ROAD SAFETY COMMITTEE

Inquiry into improving safety at level crossings

Melbourne — 5 May 2008

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The CHAIR — Welcome to the public hearings of the Road Safety Committee's inquiry into safety at level crossings. All evidence taken at this meeting is protected by parliamentary privilege as provided by the Constitution Act 1975 and further subject to the provisions of the Parliamentary Committees Act 2003. However, any comments you make outside the hearing may not be afforded such privilege. As you can see, we are recording the evidence, and we will provide a proof version of the Hansard transcript at the earliest opportunity so that you can correct it as appropriate.

Could you state your full name and the organisation you belong to, and then proceed with your presentation. We will ask questions as we go.

Dr CAIRNEY — My name is Peter Thompson Cairney. I am employed by ARRB Group. I have worked in road safety for about 27 years. I have worked on a wide range of topics over that period. I am not really an expert on rail level crossings but over the years I have been involved with one or two quite significant projects. I guess the biggest thing I have been involved with was a workshop in 1991 which really, I think, acted as a bit of a catalyst for all the developments we have seen over the last 15 to 20 years or so. Recently I have been managing a trial on behalf of the Australasian Railway Association of community-based education and enforcement at rail level crossings, and I will talk a little bit about that study today.

There are really three things I want to talk to you about. The first is the strategic issue and how important it is for the land transport system in Australia. I do not think people are aware of just what a big problem this is. Secondly, I will talk about the pilot study of education and enforcement that I mentioned and some of the very direct implications that have come out of that, and then I will go on to talk about some possible new solutions, which is one of the focuses of this committee's interests, and talk about the Austroads project I am currently working on and how it relates to that.

Just before we start, I will say a little bit about ARRB Group in case you are not familiar with us. ARRB started life about 50 years ago now as the Australian Road Research Board. We are a not-for-profit company owned by VicRoads in partnership with all the other state road authorities and the federal government. Our role is to do research and consultancy primarily for the road authorities but also for other clients in the transport sector. Our main office has always been in Melbourne, but we now have offices in Perth, Sydney and Brisbane — and Dubai at the moment. Quite a lot of our work is overseas, but the bulk of it is from the road authorities, and I guess the biggest single thing we do would be a strategic research program for Austroads, which is about $4 million or $5 million worth of work each year. In addition to that we work very closely with VicRoads on a range of issues from pavements and the economic life of roads through to road safety and environmental and social impacts. That is just a brief thumbnail sketch of where I come from.

So to turn to the strategic issue: you have probably heard this many times already in your deliberations, but Australia has something like about 6000 passive rail crossings — I think there are about 1500 or 1800 of these in Victoria — and many of them are on low-volume roads where it is difficult to justify expensive treatments. The real problem, the strategic problem we have, is that on many freight lines the standard maximum speed is 115 kilometres an hour, which is really quite fast: it is 32 metres a second. If you think about a big truck — for example, a semitrailer or a B-double; not a very, very big truck but a big truck — it probably takes something like about 20 to 25 seconds for the driver, once he has stopped, to make up his mind what the train speed is and whether it is safe to cross or not and then get the truck across the line in the clear. At 20 to 25 seconds and 115 kilometres an hour, the trains cover between 640 and 800 metres. It takes them 25 seconds, and the trains have gone 800 metres, almost a kilometre.

I do not know if any of you have ever actually stopped and looked at a train approaching a level crossing. If you have not, it is something I recommend you try and do on your drives around your constituencies perhaps. When the train is in the distance it appears to be moving very slowly. All we have got as a cue to how fast the train is moving is the rate at which that very small image is increasing, and that happens very, very slowly until the train starts to get nearer, and then it appears to be increasing at an alarming rate until suddenly it really is rushing past you. So at 800 metres away, it is very unlikely any driver can make a reliable call about how fast the train is going, and we are really facing drivers with an impossible task.

Now that remains to be absolutely proven by empirical investigation, but I am pretty sure the results will bear me out once this work is done. We are really facing truck drivers with an impossible task. Car drivers are going to have to make the decision when the train is about something like 300 metres away. Even at that distance it is pretty

difficult to pick the speed, so I think we really have a strategic issue for the future, particularly when you consider that the predicted increases in oil prices are likely to drive more freight onto rail. Now that is probably not too much of an issue in the short term, because the rail industry can cope with longer trains, but there is a definite limit as to how far they can manage in that way.

