

## TRANSCRIPT OF SESSION

D Tredinnick: I'm just here to pass on a couple of messages. One, I'm not sure if we've got any members of the media here. That's okay. That's a good thing. Ultimately what we'd like you do is if you can tape, video record, the opening statements but then essentially you're most welcome to actually stay for the rest of the sessions but please refrain from taping or recording those. Also we'll be recording the audio of the event so that we don't miss anything, just so that folk know that we'll be having Q&A sessions and the audio from that will be recorded essentially so we don't miss anything. I think that's all I've got to say. I think there's a safety briefing as you've expect from a safety agency. I'll introduce Carl-Magnus Larsson.

CM Larsson: Well, thank you, David and good evening ladies and gentlemen and welcome to the Engadine Community Centre. So this information meeting is being held in the country of the Dharawal and I wish to acknowledge them as the traditional owners. I'd also like to pay my respect to their elders, past and present, and elders from other communities that might be present here in the room tonight. Also, thanks to the Sutherland Shire Council for supporting us in holding this community information session. Now, with regard to facilities and so on, please help yourself to coffee and tea in the back of the room, biscuits, and if you require amenities, bathrooms are located back out to your left through the door out there. The safety brief, in case there is an emergency or a fire or anything, please use that door over there in that corner. Turn around to the right, turn around to the right again and walk towards the little patch of green grass that is out there which is where we are supposed to meet, all of us, in case we have had to evacuate. And as Mr Tredinnick pointed out, we will be recording the proceedings today to ensure that we can review and follow up on any issue that has been raised during this meeting. I would like to introduce myself. My name is Carl-Magnus Larsson and I am the Chief Executive Officer of the Australian Radiation Protection and Nuclear Safety Agency, also known as ARPANSA, and I will be chairing this information session. Apart from officers from ARPANSA we also have members from the Australian Nuclear Science and Technology Organisation here or, as we know, more commonly known as ANSTO. And this particular information session will consider three licence applications. One is about an expanded radiopharmaceuticals production facility. Another is about interim waste store and the third one is a waste conditioning facility. The radiopharmaceuticals facility and the waste store are both nuclear facilities and under the relevant regulations I am obliged as the decision maker here to consult with people and bodies as part of the decision making process. So this information session is held in support of the consultation. Now, the consultation is open and you can provide submissions up to 12 June. How to do

that is indicated in this brochure and I hope that you have picked up one of those brochures; they are just outside the room on the table, just outside here. Please do so if you haven't done it. So on 12 June submissions on these two applications are welcome. We are also including a third application about the waste conditioning plant because it sort of sits on the back end, if you like, of the radiopharmaceuticals production facilities. So in order to understand the whole concept we find that we think that it's useful that we include also presentations on the waste conditioning facility in this information session. So I'd just like to point out that this is not the consultation. This is an information event that we are holding here in support of the consultation process but it also means that any statements that anyone would like to make here will form part of the consultation. As was indicated before and as I indicated myself we are going to record this meeting which means that anything that has been raised here will form part of the input to the decision making. Now, ANSTO is obviously the proponent for these facilities and ANSTO is therefore here to provide you the information about these three licence applications. ARPANSA, my organisation, is the regulator. We will also describe the process in reviewing this licence application. And at the end of this session you should have a program. The program looks like this and if you haven't picked that up that's as well outside here, just outside the room. I look forward to welcoming your questions and I would like to request you to hold your questions until we have finished the different presentations. And we will also have a couple of breaks during the evening because we are planning to run this session until nine o'clock and we have plenty of presentations and I think that we need two breaks and that's a good opportunity for you to help yourselves to come coffee or tea from the back of the room. Now, before we move forward I would just like to briefly let you know a little bit about ARPANSA. ARPANSA is part of the Department of Health and Aging Portfolio. It's a Commonwealth Agency charged with responsibility for protecting the health and safety of people and the environment from the harmful effects of radiation. We have offices not very far from here in Miranda and also in Melbourne, where we've got actually our main facilities with the laboratories and the other facilities, and also liaison office in Canberra. This means that we provide advice and services to the Australian community on radiation protection, nuclear safety, security, medical exposures to radiation including related research. We also promote national uniformity of radiation protection and nuclear safety policy and practices across the Australian Government and states and territories and obviously one of the reasons we are here today is that we also independently regulate radiation sources, radiation facilities and nuclear installations of Australian government entities and contractors. So if a Commonwealth like ANSTO wants to apply for such a licence they'd need to do that to lodge it with ARPANSA and

under *The Australian Radiation Protection and Nuclear Safety Act 1988* I will make a decision whether or not to grant such a licence and as I mentioned initially when we talk about nuclear facilities as two of them that we are going to discuss tonight there is an obligation to consult with people and bodies as an input to the decision making process and that is the consultation period that is open now and this information session is, as I said, in support of this consultation process. And I think, ladies and gentlemen, that that is what I need to say by means of intro and without any further ado I think that we go forward in the program and that means that I will now like to welcome Dr Adi Paterson, Chief Executive Officer of ANSTO, to provide some introductory remarks. Thank you and welcome again.

A Paterson:

Thank you, Dr Larsson. Good evening, everybody. My name is Adi Paterson. I am the CEO at ANSTO and we are the proponents in respect of the licences that are being sought tonight and we're very pleased to be here to participate in this process. It's very important to also understand that there is a tremendous amount of information about ANSTO that we won't be sharing here tonight because we'll be focused on the particular activities that are part of the licencing process but I invite you in the breaks to approach any ANSTO staff and seek any other information that might be valuable to you and they'll give you more information on other sources of information about ANSTO that may assist you in understanding ANSTO better and indeed the potential to visit ANSTO and to spend some time on our site is available to the public on an ongoing basis. Secondly, I think it would be important for me to say that in the regulatory environment we have a proper separation of powers. Dr Larsson has indicated his engagement through the Department of Health. We are part of the Department of Innovation which is a completely separate part of government and that's the correct way to do these things, so that we are the operators of facilities. We provide the services and the regulator is completely independent to those processes. And when meet together in meetings like this it's really an opportunity to hear what members of the community are saying and fully participating in this consultative process so that the information that is most supportive of your interests is communicated in how we do the work. If I could just indicate and with your permission, Chair, I'm going to introduce them main members of the ANSTO team who will be speaking tonight or who we may call on. In respect of the ANM, the nuclear medicine facility, if you'd stand up, this is [REDACTED]. He is our Group Executive who is responsible for our business activities. In respect of the waste synroc facility that is attached, in the sense of being at the backend of the nuclear medicine by product, we have [REDACTED] *Director of Technology, Synroc*. He has been with ANSTO for nearly a quarter of a century and has led our activities in developing the synroc technology over a very substantial part of that process. And

then in terms of the licence for an intermediate level waste store we have [REDACTED] who is our General Manager responsible for nuclear operations. And should there be any particular comments or questions that are relevant to aspects of nuclear safety in a technical sense I've asked our Chief Nuclear Officer, [REDACTED], to be here this evening. And these are the main members of the team who will support me in making the presentations that will assist us in understanding your issues and your concerns and assisting the regulator and formulating the consultation process. So it's an absolute pleasure to be here. It's a session that is really important from our point of view and is essential to the integrity of the process. And so thank you very much, Chair, for the opportunity to make these few remarks.

CM Larsson: I would like to introduce Mr Martin Dwyer who is Head of the Operation Services Branch which is the branch of ARPANSA where most of the licencing activities and activities related to compliance and enforcement and also national uniformity and regulatory approaches, the home of those activities. I could also take this opportunity to introduce Dr Geoff Williams, sitting over there, who is going to speak more on the waste management issues from ARPANSA's perspective that is going to be after the break. So Mr Dwyer is now going to make a presentation or outline ARPANSA's regulatory assessment and decision making process and a little bit of the community consultation process. After that we will have a session with questions and hopefully some answers and then take a short break and continue again on the molybdenum production facility and the synroc waste conditioning facility.

M Dwyer: Thank you, Carl-Magnus, and it's nice to be here. Look, I hope everyone has had a look at the program and if I can explain it what we wanted to do first was at a general level explain your opportunities to have some input into our review of these licence applications. So that's why I'm speaking first. Then I want you to hear about the actual specific licence applications and understand what they cover and what they don't cover and what's next in the process of the development of these facilities and how we will be looking at them. And we've decided to do the molybdenum application and synroc applications first and get them out of the way and questions and answers. Then because the interim waste store has been in the past of particular interest in the community and we think there is likely to be more interest, we'll have a presentation about the regulation and the way in which we do that in a bit more detail and that will be presented by Dr Geoff Williams who is here from ARPANSA. He actually works in our Melbourne office but it's good to have Geoff in Sydney and a great opportunity for him to meet with you and you to hear him. So that's really an explanation of the program. I'll flick to the next slide. Okay, so we've got three facilities here, as has been explained. Two are nuclear installations and that is the

interim waste store and the molybdenum manufacturing plants. Now, you'll notice for the interim waste store we have site licence application. And we've got a construction licence application. We've received both of those and we are in fact looking at them at the moment and consultation is part of the process. What isn't there is an operating licence. So once these facilities are licences as far as siting goes they can start spending their money doing design works and so on. Once they want to start construction, well, you actually have to get a construction licence, otherwise not a sod of dirt gets turned and until we approve construction licence nothing gets done. But even once it's built that doesn't automatically mean that ANSTO can operate the facilities because there's a whole lot of other aspects that need to be considered: the policies and procedures; the operating instructions, the safety arrangement, the calibration testing, environmental monitoring, you name it, the whole lot of considerations that need to be considered. So even with these applications that we currently are talking about and assessing we still have a further phase of operating licence. The ANSTO Nuclear Medicine Facility, at this stage we have received a site licence application only. So construction, I think, will be coming fair shortly. I think a fair bit of design work has been done but we, at this stage, have not received a construction licence application. For synroc, the waste conditioning plant, we have received both the site licence and the construction licence application. But let me stress at this stage no operating licences applications have been received. Now, this diagram is a little bit ... well, it's got lots of words on it and it's got lots of boxes. And you've got a copy of that and I actually do recommend that you have a good look at this particular brochure. We've put this brochure together to give you the best chance of understanding how we assess the licence application. Now, we are already past the preliminary phase. We've received the applications. We have checked them for completeness which actually did require a bit of tick tacking backwards and forwards between ourselves and ANSTO to make sure that we had all the documentation that we believed we needed to start making an assessment. So there will have been lots of questions about "can you give us some more information about the risk assessment you did" or so on and so forth, numerous questions. They were voluminous applications and you have access to that material and with a few more questions it's even more voluminous. But that's an important phase. Anyway, we're now into the review phase and Carl-Magnus has, as Chief Executive, made notice that he's received the applications and that he has invited submissions from the public and that's part of the public consultation process. This meeting tonight is an information session. It's really to prime the consultation. It's to give you a good chance of understanding where we're up to in our assessment and also to hear from the proponent about what these facilities really mean and for you to be able to ask the proponents what they



