ECONOMIC DEVELOPMENT AND INFRASTRUCTURE COMMITTEE

Inquiry into greenfields mineral exploration and project development in Victoria

Adelaide — 18 November 2011

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The CHAIR — I am Neale Burgess, the Member for Hastings. This is Martin Foley, the Member for Albert Park, and Wade Noonan, the Member for Williamstown. This committee is an all-party parliamentary committee and is hearing evidence today on the Inquiry into greenfields mineral exploration and project development in Victoria. So welcome to the public hearings of this committee. All evidence taken at this hearing is protected by parliamentary privilege but any comments you make outside this room would not have the same protection. The evidence given today will become public record at some stage.

Could you please state your full name and business address please?

Prof. GILES — I am David Giles and I am from the University of Adelaide.

The CHAIR — And you are obviously representing the University of Adelaide today?

Prof. GILES — I am. The nature of my position is not quite just the University of Adelaide. I am the State of South Australia Chair of Mineral Exploration and I am the Director of the Centre for Mineral Exploration Under Cover which has been set up via a grant from PIRSA to the university as part of the — well the original grant was part of the PACE scheme, which I am sure you guys have heard of by now, and that was renewed as part of PACE 2 in 2008. The goal of that grant was to explicitly set up a university-based but collaborative research and training effort into mineral exploration and in particular into what is probably the biggest challenge facing mineral exploration, certainly greenfields exploration in the State, but also Australia, which is looking under cover, hence the slightly odd and Machiavellian sounding name of the centre. So we are looking at discovering stuff that is not sticking out of the ground or was not discovered by the old-timers 150 years ago when it was sticking out of the ground.

The CHAIR — Very interesting. Proceed. We would like to hear from you.

Prof. GILES — Okay. I started this job six years ago — no, five years ago; in 2006. As I said, the money for this game was out of a relatively small pot of money that went to the University to seed fund what was hoped to be larger research projects, collaborations between state government, academia and the ministry with I guess two briefs in that area. One was local small-tier plans; there were probably about 20 listed companies in Adelaide at that time which have always had pretty good engagement with the bureaucrats here and with the researchers here, but also to try and engage the bigger end of town: the BHPs and the farmers and everybody, the Rio Tintos and everything like that. It was $300 000 a year, which is basically, with various off costs and on costs, enough to pay for myself and another researcher, and what we have done with that money is we have — well, we have placed ourselves in the centre of what is a new research area, really. There has always been a big research effort around the world into what would be broadly called ‘economic geology’, which is the study of mineral deposits. What has probably seeded about 10 years ago and really got going about five or six years ago is the idea that there is a different branch of science, which is ‘exploration science’, which is not necessarily about how an oil deposit formed but it is much more about where to find them. You can appreciate that both these things feed into each other but once you take the text the important thing is where, not how it actually drives different sorts of behaviours and it drives a different style of research. Also, it drives a different style of teaching which I will come to in a minute.

The CHAIR — I thought a great deal more interest from the community as well, particularly the business community?

Prof. GILES — Yes, very much so. So we have gone through various grant programs through the Australian Research Council and we have got a couple of grants through that, but I guess the biggest success that we have had in the research area is that we are now involved in a federal government cooperative research centre, which is called the Deep Exploration Technologies Cooperative Research Centre.

Mr FOLEY — Who we heard from yesterday?

Prof. GILES — Did you? Richard was here? I will not give you the background.

Mr NOONAN — Ian Hardwick, it was.

Prof. GILES — Maybe I will talk about science because he is the Business Manager.

The CHAIR — Yes, he told us that.

Mr NOONAN — The accountant, more specifically.

The CHAIR — Yes, precisely what he said.

Prof. GILES — This whole research centre, it is big. Globally it is the biggest investment in this exploration style research that is going on at the moment. What it addresses is the notion that we are running out of resources at the surface. It also faces down a problem that has not really been recognised by academics or a lot of mineral explorers, and that is that we are really good at finding stuff that sticks out of the ground and there has been a lot of back-slapping over a long period of time about how terrific we are at stumbling over things that are sticking out of the ground. There is terrific analogy here. A terrific example of this is Victoria. The massive gold wealth that was discovered in Victoria in the mid 19th century was found by guys falling over it. That is a little bit unfair to them.