The likelihood is that we will be getting a lot more trains at some stage in the future. You increase the number of trains, you increase the exposure of railway level crossings coupled with the higher speeds and perhaps with more very large vehicles, and I think we will be faced with a big problem.

The CHAIR — Just on that: obviously overseas there are some very, very fast trains that travel at 300 kilometres per hour.

Dr CAIRNEY — Sure.

The CHAIR — Are you suggesting that we should slow trains down?

Dr CAIRNEY — No, I do not think you can afford to do that, but if you look at the very, very fast trains then usually they are on completely separate alignments that are totally grade separated. So you really have to think of underpasses or overpasses if you are going to run a rail system of that magnitude, and I guess the problem is then if you have the volume of traffic using rail, that is justified, but I guess this is the thing we are going to struggle with: having the volumes to justify that expenditure.

Certainly the other thing to add to all that, of course, is that with automatic protection then you can create a reasonably safe environment. But as I say, the problem we have is that we have a huge rail and road network, a lot of unprotected crossings with very low traffic volumes and currently — and I know I will be put right if I get it wrong — a set of flashing lights costs something like about $400 000, roughly speaking. It can be more, depending upon the factors at particular crossings. So we have really got to think about something radically different in terms of warning drivers that trains are on the way. And that is what I will conclude with if that is okay, gentlemen.

To turn now to the pilot study of education and enforcement, this was commissioned by the Australasian Railway Association and it set out to be a pilot study of what we could manage with community resources at problem railway level crossings. It involved the local police for enforcement, and it involved three of the RoadSafe committees to do the public education. This part of the trial was all carried out within Victoria. We had all our treatment sites out to the west of the state and all our control sites out to the east of the state so they would not be affected by any of the publicity that we did. It really was a major collaborative effort involving Public Transport Safety Victoria, VicRoads, VicTrack, Connex and the Victoria Police, and the three RoadSafe committees with some other input from local councils.

We did a before study before any publicity actually happened at the end of October last year, ran the program through most of November and concluded with an after study late November–early December. I guess there are a number of issues that came out of that. I would stress that this is only a pilot study, and although we did learn a lot, the value should not be taken as being typical of what happens at railway level crossings across Victoria. But we did find rather low compliance rates with what people are supposed to do at level crossings. Unfortunately, with the level of publicity and enforcement that we were able to bring to bear, we were not really able to show much of a change with this pilot project. But at the end of the day we were able to draw together a list of interim recommendations as to how a local community should go about dealing with problems at railway level crossings.

One of the main issues to come out of the study was the difficulty of actually enforcing some aspects of the road rules at level crossings. Probably the Department of Justice has talked about very similar issues — if not, I imagine they will. The three main issues that we were able to identify were, first of all, at give way signs. There is actually no agreed definition of what failure to give way means, unless of course there is an actual collision. The conclusion that we came to in the study group was that there needs to be some working definition of what is a reasonable definition of failure to give way. Maybe it is something like being on the crossing within 15 seconds or 10 seconds of the train arriving, but definitely there needs to be something like that.

The second issue was that a lot of drivers at flashing lights were unable or unwilling to stop as soon as the lights started flashing. Now that is not surprising, because if you think about traffic signals, there we give people usually 3 or probably 4 seconds yellow time before the red signal comes on. At level crossings there is no warning that lights are coming on, and particularly if they are at highway speed the driver does need time to react to make sure it

is safe to pull up. So this is a problem, but again we have no definition of what is reasonable to allow the driver before they actually have to stop in response to flashing lights. And of course there is no actual signal to the driver that the flashing red lights are about to come on. One very obvious solution that has been suggested is to replace the flashing lights with normal traffic signals, and this is something that certainly looks appealing because it would cut out a lot of the problems we have about the uncertainty associated with the flashing lights. At the moment we are discussing a study with VicRoads to look at this particular issue.

Mr LEANE — Can I ask, Peter, if that is a proposal that would incorporate still having booms?

Dr CAIRNEY — If you are going to replace them at open crossings, I do not see why you would not in time replace them at booms as well.

Mr LEANE — So if there is a new passive crossing that is being looked at, you would just put in a set of traffic lights and not particularly put in a boom barrier?

Dr CAIRNEY — Yes.