mean. I really do think you should take the opportunity to ask good questions and ultimately when you think you've worked out the question that needs to be answered put through to us and it will be considered. And we don't mind many iterations of questions; that's a good thing. But we do need to get through ultimately and make a decision, so I think June 12 was the close off date, so start talking. And then we get to the decision phase, so a determination has been made. We need to advise that we're going to make a decision. I think that's when things can hot up but we also have processes and the proponent quite legitimately can expect that a decision is made within certain timeframes. You probably are wondering how the hell do we make a decision and do we make up the rules or do a risk assessment from first principles basis every time. Well, we don't. Nuclear medicine manufacturing is not a new art. It is actually a well-developed process and the International Atomic Energy Agency has guidance for us. We have our own regulatory guides. I recommend that you go to our website to look for our regulatory guidance. These are quite good, detailed documents. You can find out a lot of the things that we look for and we didn't make up these ideas. We have worked with international regulators over many years to work out what to look for, what to ask for, what requirements to have, what standards to apply and so on. And the documents that we're referring to here include documents around general nuclear installations, not just nuclear medicine specific manufacturing. Another document refers to transport. We've got the radioactive waste store guidance document which has newly been rewritten and very pleased with that one because we actually sent that one out for international peer review. We have a very good-quality system for our processes and we're quite pleased and proud of it. And you can find it all on our website which actually takes me to the next slide and this is there in the brochure. Seek more information. There's a lot on the website and send us your questions and submissions, please. We'd rather get more questions than less and I think that gives us the confidence the community actually understood what was going on, asked the right questions, and you really can't have any hope of being satisfied with your concerns if you don't ask a question, so go for it. I'll probably leave it there and let's get on with the meeting. I'm very happy for some questions.

CM Larsson: Yeah, can I just say first that I mean to ask a technical question here because we were supposed to have microphones that can be ...and we are, so that helps.

M Dwyer: We can't record people who don't speak into a microphone; that's the reason.

CM Larsson: In the case you have a question please identify yourself. You don't have to ... so returning to you with answers and so on it of course helps if you identify yourself. But there is

no formal requirement for you to do so. So please, questions?

D Tredinnick:        You're allowed to ask them later too.

Question:            My name is [REDACTED]. I live at Loftus. Thinking about what you've said so far about this is a process where you begin the consultation. I'd like to know why ANSTO did not come to the community with the ideas that they are seeking for approval before this phase of the operation. I think they could have said to the community, "We are thinking of doing this. What do you think about it?"

CM Larsson:         I think what we should do is to let ANSTO answer the question of what engagement you have had with the community in this particular area. So who would like to take that? Dr Paterson?

A Paterson:         Thank you very much, Chair. What I'd like to do is two things, first of all to say a number of these processes have been in train for many, many years and indeed have been the subject of consultations, engagements, with the Sutherland Shire Council. We have a standard process by which we invite all new councillors to visit ANSTO. We brief councillors on the history of the site and all of the information about the forward planning of the site. We have regularly appeared at the request of Council at council meetings and there have been a number of briefings on these projects, in particularly the return of waste has been something that we feel very strongly about and so does the Council that the ANSTO site should be seen as research and development site and should not be in people's minds as a long term repository which it cannot become as we'll make clear in our presentation. And in many ways we have great alignment with the community and with the Shire Council that the bringing of waste back to ANSTO, for example, is something that is done on a temporary basis until the national waste repository is established. So I think it would be fair to say that ANSTO has been very transparent and has engaged and consulted on these matters. A lot of them have been on the public record on our internet site. They've been the subject of news reporting and in fact I think there's been many opportunities to consult. I'm happy, because that's not the main focus of the meeting, is how ANSTO engages with the community, to meet with you over the tea. [REDACTED] *General Manager, Government International and External Relations*, if you'll just stand up for a second, who's involved in all of our government affairs and communications activities, will also be able to help you with access to information. We believe, and this is something that has really been strengthened over the last four years, that there's no reason for there to be any secretiveness about what we do at ANSTO. In fact, what we would like to do increasingly is to celebrate what we do because it benefits Australians. It benefits nuclear

knowledge globally. It keeps us in our seat at the International Atomic Energy Agency and during the course of the last few years we've been attracting around about 12,000 visitors a year who come to ANSTO to experience our site, to experience the work that we do. So we are very excited about what we do. We're also very concerned to be safe, to be secure and to meet all of our obligations well within the framework that is established by the law, so that we always are assured that we have a compliant organisation that is effective in protecting the public interest. So, Carl-Magnus, I think that's the best that I can do in these circumstances but I will be available during the tea to take further comments or questions.

**David:** Just one question about the consultation. I think we're probably all assuming that the ILW store was the facility you were considering when you asked about consultation. Did you also apply that to the other facilities we're talking about tonight, so all three? Okay, so you're actually concerned about understanding the development applications for all three facilities?

**Question:** That's right; it's the process that I'm questioning. You're coming along here tonight telling us about ARPANSA's process and I appreciate what the CEO of ANSTO has said but it didn't inform me that ANSTO was considering these three licence applications if you like. But I think that I would have liked to have seen that come out a bit earlier.

**A Paterson:** Thank you. Well, perhaps I focused on the waste because very often that is very much in the forefront of people's minds. If I can just say on the nuclear medicine plant it was envisaged when we first set up the current plant, and I think it was widely communicated at the time, that we would build a larger scale facility. At the time it was called Mega Moly and was very much under discussion and indeed there has been a public works consultation on that plant because the scale of the plant requires a public works consultation. That's already taken place. That was advertised and took place at ANSTO and the public works approval has been given and in addition the nuclear medicine facility and the synroc plant were formally announced in Parliament in October and there was a significant amount of communication in the media at the time and on our website around that facility and the associated synroc facility. So I think there has been every opportunity to engage in a discussion on these processes. I'll just indicate to you what the constraint is from our point of view. We cannot talk widely about the scope and costs of facilities until it's been through a public works consultation because we would be anticipating government approval of that facility which we're not allowed to do because it affects the funding envelope and a number of other things. So there is a certain point before which we cannot say very much except in a broad, general, conceptual and indicative way but it becomes more



detailed when we make the submissions. So I'd invite you also to look on the public works site which is part of the government site. We'll tell you where to find the documents. There is very extensive documentation that was submitted for that process and we found that a very effective process. I would also like to invite you, if you would like to personally get more information about this, any member of the audience who is here tonight and participating in this consultation, you're very welcome to come and get an absolutely full briefing. We've given many briefings on this project to interest groups that have asked us and others would be very welcome to participate in that.

CM Larsson: We had one more question over there.

Question: Okay, [REDACTED] is my name and I come as a citizen and an ex-employee of the Atomic Energy Commission and a member of the Greens. And although we know that there's been quite a lot of opposition to the interim storage facility here and some aspiration that we get rid of waste storage at Lucas Heights and although I can see that that's an unrealistic thing, what we would like to see is some kind of long-term scenario that shows that there is some plan for closure of the site. In other words, we don't want there to be an open-commitment to a perpetual nuclear facility here and I think there should be some consideration for a walkaway scenario. One of the things ... whatever happens with this interim waste storage for what comes back from France, just the fact that there's a molybdenum facility here means that as long as that is operating there is going to be quite a repository of waste at Lucas Heights. So whether or not this stuff from France is there we do effectively have perpetual storage while ever that exists.

M Dwyer: I understand your question. From our perspective we have to not only licence the facilities and put conditions on it but we also obviously have inspections and reporting requirements and so on. So we don't just give a licence and say you can go on in perpetuity because we know it would be wonderful. We actually go and check. It is not a licence condition of the molybdenum manufacturing currently that it be ultimately closed down. The condition is that it works safely. With the new manufacturing facility I don't think that we're anticipating a closure condition but we're certainly going to have lots of conditions. They'll have to keep meeting, monitoring, reporting and we'll check. I think you're asking a bigger question. With the interim waste store it is being put to us as an interim waste store with a lifetime and with contingency plans should the final site for the material be delayed. So that's a different one. It does have a proposed endpoint but, the molybdenum one, there is no proposed endpoint as far as I've seen at this time.

A Paterson: Thank you very much for the comment that you made. I believe the important things from an ANSTO point of view is

we are not a policy agency. We do provide advice to government but we don't make policy. The availability of molybdenum for people in Australia, some 10,000 doses a week, is I understand a bipartisan position that has been taken over many years and has effectively been endorsed by the supply of funding for the new facility which allows us subject to regulation to supply globally. In fact there's a global consensus about the importance of Mo-99 as an isotope. It's involved in about 40 million diagnoses a year and it is certainly the position that I take as the CEO that it's a wonderful and important thing to be involved in, the implications for human health of supplying this critical, critical diagnostic. So we are very proud of the 224 clinics and hospitals every week that receive this isotope. We are always pleased when we get feedback from patients and clinicians about the outcome of these diagnoses and we don't take the position, and I don't think we will in any period in the near future take the position, that this is in any way something that we'd want to stop doing. We do however think about the future and ANSTO has a planning framework called our 2055 Plan. So we're thinking right out to 2055 in terms of planning for the site. In addition we've put a lot of work into understanding the decommissioning requirements for the future and we've worked closely with government to accurately calculate those. And that has been a big improvement in our standing with government that there is a clear indication that when the end of life of a facility is reached we will properly prepare for the decommissioning. We will properly cost it and we'll execute effective decommissioning, thank you.

CM Larsson: We will take one more question in this session, so one more question over here.

Question: Thank you for listening to me. My name is [REDACTED]. I live in Yarrawarra. I'm just a resident and the house that I bought in 86 was owned by Mr and Mrs [REDACTED]. Mr [REDACTED] worked at ANSTO. He was one of those who had been injured in a number of accidents at the old site, at the old reactor, and he died of leukaemia. On the day that I exchanged contracts I had to sign an indemnity protecting the government against claims by me for any injuries resulting from radiation that may be left over in that house. In 98 I demolished the house and built a new one. Interesting to note that the police station in Caldara Avenue was where the [REDACTED] family lived and their house was demolished and they built the police station. I don't know if the police know about that but that's worth noting. My question is, there was an article in *The Sydney Morning Herald* today, page 2. And it says that there is a site in the Northern Territory, 800 kilometres south of Darwin. It's Muckaty or whatever. And that is the only other site under consideration for the dumping of waste material. Now, there is ongoing legal challenges by the natives, or the people with Native Title to that area. My thoughts are that that will

never happen. So what we're talking about here is Lucas Heights as being the permanent dump for waste material. What assurances do we have once these licences have been issued and the place is up and running that it won't become a free for all where other countries can come and dump their waste? This could just be part of a mushrooming situation where a lot of material is going to be dumped. Judging by the cover up that I was affected by you can understand my reluctance to want to accept as fact that what you are saying is going to be valid. The government has covered it up in the past. Why won't they do it again in the future?

