depending on the time of the day and the temperature?

Dr Crouch—No, not to my knowledge. Do you mean that if someone is exposed to a particular level of radon they will have a different dose to their lung depending on whether it is day or night? Is that the question?

Senator MARGETTS—In the underground mines at Roxby Downs have you had at various times hourly readings of radon? Is that how you get the radon readings? Have you ever had readings from the mine which show or could prove to you that there is no difference as to what the radon readings are depending on the day or the temperature?

Dr Crouch—Yes, measurements of that kind have been made. They do not depend on temperature or that sort of thing; it is just the ventilation conditions and the operations in that particular area.

Senator MARGETTS—But the ventilation conditions can vary considerably during the work of a mine, can they not?

Dr Crouch—Not really. It is not an old-fashioned mine where ventilation has a chimney effect, where the natural currents of air are ventilated; it is very heavy-duty fans forcing air through the mine. It really has no effect as to whether it is day or night—it is the same volume of air going through.

Senator MARGETTS—I have read a recent report where I was really surprised to

read that in a particular location—it was not in a mine—on a regular basis the radon measurements varied considerably depending on the hour of the day or night.

Dr Crouch—Are you talking about in the mine or on the surface?

Senator MARGETTS—No, it actually was not in a mine but in an underground house cavity.

Dr Crouch—I quite believe that. That is an entirely different circumstance.

Senator MARGETTS—With an underground house cavity, what would be the difference?

Dr Crouch—The sorts of things that happen in houses are that—

Senator MARGETTS—No, not in houses but underneath—in a cave situation underneath the house.

Dr Crouch—Certainly there is going to be some natural ventilation which is partly driven by temperature differences. So, if the cellar is warmer than the surrounding air, which you might get at night—

Senator MARGETTS—Would you not consider it a significant difference if it was something like 1,000 becquerels difference—depending on whether it was day or night—per cubic metre?

Dr Crouch—I would have to know the circumstances, but I would say again that a cave, a cellar or something like that is dependent on natural ventilation, and that can depend very markedly on meteorological conditions and those sorts of things. We are talking about fans which are megawatts—very, very powerful—and they completely dominate any sort of meteorological effects.

Senator MARGETTS—Would the South Australian government accept something like the Office of the Supervising Scientist monitoring Olympic Dam in the same way that it does Ranger?

Mr Welsh—At this stage, I would suggest that the South Australian government would want to be convinced that there are advantages associated with it. To date, we in fact have not been convinced that there are any advantages.

Senator MARGETTS—Would this breach the terms of the indenture agreement that covers Olympic Dam?

Mr Welsh—If the Office of the Supervising Scientist became involved?

Senator MARGETTS—Yes.

Mr Welsh—I do not believe so.

Senator MARGETTS—You mentioned that there was a change in the agreement in relation to the monitoring of workers at Roxby because the company put up an argument that they no longer needed to monitor because the levels were so low. Were there not also other changes to the original environmental impact assessment in relation to how the dam would be constructed? Which department or body was it that made the decision to allow that change in the construction of the tailings dam?

Mr Welsh—I will answer the question in general terms. It must be realised that the EIS is an EIS on what is essentially a conceptual project. In implementing the project there are engineering modifications that are required. All the relevant state agencies are involved in the process of assessing those. In a nutshell, any departures from the conceptual approach outlined in the EIS is approved by the state government in general.

Senator MARGETTS—In the sense of those changes to the construction plan and the fact that it was considered not necessary to put that extra expense into the tailings dam construction, would it be fair to say that as a government you were wrong in allowing that change?

Mr Welsh—No, not at all.

Senator MARGETTS—Even though the dam clearly leaked large amounts of material, you were not wrong in allowing that change in the construction plan?

Mr Welsh—No, there is quite a body of information now available on the loss of liquids from the Olympic Dam tailings retention system. To a degree, the problems arose as a result of operating difficulties and, to a degree, the water mound that you refer to is contributed by benign mine ground water, so there is nothing fundamentally wrong with the change in the approved design.

Senator MARGETTS—Sorry, I did not mention a water mound just then.

Mr Welsh—You did mention a water leakage and that water leakage appears as a water mound within the subsurface below the tailings retention system. The tailings retention system, though, is made up of several components and I stress that the contribution to that ground water mound was from a number of sources, and to make the quantum leap that this all results from the acceptance by the state of a bad design is an oversimplification. There is quite a body of information available in the ERD report relating to the tailings system.