Mr LEANE — It would be interesting to know how many drivers flout boom barriers and flashing wigwag red lights compared with how many drivers go through red lights at traffic lights.

Dr CAIRNEY — This is all work for the future. It is work that we need to establish. We do not really have any data on this. From this study what we were able to say about boom barriers is that at one of the sites there was very good compliance with boom barriers and we hardly found any — I think we found one vehicle — going around them in a fortnight. At the other one it was a much more problematical site where you had low train speeds, very open sight distance and some very long trains, and there was a much higher incidence of people going around the boom barrier. I think a lot of these are open questions.

Mr LANGDON — Peter, is there any jurisdiction around the world that has replaced the railway signals with lights?

Dr CAIRNEY — Not wholesale. I could not really give you a complete answer on that, but my understanding is it has been done on a trial basis in quite a few places.

Mr LANGDON — Where, for example?

Dr CAIRNEY — Even that trial in South Australia, for example. It is certainly something that is talked about a lot, but it is not something I have specifically looked at at this stage. What they have done in the UK is to incorporate a yellow warning signal with the flashing lights. That gives the driver the same information but the question is whether it is better to go with the traffic signals — —

Mr LANGDON — Does the yellow go on first for, say, a couple of seconds?

Dr CAIRNEY — Yes. I think these are interesting questions, but there is a lot of work to be done there — —

The final enforcement issue which we really came across was the end of the flashing lights cycle. The lights continue to flash until the barrier is fully raised. But of course a lot of drivers, as the barrier starts to go up and they can safely get under that barrier, off they go, and that is an offence under the road rules that we have. I think if this is going to be enforced, we have to be very careful about that because there really is not a safety issue once the barrier starts to go up. The last thing that we want is to try to start to use these community enforcement tools and then get a backlash against it because enforcements seem to be unreasonable. We all know what happens when that occurs.

Mr KOCH — In your studies with the Australasian Railway Association has a lot of this discussion got beyond the discussion point and trials are in place, or are the pilots yet to be undertaken?

Dr CAIRNEY — The pilots have been done. The study was completed. All the fieldwork was completed before Christmas. The draft report went to them in February.

Mr KOCH — I only raise that point from my colleague raising with you before where a pilot has taken place with the three lights of red, amber and green. I thought it might have been a little bit more conclusive in your response?

Dr CAIRNEY — No, that is something that has not been piloted yet in Victoria so far as I am aware. Like I said, I think there was a study in South Australia and there may have been something in New South Wales, but it is very hard to pin them down because very often these things are not documented and you have to get the right person in the railway system and the road system before you can really find out what is happening.

Mr KOCH — I would have believed that out of all of the people who are doing these reviews and running the trials, pilots and what have you, that there that there would be a lead authority in some particular areas. But obviously it is not; there is a heap of duplication in there. There are very few outcomes. We are not completely aware of what is taking place versus what many people believe is taking place.

Dr CAIRNEY — Yes.

Mr KOCH — I think there is a frustration there, and we have to work our way through it.

Dr CAIRNEY — Of course this just does not happen in the area of railway level crossings. There is a lot of it happening more generally in the road authorities where good work is done in regions but it is never documented. They just do not have the resources to document it and get it out there so that may end up influencing that region and the neighbouring region. But other road authorities around Australia do not get to hear about it even though they may be working on very similar problems.

Mr LANGDON — With the lights in the UK that have the amber signal, does the amber go on when the boom gates come down and will the amber go on when the boom gates come up, so that a red is only actually in effect — —

Dr CAIRNEY — Sorry, I could not answer that one. Maybe someone from the DOI is familiar with what happens there. They did not have fancy things like that when I left the UK.

I would like this to conclude by moving on to talk about possible new solutions. It is apparent that we need to find some sort of new solution to warn people that trains are coming at railway level crossings. The conventional flashing lights are really much too expensive. I make the point, particularly if they are competing for other scarce road safety funds, the safety benefits are actually so low that there are many other things that road authorities would probably spend the money on, such as safety barriers, which is one very obvious thing; or other ways of treating roadside hazards, which is an area that we seem to be starting to make a lot of progress in.