CM Larsson: Thank you very much for that question and certainly this is now being recorded as an input to the consultation process that we are undertaking. Now in response to the possibility of Lucas Heights turning into, in effect, a permanent repository, which is more or less what you are alluding to here, first of all the legislation prohibits that. That's the first thing. Second, there is legislation in place now that would be conducive of the establishment of a national waste facility and as you were already mentioning the site that is currently being under study is the Muckaty station which is up in the Northern Territory. It is still early days to see what the timeframe is and how this project is going to go ahead or whether there will be alternative sites. Personally, I don't intervene in that debate at all because my job is going to be when a licence application is finally ending up on my table, on my desk. And that's where we have to take a look at it, whether the site is a good site, whether the proposed construction is reliable construction and whether the project can go ahead. That will in itself require much consultation and that consultation will be more wide ranging around wide ranging issues than what we are talking about today because we will have to discuss ways that it's being transferred from Lucas Heights. We need to discuss the transportation system and we need to discuss the disposal facility and the storage facility that is planned as a national facility. So all of that is much more wide ranging consultation process. Now, the intention with that is also that it might take care of some of the waste that is currently being stored in various locations in the states and territories and yet again there will have to be a discussion here which involves the state and territories in order to transport that waste to the central facility. And all of that will be covered under the provisions that have been set up in a national uniformity process. Now, one of the considerations that I will have to make in taking a decision on this facility is what provisions we have in place that will make it likely and will enable the waste to finally actually leave Lucas Heights to go somewhere else. That is the system for the radioactive waste management is going to be part of the assessment. So it's not only about the facility here. It's also about the system that is in place for a final management of the radioactive waste. And this is something that we yet have to study when we see a licence application for this but the

issues is going to be addressed already in the assessment that we are going to make of the application that we have just received.

M Dwyer: I think there's one other issue that's worth talking about. You talked about the issue effectively of staff health and exposure. Exposure limits to both the public and to staff are very important to us. It's a requirement of current operations that they report quarterly on those levels and certainly report immediately on any accidents or incidents that could lead to higher doses to staff. This is absolutely non-negotiable. It's absolutely core and when the reporting is not done properly it becomes an issue in itself and it's non-negotiable. ARPANSA watches those reports very closely.

CM Larsson: I think now we have reached the stage where we should actually take a break. We are actually running a little bit late, so I suggest that we just take a break for five minutes. As I said, help yourself to some tea and coffee. By all means continue the discussion but if you think that there is one item or one issue being raised during the discussion that you think we should be aware of, please communicate that to the ARPANSA officers that are around here in the audience, so a five-minute break.

[REFRESHMENT BREAK 43:48 – 52:12]

CM Larsson: Ladies and gentlemen, can we get started again? Please take your seats and by all means bring your coffee or tea or whatever you want to nibble on. All right, we proceed with the presentations and we are now going to have one single presentation but as I understand it is going to be given by two people. So we will have [REDACTED] *Group Executive Nuclear Business* and [REDACTED], *Director of Technology, Synroc* at ANSTO, talking about the ANSTO Nuclear Medicine Molybdenum 99 Facility and then the SyMo Waste Conditioning Facility. So [REDACTED], we start with you, I guess.

Group Executive Nuclear Business: Thank you, Carl-Magnus. So the presentation I'm going to give this evening will just probably outline a little of what operations currently happen at ANSTO in terms of our nuclear medicine production and just give you an overview of the processes that are already established onsite and then more information about the upscale facility, the ANSTO Nuclear Medicine Project. Then I'll hand over to my colleague, [REDACTED] *Director of Technology, Synroc* who will talk a little bit about some of those by products that come from nuclear medicine manufacture. So you can see on the screen a picture of looking into the OPAL reactor. Now the OPAL research reactor is a world-class and world-leading reactor and helps ANSTO in holding a world-leading position in terms of manufacturing and distributing radiopharmaceuticals. Adi Paterson mentioned earlier the

volumes of product that we ship and the number of facilities that we ship to every week and how important it is that those products get out to the community for use in diagnoses and in some cases the treatment of a number of disease conditions. The OPAL reactor in itself is a very modern reactor and as such uses low-enriched uranium fuel and we're noticing around the world that there is much more demand for the products we make in a reactor that uses low-enriched uranium fuel which effectively makes it proliferation proof. So it's important for us to use new technology in this reactor. Okay, so as Adi mentioned earlier molybdenum is one of the important radiopharmaceuticals that is used globally and represents a product that deals with out about 80 percent of all diagnostic imaging globally. It's key in diagnosing conditions such as heart disease and also in diagnosing and staging cancers. Around 40 million patients every year benefit from some form of nuclear imaging that then goes on to help and support good diagnoses. And when you have good diagnoses that leads onto the appropriate treatment which leads to better health outcomes. So as you can see, a large number of patients worldwide and there's a little note at the bottom of that page that says on average we expect around one in two Australians to accept or benefit from the use of a nuclear medicine dose that's probably made at ANSTO. So as you can see, it has a great effect in terms of diagnoses for Australian healthcare. The slide on the screen at the moment just describes the process and I'll just walk you through that from left to right and hopefully as I turn around you won't lose the voice in the microphone. On the left-hand side is a picture of the reactor and we use a starter material that goes into the OPAL reactor and we radio that for about seven to 10 days. After it comes out of the reactor we transport that to the production facility and when we talk about ANM that's the production facility we're talking about. That's where we process and purify the product which is a pharmaceutical ingredient. That process or the second stage takes around 24 hours. During that process we create some intermediate-level waste or liquid waste and [REDACTED] *the Director of Technology, Synroc* will explain a little bit of how we'll manage that as we go forward in his presentation. After we've purified the product it's either shipped to our own facility onsite where we manufacture product that then goes into hospitals into Australia or we ship it globally to a number of other countries. And currently we ship to Japan and to the US. So you can see that we have an operation that supplies medicine not only to Australia but also to some other global markets. After that the important part comes. Elution of that product where we then get into diagnosis and the very important part on the end of course is patients because we do all of this so that we get good diagnosis of conditions, would benefit patients and there's good healthcare. So the process is one thing but for us the important component of this is treating patients in Australia and globally. Now, the



rationale and the need for the largest scale facility that we're building at ANSTO is just to give you an understanding of how currently nuclear medicine and particularly molybdenum is manufactured globally and where it comes from. You'll see at the bottom in Australia we represent currently around five percent of the global supply of molybdenum. So we play an important role and the good news from that is we can guarantee security of supply for Australia. In recent history when there's been difficult supply challenges Australia has been cushioned from that and no doses were missed, where in other parts of the world medicine was missed because the reactors were either in some form of shutdown or they couldn't produce the nuclear medicine required. The critical step is that a number of these reactors are closing down and you'll see from the percentages underneath that that represents reactors that could make up to around 70 percent of the global capacity of molybdenum. So when you start taking that volume out of the supply chain you then start to create a supply challenge. The upscale facilities that we're talking about at ANSTO will allow us to contribute about 25 percent of the global capacity of molybdenum. It will make us a world-leading player in terms of this marketplace and importantly provide security of supply for the Australian market. Now irrespective of this facility the current facility needs to be replaced in 2017 anyway. So we do need to build another molybdenum facility and that's why we're talking about the upscale facility to take advantage of the radiation capacity that already exists in the OPAL reactor. So you can see a representation of the nuclear medicine facility on there. It's a drawing, it's a building, but it just gives you an idea that some of our initial planning is underway and importantly there's a diagram. Again, if you can see on the left-hand side the building just above that is the OPAL reactor and then the little round box is the siting licence for where we intend to put this facility. So it's close to the reactor and then from there the target plates that we irradiate can get transferred and processed onsite. So really I guess the overview to give you here is that at ANSTO we're proposing a new nuclear medicine facility to take advantage of the fact that there is a global supply crisis coming on and that the fact that we need to make sure security of supply for Australia is going to continue. In addition to that we're co-locating a synroc plant. [REDACTED] *The Director of Technology, Synroc* will talk about that in a moment and of course part of this becomes very important because we're also creating jobs both in the construction phase and ongoing. One thing I should probably mention about the reason for the reactors closing down is that those reactors are aging reactors. They're up to and over 45 and 47 years old. The OPAL reactor is a new reactor. It's been commissioned and operating for about four to five years so therefore we've got a lot of life to go in that reactor. We've got a lot of capacity. We can take advantage of that existing capacity with just an upscale facility for producing

molybdenum. So I guess this is the point, [REDACTED], where I hand over to [REDACTED] *the Director of Technology* who will talk you through a little bit about how we'll manage the by product from production.

Director of  
Technology,  
Synroc:

Thank you everybody for allowing me to give a little bit of a brief presentation on synroc. I'm very passionate about it. I've been working on it for 24 years. I started as a researcher there. I'm not trying to give you a history of my life but it's a technology that's been developed in house and has some key advantages and I'd like to take you through those. As [REDACTED] *the Group Executive* said, this plant will be co-located with the new moly facility. It will be located across from the facility so that the waste can be directly transferred for treatment. So it will treat the waste that is coming from that facility but it will also treat the waste that has been safely stored onsite from previous molybdenum 99 production. And so that's been going on for almost 30 years and it's a way to treat these wastes that convert them from a liquid waste and turn them into a solid waste that's road ready to transport to the Australian Radioactive Waste Management Facility when it's built. So we've chosen the synroc technology because of the cost effectiveness as well as what we believe to be the technical superiority of the technology against the baseline technology. There's some 30 years of underpinning science and technology development and Professor Ted Ringwood, if you indulge me a moment to give him some credit for it, he was studying naturally occurring rocks and he had dated these rocks at hundreds of millions of years. And what he noted was radioactive elements in those mineral phases. And he surmised, he said, "If I can synthesise these rocks then nature has shown me a way that I can immobilise these radioactive elements and show that they will survive for geological timeframes, which is very important in trying to immobilise radioactive waste." So the process is fairly simple. The analogy is probably a little bit like cooking. Once you understand the chemistry of the waste and those ingredients our waste form scientists, or our master chefs ... and there's one in the audience here, [REDACTED] ... they work out what the additives need to be and they mix them together. They drive this mixture to a granular form. We then fill ... what you see here is this odd shaped looking ... what we call a dumbbell can. We hermetically seal that can and then we apply heat and pressure and basically what we do is what nature takes millions of years to do to create rock. We do it in about 10 to 12 hours, so a little bit faster. And so what you end up with is an immobilised radioactive waste in a crystalline structure. So the waste elements are locked in. Now, this is, as I said, an Australian developed technology and we're very, very proud to be applying that to this waste. But even given superior properties of synroc, unless it makes economic sense you don't apply it. So what you can see here is that we're creating around four cubic

metres of ILLW waste, intermediate level liquid waste. If we were to take the traditional route of treatment which would be cement and by the time we packaged that waste we would create 100 cubic metres of packaged waste that we would have to store on our site and also send to a national repository. By using the synroc technology we actually reduce it from four cubic metres to one cubic metre. And that's for storage onsite. Now, of course, we have to then have transport to ship it to the new store or repository but even then we'll be 10 times less than the volume if we used the traditional technology. So I think the important points are there's a huge volume reduction of up to 75 percent. We're taking waste that's safely stored on our site and converting that to a solid form that's getting it road ready to go to that repository. So I thank you. Any questions?

