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# Official Committee Hansard

## SENATE

ENVIRONMENT, COMMUNICATIONS, INFORMATION  
TECHNOLOGY AND THE ARTS REFERENCES COMMITTEE

**Reference: Environmental regulation of uranium mining**

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**SENATE**  
**ENVIRONMENT, COMMUNICATIONS, INFORMATION TECHNOLOGY**  
**AND THE ARTS REFERENCES COMMITTEE**

**Thursday, 24 October 2002**

**Members:** Senator Allison (*Chair*), Senator Tierney (*Deputy Chair*), Senators Lundy, Mackay, Tchen and Wong

**Substitute members:** Senator Crossin for Senator Mackay, Senator Buckland for Senator Lundy and Senator Scullion for Senator Tierney

**Participating members:** Senators Abetz, Bolkus, Boswell, Brown, Buckland, George Campbell, Carr, Chapman, Conroy, Coonan, Eggleston, Chris Evans, Faulkner, Ferguson, Ferris, Harradine, Harris, Knowles, Lees, Mason, McGauran, Murphy, Nettle, Payne and Watson

**Senators in attendance:** Senators Allison, Buckland, Crossin and Scullion

**Terms of reference for the inquiry:**

For inquiry into and report on:

The regulatory, monitoring, and reporting regimes that govern environmental performance at the Ranger and Jabiluka uranium operations in the Northern Territory and the Beverley and Honeymoon *in situ* leach operations in South Australia, with particular reference to:

- (a) the adequacy, effectiveness and performance of existing monitoring and reporting regimes and regulations;
- (b) the adequacy and effectiveness of those Commonwealth agencies responsible for the oversight and implementation of these regimes; and
- (c) a review of Commonwealth responsibilities and mechanisms to realise improved environmental performance and transparency of reporting.

**WITNESSES**

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**Committee met at 2.05 p.m.****HART, Professor Barry T., Chair, Alligator Rivers Region Technical Committee**

**CHAIR**—Welcome. We are very pleased that you are able to talk with us today. We have had some challenging issues to deal with in this inquiry, so I am sure that your advice will be very useful to us. The committee prefers all evidence to be given in public, but should you at any stage wish to give your evidence, part of your evidence or answers to specific questions in private, you may ask to do so and the committee will consider your request. You are reminded that evidence given to the committee is protected by parliamentary privilege and that the giving of false or misleading evidence may constitute a contempt of the Senate. I invite you to make any comments you wish to make by way of an opening statement before we go to questions. Perhaps you might like to start by giving us an outline of the ARRTC's role and the changes that were made to its structure last year.

**Prof. Hart**—Certainly. I really did not have anything in particular that I wished to say to this inquiry. I thought that you may well have a number of questions that you wished to put to me. I think it is fairly clear to you that the government changed the structure of the Alligator Rivers Region Technical Committee last year in response to both national and international pressure. It has now been revamped, with seven independent members and six stakeholder members. I have to say that the seven independents have an interesting and challenging role, thinking of what we are about. It is very clear in the act what our responsibilities are—that is, to underpin the management of the Alligator Rivers region with good science. But, having said that, I suppose it is also to make certain that good and relevant science is available, is being collected or generated as the case may be and is being used.

We have had three meetings, as I think you are probably aware, since we started late last year. Our first meeting was in September 2001. We are really still working through our modus operandi. We have started to develop an operational plan—which is a strategic plan, or a business plan—where we are really trying to spell out what our modus operandi or our operating principles and our goals are. The Senate committee might wish to have a copy of that. It still has a number of question marks, but I think it will give you a fairly clear idea of where at least we see the necessity for open, transparent activities.

**CHAIR**—I think that would be useful.

**Prof. Hart**—I would have sent it along, but my email is down at the moment. I am a member of Monash University and apparently, following the terrible things that happened on Monday, the number of emails that are being received has severely strained our emailing system.

**CHAIR**—When you are ready.

**Prof. Hart**—Yes, certainly. I will send that to you. But it may be useful just to indicate that we—in particular, the independent members, who are still trying to come to grips with much of the information in this region—are very well aware that we are being scrutinised or will be scrutinised both by the national community who are interested in this area and certainly by the international community. So in terms of our operating principles, we have been very clear to try and at least spell out that we want to be open and transparent; we want to be as independent as we can be; we want to be proactive and not just reactive. It is very easy for these technical

committees to be swamped with information from those who know a heck of a lot more of the detail. We are very keen to focus not just on the present but also on where we need to be in terms of knowledge needs in the future and a few other things. Basically, our goals are to ensure that the research being undertaken by ERISS and ERA is of the highest quality and relevant and to ensure that that scientific knowledge is used to underpin the regulations, both the management and the policies. I think that is all I would like to say in introduction. I would prefer, I guess, if you asked me questions.