There are a few things that are worth considering. First of all, there was a very interesting workshop held at the end of February — my notes are wrong and say 'January', but it should say February — which looked at how intelligent transport systems might apply to railway level crossings. There are a few very interesting ideas there. The thing that impressed me and one or two of my colleagues from the road authorities was really just how far some of the in-car technology has come along so that there are now a number of systems available within vehicles that could, in principle, be used as a way of delivering information that the driver is coming up to a railway level crossing and perhaps even that a train is approaching the railway level crossing.

These include some of the navigation systems which are available at the moment. There is certainly no reason why the type of railway level crossings could not go on there, and perhaps the type of railway level crossing could be shown — that 'A stop signed level crossing is coming up' so we should be ready to stop. It would not be a trivial extra step but it would be quite a big extra step at this stage to be able to feed in information about trains and their approach on that sort of system.

I am not sure if the committee is familiar with the intelligent speed adaptation trial? Then you would be familiar with it, that it is an on-board GPS-based system in a car. The system always knows what the speed limit is; it has a complete notion of what the speed limit is. From the GPS system it can place the car on the GPS map. It can compare the vehicle's actual speed with the permitted speed on that stretch of road. If the vehicle is going too fast, then it sends a warning message to the driver.

It was suggested at the conference that this sort of system in a vehicle could and should also be linked to some sort of information about trains and where they are, and would be used to give the driver warning of the approach of a train.

There are other options such as delivering a warning through the car radio — there are two or three options for the precise sort of system that you could use so that it is very targeted and only delivers the message to be used when approaching the railway level crossing.

Mr TREZISE — We heard at that conference that those ideas that you are talking about there are actually concepts but are they in fact operating in other countries? In European countries?

Dr CAIRNEY — Not as yet.

Mr TREZISE — I thought we heard — —

Dr CAIRNEY — Sorry. The systems are up and running but my understanding is that we have not been actually able to make the link with the information about trains.

Mr TREZISE — It might be on emergency vehicles?

Dr CAIRNEY — Yes, that is right. They are systems like the ones we talked about that warn of the approach of emergency vehicles.

Mr TREZISE — Yes, that is right.

Dr CAIRNEY — Yes. I think the interesting thing there is that there is nothing you could pick up tomorrow and run with. There are a lot of ideas that are very close. It is not clear at the moment which is going to work best, but there are a lot of options and I think solutions potentially are very close.

Mr LANGDON — You mentioned enforcement before. Is there any jurisdiction in Australia or around the world that you know of that has cameras on railway crossings that will pick up those people who are constantly going through the red signals?

Dr CAIRNEY — There are lots of studies from North America that look at the effect of cameras at half-boom barriers and can detect vehicles going around. They have probably been very effective, no question about that; these do work very well. I am not sure about just straight flashing red lights. I think if we looked in the literature we would probably find something there as well.

The CHAIR — I think we are trialling it here in Victoria as well, in Bentleigh.

Dr CAIRNEY — I know the Department of Justice has a got a major trial going with this particular issue. But there is certainly good reason to believe that these will work well.

At the moment I am working on a project for Austroads. Austroads is the sort of — how would you describe it? — it is the peak body, , the umbrella body, for all the state road authorities such as VicRoads and it funds a strategic research program with us. I am looking generally at what you might call infrastructure-based, safety-related intelligent transport systems, not the ITS things that are in the car itself but the things that sit by the side of the road — things such as weather alert systems and collision avoidance systems. As part of this we are looking at — we are just starting this project now — the options for ITS at railway level crossings. Hopefully in another couple of months I will be able to give you a much better run-down of where we are at across the country with our thinking about ITS and how this would relate to a railway level crossing system and how it could perhaps be made compatible with other aspects of ITS that the road authorities are currently considering. As part of this process we will be talking to the various road authorities and we will be talking to the rail industry and rail regulators as well.

There are a couple of other issues that were not raised at the ITS meeting that are possibly worth pursuing, and with their ideas they will be trying to sound out the road authorities and the rail regulators. One is to monitor truck behaviour at railway level crossings. I do not know if you are familiar with what was called the Intelligent Access Project? It was a deal to allow large vehicles more general access on the road system in exchange for having a GPS-based system on board that would allow the compliance to be — —

The CHAIR — We have been briefed on that.