CM Larsson: All right, the floor is open for questions.

Question: My name is [REDACTED] and I'm living in Thirroul. I guess my question about this is sort of why would we want to supply the demand around the world if we only require the five percent that we're currently making is sufficient to secure the Australian demand? All these other processes are closing. Why can't they build the processor somewhere overseas and deal with their own waste problem rather than Australia supplying 25 percent to send around the world and then being left with this waste where currently there is no other site to put it other than here? Yeah, why should we have to deal with that waste here when there is no solution to it, to supply the rest of the world when they could deal with their own waste problem?

A Paterson: I think that's a very, very important question and one which I think is being discussed widely around the world as we've looked at the various supply shortages and the issues associated with it. The basic principle that we're applying from the point of view of Australia producing this and shipping it to other countries is that in the price that we charge we include the full cost of the waste management in the price that we charge so that we are not subsidising with Australian money any of the cost of the waste that is associated with the production of the nuclear medicines. We've benefited through the years from other countries supplying to us when we haven't had access to nuclear medicines and there's an agreement essentially between the countries that produce and the countries that benefit that there should be a fair pricing regime so that the waste can be fully taken care of and so that there is an ability to supply these medicines around the world. For example, as [REDACTED] *the Group Executive Nuclear Business* showed you that reactor which is in Canada, the research reactor at Chalk River, produces 40 percent of the world's supply. But the Canadians don't use 40 percent of the world's supply. They supply to a number of other countries who then benefit from their medical treatments. The Canadians have agreed

to take the waste burden as part of that global public goods of supplying healthcare in a predictable and an effective way. So this is how people agree about all sorts of different waste treatments, as we know. Provided the economics is working and there's a sound pricing regime and you can demonstrate that that is true, and Australia has demonstrated, that's an international benchmarking study. The responsible thing to do is not to move waste around with the medicines. Keep the waste, store it safely in an interim mode and then ship it to a final repository. Because the costs are all covered this is the general global agreement of how it's done. So we think we're very comfortable with that and we wouldn't want to create a condition after having benefited from all of the innovation that takes place in nuclear medicine. You can imagine the situation if Australia said we're not going to assist in this global situation and everybody else said, well, all of the developments in nuclear medicine won't come to you. It wouldn't be the right thing to do. So we think it's a fair basis for doing it and that is the basis on which the government has approved the funds for the construction of the facility.

Question: [REDACTED], again. I have a couple of questions but I'll start with one. To what extent has the possibility of alternatives to Technetium-99m been explored? I mean, one of its advantages, I know, is it can be functionalised with a whole lot of pharmaceuticals that target particular parts of the body. I can't imagine that's impossible to use functionalised pharmaceuticals to use with a, for example, MRI. Now, to what extent has that alternative been explored? If I could put the other questions now? When you use low-enriched uranium, certainly it's hard to ... you can't make a bomb from the uranium but it does mean that you make proportionally more plutonium for the molybdenum that you are exposing or creating. Could you give us an indication of just how much plutonium would be produced in this waste stream from the new facility? That will do for now, thank you.

Group Executive Nuclear Business: Okay, [REDACTED], I'll certainly take the first question then I may ask to get some other information. [REDACTED] *The Director of Technology, Synroc* might take the second part. There are a number of other postulated options for creating technetium and I think first of all it's important to say that technetium does represent 80 percent of that imaging market and that market continues to grow not just in those countries that already have developed nuclear medicine systems but also in new emerging countries such as parts of Asia where we're seeing an increase in the use of nuclear medicines. So technetium is a very important product and will be for many years to come. So having a reliable and cost effective way of manufacturing a product that can be easily transported is going to be critical and to some degree that is part of the crux of the alternative methods. Some of

the other ways of making the product have to be near patient and it's not practical in some cases to build so many of those facilities. Some of them use a different starter material of which the cost of that starter material is incredibly expensive which makes it nonviable in an economic sense. There are some alternative modalities of imaging and those are already being used but by and large the most reliable and predictable way is to use molybdenum from fission used in research reactors such as OPAL and of a number of other opportunities to produce technetium and molybdenum those are being explored around the world at the moment and there continues to be exploration but right now and for the foreseeable future this is by far the most reliable, cost-effective and economic way of doing it.

Director of  
Technology,  
Synroc:

I've got the waste expert sitting in the room. Do you want to comment, [REDACTED] *ANSTO Waste Operations Manager*?

Waste Operations  
Manager:

[REDACTED], waste operations. The targets are only in the reactor for a very short period of seven to 10 days, so the amount of plutonium is extremely, extremely small. So there's much more in the fuel which is in the reactor for a longer period. So it is a very, very miniscule quantity.

Question:

My name is [REDACTED]. I used to work at ANSTO for 37 years. The energy of the neutrons from normal fission is too high to produce much plutonium at all. The neutrons need to be moderated and slowed down so that when they hit the uranium 238 atom they will produce through a chain plutonium 239. And if they're not moderated and just left as high-energy neutrons from the fission of 235 they won't produce much plutonium at all. The molybdenum comes from the fission of uranium 235. The plutonium comes from the bombarding of uranium 238 with low-energy neutrons. So they come from two different sources. One is the fission of uranium 235. Do you understand that?

Question:

Yes, but I know there's moderators in reactors so as to get the 235 to fission as well.

Question:

It's getting highly technical.

A Paterson:

Thank you very much. I think one of the important elements of this debate is that the target plates that we use are composed of low-enriched uranium, as the fuel is low-enriched uranium. They have a very short irradiation time and they are in a pretty high-flux region of the reactor. The amounts of plutonium are tiny and I think that what we will do is do some calculations which we will use to support the analysis of the amount of plutonium that is generated against some sort of standard in relation to the amount of nuclear medicine that is produced. And we can use that as a basis for a fact-based discussion in relation to the



plutonium. If I could also just say on the issue of alternatives, one of the great advantages of technetium-99m and its differentiation from MRI is that MRI ... and those of you who have been in an MRI machine will know that it essentially looks at your anatomy and most of the traces that are used to look at particular diseases are not very effective and are used in quite high concentrations. When you use molybdenum-99 which converts into technetium-99m you use a much smaller concentration. In fact, it's probably one of the lowest doses of radioisotopes that are given in any modality. You get much more, for example, in a PET scan from F-18. So what you are doing with mr-99 is you're doing something that's very cheap that is complementing the scanning technology of MRI and/or CT scanning with information about your pathology, where the disease is. It targets where the disease is and hangs on to the disease. So in fact the CT scanning techniques and the MRI techniques are complementary to nuclear medicine in order to enhance the quality of the diagnosis. And in fact in the modern era it is that the effectiveness of that complementarity which has greatly expanded the use of mr-99 into technetium-99m. So more and more people will benefit from this as these different imaging techniques are used. We don't see reduction. We don't see swapping between imaging techniques. We see them being joined together and adding even more benefit. In fact, one of the really exciting things in nuclear medicine is that in every generation with improved detectors, improved cameras, we've reduced the doses that we're giving to people because first of all it's expensive to make. So if you can make the doses smaller you get more doses to more people. And secondly if the cameras are already getting more efficient and more effective you can make sure that the absolute minimum dose is given to the person. We care about that stuff and we believe that it's really important that you get the best image for the diagnosis of the disease with the minimum, minimum, minimum negligible risk to the patient.

**CM Larsson:** Before we take one more question, in order to resolve the question that you were asking here about the molybdenum and plutonium ratio we have noted the question and I would actually ask ANSTO to take this question on notice. It is part of the consultation process that is a question that has come forward here and you take it on notice and you provide the information with the responses to other consultation issues that are being raised.

**Question:** [REDACTED] Sutherland resident. My question is about the location of all these nuclear waste facilities, storage facilities. As you know international atomic agency ... energy agency has got certain requirements. One of them is low density. Another one also all risks should be considered, like bushfires or something like that. So documents that you provided on your website, I read through

them and unfortunately I couldn't find any deep analysis of density or population on population growth. For example, there is nothing about plans of state government and Sutherland Council to introduce urban activation precinct just in the area nearby and analysis provided just refers to quite outdated documents, 2004, which are not provided actually. And I think it's much more analysis should be taken and also I'm worried about bushfires because in your documentation risk of large bush fires is once every eight to 12 years and, as you know, once it happened where bush fires just took nearby the site. So my question, why these risks and why analysis is not very deep, thank you.

A Paterson: Thank you. In fact, bushfire risk is part of the licencing basis of the reactor. And extensive studies were undertaken in relation to the bushfire risk because it's a known risk and it's a risk with a frequency, as you indicate, of every eight to 12 years. That has led to detailed analysis of the different pathways by which that might escalate any conditions that would provide a risk to the public or to the environment. And all of those analyses have been completed and reviewed on a number of occasions and the do not constitute a credible pathway to a risk of the release of radiation from the OPAL facility. The facilities we're talking about here, which is the nuclear medicine facility, synroc facility and the waste facility are well enveloped by the risk to the OPAL reactor. So there's no credible pathways for these facilities which have much less radioactive material associated with them in terms of creating a risk in relation to bushfires. In relation to the NSW State Government and the other actors like the Rural Fire Service and the other fire brigades, we have detailed planning protocols in place with them. We have regular exercises with them and some of those exercises in fact envisage a bushfire. We have bushfire drills on a regular basis. We have some 40 volunteers in ANSTO who are associated with those activities and therefore we have a very credible framework and an emergency response framework to deal with these issues. And I believe that it's demonstrable both from the analysis that underpinned the licence for OPAL and will underpin these licences that the bushfire does not constitute a threat of release of radiation in respect of the public and therefore this matter is essentially dealt with. And as I indicated in terms of the emergency planning that framework exists. It's tested on a regular basis and it is done effectively. In terms of population densities the exclusion zones that are applied are the 1.6 kilometre zone which was the exclusion zone for [1:23:43 BRAG] and we've accepted that is a very conservative position and we think it's a good position to be in to accept that conservative position. But the safety case for the OPAL reactor is bounded by the reactor building.