**CHAIR**—That is what we will do. I will start with the question of event based monitoring. This has come up again and again in submissions. Conservation groups and representatives of traditional owners have said that this is the only way to understand if there is an impact and to be able to monitor the worst events in a way which is not possible with the current system. Could you comment on that, please?

**Prof. Hart**—I presume you are all very well aware of event based monitoring, where you try to monitor, in this case, the water—probably downstream of the mine—over a hydrological event. Hydrological events—rainfall or run-off of that rain—are really the time when any of the major impacts are going to occur. It is not the only way in which materials can get from the two mine sites—I am focusing on Ranger and Jabiluka—to the Alligator Rivers region but it is by far the most likely to get there via the water pathway. Most of that action is going to occur during high rainfall events and so the theory is that if you monitor over high rainfall events when the flow increases you will get the best indication of whether anything has been transported.

I would say that ideally that is the way to go—to monitor events. There are two points to make, though: one is that it is very difficult and quite expensive in that particular region and the second is that really event based monitoring will only pick up materials that are being transported in particulate form or in dissolved form. It does not indicate what the effects are, and I guess the focus, certainly ARRTC's focus, has been on the ecological integrity of the region. So event based sampling does not give you any indication of what the biological effects are.

ARRTC looked quite closely at the monitoring that is taking place and the suggested modifications to that being undertaken by both ERA and OSS and we were confident of the monitoring that is in place at the moment. We have a number of things that we are still watching in terms of the implementation of the new monitoring program that ERA have proposed but, given what the OSS has in place off-site, coupled with what ERA have on-site, we are at this stage confident that any adverse effects will be picked up. That is a longwinded way of saying that event based monitoring has a place on-site but, at this stage, I do not really think that it is necessary off-site.

**CHAIR**—What about the question of landscape monitoring? Is that something that is being considered?

**Prof. Hart**—Yes, it is.

**CHAIR**—What is landscape monitoring?

**Prof. Hart**—ERISS have put up a proposition—I believe the suggestion came from the World Heritage Committee—suggesting that they need to be putting any potential effects from the mine site into the overall Kakadu or Alligator River region context. So landscape ecology, or landscape effects, is really just saying that you have got to look at the catchment—you have got to look at what is going on upstream and what is coming from the site that is likely to be putting adverse effects into the system and you have got to look downstream. That is the way I describe landscape ecology. It is really about trying to get the effects of the mine—or the mine sites—into context with other activities that are going on within the catchment.

**CHAIR**—Will that happen at Jabiluka?

**Prof. Hart**—I think we have a way to go. ARRTC was presented with the start of a more landscape-oriented research program. We were doubtful about a number of the things being suggested. In fact, we did not feel that we had enough information to say that we thought the research being suggested was going to produce the outcomes we felt were required. So, for this year, we have agreed to support a small number of projects that will give us some better information, and then at our February meeting next year we will be looking in much more detail at what is being proposed. We supported the idea of widening the brief to a broader scale than just in the immediate vicinity of the two mines.

**Senator CROSSIN**—When you say you were provided with evidence that you did not think was specific enough or did not meet your needs, who provided that to you? Was it OSS or the company?

**Prof. Hart**—No, that was ERISS. Dr Finlayson provided us with a brief on a possible landscape scale research program. It was pretty big. That was the first scoping document, which was really about opening up a number of questions. Our remit is to always focus back on the potential effects of the mines and, while it could be good science to go much broader than that, we were just concerned that we needed to look very carefully at the scale and the scope of such a project, which could take many hundreds of thousands of dollars. We have got a first thrust at what this program might consist of, what questions it is seeking to address and what the outcomes might be. We have got some more work, in collaboration with ERISS, I think, to firm the program up.

**CHAIR**—If it were agreed to go ahead with a process which would cost \$100,000 or more, who would be obliged to pay for that? Would that come out of Commonwealth funding?

**Prof. Hart**—My understanding is that the Commonwealth government pays for the entire research program.

**CHAIR**—But the new type of monitoring would not be required to be paid for by the miners, for instance?

**Prof. Hart**—I do not know; I do not think we have any role in deciding that. Our role is very much about the best way of doing things to provide the required amount of surety for the environment.