Senator MARGETTS—So you were absolutely right at the time in your decision,

even though now the company has accepted that it needs to make efforts to put linings in its liquor holding ponds and has changed its method of operation?

Mr Welsh—With the benefit of hindsight and with the benefit of developments in engineering, you can always make improvements. What you are referring to are reasonable responses to a set of evolving circumstances to which the mine, to its credit, responded very quickly.

Senator MARGETTS—Excuse me. Very quickly? There were years involved between the concern about the leak and the final construction of those lined ponds. How do you define ‘very quickly’?

Mr Welsh—Approximately three years elapsed after the first recognition of the water rises in the ground water table. Roughly three years elapsed.

Senator MARGETTS—Recognition by whom; the company?

Mr Welsh—Both the company and the state government collaborate very closely on the management of Olympic Dam. The rises were discussed very early in the piece at the quarterly meetings. The rises were difficult to interpret in the first instance because of the coincidence of unusual rainfall events and it took a reasonable period to unravel what was actually taking place, with any confidence. The fact that the water contained in the mound was of the same composition as, or indistinguishable, from the ground water certainly did not suggest that there was particular urgency, nor did it give any clue as to what part of the tailings retention system was contributing most of that water. I reiterate that, under the circumstances and given the complexity of the system you are dealing with, the responses were quite timely and quite reasonable.

Senator MARGETTS—How radioactive is the leakage of the tailings dams or retention bowls?

Mr Welsh—The water in the ground water mound is indistinguishable from the natural ground water.

Senator MARGETTS—But some of that natural ground water around that mine has fairly high levels of radioactivity, has it not?

Mr Welsh—I cannot comment on the actual quality of the ground water, but Brian may be able to.

Mr Harris—I believe there are low levels of radiation, but just low background levels.

Senator MARGETTS—Perhaps you could provide on notice the levels of

radioactivity from the leakage, either from the tailings dams or retention ponds?

Mr Welsh—Yes, we will happily do that.

Senator MARGETTS—What would you consider to be the active life of Olympic Dam?

Mr Welsh—The active life is widely accepted as being in excess of 100 years.

Senator MARGETTS—Considering the changes that have occurred in what is considered to be acceptable levels of radiation over time, what do you believe will happen to the acceptable level of radiation exposures for workers during that period?

Mrs Fitch—Nobody knows what will happen in the future to radiation protection standards, but I might just give my own opinion. While our knowledge will obviously increase in the future, we already have a reasonably good knowledge of radiation effects. A lot of our knowledge depends on the study of the atomic bomb survivors in Japan. Until those who were exposed in that population have all died, we will not have the final information from that population. However, I believe we are now getting close to a very good estimate from that population, so I do not anticipate that there will be such very large changes in the future.

Senator MARGETTS—Is it not the case that in the United States new figures and new data is coming in in relation to what were considered to be low levels of risk for long-term exposure to what were considered to be low level radiation sources?

Mrs Fitch—There is new data coming all the time.

Senator MARGETTS—I am trying to establish that the Hiroshima-Nagasaki event is not the be-all and end-all of the data that you are using to build models?

Mrs Fitch—No, that is right, but it does form a big part of our knowledge base at the moment.

Senator MARGETTS—Are you aware of the papers I am referring to which talk about new data in the United States which relates to exposure to what is considered to be low level radiation?

Mrs Fitch—I am not sure which papers you are referring to, but certainly there have been some recent studies of people occupationally exposed to radiation.

Senator MARGETTS—I have heard it from the Medical Association for the Prevention of War. I might have to go back and find out which particular papers, but there were some specific authors, whose names escape me at the moment, who have written

extensively on new information about long-term exposure to what were considered to be safe levels of radiation.

Mr Welsh—I think it would be useful for us to have some more details because we may have an opinion to pass on the substance of those papers.

Senator MARGETTS—I think that at just about every point in history, scientists believe that they know the limits of the areas that they are looking at.

Mrs Fitch—They never know everything.

Mr Welsh—Could I comment on the reduction in dose limits over the last 30 or 40 years. I think the thing that is driving this discussion is the 50-millisievert limit which was set back in the 1950s or 1960s. I think that that was not much more than an inspired guess because, at that stage, there was very little data from the Hiroshima and Nagasaki victims. So it is not at all surprising that now, when people have had an opportunity to follow them for 30 or 40 years after their exposure, the results are different.