Question: My name is [REDACTED]. You can see that I've been here for many years. I've actually been in Sutherland Shire for 83

years. My father was a health inspector here when HIFAR was considered and when ANSTO was established, when it was the British Atomic Energy Agency which enforced our government to take that into this suburb. The history is important, so if you will excuse me ... and I do direct this to ARPANSA because they're much younger than we are in institutional terms as well as physical. We had to battle to get ARPANSA. There were no regulations. What I wanted to add to this discussion is that it's in the wrong place. That's my opening ... and I thank you for your comment because when it was selected there were 5000 people living in Engadine, 5000 people living in Heathcote and they were the only populated areas. And they had primary industries and they had a lot of hope for the future of getting electricity and water supply. It was on the basis that there were two areas that were already populated and the others weren't with 5000 people that the regulations were drawn up that they should only have 5000 people living in any 20-degree segment of the circular circumference from the reactor. That was the basis. That way they could say "We can control 5000 people in each 20 degree segment of the population." Now, we know now just how short sighted that was, how short sighted the people were that established that reactor in the first instance. Since then through Sutherland Shire Council, with Councillor [REDACTED] operating also in the national local government areas and with firm and strong support from our community and particularly from young families who have now been mortgaged into staying into that area do we have 15 schools in the three kilometre circumference within that zone? We had to battle to keep that three kilometre circumference. If the Council is disinterested on political terms or if the federal government or state government are disinterested in protecting the people then it falls upon you as ARPANSA with your particular professional ability to convince them that it's the wrong place. The exits from this shire are limited. They're across bridges. We're adjacent to a national security situation. We have emergency exercises only ... only because the citizens got together and demanded it. And when they did we never have ever had an exercise for the whole community, only ... and I applaud, I really applaud, the services that are involved here, the ambulances, the fire brigade, public services. But I don't have respect for the people who don't see the protection of the people who live here and have been brought into this area under false circumstances, unable to get out of it because of their mortgages, all young families. My next question is the biggest waste is the existing HIFAR reactor. What are you going to do with that? That won't go out in the small areas of the new waste situation that you are projecting. The other thing is we had a McKinnon Report, huge cost to the taxpayers, huge, long period of time. The idea was that the HIFAR would be considered to be closed down over 25, 30 years ago. It was the oldest reactor in the world that was still operating when others were closing them throughout the

world. If we have agreements with other countries, why didn't we know? If there are agreements when we sell our uranium to other countries that we take back their waste, which are now apparently going to do from France in 2015, we'd want to know what is the extent of that waste, what is the strength of it, is it greater in its volume and its capacity and problem and waste situation than what we sent in the first place? Does it stop at France? Is it a situation because we were deprived by governments not telling us that there were agreements that said we would always get the waste back because it was considered commercially in confidence, just as synroc was considered commercially in confidence and taken out of the hands of the public entity and given to private enterprise and tested in the USA. These are the questions that make us concerned. This is why we've lost faith. This is why we want the protection of our people. We're into preventative health as well. We have great respect for what you do at a medical level but we've got a great responsibility as fellow citizens and as people in a high place, as you are ... and I'm glad you're there because we struggled to get you there in the first place. I just want the answer about HIFAR. You know, it's a great big muddle of waste. It's not going to fit into those program that you talk about. How long is it going to take? The McKinnon Report said it would be returned to Greenfield. It didn't say we'd get another reactor and we paid a fortune for that McKinnon report, a fortunate as taxpayers, travelled the world to get the result. And we were told at the end it would be returned to Greenfield. That's why we're very, very concerned.

CM Larsson: I will start making a little bit of a response to that. I think it's difficult to respond to what you have put forward here because it requires quite a bit of time and quite a bit of consideration. It's important. I think that one of the main considerations that ARPANSA ... before ARPANSA when we look at these new facilities and in particular the siting licence for the molybdenum production facilities is about looking at the different accident scenarios but our probability ... what can be the causes and also the consequences. After all what ARPANSA's responsibility is, is the protection of human health and of the environment and the guidance that anyone can consult on our web focuses very much on those particular issues and there are stringent standards there and there are also guidance for how to demonstrate compliance in order to convince us that the kind of scenarios or inadequate protection of the population will be the result of the siting of the facility. A conclusion that that there is inadequate protection will not lead to a licence. So that is going to be one of the main outcomes obviously of the assessment that we are going to make. Now, the different scenarios that will have to be analysed, obviously we had a question here before about bushfires but we can have a variety of different events that can create problems. Included is security events, security related events, that you

were mentioning and the question of course boils down to what you are saying here. Is this the good site and can we be comfortable with that adequate protection is here being achieved? That's at the core of the assessment that ARPANSA is going to make. So I cannot prejudge anything and tell you right now this is what we believe because we are in the middle of the assessment process. We are taking the questions here and as an input to that assessment process the question that you have put in front of us here is going to be recorded and it's going to be responded to in the process of resolving the assessment and the decision making. And that is going to be transparent and currently I cannot comment any more than that, other than I think it's a highly valid and very important question. I have to probably demonstrate my own ignorance when it comes to McKinnon Report. Somebody else here might comment on it. The HIFAR is technically speaking not part of this consultation process but I would allow some quick reply from ANSTO. Maybe Dr Paterson would respond to that and talk about the plans for the HIFAR reactor.

A Paterson: Thank you very much. The HIFAR reactor operated into its fiftieth year and then was put into a position after it was defueled which is called a Possess and Control Licence. That's a condition under which we keep the maintenance and the facilities in an operational condition from the simple point of view of making sure that the facility is accessible, that it's got electricity, that it is in a safe condition and that all of the radiological parts of the facility are well characterised and well understood. So we work with ARPANSA on HIFAR if we make any changes in relation to how we are looking after HIFAR or substantive changes in how it's operating from a day-to-day basis. We do that in consultation with the regulators so that they are completely familiar with the exact status of the HIFAR reactor. The Possess and Control phase leads into the decommissioning phase and the decommissioning phase is currently, in terms of where we are in a scoping phase, leading to a detailed planning for that decommissioning. The normal practice is to do that in a very careful way so that all of the risks that are associated with the decommissioning are well characterised, that they are fully costed and that the process then of dealing with any radioactivity related waste materials is fully disclosed to the regulator before a decommissioning licence is issued. So the review that you're interested in would take place after the planning phase and in the licencing phase for decommissioning because decommissioning itself is licenced. In terms of the detailed future of the immediate area around HIFAR there are a number of people who are interested in that facility from a heritage and a legacy point of view and there are others who are interested, as you've indicated, in a Greenfield site. That will form part of our planning and evaluation for the decommissioning phase of the reactor. We are very proud of the legacy of the HIFAR reactor. We



think it has served Australians well and has also contributed to global knowledge on nuclear science and technology and has supported the training of generations of researchers who are now deployed in medical fields, in nuclear science and technology fields and are working in research on nuclear science and technology all over the world. And so we hope that we might be able to work in close collaboration with the community understanding the final disposition of everything that is associated with that facility. But we may not agree on our assessment of its value. Thank you.

**Question:** Can I take Dr Paterson back to his answer to a question in relation to the production of, I think it was molybdenum-99 by Canada? The slide showed us that Canada produced 40 percent ... is that right? They have now closed their reactor. They haven't closed it but they are closing?

**A Paterson:** They will close that reactor in the latter half of 2016.

**Question:** Okay, now, you then went on to say that we are going to increase our production and export to the world and you seem to be saying that if we didn't do that then we're going to miss out on some medical research or whatever from around the world. Is that what you were saying and if so what's happening to Canada? Are they going to be treated that way because they've stopped producing? It doesn't seem to make sense to me and are we in it just to make a buck and produce more waste in doing so?

**A Paterson:** I think it's an excellent question. Firstly, just to go to the situation with the NRU reactor, it will be closed in 2016. In 2016 when it's closed it will have exceeded 60 years of age, so it's quite an old reactor and it's a reactor which has served many millions of people by the provision of nuclear medicines. The Canadian policy position is that they are looking for alternative means of production and importation to serve the needs of their people. Countries like South Korea are building a dedicated isotope producing reactors. There was a recent announcement that some other countries are now considering the same thing. Both Argentina and Brazil are looking at producing some mo-99, so you can be assured that there is a global discourse. We meet twice a year in Paris to talk about medical radioisotopes and the security of supply. And this is a group that was constituted to deal with the risks to global human health from no security of supply from the closing of these reactors. So there's a group of countries that meets about this to make sure that exactly the situation that you raise is that there are winners and losers in the nuclear medicine environment is something that doesn't happen. And that's where we do the rule setting for the mo-99 part of nuclear medicine supply. So you can be absolutely certain that in this transitional phase we are indeed in the negotiation as to how global public good from all of the developments in nuclear medicine globally can equitably be shared as rapidly as

possible with the widest number of people. Of course, every sovereign state retains the right to make decisions about how it will interact with that system and we certainly know, for example in the case of cyclotron based isotopes, that some countries already benefit from nuclear medicine procedures which we don't benefit from in Australia yet because we haven't been able to run the clinical trials with the very broad community of practitioners. So there is a timing issue and that timing issue can be affected by how you are participating as a respected and valued partner in nuclear medicine globally. So I'm not saying that this a ... I wouldn't characterise it as a schoolyard spat but it is a very real consideration that nuclear medicine is not equally distributed across the world. By being a supplier we demonstrate our good will to all the other people of good will in the rest of the planet who are developing new techniques and we will therefore be at the front row of the table when those techniques are able to be imported in for the benefit of Australians. So it is a genuine discourse and it's an important discourse and the fact that we will become a producer of technetium-99m from our mo-99 and will be globally respected for that, I believe, will enhance the flow of other nuclear medicines into Australia on a considered basis. In fact, simply because of the existence of the OPAL reactor, and a very good partnership with our colleagues in Germany, we'll be introducing a new therapeutic isotope over the next couple of years which will deal with endocrine tumours in the therapeutic sense, not just the diagnostic sense. So I hope that's a helpful answer to what is a very good question.

CM Larsson: Thank you very much. I would actually like to discuss now that we try to stick to the program as much as we can. I would like to suggest that we now take a five-minute break and just stretch legs. Help yourself to any refreshments that still may be around down there and then we'll start on the last leg of this presentation which is going to be information session which is going to be on the waste management. And at the end of that, if there are any issues or any questions with regard to the previous presentations we can take those as well. The target would be to finish by nine o'clock. So, please, short break and then we start again.