**CHAIR**—A related question is why a relatively small section of the biota is monitored or tested—mussels and fish, and I think snails are the third group.

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**Prof. Hart**—Yes.

**CHAIR**—Why not take more? Why not take plant material and look at soil structures? Why is this so limited?

**Prof. Hart**—In the aquatic environment it is pretty common nowadays to be using the insects or the invertebrates and fish structure where you can. Again, in an ideal world you would use more biota. The question is what we know about those biota and the effects of the contaminants that we are likely to be looking at—uranium sulfate, manganese and so forth. It really comes down to the pragmatics of what is feasible, what is known and whether, in fact, the three or four groups that are being looked at at the moment are sufficient to give us a clear enough indication of the response. We obviously want to look at sensitive organisms that are going to give us a good signal if things are going wrong.

**Senator CROSSIN**—Are you aware of moves to put a representative of a non-government organisation on ARRTC?

**Prof. Hart**—Yes, we were asked to look at that question by some of the traditional owners. At last February's meeting, we had a long and lengthy discussion about that. Our basic advice to the minister was that we had no in-principle objection to an NGO represent—there used to be two NGO reps on the previous ARRTC. But we as a group—it was mainly the independents—did not really see that it would significantly enhance the status of the committee, so we said that to the minister. The minister has decided that he wishes to have an NGO representative on ARRTC and there is a process at the moment to identify who that might be.

**Senator CROSSIN**—It was a decision of the World Heritage Committee, wasn't it?

**Prof. Hart**—That there be an NGO?

**Senator CROSSIN**—Yes.

**Prof. Hart**—I do not think so. I thought the World Heritage Committee, in fact, wanted a more independent ARRTC. I am not aware that they spelled out how the committee might be constituted. Independence was the thing that they were on about.

**Senator CROSSIN**—Why would they believe that you were not independent? Could you give me some background to that? Why did they make that recommendation? What did they see that you were too close to—was it the Commonwealth government or the mining company?

**Prof. Hart**—With the previous ARRTC, I think the situation was that they felt that ARRTC mostly consisted of stakeholders. The new structure, in fact, has a majority of independent members—seven of us—and six stakeholders.

**Senator CROSSIN**—Has ARRTC considered the relocation of ERISS to Darwin?

**Prof. Hart**—No, we have not. We have got to be very careful that we are looking at effectiveness. Our focus is on the science—ensuring that the right knowledge is being

generated—and, I have to say, it is primarily a physical, technical and scientific focus and not the social side of things. Focusing primarily on that, we have not considered it.

**Senator CROSSIN**—Would either you or the committee have some concerns about ERISS relocating to Darwin and being a couple of hours drive always from the major area in which they are actually conducting their science?

**Prof. Hart**—There are always trade-offs in terms of getting and keeping good people, which will be enhanced by being in Darwin, and being able to get to your field sites. I guess one would always have to have some concerns about that. It is a trade-off as to whether the relocation of most of the people into Darwin gets ERISS a more consolidated and better scientific staff in the longer term.

**Senator CROSSIN**—I think the numbers have diminished, have they not, in the relocation to Darwin?

**Prof. Hart**—I cannot comment on that. I do not know.

**Senator CROSSIN**—Can you explain to us a little about the process for the approval of the Jabiluka water management plan?

**Prof. Hart**—ARRTC does not approve anything; we are an advisory committee. We certainly considered the water management plan that was put up by the Mine Site Technical Committee. Specifically, what would you like to consider? We looked at what was being proposed. We looked at the process by which that was being decided. I suppose our primary focus was: what was the knowledge base behind the decisions that were being made? As you probably have seen from our minutes—if you have not got the minutes, you certainly should get them—we certainly had some issues that we wanted explored a little further. One of our members, Ray Evans, is a geochemist and a hydrogeologist, so he knows lots about ground water and uptake on soils and the like. He had one or two concerns that are being worked through at the moment. I think our role is more to look at the knowledge base behind the decisions.

**Senator CROSSIN**—Professor Hart, concern was expressed to us in our Darwin hearings that some of the people who attended your meeting of 25 to 27 February held earlier this year, where you looked at the water management plan for Jabiluka, had knowledge of the incidents that occurred at Jabiluka with respect to the water yet did not bring that to the attention of the committee during its discussion and analysis of the plan. Are you aware of that?

**Prof. Hart**—I do not quite know what you are referring to there in terms of ‘incidents’. There was an incident at Ranger.