Dr CAIRNEY — Okay, I thought you might have been. It would seem to me to be a relatively simple matter if railway level crossings were included as part of the package of the intelligent access program that the Transport Certification Australia has now become. It could include, for example, that from the GPS record you would be able to identify whether or not drivers stopped at level crossings where a stop was required and you would be able to detect any speeding up at level crossings. It is not a complete answer because you cannot easily relate it with the presence of trains. But it would at least give some indication and would really establish it in drivers' minds that their behaviour at railway level crossings is something that is really audited and has to be taken seriously.

The CHAIR — That would obviously help in the way of investigations after an accident as to what occurred.

Dr CAIRNEY — Certainly, yes.

The CHAIR — But it would not prevent them.

Dr CAIRNEY — It certainly would help in that regard, but of course we really want to try to prevent them rather than pick up the pieces afterwards. One thing that is worth mentioning in relation to that is that as part of the pilot project I was talking about earlier, we were able to take on board as a case study the response of the mine to the aftermath of the Ban Ban Springs crash, which you would have heard about in your deliberations so far? The company there was very keen to get this problem fixed so it introduced a rule that all vehicles must stop for at least 3 seconds at railway level crossings. They tried that and with partial monitoring found that they were not getting very good results, so they made the rule that the drivers had to get out and sign a book before they crossed the crossing. That is quite a logical application of what people do in mines with things like explosives and all sorts of other things. Once they got that into drivers' minds, after a month or so they relaxed and said, 'Okay, you must stop'. They had a security guard monitoring whether people would stop or not. They relaxed that out to partial surveillance.

When the program first started there was something like about 30 per cent non-compliance. Over about three months or so they got that down to just the very occasional non-compliant vehicle. Mind you, the result of non-compliance was instant dismissal — for one of their own drivers, and having — if they were a contractor — that vehicle and all the contractor's other vehicles sent off the site at the end of the shift. It is pretty drastic stuff, but it did work.

Large vehicles are a particular problem in the context of railway level crossings, because when there is a collision with a large vehicle there is much more likely to be a derailment, and of course the probability of deaths and injuries and the financial costs go up enormously. It looks as though there may well be good scope for effective action through the occupational route. Maybe it is something that we can get a much better handle on in the short term.

The last thing I would like to mention is the possibility of developing a camera system for detecting offences at railway level crossings, particularly at the passive crossings because they are the big issue out in the open. Although the Victorian police were very keen to be part of the pilot exercise, there really is a limit to what they can be expected to do at railway level crossings. If there was a camera on the train and then the driver saw a vehicle crossing when he was close to the crossing, it would be very simple to press a button to detect the vehicle on the crossing as proof of an offence. In order to make that work, though, you really need to be able to get the vehicle's registration, so maybe you need to have another camera somewhere in the crossing equipment with a radio link to the train so that it can record the vehicle's number plate at the same time.

Having talked to my colleagues, this is certainly technically feasible, not to say it would be easy because you would have to be pretty clever about dealing with issues like vandalism and so on, but it would seem to me that this would be one that would be worth pursuing to see if we can get something to work in this regard. Even if it cannot be used as an enforcement tool, even if you had a camera on the train, then this could be a good way of being able to record offences and build up a better picture of how frequent offences are at different locations, and that would then give the police and the railways something to work on in terms of deciding where you want to put enforcement resources. Are Victoria Police going to be — —

Ms DOUGLAS — I don't think so.

Dr CAIRNEY — Anyway, the point that the police did make in the course of this trial was that they are firmly committing to evidence-based policing. They are quite happy to police rail level crossings, but before they commit resources they really need evidence either of a crash history or of aberrant behaviour at the crossings. Even if there is only a camera on the train that you cannot use directly for enforcement purposes, if it can be used to guide the police as to where to put enforcement resources on the community education apparatus, as to where they should concentrate their efforts on publicising safety, then it would still be a worthwhile development.

The CHAIR — You are right. Behaviour is certainly an issue. I heard on 3AW last week there was an incident at a level crossing where the boom gates and lights were on, and the lady was quite rightly waiting at those boom gates, the boom gates went up but the bells and lights did not, so she did not move. But then she got a barrage of abuse from the people behind her, prompting her to move on. Obviously behaviour needs to be changed. Enforcement is obviously part of that.

Mr KOCH — Peter, from your investigations with the railway association, has it gone beyond the talking? What investigation work is being done? Has it gone beyond the discussion you put back to us in relation to enforcement authorities? Is there the possibility of trial work, and that that would be done in the next three to six months as far as having photographic equipment on trains? Has that been discussed with rail providers?