Senator MARGETTS—I would agree that there has been a lot of inspired guessing and some uninspired guessing, too. From what we hear, there have been very limited in-depth epidemiological studies and certainly not much in Australia.

Dr Crouch—That is not so.

Senator MARGETTS—No?

Dr Crouch—No, there has been a vast amount of work done on epidemiology of radiation exposures.

Senator MARGETTS—Yes, but can we extrapolate those studies directly to Australia, or do we have to look at Australian studies as well?

Dr Crouch—Yes. Why not?

Senator MARGETTS—Thank you.

CHAIR—Thank you for your appearance before the committee this evening. If there are any further matters we want to follow up, we will do so in writing and seek a response in writing.

[10.19 p.m.]

SCHNELBOGL, Mr Hans-Peter, PO Box 1223, Lismore, New South Wales 2480

CHAIR—Welcome. In what capacity are you appearing before the committee?

Mr Schnelbogl—As a private citizen.

CHAIR—The committee has before it submission No. 69. Is it the wish of the committee that the document be incorporated in the transcript of evidence? There being no objection, it is so ordered.

The document read as follows—

CHAIR—I invite you to make an opening statement. I ask that you keep it to about three to five minutes so that we can have maximum time for questions.

Mr Schnelbogl—I mainly want to refer to the principal points on the radiation issue. The tailings dams regulations in Australia require that a tailings dam has a structural life expectancy of 1,000 years and a functional life expectancy of 200 years. Internationally, this life expectancy extends up to 10,000 years—I am not aware of any country that has more than 10,000 years—with similar limitations on the functional life expectancy. In other words, it cannot be expected that a tailings dam will last any longer than perhaps 1,000 years in terms of functional performance.

We can compare that with the radioactivity which is left after 1,000 years. There are scientific figures on that and these scientific figures say that 99 per cent of the original radiation of the tailings is left. If that tailings dam performs for 10,000 years, which is just about impossible because one of the supposedly best performing tailings dams collapsed after a few years, then the remaining radioactivity would be 91.4 per cent. So we have very exact figures on how much radioactivity is left after how many years and we have a good idea of how long a tailings dam cannot last. After 100,000 years we have 40 per cent of the radioactivity left. After 250,000 years we have 10.5 per cent of the radioactivity left.

I would like to look at the danger of radioactivity from tailings. The main danger from uranium ore is the alpha radiation. The alpha radiation has no effect if the particle is not very fine—less than 100 micrometres. During milling the particles have an average size of below that and 80 per cent of the radioactivity is actually in particles sized less than 38 micrometres. This size of particle can easily become airborne. The limit for easily becoming airborne is 100 micrometres. That means the dust in the tailings dam—and it is really only dust apart from a small component of more coarser sections which are like fine sand but which do not have a major contribution to the radioactivity—can easily erode when the tailings dam collapses.

I wrote a submission to the South Australian hearing into Roxby Downs for the conservation council. Can I table that document?

CHAIR—Thank you.

Mr Schnelbogl—This graph basically shows the death toll during the mine's operation. That is a figure which I did not calculate that I just put in because I wanted to put something in. It could be lower; it could be higher. It depends very much on the mine's operation. Naturally, that death toll does not apply during the mine's operation; it applies 30 years later when the lung cancer has had its effect.

After that comes the period of up to a thousand years when the tailings dam performs its job. It is covered with soil and rocks. After that period we have the real rise in

the death toll for about 400,000 years. Even after 600,000 years, we are still above the dose limits for certain exposure situations.

The calculated death toll, which is based on studies by the American Environmental Protection Agency, is 3.4 million people with a spread of 568,000 to 28 million people, depending on the population density and so on. For these people, there is no protection at all. Theoretically, we would have to re-arrange the tailings every thousand years into a new structure, guard it and provide the information for the future generations. These future generations do not have any input in the decision making, any benefit from the profit and will have a death toll which is unprecedented.

We have similar situations with, let us say, a nuclear holocaust, but then we are participating in that death toll with our generation—ourselves—as well, with future generations via genetic damage. What we are doing in this case is very cynical. The previous group was asked about the cost benefit. They said that obviously the benefit is much higher than the cost. We are giving no consideration to those people who live after a thousand years from now. That is the main point of my address.