**Senator CROSSIN**—I think there was also an incident in respect of the excess water at Jabiluka having to be disposed of and the way in which that was done. I have not brought my papers with me, but I thought there was another incident with respect to run-off upstream at Jabiluka.

**Prof. Hart**—Yes, there was one high level uranium result. We certainly did not know about those incidents. We have looked at the report that was subsequently produced on that so-called incident and certainly the report on the other incident that occurred in January at Ranger; they

were not brought up. But I do not think the Jabiluka water management program really would have had any great relevance to our looking at the knowledge base behind the decisions that were being made.

**Senator CROSSIN**—The evidence we got from some witnesses in Darwin was that they felt that some people on the committee were being somewhat disingenuous in not providing the committee with knowledge about that incident at the time you were looking at the water management plan. I suppose I am heading to this question: should there be somewhere a recommendation that your committee be advised of those incidents prior to any sorts of plans—or further scientific approval—by your committee being undertaken?

**Prof. Hart**—Again, it is a tricky situation. The whole area of communications is one that I am sure you have been tackling: how much information is given, what sort of communications there are with ARRTC and the like. I have instituted a process whereby ARRTC will be looking at all of the relevant mine site plans. Certainly, water management plans are very much in that light. On the question of incidents like that which occurred at Ranger—and perhaps also at Jabiluka, although it is a bit more tenuous as to what actually happened there, whether something occurred or whether it was a spurious result—we have made it very clear that ARRTC should be informed of those situations straightaway. ARRTC has done a review of the Supervising Scientist's report on those two incidents. ARRTC's report is not quite finished at the moment, but we went through the OSS report in quite some detail and have made some recommendations to the OSS.

**Senator SCULLION**—I would like to validate a couple of bits of evidence we have had in the past and perhaps get some of your views on them. I have asked a number of people about whether or not they have seen any increase in uraniferous material outside the project as a consequence of the mine being there, and they have said no. Can you tell me how hard it is to ascertain whether that has come from the mining view that there is a possibility of naturally occurring levels quite higher than background levels prior to the mine being there. I am talking about landscaping and doing a larger survey of the area. How difficult is that going to be?

**Prof. Hart**—That is a good question. It will be difficult because normally to pick up those changes due to something like a mine you need very good data about the 'before' situation. I have to say that the Alligator Rivers region is probably the most studied area in Australia. However, the amount of pre-mining information was very much 'stamp collecting', I have to say. It was very much about what was there, how much there was, what the wetlands were like, what wetland plants were there, what the flow was—those sorts of things, rather than ecological process understanding. To answer your question, yes, up to a point it is possible to pick up changes due to the mine, but in general it is relatively difficult, particularly in terms of accumulation of materials, to bring that back to the mine site itself.

**Senator SCULLION**—In a similar vein, have you seen or heard of any work that has been done on the impact of a long-term exposure to low levels of uraniferous materials? We have set limits and levels; they are the only benefit—if it is a lot more than that, then we get concerned.

**Prof. Hart**—Is this to humans?

**Senator SCULLION**—To anything. The sorts of levels we are talking about seem to me, as a layman, to be very small levels—

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**Prof. Hart**—They are.

**Senator SCULLION**—but over a very long period perhaps there could be some sort of impact on the environment, on species. Do you know if there is any work that we could look to?

**Prof. Hart**—I cannot comment on humans; I do not know enough about that. I can comment in terms of the biota. The question previously was: why not a wider range of biota? Equal to that question is: why do we just look at particular life stages of the snails or the fish and so on? They are all different in their sensitivity—for example, fish go through a whole range, from eggs to fry to adults. Generally speaking, the earlier the stage, the more sensitive is it. In the ecotoxicological area there is always discussion about ‘What is the best form to use in testing?’ That is trying to get at your question—what are the most sensitive life stages, what are the most sensitive biota, are there longer term effects? Most of the ecotoxicological tests are run for a laboratory convenient time of four or five days. Some are run for longer than that, depending upon the organism. The sorts of questions that you ask are always at the back of the mind in terms of our knowledge base. I do not think I can say much more than that except that this is a worldwide situation. We are always looking to see whether there are more sensitive ways in which we can put monitoring programs in place.