[REFRESHMENT BREAK 1:42:58 – 1:51:08]

CM Larsson: Ladies and gentlemen, can I please ask you to take your seats again. All right, we are going into the last leg of this information session and that is going to be on waste management and in particular of course the interim waste store for which we have received a siting and construction licence. And this sequence is going to be ... we're going to kick off here with Dr Geoff Williams from ARPANSA who is going to talk about the licencing of radioactive waste storage and disposal facilities. And we are then continuing with the ANSTO presentation which is going to be given by

██████████ here, who is the General Manager of Nuclear Operations with ANSTO on the ANSTO application for a licence for the interim waste storage. So we will have these two presentations, the first one from ARPANSA and the second one from ANSTO. After that we will have questions and answers again. We can also pick up a few questions that may be related to the previous subjects that we have discussed during the evening. And as I said our target time for finishing here is nine o'clock. So please go ahead, Geoff.

G Williams: Thank you, Carl-Magnus. Coming up from Melbourne this morning I found that I was really looking forward to coming here and talking to you about our role in regulating radioactive waste safety and I was thinking a little bit about the reasons for that. My role for the last 12 years, I've been Australia's representative on an international committee, a committee of the International Atomic Energy Agency on radioactive waste safety. It's called the WASSC Committee, WAS, Waste Safety Standards Committee, and it's the international committee that sets the international standards for radioactive waste safety and currently I'm actually Chair of the WASSC committee and I was thinking often when you're in Vienna and you're working with that community of experts with a vast experience in dealing with radioactive waste and very concerned about the safety of radioactive waste the realisation dawns that ... I mean, it's very noble of ARPANSA to send people like me over to Vienna to work on developing international standards for waste safety, learning the lessons from past experience all over the world, in particular experience where things go wrong, accidents and so on, incidents. And just I guess the scientific knowledge that we need to take on board as science progresses and technology on making sure that that translates into safety standards globally that are up to date, very noble of ARPANSA to send me over there. But the rubber hits the road when we come to a session like this. Those standards, this is where we apply them and all of you here, excluding ARPANSA staff and ANSTO staff, you're all stakeholders in this particular issue, stakeholders in radioactive waste safety in your community. And that's where the standards that we develop internationally and that I'm privileged to be part of, this is the practical part of it that makes it really all worthwhile. So for people like you, and also people like the outback communities who ultimately one day will be looking at hosting a national radioactive waste store and disposal facility, they're the stakeholders that ARPANSA ... I guess we have a mandate to ensure the health and safety of you in particular. So what I'm going to do here is quickly run through, give you an overview. It's our new regulatory guide. It's actually 100 pages so it's going to be a very brief overview and obviously I'm going to just pick the eyes out of it. I hope the bits that I pick out are the bits that are relevant and important for us here tonight. But you can download this regulatory guide. It's on the ARPANSA

website. It's not too hard to find and you can download it from there and go through it in as much detail as you wish. So the new regulatory guide is very current. It's March of this year. It replaces the 2006 Regulatory Guide which was the first version of this. And the guide encompasses the essentials which are the requirements. The things that must be met and also provides a large amount of advice which we call guidance on how to meet those essentials. So that's all in this document here, this regulatory guide of March of this year. And the guide addresses both safety and security, so both aspects are covered although the main focus is on safety, human health and safety of the environment, the health and safety of people and the environment. Okay, so the licencing phases, this has already been discussed and as has already been mentioned ARPANSA already has received for the intermediate level waste store, the interim ILW store, we've received applications to site and to construct and the other phases are the operation of the store. There'll be a licence application for that. And at the end of it all there will be a licence application to decommission the store and there's been a little bit of discussion on decommissioning although in the context of HIFAR. But obviously for a waste storage facility there's also a decommissioning phase. The part down the bottom is not particularly relevant for us tonight. That is the phases, the licencing process for a disposal facility. And that's not what we're talking about. ANSTO is not a prospective site for a disposal facility as has been made very clear and the demographics would be quite wrong. But it's just of interest to also ... that's also presented obviously in great detail in the regulatory guide and it's part of that diagram. Okay, so what's new, what's important in the regulatory guide, the new 2013 version? Well, obviously updated international best practice because a lot's happened in those seven years since the 2006 version. In particular there's been ... I guess the main thrust of international development has been in the safety case, whereas there was a mention of a safety assessment in the 2006, in the 2013 version of the regulatory guide, consistent with international best practice, the safety case is front and centre of any licence application for a radioactive waste store or disposal facility. Protection of people and the environment, there's a much greater understanding and emphasis on how do we protect the environment. Now, in the case of the ANSTO store obviously it's on a site that's already established. But the protection of the environment is particularly important for a disposal facility, wherever that might occur, somewhere in outback Australia, one would imagine, and protection of the environment and perhaps specific species that may only exist close to that area. A summary of the licence in plain and non-technical language, this is really important for us here tonight as stakeholders. We had a discussion before on the plutonium production and it was getting rather technical. All that technical stuff is important. It's important in our licence application. It's important to Carl-Magnus

when he makes that decision to know and understand it and to seek expert advice. It's not something that here tonight as stakeholders we can even begin necessarily to get our heads around. Maybe some of us can but not in general. We want in plain and non-technical language that really gives us all the information that we need to know as stakeholders to have input into the process. And really that's what we're doing. We are providing value added input to the licencing process and that's why we consider in ARPANSA as regulator, we consider the consultation period as very important, very significant for the licencing process. And so that summary in plain and nontechnical language, it's recommended internationally and also by your guidance here that that summary be provided as really the executive summary of the safety case so that it encapsulates all of the aspects that go to providing confidence in the safety of what's being proposed. This new guide incorporates Australia's new radioactive waste classification scheme. So since 2006 we've developed a new classification scheme for radioactive waste that is far more practically useful and also consistent with the current international atomic energy agency safety classification scheme and there are six classes. I won't run through them all here but they start with exempt waste that's below the level of regulatory concern and the go right up to high level waste and in Australia we don't have any high level waste. We're very fortunate in that regard and so the four classes in between are what we're considering in this safety guide. Requirement for a safety case, I've indicated that. It's a collection, the safety case is a collection of all the arguments and evidence in support of the safety of the facility. And that goes way beyond the technical safety. It goes to the competence of the organisation that's applying for the licence, their economic stability that they've got funding that's going to be there for the duration of the licence. Safety culture of the organisation and it includes the demographics. We've discussed some of that in some of the questions but the safety case will include the population within which that facility exists. And all of the issues of concern such as transport and so on, so the safety case is really a very, very critical and important element of the licence application. Storage is always an interim measure and I'm going to come back to this because I think we can point out that's not just a whim, not just because we don't like the idea that storage could be indefinite. It's not just that we don't like that. There's a valid reason for that and I'll try and draw that out just in a moment. And a really new one, requirement to be prepared for mediation in the event of any accident, for instance during transport or an accident onsite, and we've had some suggestion of some accident scenarios that obviously need to be considered and they will be considered. Requirement to be prepared for a mediation, we have emergency preparedness. We have very good emergency preparedness. If there's an emergency we're prepare to deal with it but after an emergency, after the



emergency phase has finished, we're left with whatever results of the ... yeah, the mess that's left behind after an emergency and that's what we call remediation preparedness. And this is part of the, if you like, naval gazing, the evaluation of safety standards following Fukushima. The accident in Fukushima happened. Japan is a country that's incredibly well prepared for emergencies but now they're left with cleaning up the mess, recovery from the accident. And you'll find that the lesson that's been learned is that after an accident happens it's too late then to start planning for that recovery. And so part of our licencing requirements are that for any conceivable accident there's thought being given and there's some suggestion in the regulatory guide as to what things should be considered to aid recovery after an emergency, after the emergency phase is over. Maybe populations have been moved from homes and so on. How are we going to recover? We need to give some thought to that. That's part of now the licencing requirements and that's a very recent one. Okay, just international best practice, there's a suite of international documents, mainly from the International Atomic Energy Agency. Some are from the Nuclear Energy Agency, part of the OECD. On safety, those on the left, security ... the blue on there. But they all feed into this document here and there's a wealth of references at the back and most of that is guidance for the proponent, the people who are putting together a licence application to draw on that guidance that we're provided here, international guidance, so that their licence application is the very, very best that it possibly can be based on international best practice. Just some definitions, storage ... these are the definitions that we use in the guide. Storage is the placement of radioactive waste in a regulated facility that provides for its containment pending actions relating to its further management or ultimate disposal, the definition of storage. Disposal, putting the waste in a purpose-built facility which will eventually be closed where there's no intention of retrieving that waste, ever. It's not to say that there isn't the possibility of having it to be retrieved. It's a smart thing to do often but there's no intention of retrieving it. When you put it there, the intention is it's disposed of safely. Safety cases, really we've discussed it. Collection of the whole suite of arguments and evidence in support of the safety of the facility, it includes safety assessment and statement of confidence. So it's important when you do the technical assessments that you look at the uncertainties. What's the certainty or uncertainty in what you're presenting in a technical sense? Okay, so I'm very close to the finish. The safety case, just quickly what it is, it's a demonstration of the competence and adequate resources of the proponent. It's a quality management system. It contains a quality management system. Development of appropriate waste acceptance criteria, the actual characteristics of the waste that are going to be safely stored or disposed of, so there's a lot of detail there, technical detail, waste acceptance

criteria. Timeline of safe storage, now this comes out of the safety case. The reason that you can't store waste indefinitely is because after a period of time it becomes inherently less safe, to a point where it becomes what the regulator would regard as unsafe or not appropriate to be stored any longer on safety concerns. And the safety case will tell you what that timeline is. It's based on ... including things like the probable costs and the technological challenges in maintaining storage beyond that period. You know when you store anything ultimately there's a degradation either of the containment or the thing you're storing. Ultimately you're going to have some problems and that comes out of the safety case as to what that safe period is. Consideration of appropriate safety barriers, obviously technical defence in depth, periodic reviews of the safety assessment. So when you do a safety assessment of a facility, like a storage facility, that safety assessment is for a point in time and as time goes on things change. Your knowledge of the facility grows. Your understanding of the strengths and weaknesses, there'll be things that you will do to improve and the safety assessment is a living document. It grows with your knowledge and understanding and with technological advances so that the safety assessment is something that is periodically updated as the project continues. The uncertainties, we've discussed. Mitigating the consequences of an event or accident and a surveillance or monitoring program is all part of the safety case. Okay, timeline for safe storage, and this is what I'm finishing with, basically the regulatory guide states that during operation of the waste store you can appropriately isolate and provide monitoring for a period for several tens of years. Based on international best practice an applicant for a licence to prepare a site for construct, operate or decommission a waste store because that's what we're dealing with specifically here tonight ... shall provide a strategy such as a reasonably practicable disposal option for safe management of the waste in storage when the period of safe storage concludes. So that's a requirement that the CEO of ARPANSA has on the licence application that it includes a strategy for a reasonably practicable disposal option or alternative management proposal for that waste that it can be safely dealt with when that period of safe storage concludes. So there's been a number of questions on that and it's been addressed in the licencing process. It's a requirement on ANSTO. And that period is predicated on the safety case. It falls out from the safety case. So I think that's probably all I wanted to say. Thank you.