CHAIR—Thank you for your introduction. Accepting obviously the half-life and so on of the tailings, your analysis seems to ignore—in fact, if you look at part 6, ‘The lost knowledge’—the fact that technology is improving all the time and that that would have, I would have thought, two impacts: firstly, given improved technology, it is less likely that we will lose the knowledge because there would be more capacity to retain the knowledge; secondly, there is every likelihood of better means of dealing with the waste as technology develops over that 100,000-500,000 years, if that time frame is required.

Mr Schnelbogl—This raises basically two problems. One problem is the expanse of time. The other problem is the expanse of volume. The volume of the Roxby Downs tailings eventually amounts to 100 million cubic metres. That is equivalent to a 40-millimetre cover for the ACT with 2,400 square kilometres. That is equivalent to nearly two millimetres cover for Tasmania, the whole of Tasmania. There is no technology available, and it cannot be envisaged for the future, which can digest that sort of waste into a Synroc technology or something like that.

Taking these two effects together—the volume and the time span—it is impossible to envisage a technology. Radiation is not like chemical waste. Firstly, with chemical waste, a chemical toxic substance has normally a fairly aggressive nature. It wants to recombine. So it will probably recombine anyway. We can induce that recombining at an earlier stage if we have the knowledge and the money for that. With radioactivity, the only thing that will decrease it, completely regardless of the chemical composition of the material, is time; and we know the facts with time.

CHAIR—I note that a large part of your submission deals with Roxby Downs and Olympic Dam. That is an existing mine. It is an operating mine and it is certainly not a

mine that is going to be closed down.

Mr Schnelbogl—From my point of view, as a person who tries to be responsible with my life, I think it has to be closed down definitely and the costs of cleaning up the mess would be horrific. In this submission, I went into some details how to store radioactive waste safely. I think it is in paragraph 13. The only reasonable and safe way to store all of the existing waste, not newly created waste—there is never justification for that sort of test hole to be created in the future—is either in an old mine shaft or in a purpose built mine shaft for that specific situation. These mine shafts would have to have a certain location, which is reasonably out of the reach of aquifers or at least out of reach of major aquifers. I have also partly listed a lot more conditions which have to be researched more. That is the only way to deal with that sensibly.

There have been many efforts to deal with uranium tailings in Europe and in the US. It is very costly. In Germany, there has been more money expended per pound of yellowcake produced on reclamation of tailings than the yellowcake is worth on the world market. That is for 1995. I do not know the current prices. So that reclamation has to be repeated every 1,000 years, as long as there is knowledge there and at the same moment these tailings have to be guarded. I made a calculation in here, and I think it is quite a reasonable calculation, and it comes out at \$70 billion for guarding tailings. I have been talking with a radiation officer from the OSS and he confirmed my gamma radiation calculations, as effectively measured values, and he confirmed my calculations on the maximum amount of tailings dust to be inhaled. It is out by about 30 per cent, which is completely irrelevant in that sort of scale that we are talking about, with these long-term scenarios.

Looking at the gamma radiation, after 91 hours somebody at Roxby Downs tailings would have his yearly dose. That would be in 1,000 years the same. In 10,000 years, it would 100 hours. How would you put signage up in the languages of the future—possibly in stainless steel—and provide information to those future generations? It is impossible.

CHAIR—Why is it impossible? Each generation can surely maintain those records and information.

Mr Schnelbogl—But we cannot maintain it. When we look in the past, we do not even understand what they did 2,000 years ago. We have to respect scientific programs. We have to work out what the Egyptians were meaning with this and that. We have no concept.

CHAIR—Yes, but the Egyptians did not have the technology that we have and that future generations will have.

Mr Schnelbogl—I think our technology is probably decaying faster than the Egyptian one because it is more sophisticated, more complicated, much more involved and

needs much more base knowledge. The seeds of the destruction of our society are obvious wherever you look. I do not think we have any right to expect that our knowledge will be passed on to future generations. So, basically, with uranium mining, we are providing a death trap of unprecedented extent for future generations.

Senator MARGETTS—There are published figures for levels of radiation that workers or communities have been estimated to receive. Have you any comments on the calculations that have been made by companies or by governments about safe levels of radiation and the cumulative levels of radiation from the various sources?

Mr Schnelbogl—Naturally, it is impossible for me to repeat measurements which are presented to us. But, from my calculation of the radon emanation from the tailings dam in Ranger, I cannot understand the measurements taken, except if the measurements were taken at a moment when the wind was blowing the other way and, naturally, all the emanation moves away. I also cannot understand certain claims about the radiation uptake of mussels in Magela Creek or in certain billabongs in that area. There are certain studies which give, I think, up to 100 or 150 times more radiation measurements than those official ones from OSS. I hear there is a whole filing cabinet in Darwin or Jabiru full of data on mussel measurements which is not being released. So it is very unclear what is happening.