**Senator SCULLION**—Further to the issue of ecotoxicological testing, what I took out of much of the evidence given by some of the Indigenous representatives and the people from the Kakadu area was that they are concerned principally because they do not know. Their concerns related to bush tucker—the things they eat, the things they catch, those sorts of things—in the area and what impact that would have on those things. Because they are concerned about that, perhaps they would not eat those things. Just in a pragmatic sense—outside of the social sense—what sort of value would you put on going down the line of saying, ‘Let’s have widespread, outside of the project area, ecotoxicological testing on those issues that are associated with the Indigenous people in the area—all of those plants and species’? Is that possible?

**Prof. Hart**—Anything is possible. Let us come back to why you would do that. The ecotoxicological type tests are primarily to get an idea of the ecosystem resilience or the ecosystem capacity to be influenced—the biodiversity. That is what almost all the uranium testing, sulphate testing and manganese testing has been aimed at—the broader ecological integrity of the Alligator Rivers region. The issue about bush tucker—the traditional owners’ concerns—is much more about human health. I believe that there is some monitoring of that going on. I know there has been a huge amount of work done on radiological bioaccumulation in past years, but I really cannot say anything more about what is going on at the moment. But, yes, it is feasible to do that, and it probably is a very good idea that it be done. It would not have to be done every month; it would be the sort of thing that you might do every couple of years.

**Senator SCULLION**—I go back to not so much the event based monitoring but the actual number of sites. There are a number of sites within the project area. As I understand it, the catchment runs through the project area such in a way that the last point at which it leaves can be a point at which you can have reasonable levels of confidence. It has been put to us, by Dr Mudd, if my memory serves me correctly, that we should increase the number—I do not have the number, but it is an astronomical increase in the number; whatever the number is, it is quite a quantum leap in the number—of monitoring sites within the mine site area. Do you think there is much value in doing that?

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**Prof. Hart**—At our last meeting ERA put what I think they have now put to the Ranger Mine Site Technical Committee: a modified monitoring regime which, in principle, to us sounded pretty sensible. We will still need to look at how that pans out. The idea was to have I believe about three, if not four, of those exit points some event based monitoring—which I think still needs to be worked through in its entirety—and a number of investigative sites at key and strategic locations within the mine. That seemed, in a water management sense, to be a sensible way of going about it. I do not know what Dr Mudd is suggesting. From what was presented to us by Ranger—it is one thing to recommend what a modified program might be and it is another thing to see it actually put in place and being effective, and we have not seen the latter yet—I certainly would have thought that there was not a need for an astronomical number more than they were suggesting. The recommended ERA program seemed to us to be pretty reasonable.

**Senator SCULLION**—I want to just touch again on the technical aspects of the monitoring. The Mirrar people have called for the limit levels—and I understand that the limits are 5.8 for both Ranger at Magela Creek and Jabiluka at Swift Creek—to be taken down to 0.05 and to 0.5 at Jabiluka and Magela Creek respectively.

**Prof. Hart**—Is this for uranium?

**Senator SCULLION**—This is, I understand, the uranium level. Do you think that is going to be realistic? Do you think that is achievable?

**Prof. Hart**—Did you say 0.05? Can I just clarify that?

**Senator SCULLION**—The current limit in parts per billion is 5.8 at both Magela Creek and Swift Creek. They wish to take both of the limits down: at Ranger to 0.5 and at Swift Creek off Jabiluka to 0.05. That is the actual allowable limit.

**Prof. Hart**—The statutory limit, yes. I think that is probably pushing the limit much too far. I have got to say, just before I go on any further, the figure of 5.8, I think, is unduly exact. I think of it as basically a figure of six: six micrograms per litre, or six parts per billion. A figure of 5.8 is really indicating that the level is a lot more accurate than I think the basis of the data is. To go back to the way in which ERISS arrived at the figure of six, it was in line with the new ANZECC guidelines for 99 per cent protection of the aquatic biota. That is certainly the internationally accepted methodology nowadays for very high and essentially unmodified ecosystems. So I think they have done that pretty well.

The problem often with a situation like that—where the statutory limit might be something around six, but in fact if you have had a look at the data it is pretty rare that the background levels in any of those systems gets above about 0.1 part per billion, or 0.1 microgram per litre; so there is a huge difference between what is there at the moment and the sort of level the ecosystem can tolerate—is that a statutory organisation might allow pollution up to that level. That is why the focus and the action levels are very relevant; you can make some management decisions well and truly before it gets to a statutory level. But we were happy with the process that ERISS had gone through to get to that statutory limit, and the Mirrar suggestions are way out of what I think is necessary.