Dr CAIRNEY — No, this is a new idea, merely testing the water at the moment. This is just my reflection on what has happened in the trial.

Mr KOCH — What you raised at the table has been initiated and thought about by others, and that is great, but we are going to cut past that stage, and I would guess from that point of view I was hoping you might have been in a position to say to us today some of the recommendations that you have discovered and how quickly some of these might be implemented, but we are obviously far too early for that sort of discussion?

Dr CAIRNEY — I am sorry. That is really out of my hands. The most practical thing that came directly out of that project was a set of guidelines as to how a railway or a community could go about tackling the problem of non-compliance on a particular set of crossings, and that is as far as we could go. It is really back to the railways and the road authorities now.

Mr KOCH — You have also demonstrated the costs of actually implementing some of the safety equipment, be it lights or be it booms or other things. Have you and your colleagues given consideration to non-failsafe equipment, bearing in mind that that sort of equipment can be delivered on site at a lot lesser cost than down the track? Do you have an opinion in relation to non-failsafe?

Dr CAIRNEY — Yes. This is a personal opinion, I hasten to add — I really think it is time we were prepared to go beyond the old notion of fail-safe, because even if you have got equipment that is not fail-safe, if it can be done at a much lower cost and rolled out over many more crossings, then you really are giving the community additional protection, even though you have always got the possibility of failure and a messy legal situation.

I mentioned the railway level crossing conference I organised in 1991, and I think probably the most useful paper given at that conference was one that I recommend that you find time to read, if you possibly can. It was given by I think Phil Chapman who was at that stage the solicitor for what was the Australian National Railways.

He made it very clear that a railway is always obliged to do what is reasonable. It (the equipment) is not obliged to be fail-safe. It is obliged to do what is reasonable; and extending that argument, if by insisting on having everything fail-safe you are not extending this low cost protection more widely, then arguably you are not doing what is reasonable. And by insisting on that fail-safe principle — —

Mr LEANE — Do you think the issue there is — — I personally think it is very unreasonable if 1 in 1000 times the equipment does not work, and that means that whatever the equipment is that you are relying on does not work and 1000 times — I do not want to be number 1000 when a train is coming through. I think it is pretty reasonable for people who look after the infrastructure to say, 'I do not want to take that risk on behalf of other people as well'. I do not know if non-fail-safe stuff is used anywhere in the world but I have a good appreciation now, after the few months we have spent on these — —

Dr CAIRNEY — I can understand people's nervousness and reluctance about it because fail-safe really is just such a core value in railway engineering.

I think there are two things to say, though. One is that the biggest increase in safety at rail level crossings comes about when you move from no protection to providing some sort of active warning. That really is the big step in safety.

Mr KOCH — That is the catalyst.

Dr CAIRNEY — The boom barriers are another step on top of that. It is providing an active warning —

Mr LEANE — I think the active warning could be auxiliary to the stop sign or give-way sign.

Dr CAIRNEY — That really is a legal nicety, I think. If you make it an advisory — —

Mr LEANE — Advisory, because I might not have my radio on. I might have my radio pulled out. I might have no radio, so as an advisory or auxiliary thing, that is fine.

Dr CAIRNEY — But if you put in something like this and arguably it saved 99 crashes, then it goes wrong one time and there is a crash, is the community better off from having the 99 crashes and not this one crash because the equipment failed? Or is it better off saving the 99 crashes and wearing that?

Mr KOCH — Or not having any equipment at all? That is really the argument.

Dr CAIRNEY — Yes.

Mr LEANE — It depends; are we are talking about low-cost level crossing technology?

Dr CAIRNEY — Yes. The other point to make is also that with modern systems you can produce electronic systems that are very reliable; it takes a lot of work and a lot of development, but you can produce systems that are very reliable.

You can also make them self-monitoring so that it is very unlikely that they could fail, but if they do fail, then you can very quickly get information that they failed. I think there is the possibility of creating maybe not fail-safe but extremely safe and reliable systems.

On this issue, we are moving into a new era already. Last week the European Union launched a new satellite that is a pilot, a satellite that is accurate enough to take on board safety critical functions. It is accurate to within 1 metre in terms of its measurements so this is seen as the first pilot for a system of satellites that will do things like control traffic in Europe and overall in that set of applications. Even since the 20 years or so ago when we ran that last conference, the technological options have really moved ahead by leaps and bounds.