The CHAIR — Pretty close to the surface.

Prof. GILES — It was close to the surface. They were true explorers in that they went out there, they panned the creeks, they found nuggets of gold but it was sitting on the ground. If you take that gold system, the typical gold system might have a vertical extent of about 1 kilometre. We can now mine these things down to 2 kilometres. Even in the areas around Bendigo and Ballarat where there was gold sticking out of the ground, they are still likely — a lot of those kilometre-high systems that never stuck out of the ground, you do not find them by just looking for gold on the surface let alone the fact that that entire belt, the Golden Triangle there in Central Western Victoria, is completely open to the north and to the south: to the south where it is covered by volcanics and to the north where it is covered by the Murray Basin centre.

The exploration which has gone on in there, it is almost nil. I mean, it would be disparaging to the people of Hagworth there to see it is nil because that area has not been tested. It is the same in South Australia. We have got more cover. We have probably got 90 per cent plus cover in South Australia but it has been blind to exploration. So what we have tried to look at is why it has been blind to exploration. A little bit more than it is easy to find stuff sticking out of the ground, and the reason: it is complex reasons of the geological difficulties, the fact that you need to get a chemical or physical signature of the mineralisation of some depth to the surface, usually, and the regulatory environment and all that kind of stuff, that kind of stuff I assume you are going to hear from other folks and I am not qualified to comment on it but what I can say about the broad aspects of the science are that we have tended to take the following approach.

It is an empirical approach to exploration, and that is if we recognise the system that looks like Bendigo, say, and we recognise its characteristics, then we can determine what characteristics of that system we might be able to identify under cover and then we look to data assess what we will be able to see them in. Mostly under cover you look to remotely under cover data assess. You do not want to be out there putting drill holes all over the place. Drilling is a very expensive process. What that leads to is the idea you can hit a deposit by looking at one or two geophysical characteristics, and those of us in the exploration community have been really cocky about how good we are at doing this. This is the message sent to shareholders year after year after year: we can find stuff under cover because we know what they look like when they are sticking out of the ground but all the evidence is that we are not. We are actually terrible at it and if you look at the declining discovery rates when people have gone under cover, what that means is that companies end up getting — they might invest in an area for a while but then they get fatigued over the area because they do not get a discovery, the shareholders get might miffed, it is all too hard and the investment moves elsewhere; it moves to somewhere where the rocks are sticking out of the ground.

Mr FOLEY — West Africa?

Prof. GILES — West Africa is probably where a lot of investment that might come to Victoria or Western Australia has gone over the last decade or so. The rocks are sticking out of the ground beautifully and they are an analogous system. So what we need to do is to say to people: 'We need to provide confidence that you can do something in that environment'. We need to reduce the cost for drilling and we need to build up the knowledge of the geological system and the hydrothermal system that is under cover. This whole process cannot be done in a data poor environment.

I think I mentioned this before. We have had a belief in the exploration industry that you can go out there to a difficult exploration terrain and go 'I am going to drill there; X marks the spot', and take out a really big drill

rig, lots of time and people-intensive, make a huge environmental impact by pushing roads in and getting the farmers offside and whatever, drill one hole and if it misses the target move on. A really bad spot and data poor.

We are dealing with a statistical situation here of the spread of these economic resources is not predictable so what we have to do is map it out. That means taking samples through that cover in a regular and systematic way. So this is why we have a research centre which is looking at reducing the cost of drilling, reducing the environmental footprint of drilling and increasing the efficacies of the sampling program.

What we would like to do is to take that — it is a really great example and it is an example we have talked about working on in future years in our research centre, is to take that incredibly well endowed belt in central and western Victoria and, in fact, if you look at your own government's maps of this — you guys might even be familiar with it — there are maps on the DPI web site of prospectivity within the Golden Triangle, beautifully outlined areas. What they are doing is they are outlining a hydrothermal system. These things were all formed because of hot fluids percolating through the crusts. They follow faults. You have a small deposit — it might be a kilometre this way, 50 metres this way, even less in some of these high grade zones — but it has an alteration footprint which is as wide as the damage zone of the faults — kilometres. We can see that footprint in a whole range of geological data as long as we have got the samples. What that does, so if you say: 'Here is 200 metres of Murray Basin cover, here is the prospective rocks', now what we want to do is say there is a kilometre column of some sort of system under there. Now, we are going to say: 'Okay, that is now 3 kilometres this way and it is 3 kilometres this way'. If we can get geochemistry through that cover, we can populate these areas under cover with those similar yellow outlines and then companies have got — it is all about confidence with these companies. They need to have the confidence that they can go in there and first of all generate intercepts that are going to keep shareholders happy and get their price up and what have you and eventually hone into an actual deposit. That is one thing I can see I am grabbing on to you guys.