Senator MARGETTS—We have had micro-organisms mentioned to us from the OSS, but why are mussels in particular important in the measurement of radiation?

Mr Schnelbogl—From the information that I have so far, mussels seem to be a being that accumulates most of the radium-226. I think it is up to 20 times more. It could be a very good indicator. It is also a food source for the Aboriginal people. There have been agreements reached that say that intakes can be four kilograms per year. Going by that one study that I referred to, which was done when the dose limit for the public was still five millisievert, it was claimed that the intake is about 11 times below the limit. But now the dose limit is one millisievert, so the intake from four kilos of mussels is already, I think, about 40 per cent of the yearly dose limit.

So a person who lives in the area, breathes in radon, ingests water and other food sources, perhaps 400 kilo, and later on will also be inhaling the dust. This mussel problem at the moment is appearing when the whole radiation effect is totally controlled. The tailings are dry and contained at 20 metres high. The detrimental effect of the tailings is proportional to the surface area.

There is an OECD study which refuses to look into the future—it is called a long-term study, but it refuses to look into the future beyond 10,000 years. It has only one case where it assumes a breakdown of the tailing structure. I think, but I am not sure, it is after 6,000 years. The OECD study, dated September 1994, is titled *Long-term radiological aspects of management of wastes from uranium mining and milling*.

This study acknowledges that, when a tailings dam made of stone starts eroding at 0.5 millimetres in the first stage and later on at about 0.2 to 0.1 millimetres, it accumulates to 4,000 to 20,000 cubic metres per year. So in the earlier stage it is about 20,000. That explains why that graph is rising so steeply. In the early stages a lot of material will be airborne. Each cubic metre has 1.9 million grams of tailings. By coincidence, 1.9 grams is exactly the limit of what somebody is allowed to inhale. We have between 4,000 and 20,000 cubic metres, with a million doses in each one contained per year and that extends for 200,000 to 250,000 years. That gives some sort of impression of what is involved.

I have one more point to add about the effect of the public dose. The radon levels depend very much on the day and night situation at Roxby Downs, for example. Eighty-five per cent of the nights in Roxby Downs is inversion, with an inversion level of 100 to 400 metres. I used that in my calculations of exposure of the people in the vicinity. Those people who live in the vicinity of Roxby Downs would have at night time, when they are not even aware of any problems, a much higher exposure level than during the day when it is possibly being measured.

Radon exposure increases with the surface. Once a tailings dam breaks down, a huge area will be contaminated and much more radon will escape. Its half-life is 3.8 days. It can travel at 15 kilometres per hour easily to Sydney and at 10 kilometres per hour probably to Melbourne or something like that. Clouds of radon can go anywhere, just like the radioactive cloud after Chernobyl went around Europe, right down to Spain, up to Sweden and so on.

Senator MARGETTS—It has been suggested to us that the measurements of contamination in the water system at Ranger, for instance, are not significant because you can compare the upstream and downstream measurements. Therefore, the level of comparison you can make of upstream and downstream is some sort of proof that no contamination is going into the river system. Have you got any comments on that?

Mr Schnellbogl—At the moment there is only one sort of leakage from the tailings dam, and that is aqueous through the water going down into the ground. In the long term it will be completely different because the main leakage will be airborne dust. But at the moment it is via leakages into the ground. The tailings liquid enters the aquifer; the aquifers are all under pressure from the soil on top. A spring which is fed at 10-metre ground level can come out of a mountain at a ground level of a few hundred metres. So the input level of an aquifer might be considerably lower than the output level of an aquifer. That depends on the geological stratification of the ground. It is possible that these measurements taken above the mine could be explained by the aquifer supplying the pollutants above, but I do not know that.

Senator MARGETTS—Have you had any access to information about possible overall methods of measuring radiation at the proposed Jabiluka mine?

Mr Schnelbogl—Do you mean workers' exposure?

Senator MARGETTS—Workers is one, but there seems to be a bit of a trade-off between workers and community in relation to the Jabiluka proposal at the moment.