**Senator SCULLION**—Thank you, Professor. I think there are some other senators who want to ask questions, so I might come back to you if there is time at the end.

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**Senator BUCKLAND**—Professor, I have only a couple of questions because most of mine have actually been asked. Is the water filtration system that they have at Ranger, through the wetlands system that they have, successful in removing heavy metals from the water that eventually goes into the river system?

**Prof. Hart**—We had a couple of reports from ERA that one of my colleagues is studying in detail. Our broad understanding at the moment is that they seem to be quite effective for heavy metals. Wetlands system will be very effective, whether it is up there or anywhere else in the world, in removing anything that is associated with larger particles—soil particles and sediment particles. They tend to be less successful for dissolved components, and it depends very much on the retention time, the hydrology, as to how successful they are. But the work that we have seen so far suggests that the wetlands systems that are in place in upper Corridor Creek are performing very well at the moment. There is always a question as to how effective they are in the longer term, but certainly at the moment they seem to be working very well.

**Senator BUCKLAND**—From your answer, would I be right to have in my mind that the longer the water was in the holding pond or in the wetlands system, the more likely that the dissolved contaminants could be removed?

**Prof. Hart**—Yes, that is a fair comment. There are a number of processes that will occur the longer the water is in that situation. For example, there is the potential of actual biological uptake in the aquatic plants and there is also the potential of adsorption on to the bottom particles, the sediment at the bottom.

**Senator BUCKLAND**—Is the external measuring station they have too far from the site to monitor the water flow once it has gone down Corridor Creek? I think it then enters the river, but I cannot recall from the map that I was looking at. Would it be better to have a number of measuring stations along the creek?

**Prof. Hart**—The downstream situation that OSS monitors is at the gauging station; you probably know it as GS009. It is a couple of kilometres downstream, as I recall, and I am just racking my brains as to where Ranger monitor. I know that they do monitor Corridor Creek and I think it is, again, at a weir that is a kilometre or so from where it enters the Magela Creek. In answer to your question, you can always add in more monitoring sites. I guess our feeling was to stay pretty much with the ERA suggestion at the moment to see how effective that monitoring was going to be. One could put a monitoring site further down in Corridor Creek, but there is little opportunity for materials to get from the mine site into Corridor Creek below where they have got their present monitoring site. I do not really see all that much relevance. It seems pretty effective at the moment.

**Senator BUCKLAND**—Is there any likelihood—and you may not be able to answer this question, reading your background—of airborne contamination of plant life or animal life within the vicinity?

**Prof. Hart**—That is certainly always a potential in a mine site. I cannot answer that directly, but I know that there have been studies. There are two ways: there is the potential for radon gas to get off site and there is potential for contaminated dust to get off the site via an aerial pathway. The Supervising Scientist has done quite a lot of work on that. I am not au fait with exactly where that work is at the moment, except to say that all of the studies that we have been

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looking at and are asking for are bigger picture studies, or syntheses, to put some of those issues into context. Your question is a very relevant one; it is one that the traditional owners ask. At our last meeting, we suggested to ERISS and to the OSS that they really need to put together some big picture syntheses of the pathways by which contaminants can get from Ranger, in particular, into various locations within the Alligator Rivers region. What we call conceptual models have been done—models of the pathways, where you can quite succinctly indicate what is likely to be a high-risk area and what is likely to be pretty insignificant.

**Senator BUCKLAND**—The only other question I want to ask you is: is there any likelihood of subterranean contamination?

**Prof. Hart**—Yes. The whole question of ground water contamination is one that has implications in the longer term, because the ground water flows are very much slower than surface water flows. So they are the long-term potential impacts. Again, the company, OSS and the Northern Territory government department have done quite a lot of work on that, of which I am not fully familiar, but I am sure that they could assist you in terms of the risk. Again, I would say that it would be part of trying to describe as a conceptual model the potential contamination pathways—what was there, what was the risk, what was the time frame that the risk might manifest and whereabouts in the region. We think that such conceptual models could assist very significantly in explaining to people and putting all of the potential risks into a proper context.

**Senator BUCKLAND**—I did say that was the last, but I am never right when I say that. My other question was: what weight do you put on the research undertaken by the ANU?