The CHAIR — No, not at all.

Prof. GILES — There is one thing in Victoria you can be absolutely guaranteed of in the gold area which I am most familiar, that is there is an endowment in those covered areas equal to what has already been found. As you know, that is terrific agricultural land and there are all kinds of other issues that will put explorers off but the very least that they need is to know that they have got a set of tools to find these things.

It is really interesting that one of the reasons why this kind of large scale sampling program that I am talking about has not been done, there are two reasons. One is it is too costly. The other one is tenement holding in general is too small so that the scale of the systems we are looking at are tens of kilometres scale systems which you can identify and then hone in on a good part of it but any one explorer cannot delineate the entire system, which is what we need to be able to do.

So there is a great case to be made, and it is a case that we are making strongly here with the State Government to see how far it gets. That part of the pre-competitive data that we need to collect is geochemical data and we will need to do that in collaboration with the companies I suspect in a similar way to — you will be aware of these PACE co-investment schemes for drilling. That has been a terrific way of building confidence.

Mr FOLEY — Victoria has done similar things; a *Gold Undercover* program.

Prof. GILES — Yes, I am aware of that one. Those are terrific. It reduces their risk, but it also allows the Government to get in and build their knowledge database on these areas.

Mr FOLEY — But you think perhaps it is necessary that there should be additional focus in what you call the geochemical?

Prof. GILES — Okay, what happened here — and I know this has happened in Victoria as well — in the early '90s they started out here with the question 'what is the pre-competitive data we need to build confidence?' and they collected state-wide magnetic images and they have been gradually building up the state-wide gravity image, big data sets that cover tenement, truly pre-competitive because everyone is on a level playing field and that is absolutely terrific.

What has been lacking in that, the sort of behaviour that leads to in the mining industry people go out there and do what we would disparagingly call 'bum hunting'. They drill high on the magnetic image or gravity image

based on the assumption there is something interesting happening there; there is a geological anomaly which is leading to this. There is no regional scale overlay which says which one of those to drill based on the geochemistry and ultimately it is a chemical system; it is a system of hot fluids dissolving stuff from here and depositing it over there.

So it is obviously a more difficult problem because once you make ground disturbance you are doing active exploration of somebody's tenement. If you do it only on one person's tenement, it is an unfair advantage and all that kind of stuff. So it is a challenge that I hope we can overcome which means we can design a set of programs in a geochemical way which recognises there can be co-investment on tenement with the ultimate aim over 10 years of building up a state-wide geochemical aim. If we do that, it turns the cover horizon into eye prospecting just like it was on the surface, which is what the old-timers did. They went around and effectively did old-timer geochemistry with a pan.

The CHAIR — That is a technical term?

Prof. GILES — That is right. If you can see it, it is there, but we just do not have that down at those horizons.

Sorry, I will say one more thing about the training aspects. The other thing that we have had a mandate to do, and I hope we have done successfully, is that we have tried to design undergraduate training programs in geology that specifically meet the needs of the exploration and the mining community and we have done that a couple of ways by making new undergraduate courses: one called 'Mineral Exploration', where we are looking at that 'where' question, not the 'why' question, which was a traditional thing to do in universities, and we have established now an Australia-wide network of fourth year training courses that has support from the Minerals Council of South Australia. This is called the *Minerals Geoscience Honours Program* and what that does is that sends our students around to — there are eight different universities in the country involved and we send them around to the different universities to do short courses in areas that those universities have expertise in. I think this is a commonly overlooked area in terms of state government investment that tends to make a big distinction between the government side of where contributions can be made and the teaching and training side and I think those two things can successfully be brought much closer together.