Mr Schnelbogl—These TLD badges are very symbolic. As one of the radiation officers mentioned before, they do not measure the alpha radiation and the alpha radiation is the dangerous radiation. So, depending on the situation of the person who is exposed, it shows hardly anything and he might be above the dose limit. It is very different from if somebody is mainly exposed to dust. Those people who do the drilling would get a very high dust exposure, depending upon their protective gear and so on. I do not know whether that was your question.

Senator MARGETTS—That is okay. In relation to this, we were given to understand that Nabarlek was an example, like a showcase, of what can be done in terms of rehabilitation of uranium mines. Have you got any knowledge or critique of Nabarlek as a rehabilitation success?

Mr Schnelbogl—I did not study Nabarlek much but I know that the ore grade is one of the highest ever. It is one per cent. An average ore grade is 0.1 per cent. This is the uranium content of the uranium ore. That uranium content of the uranium ore directly determines the radiation content of the tailings. So because the ore grade is about 10 times above average at Nabarlek, and five times above average at Jabiluka, the effects from that will in the long term be very detrimental.

This two metres cover on the tailings dam is already breached by cracks now. There will be more cracks because of the chemical nature of the tailings. A truck attracts the water and then the clay cracks and then animals get in and bring contamination out. So there are many pathways. Naturally the main pathway, as long as the tailings dam is in good condition, will still be leakage of the tailings dam. But once the tailings dam is broken down, we have a very high radioactive deposit spreading around the area costing many, many lives.

That is obvious and can be calculated, but there are certain things that cannot be easily calculated, like how many people will die of inhalation in the long term. That is very difficult but certain things are very easy to calculate, like gamma radiation. You go and measure it and then you calculate what it will be. You know what depths of the tailings deposit will contribute to that, because the lower stratas will be shielded off by the upper stratas, so really only the top strata counts for that. So, again, the spreading out of the tailings will have a multiplying effect.

Senator MARGETTS—If I can return to the concern by some Aboriginal communities surrounding the Ranger mine and the proposed Nabarlek mine in relation to pathways, it has been often said by some people that they are responding to emotional

concerns that have no basis in scientific fact. Would you like to comment on whether the concerns of Aboriginal people are just based on emotion and that there is no scientific basis to their concern?

Mr Schnelbogl—Aboriginal people are very different from us in that they think in the long term and care for the earth, the land, the animals and the environment. In their philosophy, the current situation—I do not know what it is in the various groups—would be severely influenced by our situation which is imposed on them. From that long-term prospective the Aborigines must be very concerned because in the long term Roxby Downs is the biggest crime we have ever had.

Senator MARGETTS—Although that is a model on Roxby, you are suggesting that there could be similar models for large amounts of radioactive waste in other mines throughout the Northern Territory or perhaps Western Australia?

Mr Schnelbogl—Yes, I have made a comparison here on the last page. It was done very fast so it might not be very correct and I might want to correct it afterwards. The comparison is between Roxby Downs, Olympic Dam, Ranger and Jabiluka. Depending on the options they want to use at Ranger and Jabiluka, the effect on future life is very similar. If the Ranger dam, which is designed and approved as a temporary storage facility, is going to be re-declared a permanent storage facility, I come up with perhaps 2.5 million humans to die from it. That is the most likely estimate. As I said before, the total estimate has a spread of one to 50 because of so many insecurity factors. So it could easily be eight times higher.

The effect of the tailings on future beings depends very much on how they are stored. If they are stored in an old mine shaft and it is a very well selected location, then the effect might be reduced to 95 per cent of that estimate. But then what is 95 cent of 3½ million people? That is 70,000 people. And we do this for our short-term interest; for our convenience; for our lifestyle; and because we do not want to be concerned about developing other energy sources which are at hand. We know about them. We know that they are viable. We would just need to put some money in and get some government support. Instead, we put the government support into various inquiries into uranium mining.

CHAIR—What population of Australia are you basing the 3½ million deaths on?

Mr Schnelbogl—That 3½ million is based on double the population we have now. For the lower estimate—there are a lot of factors which I have considered on page 23—the population will be exactly the same as it is now.

CHAIR—How do you get that population estimate over a period of half a million years?

Mr Schnelbogl—No, as I said, you can only estimate for various scenarios. I have here one sentence which says that I believe that the population density will eventually adapt to the agricultural capacity of a country and Australia is a vast net exporter of agricultural products. From that point of view it is a very attractive location for Asian countries or for any country which has a problem accommodating its people for environmental or whatever reasons. If there is a major catastrophe, let us say some nuclear power station blows up in Russia—a much worse situation than Chernobyl—then a lot of people might want to come to Australia. Maybe the United Nations says, ‘Yes, that should be the best location.’ We do not know what happens in 10 years.