**Prof. Hart**—Which in particular?

**Senator BUCKLAND**—The Wilderness Society have certainly brought to our attention comments by Professor Wasson.

**Prof. Hart**—These were the earlier ones that led to the World Heritage Council—

**Senator BUCKLAND**—I understand that is right, yes.

**Prof. Hart**—Professor Wasson is a very highly regarded, internationally recognised geomorphologist—there is no question about that. He put up a number of suggestions, and questioned some of the assumptions that were the basis of a number of the management options in the Alligator Rivers region. They were addressed by the Supervising Scientist. Some of those were modified, and I believe that there was a report by an international scientific committee which took both Professor Wasson's and the Supervising Scientist's response. Out of that came the recommendation that ARRTC be modified.

**CHAIR**—Can I ask you about rehabilitation and closure. I understand that there is a closure plan for Jabiluka. Is the ARRTC involved in the development of that plan? Do you provide advice?

**Prof. Hart**—No. We would certainly expect to have that put to us, but there has not been anything yet. I think a few things have been hastened by a certain interview with the chairman of Rio Tinto. But we have not seen anything. We have certainly seen a number of the research

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components that are being done at Ranger to give them additional information on what the rehabilitation might be like. That is absolutely a key area. At the moment we have some questions as to the feasibility of some of their revegetation suggestions being investigated by the ERA.

**CHAIR**—We understand that version 5 of this plan has been talked about with traditional owners. In terms of process, when would you expect to be consulted?

**Prof. Hart**—I would have thought that we would already have been consulted for at least a feasibility suggestion. If I understand you, we have had only very broad indications. Certainly, we have had specific details in terms of the water management plan, but nothing in great detail in terms of a closure of Jabiluka.

**CHAIR**—At what point in the process does this happen? What will you be asked to do? Will you be asked to look at the final version or will you be involved in the earlier stages of it? How does it work?

**Prof. Hart**—I do not think there is any particular process at the moment. We are really working through what the modus operandi is with these. My feeling is that we should be involved at the earliest possible stage. We have quite a deal of expertise on that committee coming from a number of different directions, and it would be well and truly in the interests of those putting those up to put it to ARRTC to get their comments as early as possible.

**CHAIR**—It is my understanding that a closure plan is not the same as a rehabilitation plan. Are you already in discussions with ERA about the rehabilitation of Ranger and Jabiluka? If not, when do you expect that to happen?

**Prof. Hart**—Certainly, for Ranger—a little less for Jabiluka, because that is a much smaller operation. But the closure and rehabilitation of Ranger is going to be a major exercise and we are reasonably familiar with what is being proposed at the moment, primarily because a number of those plans have a lack of knowledge on certain components, which then feeds into the need for additional research. We need to make comment on the feasibility and the quality of that research.

**CHAIR**—How realistic is it that a mine can be rehabilitated in a sensitive area like this to the point where, say, no material at all that might have any level of contamination in it moves off the site?

**Prof. Hart**—That is a good question. That is certainly a question that ARRTC is also asking. We had quite a discussion at the last meeting, and there is some discussion with the traditional owners. We had a meeting with the traditional owners associated with the Kakadu Board of Management out at Jabiru. They kindly gave us a couple of hours, and we had a good starting discussion there. We came away from that meeting with a fairly clear impression that a number of the traditional owners—even though they may well have been involved in some discussions—really had quite a different idea of what that site was going to look like after ERA had finished, compared with what maybe they thought it should be like. We felt that there was a need for some more detailed discussion and some simpler diagrams of what the system was going to look like.

**CHAIR**—Can you expand on the different perceptions?

**Prof. Hart**—It is always a case in point that engineers, miners and so forth have a perception of what they see as being a pretty good job and that may be very different to what the traditional owners see as being a very good job.

**CHAIR**—When you say ‘different’, do you mean inadequate?

**Prof. Hart**—I mean ‘different’ in the sense that the miners might feel that they have done a superb job in rehabilitating, replanting and so forth, but in fact it still looks very different to what it was like before. Some of the traditional owners have a perception that it is going to look exactly like it was before the mine went there 20-odd years ago.

**CHAIR**—In a regulatory sense, what is the requirement as part of the licence to do this mining?

**Prof. Hart**—I do not know.

**CHAIR**—What does the government expect in terms of rehabilitation and how is that expressed?

**Prof. Hart**—I do not know; you had better ask someone else. ARRTC is interested in trying to work through the science and the knowledge needed—for example, if people say they are going to revegetate, whether in fact it is feasible for them to revegetate with indigenous vegetation. I cannot answer your question about what the government’s perception is—I do not know what is written into the mining licence.