Mr TREZISE — Peter, would you like to make some comments on train visibility — that is, lighting, livery colour, reflective tape?

Dr CAIRNEY — Yes. In terms of lighting, there is really not much advantage to be gained by further lighting. A few years ago I conducted — I did not quite realise what I was getting into, and it ended up being quite a circus — a visibility trial for Western Australian Government Railways where we looked at the effect of adding strobe lights to trains to improve visibility.

Mr TREZISE — On the locomotive?

Dr CAIRNEY — On the locomotive, yes. This really did not do anything because at night the existing locomotive lights, the headlights and the ditch lights, even in the clear West Australian skies, were just providing such a big glow and advance warning that the strobe light actually added very little. In the daylight — and it might be different under darker skies, it was very bright weather then — the strobe light was not invisible but it just did not make much of an impression in bright sunlight.

The CHAIR — I would have thought that it would be more effective to actually have the strobe lights on the wagons?

Dr CAIRNEY — But most train collisions are between the locomotive and the road vehicle. If you are talking about giving people warning that there is something on the crossing, because about 30 per cent of crashes are road vehicles running into the side of trains, then that has not really been trialled. Certainly there have been trials with reflective sheeting, and reflective sheeting works okay provided it can be kept clean. But there are serious problems in the railway operating environment, so maybe you have got to make sure that whatever you put on the side of the wagons is seen to be critical for marking, then they will keep it nice and bright and shiny.

Mr WELLER — And the strobe lighting on the engines did not improve the sighting during the day?

Dr CAIRNEY — No.

Mr TREZISE — Nor at night?

Dr CAIRNEY — Nor at night.

Mr WELLER — I would not worry about the night — but no improvement in the daytime?

Dr CAIRNEY — On a day like today? I would have to say this was done in bright weather conditions, and I do not know how it would go on a day like today. But you have got very bright lighting on the front of the locomotive as it is.

The CHAIR — If anything, it is harder to see at night. I live close to a freight line; a train has about 50 wagons, some of them not having containers on them, and particularly at night it is very hard to see them

Dr CAIRNEY — To see them, yes.

The CHAIR — I just thought that at night it would be more sensible to have strobe lights on them.

Mr KOCH — I support the Chair's comments. The Melbourne–Adelaide freight train can often have in excess of that and be even up to a kilometre or more in length. I know that when I come to some of those crossings in the dark, if the wagons were clean you would obviously have a lot more opportunity to see them but on some occasions that is not the case.

I think one of our colleagues approached a crossing and there was a car sitting on the other side. He could not for the life of him work out as he approached what was going on because the side of the train was too dirty, had empty rail carriages and quite obviously visibility was right down. So there may be some opportunity for strobe lighting somewhere along the side of the train even if it is only the start, the middle and the finish because in most cases, especially in regional Victoria, you do get a good view of the side of the train. It is not like in a built-up area where you do not have that visual opportunity.

The CHAIR — Would you like to make some comments about rumble strips?

Dr CAIRNEY — No, I do not think I can really make any comments about rumble strips at this stage. Some of my other colleagues at ARRB are in the midst of an evaluation of the rumble strips for VicRoads. This is quite a thorough evaluation in that it is obviously going to involve crash analysis but really the crash numbers are so small that there is no prospect of being able to show whether they work or not in terms of crash analysis.

We are also looking at driver behaviour. We are using a laser speed gun that can give continuous output so we can get a profile of the vehicle's speed as it approaches the rumble strips, as it goes over the rumble strips and as it goes past the rumble strips, and we are also using our video trailer. This is a trailer that sits by the side of the road and it has got a pneumatic mast and a video camera on top so we get a good view of just what drivers are doing. We will be looking at that mainly to check whether the drivers are going around the rumble strips or not. So that is very much in hand at the moment.

The CHAIR — When can we get some results?

Dr CAIRNEY — You would have to ask VicRoads. I am not quite sure when it is supposed to finish. I think it will be by the end of this financial year.

The CHAIR — Any further questions? No? Thank you very much for your contribution.

Dr CAIRNEY — Thank you, gentlemen, for the opportunity to contribute.

Witness withdrew