CHAIR—It is not up to the United Nations to say—

Mr Schnelbogl—Not so far.

Senator MARGETTS—With all due respect, I do not think that is actually relevant to the calculation—

CHAIR—I was just asking what the basis of it was, that is all.

Senator MARGETTS—Trying to make fun of somebody’s calculations based on that—

CHAIR—I was not. I was asking what the population projection was. Are there any further questions?

Senator MARGETTS—Yes, there are. We were given, I thought, a reasonable time to see this witness and we did—

CHAIR—We were given 50 minutes, which is longer than the South Australian government had.

Senator MARGETTS—We have not yet had that 50 minutes.

CHAIR—Yes, we have. We have just had 50 minutes.

Senator MARGETTS—I think it would be reasonable if I could ask the questions without people talking loudly behind me and without people being rude to the witness by not listening to what is being given in evidence. Perhaps if I could ask a couple more questions.

CHAIR—We want to know how long you are going to be.

Senator MARGETTS—Excuse me?

CHAIR—How long are we going to go for?

Senator BISHOP—This nonsense we are hearing now.

Senator MARGETTS—My nonsense or the witness's nonsense?

CHAIR—Both of you.

Senator MARGETTS—I can see the means by which some members of the committee are receiving evidence, but I would like the opportunity of asking perhaps two more questions.

CHAIR—Two more questions, okay.

Senator MARGETTS—Thank you so much. What is the basis of your interest and knowledge? What sort of qualifications do you have. In a nutshell, do you have any qualifications that relate to the mining industry and specifically to the uranium mining industry—here or overseas?

Mr Schnellbogl—No. I have a master's degree in electronics and in Germany a master's degree passes on very general knowledge. For example, for four semesters I studied one hour every day in mathematics. So it is not a specific knowledge. I acquired that over the last eight months mainly, but it was a general ability to analyse scientific aspects which was gained during that study.

Senator MARGETTS—In relation to your particular interest, what has led you—you have obviously done a lot of work in this area—to believe it is important enough for you to put in this effort to give evidence to this committee?

Mr Schnellbogl—I had some indication—but to a much lesser extent than it turned out to be—of what that mining means for future generations. I felt that we cannot just close our eyes to that, and as I continued getting more information and making more calculations, the extent became more and more visible. I think it is our responsibility to consider the people of the future even more than ourselves because they cannot participate in what we are doing.

Senator MARGETTS—In relation to those calculations, it has often been said that if there are, for instance, granite outcrops or other natural phenomena which are radioactive, then we should compare that to what is produced from uranium mines and so on, because uranium is in the ground and we should assume that, if it is in the ground, it has similar radiation. What makes you so concerned about the radiation from uranium compared to, for instance, the natural radiation emanating from granite outcrops or from the uranium if it happened to be a source in the ground that had not been mined?

Mr Schnelbogl—The uranium is being mined and that makes a huge difference because to be bio-effective it has to be very small in particle size, and that happens in nature to a very small extent, as can be measured in terms of weathering of rock formations which come up to the surface. They make a very small contribution, whereas what we are doing now makes a huge contribution and we can measure it and determine what the contribution will be over hundreds of thousands of years to the natural environment of radioactive alpha-radiating material.

If you meant in terms of comparing it with other industries, I think if we take all the toxic chemical waste accumulated in Sydney and Melbourne—the two industrial centres of Australia together—I do not think we would get as much hazardous material as we will eventually get from the current two major uranium mines, Ranger and Roxby Downs. So we are creating a problem of unbelievable proportions for a minute profit. There is hardly any revenue but a quantity of waste which is unbelievable and a time scale which is unbelievable.

CHAIR—One further question. What is your current occupation? You told us your qualifications; what is your current occupation?

Mr Schnelbogl—I have a business with solar energy, but obviously over the last six months, I dropped it fairly well.

CHAIR—What was the nature of the solar energy business?

Mr Schnelbogl—Retailing solar energy products and working on an electric drive systems with the potential of extending it to solar energy for small scale transport.

CHAIR—Thank you for appearing before the committee this evening and for answering the questions of the members. If there are any further issues we want to raise with you, we will do so in writing and seek a written response from you. Thank you very much.

Committee adjourned at 11.00 p.m.