CM Larsson;

Thank you, Geoff. In that case we proceed straight to [REDACTED] *the General Manager, Nuclear Operations'* presentation.

GM Nuclear Operations:

Thank you, Carl-Magnus and thank you everyone for having us here tonight. As a number of speakers have said today and the public as well, they've raised the issue of interim

storage. I'd like to re-emphasise that word "interim." We are looking at interim storage at ANSTO. The waste coming back from France will be on an interim basis. Why, well, we go back to *The ANSTO Act 1987*. Waste cannot be permanently stored at ANSTO. That is the law. The Act clearly states that ANSTO cannot become a national nuclear waste repository. We are looking at best practice. It's internationally accepted practice, as Geoff was saying, that we look at storage of waste in a national facility and each country has that obligation to go that way. It's incompatible and the facility and the size of the national facility is not compatible with current and future land uses at Luca Heights, raised early on by one of the participants, and I actually worked for the last 10 years in waste operations. I've been part of the IEA waste technical committee in terms of disposal. We meet every year. We look at disposal facilities and we look at these aspects about having a nuclear research reactor and no nuclear research reactor in the world today that houses the national waste repository. And ANSTO in no way will not become a national waste repository. So in the question of where does Australia's waste come from, we've mentioned HIFAR. That is it basically operated for 50 years as Dr Paterson said. It shut down in 2007. We've taken all the fuel out. The fuel has gone overseas. What's coming back is the reprocessed waste from that spent fuel. It's the by product. It was sent back in the late 1990s over a period of about five years between 1999 and 2004. It was sent back to France for reprocessing because they've got the global expertise. The French do that process for research reactors around the world. They do it as basically a service to the rest of the world but in the end we're all obligated. Australia is obligated to take the waste back and this should be coming back by 2015. It's an obligation from the Australian government that the waste must come back by late 2015. As we mentioned before, we've got a nuclear medicine cycle. We're part of that. Whenever we're producing nuclear medicine waste gets produced and the spent fuel that's used to produce that nuclear medicine by the research reactor. We mentioned before one in two Australians are likely to need nuclear medicine at some point in their lifetime. We supply the majority of the Australian nuclear medicine and along with these benefits a responsibility of Australia is to safely deal with the by-products including the nuclear waste which is very important. That's a fact that we always must consider. So why was the spent fuel sent to France for reprocessing? The spent fuel that enabled this medicine production was sent to France, as I mentioned before, in those four of five years in the 1990s and 200s because France had that expertise to assist the global nuclear community in reprocessing. That was made in contracts with the French and the Australian government signed a contract for the waste to come back. That is coming back and the actual contract makes the obligation to be back here by 2015. We have to prepare for that. So how

is the spent fuel reprocessed in France? The spent fuel, just basically it's a little four kilograms of uranium and it has about 2281 elements, some of those went back to France. Now, the French process at a particular site in France, it's to extract the uranium and plutonium from the spent fuel and it's used in the French nuclear program and it stays there. The mixing of the remaining waste is with glass. It's a little bit different to synroc and I think synroc is a speciality for a different type of waste. And the French have got the equivalent of glass and this becomes immobilised in that black canister on the left. So between 23 and 28 of those canisters will come back to Australia. There about so tall. They weigh about 500 kilograms and they contain 180 litres of vitrified waste. So in essence those canisters are about four cubic metres. They go into a large container which will be one container coming back to Australia. That will hold four cubic metres of the waste. Overall the equivalent to less than a third of an ISO container. So we're not looking at a large volume. The actual volume coming back is small and this large container on our right is a dual transport storage container, designed not forever. They're designed up to 40 years and they can be relicensed after that up to period of five years plus. And I would expect the regulator to check on that and there's a committee in the IEA that looks in containers in terms of storage. Through Europe there's lots of storage of containers. In the US this is not new. It's actually well proven practice and well proven and I can explain that a little bit later when I show you one of the facilities we visited which is this one. So these containers, they're quite heavy. They're about 130 tonnes but basically it's the shielding. You can see myself there and a nuclear officer ... [REDACTED] and a number of other staff and the public are allowed to go to this facility. This is actually ZWIGLAG in Switzerland. They have a facility that uses these particular casks. This is a French designed cask. So it's heavily engineered. People can stand next to it because of the extensive shielding. And standing there basically you would receive no greater exposure than walking down the main street in Engadine or anywhere. But it's below what we call background, so if you're walking out there you can actually stand next to the container. So it is inherently safe in its own right in terms of radiation dose. The public could actually walk in. Before that they would need ... there were particular rules. They look through glasses. Now it's open but it's not for all public. It's really basically for visitors like us to prove to the regulators that this facility is inherently very safe. So there's only one container. That's all Australia is getting back from operating HIFAR for 50 years, very, very important. What will Australia do with the waste? Well, subject to regulatory approval from ARPANSA, which is the basis of our submission now, licencing and construction of the interim waste store, ANSTO proposes to temporarily store the waste at Lucas Heights campus on behalf of Australia, to benefit Australians. So it needs to come from that basis, Australia's benefit. ANSTO, it's very

important to say we've been safely managing nuclear by products for 50 years. I've come from different industries and I think the nuclear industry is very highly regulated and every well regulated and very, very safe inherently when you're working under industries which have got long-lived, more dangerous by products such as asbestos and other things. This is a safe industry. Very, very safe and I can vouch for that for the 15 years that I've been working at ANSTO. So why it's coming back, well, agreements are in place. I mentioned that before. I think we discussed that a few times during the sessions tonight. There are in place with the Australian government and the French government to return the waste to Australia. It's an established international accepted principle that waste must be returned to the country of origin. We can't expect France to keep it for us as vice versa. If they are reprocessing they have to send back the reprocessed waste, so that's the onus back on the country of use. Interim waste store, the first presentation showed the synroc and the facility on the left side near the reactor. The interim waste store is in the precinct of waste area. This is where we manage our radioactive waste. It does not take much space. It's basically a facility about twice as big as this room. And it needs the height. You're coming in with a large truck and you've got to unload it. So that is in the precinct within the waste area and away from the reactor, specifically because that's where we have the waste and we've actually put that together in a best site for ANSTO. And what happens then? Well, we're looking at the national radioactive waste facility. It's the government's responsibility to establish a facility. At this stage it's bipartisan support, as Dr Paterson mentioned. It's actually both sides of the government are looking towards a national facility. We're expecting to have something available by the end of the decade, so always interim storage, nothing permanent. We can't do that, so we have to have a disposable facility. And this is the reason on behalf of the Australian government is we're proposing to temporarily store the waste until this permanent facility is built which is very important to note. And that's the real basis of the submission. It's not permanent; it's interim. And basically that ends up the discussion, so I'm happy to take questions.

CM Larsson:            In that case, the floor is open for questions to both  
   [REDACTED] *the ANSTO Waste Operations Manager and*  
   *the General Manager Nuclear Operations.*

Question:                I've got a couple of questions. First of all, there's a lot of talk about the waste coming from France. I understand that the early waste at ANSTO was disposed of in two ways. The little place out there called Little Forest Burial Ground and I'd like to know ... over the years there's been a lot of speculation about what is buried there. We could never get a straight answer. We've asked it many times. Secondly, the early waste from HIFAR I understood went to Scotland,



to Dounreay in Scotland for reprocessing and Dounreay is now closing down. So my question in relation to that is there waste at Dounreay which I understand is going to come back to Australia and it has to be of a radioactive level exactly the same as left Australia. So we've got to take it back into Australia, waste of the same radioactive level. So I guess my question in this stage is, is ANSTO aware of the Little Forest Burial Ground? I certainly hope they are because I understand they're responsible for it. And secondly, all this talk about France, well, what's happening about the waste in Scotland? Is that coming back here?

CM Larsson: Can we take these two questions in reverse order? I think it's better that you talk about the waste returning from the UK first and then we can have a quick response on the Little Forest Burial Ground because technically speaking that's not part of the consultation here but I think in the interests of everyone we should have a response to that as well.

GM Nuclear Operations: That's a very good question. There's no doubt there was spent fuel gone to Dounreay back in 1996. It got ... consisted 114 elements and Dounreay has now a substitution contract that the Scottish government is asking all of the original spent fuel owners ... there was a substitution contract, they will keep the cement waste there and give us an equivalent substitute amount of vitrified waste. That will come out of the [2:24:32 Cellarfield] site and we've established a contract. The Australian government established a contract with the UK NDA with the particular amount of waste. That is subject to finalisation of substitution in the contract and we are looking at possibly going towards the latter half of the century before the waste can come back. That is basically the contract ... sorry, the decade, that's around 2020, which means that we are hoping that the facility will be established so the waste can go back to the national facility because that's the process.

A Paterson: I must just give a great deal of credit to the people who drafted the contract in the 1990s and established an international agreement between the United Kingdom and Australia that clearly delineates what is to happen with the waste. [REDACTED] *The General Manager Nuclear Operations* has just indicated something that's very important. We would have had a cemented waste if we were relying on the Dounreay facility but as is good practice now internationally, you can do an equivalence activity swap. I think that was more or less the way you framed the question. And we will in fact use the same over pack when we've completed that swap as the one that you've seen on the screen. So we'll get a much lower volume back. It will again have a lower cost to retain that waste and it means that we're only using one technology and that is framed in the submission that we have made to the regulator. The reason we're emphasising France at the moment is the matter of timing. It is important that subject to regulatory

approval the timings are taken account of because of the international agreement in relation to our agreement with France. And we also have a very good agreement, as I indicated, with the United Kingdom which anticipates the existence of a national repository which is great. So ANSTO is absolutely certain in our mind that the best policy position that we can achieve is that there is a national waste repository, that we have this as a temporarily stored on return from France and if necessary on return from the UK. And it will ultimately be dispositioned to the national store, consistent with the excellent regulations which have just been published in March 2013. In respect to the Little Forest Burial Ground, ANSTO knows all about it. We monitor it and manage it and we discuss it regularly with the regulator and indeed we're doing some research on that site as well. That is important in international benchmarking of these types of sites.