Apart from that, there is a massive wealth of intellectual power; for example in the Victorian universities, that can be brought to bear on these problems if they are given proper incentive, and that information goes straight from those academics to the students they are teaching and those students go straight out there into the work force. It is a very quick turnaround to getting that intellectual power into the work force.

The CHAIR — David, have you put together or would you be able to put together a framework for the ideal scenario for a state to move forward in this area?

Prof. GILES — The ideal scenario? I could certainly do it from my perspective. Whether that is right or not is a different matter. Yes, I have some fairly strong ideas about the sorts of things that can happen.

I mean one thing to realise is that the investment that is required to bring the universities, the academics and the students along with you in these programs in monetary terms is much less — it is a fraction of the type of investment which you need in terms of building these big data sets and the co-investments and all of that kind of thing. It is a very small initial investment. It usually has a much larger footprint because it ties the survey to the university, the university can then go out and look for Federal Government money and the university can then go out under a research banner and look for company money for those co-investments.

As an example, the State Government here now has put $2 million into the Myer Centre and I added this up before I came over. So the research investment that we have got back from them is $10 million over six years and in that time we have now 600 students across the country through these honours courses.

Mr FOLEY — Six hundred?

Prof. GILES — Yes, because it is the eight universities that teach the most honours students and they filter out. They have not all gone through the Adelaide courses, they have been pushed out. Now, the University of Adelaide has the biggest undergraduate numbers in geology in the country, despite the fact they are three universities in a city of a million people. We have the biggest honours numbers in the country, who are fourth

year students. We had 45 last year, 35 this year. We will have 40 next year, and more than half of those do mineral exploration – related projects. Nearly all of the honours classes going out into the minerals and energy area at the end of this year, with the exception of about five, who are doing PhDs. Since 2004 there has been steady growth in those teaching areas and we now teach across the board three times the number of undergraduate students we did in 2005. It is terrific. It is a terrific success story.

The CHAIR — Is there any sort of road map you have or would be able to put together, just a mud map type thing that gives us an idea of how you think that should be set up in an ideal scenario. We would be very, very grateful to accept that.

Prof. GILES — Yes, I can do that.

The CHAIR — That would be sensational.

Mr FOLEY — And perhaps identifying any Victorian-based university colleagues who would be on the same wavelength?

Prof. GILES — Yes, I can do that, absolutely. There are two very strong earth scientist departments at Melbourne and at Monash. There is a cohort at each of those universities that you guys should speak to at some stage that are doing very relevant kind of research.

The CHAIR — Excellent. Do you have any questions?

Mr NOONAN — I do. Some of it has been covered but just to tease it out a little bit, we were talking about road maps. I think if you track back through history in South Australia as best as I can gather, this PACE policy initiative and the $30 million that came with it in 2004, which I understand has now been extended, it seems to be a road map of sorts around policy and investment and you seem to be familiar with it. Obviously you are part of PACE in terms of where you received your funding. I just wonder, to the extent of your knowledge and understanding of PACE and in terms of what it has delivered for South Australia, whether you could highlight the better aspects of PACE. So the South Australian Government had $30 million put into PACE and has benefitted the five to seven years PACE has been running. What are the areas you would absolutely invest in and what are the areas that perhaps have not yielded the sorts of outcomes that may have been expected in the early parts?

Prof. GILES — Okay, there is a regulatory side to PACE which I cannot claim to be across at all. The best aspects of PACE and the thing that it has been able to do — we all have to admit this has been on the rising side of an economic boom and all that kind of stuff but what it did was give confidence to the small players and even to the large players that they were in an environment where they would be supported, and it is the aspects that go to that that were the most successful. I think the co-investment schemes were absolutely important for that.

The CHAIR — So drilling?

Prof. GILES — The drilling, yes, and there is co-investment in geochronology now, things like that as well to build up the geological fundamentals if you like. You know, there were some things that happened that were terrific from the co-investment, and that is that they had some really early successes. There was a drill hole that went out at this Carrapateena prospect in 2005. In the second round of drilling the 200 metre, 2 per cent copper or something, that made people go: 'Yes, this is the mineral belt that has Olympic Dam in it and Prominent Hill in it, there is a lot more to find'. We just need to be persistent.

The CHAIR — That must have been pretty exciting.