**CHAIR**—Can we look, then, at some other mines. Is your committee involved in, say, rehabilitation at Nabarlek?

**Prof. Hart**—No. Basically we get reports on what is happening at Nabarlek so we do know broadly what is going on. Again, we do not have a regulatory role in saying that it is good, bad or indifferent. But we certainly have a role to say, for example, ‘We think that the vegetation you are putting in is inappropriate’—and I am not saying that this is the case at Nabarlek—and that the rehabilitation could go in a different direction on the basis of our knowledge. One of our independent members, Carl Grant, is an expert in rehabilitating mine sites.

**CHAIR**—Would it be fair to say that, whether or not you are putting local indigenous plants back into the region, that would be of less concern overall than the continued flow of contaminated water off the site?

**Prof. Hart**—The seriousness of the situation depends on your perception, but I would say yes. I think they really should be able to do both: put the site back to what it was before, although it is not quite humanly possible to do that, and ensure that no long-term contamination is coming from the site.

**Senator SCULLION**—In regard to rehabilitation and the concerns of contaminated water flowing off site, is it a reasonable assumption that similar levels to those we have put out as an

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action level would be the focus and a limit would be maintained? Would it be reasonable to say, when the site has been rehabilitated, that having six parts per billion would be the level of acceptable contamination?

**Prof. Hart**—Absolutely, but I would hope that the system was not increased from what it is now in terms of uranium concentrations up to six.

**Senator SCULLION**—Yes, six parts per billion; that is the limit.

**Prof. Hart**—Yes, that is right. But, as I pointed out before, that is very much higher than the present levels in the Magela Creek system.

**Senator SCULLION**—Would it be reasonable to say then that if you were going to set up a limit after the mine had been rehabilitated then perhaps you might review that limit?

**Prof. Hart**—Yes. The situation at the moment is that it is very rare for the level in Magela Creek downstream of the mine site to go above about 0.1 microgram per litre—parts per billion. I would have expected that, after proper rehabilitation of that site, that sort of scenario was maintained. So I would not see any relaxing of the statutory limits. Those limits are what should be aimed for.

**Senator SCULLION**—So if there was any alteration, it would probably be a downward alteration?

**Prof. Hart**—Yes, it should be.

**Senator SCULLION**—My last question is a general one but very specific to this inquiry. Have you, in your time and investigations, come across any evidence to suggest there has been any devaluing of the environment outside of the project area and any evidence of an alteration or degrading of the biodiversity values of the park?

**Prof. Hart**—Due to the mine?

**Senator SCULLION**—Yes, due to the mine.

**Prof. Hart**—I think the answer to the latter question is definitely yes due to buffalo and a few things like that, but due to the mine the answer is no, we have not seen any evidence which would suggest that.

**Senator CROSSIN**—Just before you go, Professor Hart, I would like to ask you a question. Looking through some of the summaries of the minutes of your meetings, I see that you talk a lot about social impacts and other research your committee might look into. Are you actually involved in any research relating to the social impacts in the area?

**Prof. Hart**—No, we looked at this very early on and recognised that the seven independent members were all biophysical scientists; we have radiation, water quality, ecology, revegetation and ground water experts and so forth but no-one with social science expertise. We did ask for a briefing on what social impact research had been done and was needed, because we feel very

strongly that you must have both the social and the biophysical. Our conclusion at the end of all of that was that we certainly were not structured to undertake research in social science. In fact, I just wrote to the minister, as a result of our last meeting in September, reiterating that we saw it as extremely desirable to see social impact research and monitoring—that it was not going on at the moment; that we were not set up for it or did not have the expertise to do it—and imploring him to perhaps look into doing something about that. Does that make it clear?

**Senator CROSSIN**—Yes.

**Prof. Hart**—We just could not possibly do it; we do not have the skills.

**Senator CROSSIN**—I just wanted to clarify what the reference was to it in the summary of your minutes.

**Prof. Hart**—That is very much it. We feel strongly that it should be done but that we are not set up to do it. We would very much like to see maybe another ARRTC or some other process—there would be a number of ways of achieving that.

**Senator CROSSIN**—But there is already the KRSIS—the Kakadu social impact study committee. Is that not operative?

**Prof. Hart**—The advice that we got in the briefing is that it is very sporadic, not very well funded and not a consistent process. I think that is basically where things stood with that—at least on the advice that we got.

**CHAIR**—Professor Hart, we are finished with our questions. Thank you very much for making yourself available to us today; I think it has been very useful.

**Prof. Hart**—Thank you very much, my pleasure.

**Committee adjourned at 3.09 p.m.**