Question:

There was a few things. Earlier you spoke about the included price of the waste management but I was sort of wondering for how long when this waste obviously lasts for a long time because you mentioned funding for the duration of the lease but even just as a temporary situation it could be there for multiple decades. You didn't specify how many multiple and it's going to keep coming from other countries, as you've just said. So I mean, yeah, a timeline could be a period of several tens of years. Basically the obligation with France, I believe, is by 2015 to bring this waste back. We have an agreement with them but why doesn't the Australian government ... I believe they haven't even formally suggested that the waste stay there a bit longer. We have a bond with them which I believe if \$400,000 but there is a budget of \$35 million to deal with this waste. So why not tell France that we can't take it back yet until appropriate disposal or ... yeah, I guess you could call it disposal measure is thought of. There was 10 sites before Muckaty in the Northern Territory that were proposed. They all got rejected. Now there's one site which is going through the same problems that those other 10 sites went through. When you're saying tens of decades of years facing those problems, what does that actually mean?

A Paterson:

I think your analysis is exactly correct. If one did a risk analysis of the different alternatives in relation to our international reputation, in relation to our global nuclear obligations, in relation to our standing in the international atomic energy agency and the other nuclear leadership bodies around the world, the assessment that has been made – and I suppose that assessment – is that it is more important for us to meet our obligations to France as a sovereign nation in its own right as an Australian nation than it is to attempt to renegotiate the time scales at present. I think that's a very wise decision because you don't want to create uncertainty in relation to international nuclear agreements between nations. That's what we have the IAEA

for. And it would certainly not be a good precedent to not meet our obligations in respect of the return of the waste. The financing aspect, correctly you identify that there is a significant quantum of money in the management of this waste and in fact I think early responses and predictable responses with future suppliers of reprocessing services for Australia will support the lowest possible price if we maintain our obligations. If we are seen not to maintain our obligations you're going to attract a very premium price in future when we reprocess fuel from the OPAL reactor. So I think the judgment of the people who have applied their minds to this certainly has thought through the analysis that you've raised. But on balance from a reputational and country risk point of view I think we've landed in the right place. And I think it also then goes to the very, very fruitful acceleration of the processes in government after the passing of the legislation for the national waste repository that we all work hard to make sure that is built in a safe and effective way. It's licenced subject to the decision of the regulator and becomes the place to which all future spent fuel returns with be associated with direct transport to the final repository. That would be the best solution for all of us. I think we all agree about that. So I take very much the same position as you but with a slightly different landing.

G Williams: Thanks very much, good question. In terms of establishing a national waste facility somewhere in Australia you're absolutely right. We had the 10 sites. We chose an ideal site which was Woomera and of course it fell over for a number of reasons but fundamentally it's politically very expedient to delay such a decision but then there's other pressures that are going to come on Australia. For instance, we're signatory to the joint convention, United Nations convention on safely managing and disposing of our radioactive waste. And there's international obligations that Australia along with all the other countries that are signatories to that convention have, to properly, safely manage and dispose of our radioactive waste. So there's international pressures that are building on all countries who are delaying that decision to safely and securely dispose of their radioactive waste. There will be pressure from the regulator because if we have a licence application that has a finite time on it, at the end of that finite time what's going to happen? There has to be some channel, some avenue, whereby something can be done because the licence will be ... it will have run its course. So there will be pressure from the regulator. There will be economic pressures because ultimately the economics of indefinitely storing waste and more and more of it and the safety issues and the security issues of attempting to do that, so politically it's a tough one but there's all these other pressures. Our obligations under the international treaty, regulatory pressures, economic pressures on Australia, so ultimately we have to do it and we have to find that site and really, as you've said, Australia is blessed with a multitude of sites that potentially are

satisfactory. We have to find the one where it just works and certainly there's a role for the regulator there in helping to set the guidelines for choosing that site.

Question: [REDACTED], what is the motivation for choosing a very remote site like Muckaty? I should have thought that there'll need to be some kind of monitoring, some kind of professional presence there, the whole time, just so that people will have the confidence that it is being handled responsibly even if it could logically be left alone. And it seems like a very expensive operation to mount that in a remote site. And it seems to me that choosing a site like that has elements of terra nullius idea about the whole thing. It's just out of sight, out of mind. It belongs to nobody. And really nowhere in Australia is terra nullius, we know. Why do we not buy an area closer to infrastructure where we can service it and transport it more easily?

G Williams: Yeah, good question. It's really not the scope of what we're here for tonight but just very briefly, I mean, the criteria, currently international best practice are all in here. And some of those criteria would lead you to a remote site and others, as you've just discussed, would lead you to a less remote site, things like surveillance, security aspects and so on. It's a balancing act and it's not for the regulator to choose or recommend one site over another when policy, those in government whose mandate is to define the policy in the area, when they make that decision and come to us with an application, then we'll look at how well they've addressed all of these issues. It's not for us to say that is better than this or this is the overriding issue that would push you towards a remote over a less remote location. They'll make that decision and so long as the safety and security elements are addressed adequately, properly, then obviously they have an excellent prospect of obtaining the licence. But if they're not, for whatever reason they choose a site and one of those elements is not properly addressed by that site then that licencing process would not go ahead.

Question: With regard to the waste being produced at Lucas Heights can you tell me what the short half-life of that waste is, what it will be when it becomes waste? My understanding of a short half-life definition is that it is the time when the waste starts to breakdown and I have read ... I'll have to look this up. I've got it at home somewhere that the waste is something like a short half-life of hundreds of thousands of years. Is this fanciful or not?

GM Nuclear Operations: Well, there are different types of classifications of waste as Geoff mentioned earlier. You're talking about certainly the waste coming back from reprocessing because that is a different type of waste that has got that part of the cycle where you've got long lived. Anything above 30 years is a 30-year half-lives ... every 30 years is a half-life drop in the activity. You've got ... that's the cut off for waste, so

anything above that is and then some of that will be geological. We're talking about interim storage, so this is 50 years of interim storage, stored. So a national facility will be based around near surface disposal for low-level waste, anything below 30-year half-lives that will decay in a period of 300 years so that you can actually shut down the facility. You manage it after 300 years you can actually shut it down. You have some control over it. But for a store that's the ... Australia doesn't make much waste at the moment, so the store will capture the ILW waste but to go ... the international practice is actually if you go down ... they're geological. Now, high-level waste will go very deep. We're talking intermediate level waste, medium depth, anywhere between 100 to 200 metres. That's something for Australia to think about in the future. That's why the government is actually looking for a co-located near surface disposal facility for low level waste with a short-lived and a near surface store for the longer lived waste. At ANSTO we produce lots of waste. [REDACTED] produces radiopharmaceutical waste, very short lived. We have good segregation processes which we've implemented which decay the waste at the source. Then we move it separately. We have certain decay periods. In the end a lot of the waste decays that can be exempt, as Geoff mentioned, which is free of regulatory concern which can be disposed of to normal municipal tips. So there is a waste reduction process in every nuclear research facility but in the end you have longer lived waste which is the reprocessing of the spent fuel.

A Paterson:

I think [REDACTED] *the General Manager Nuclear Operations* has explained a couple of the important principles. We do try to minimise the volumes of the waste by stratifying it and separating it into different components of waste. I think that the public should be aware of what the national legislation implies. This is not a responsibility of ANSTO but just in the interests of complete openness in this regard. The Act that has been passed talks about a national waste repository and store. The repository piece is for the low level waste which is typically things like gloves and things that are used in nuclear medicine production. They ultimately end up in drums and then those drums are volume reduced and you reduce the volume as much as you can. The repository part is the bit that will ultimately lead to that waste being disposed of and that's why we call it a repository. The intermediate level waste that will be returned to Australia will be in a national store. That means that the final pathway for the disposition of that waste in its final form is not determined. So it is in interim phase in its own right and what will happen over the next period of time while it is in that national store is the process, the final disposal of the intermediate level waste will be determined for Australia. Now, we know from around the world a couple of countries have made good progress. Finland, Sweden has made some recent announcements in terms of its long-term



storage. There's been a very long debate in Germany about the adequacy of some of their current stores. So this is pretty much we've caught up with the rest of the world with our legislation but we now need to move into the technical solution for the long-term disposal of the intermediate waste. That will be a matter for the authority that operates that store and for the part of government that is responsible for the waste that is in that store and that is currently the Department of Resources Energy and Tourism and I suspect that if there's any need to get information in respect of that part of what we're discussing you should approach them directly because that is their accountability.

**Question:** Are you saying then that ANSTO will not be producing on the intermediate level waste with its processes in the future? I mean, I can put it another way. If the waste is going to be produced at ANSTO with your expanded facilities, give me an idea of what it is and how it's going to be stored and where it's going to be stored and so on?

**A Paterson:** Thank you, I just want to be clear about the national facility itself being a store for the intermediate level waste. ANSTO will continue in the production of nuclear medicine to generate waste in the classification that it would be below the threshold and would be disposed of using the typical routes where it's not required to be stored in a waste repository or disposed of in a waste repository. We will have low-level waste. You're very familiar with the classifications. If not, they're in the new guide. Low-level can be disposed of in a repository and intermediate-level waste is stored at the national level. ANSTO will continue to produce intermediate-level waste as a by-product of the production of nuclear medicines and for fuel return programs after the reprocessing of OPAL fuel. So we haven't eliminated the need to have an intermediate-level waste capability nationally to store the ultimate waste that comes out. What we do in nuclear operations is continually reflect on how the waste is being produced and seek by a variety of means – and there are conferences around this globally, annually – how can we minimise waste because obviously that's what you would want to do. You'd want to minimise waste to the greatest extent possible. And that will be a continuing journey for ANSTO.

**CM Larsson:** Anyone that has an additional question? I'm looking around the room here and I don't see any hands and I guess that suggests to me that it's time to draw this information session to a close. I would like to thank everyone who showed up here tonight and thank them very much for their participation. The representative of ARPANSA and ANSTO were actually paid to be here but the rest of you have sacrificed your evening to participate in this meeting. I'm very grateful for that. I would like to echo what Geoff Williams was saying here before, the importance of the consultation process. The consultation process is not only

something that you actually do just to tick the box. It's an obligation and you have done it and that means that you can proceed from there. The consultation process is an extremely important element in reaching the best decision. Whatever that decision can be or maybe but it's a very important process whereby we get more information from the decision making side about anything that could be of concern for anyone among the stakeholders. And incorporating that in the decision-making process and having that properly reflected in the actual decision that is being take in the end is a way, a means, of reaching a much better decision. It doesn't say anything about in which direction the decision is going to go. It just says that a decision is going to be better founded. We will have a better basis for it. With those words, again, I would like to thank everyone who came tonight and wish you a safe trip back wherever you go, locally or further afield. And we will continue the consultation process. It will close on 12 June as was indicated. Yet again, if you would like to make submissions please do so. Follow the instructions in the brochure and we will keep a record of all the submissions on all the issues that have been raised. We will also communicate back when we finally have reached a decision on this issue how we have responded to the different questions or issues that have been raised to you in the consultation period including those that have been raised during this meeting. So finally, thank you very much.

[END TRANSCRIPT]