Prof. GILES — It was exciting. That was basically in the few months before I arrived here and you can feel the buzz not just from the investor's point of view but from the mining company executives and the guys on the ground that do the work. They are an emotive bunch. They really feel the cycles and if you can give them this kind of confidence then many come back and they really relish the opportunity maybe to do something a little bit more riskier that they might not have done before. So I think that has been a big success.

I think the co-investment — well, not co-investment, the investment with the university has been a success and I think that is a very cheap way for the Government to influence the direction of research within the State. So again this where question, building confidence question. And this is important, right; that people need to

know (a) they need to be confident they are in the right rocks; and (b) they need to be confident they have a set of tools to find things.

Mr NOONAN — Since your inception, it says here you have established sensitive industry partnerships and I gather you are still doing that?

Prof. GILES — Yes.

The CHAIR — But those partnerships include the Victorian Department of Primary Industries?

Prof. GILES — Yes.

The CHAIR — And other Australians universities which you have alluded to, including Monash. From that perspective, can you just — I think you outlined the undergraduate activities with eight universities. Can you just tell us how your centre might share its findings with other jurisdictions to help them advance or enhance their greenfields exploration perhaps with a focus on Victoria?

Prof. GILES — Both through the DPI and PIRSA here there have been relationships. They have been off again, on again I guess over the last few years but with particular emphasis on looking under the Murray Basin. There is a strong case to be made in those border areas. There is potentially a whole new mineral belt that we just have not found. We did some work with Tim Rawling, who was at DPI for a while as part of their three-dimensional modelling projects, and there has been an Australia-wide collaboration which has been associated with that about collecting seismic data, some of which goes across the South Australian/Victorian border with an aim of seeing what is happening there. They are particularly looking for structures within those rocks. The bigger collaboration, the ones that have actually resulted in money in people's pockets to do research have tended to be with CSIRO and Geoscience Australia and they are both involved in this cooperative research centre. So is Victoria, I might say, as an affiliate. I think they put in a small amount of money.

Mr FOLEY — The Feds have deeper pockets?

Prof. GILES — They do.

Mr NOONAN — But if you were to transfer over to Monash University, just as an example, there would be no reason why a pitch could not be made to the Victorian Government to make a modest investment to essentially set up the collaboration between the various stakeholders that you have been able to establish here in South Australia with a similar impact, for example?

Prof. GILES — No, I think that would be a terrific idea. That is something I would encourage you guys to think really hard about. It is an interesting world, the academic world. It is one that sometimes I am not that comfortable with because it is supposed to be about research and training, right, but in the end a large part of the work that people do is justifying their existence, you know — they are paid by the taxpayers after all — and running around trying to find research money. A really difficult thing to do and very low success rates, and what is a terrific thing for an academic is to be able to say 'I am hooked into this research problem that is larger than me which gives you a purpose for being'. This is the other thing about academics that you guys may find, is that they are all constantly undergoing these little crises about what the hell they are doing.

Mr FOLEY — It is not just academics.

The CHAIR — When they really fail they go into politics.

Prof. GILES — So one thing that I have really appreciated — I actually came from Monash, that is where I did my PhD, and this is one reason why I feel confident that you would get uptakes from academics on that side of the border — is that it is terrific to feel you are part of something larger and you are making a contribution to something more than an academic paper that 10 people might read. So, you know, personally that is been an experience that I have really enjoyed.

Mr NOONAN — Thank you.

The CHAIR — Excellent.

Mr FOLEY — That was very useful. Because one of the key things we are grappling with is what is the role of government. Because essentially there is a private sector for profit businesses.

Prof. GILES — Yes.

Mr FOLEY — That is delivering for their shareholders. That is fair enough in a particular sector where the resource is publicly owned by the Crown and you have got to tread a careful regulatory path. South Australia regularly holds up as the best practice model of Australia. There are things we can learn but against that background what is the full package of state, as broadly defined government — local, state or federal — in facilitating a sustainable worthwhile sector, your contributions have been very helpful in that regard.

The CHAIR — It has been. I really appreciate it. In the next couple of weeks you will be sent a transcript of today's proceedings. Feel free to make any typographical changes wherever you think there might be an error, but none of the substance. On behalf of the Committee and everyone else, I would like to really thank you. We are very grateful for your participation.

Prof. GILES — No worries. I have enjoyed the chance to put stuff forward.

Witness withdrew.