COMMISSION OF INQUIRY
INTO FORENSIC DNA TESTING IN QUEENSLAND

Brisbane Magistrates Court
Level 8/363 George Street, Brisbane

On Thursday, 24 November 2022 at 9.30 am

Before: The Hon Walter Sofronoff KC, Commissioner

Counsel Assisting: Mr Michael Hodge KC
Ms Laura Reece
Mr Joshua Jones
Ms Susan Hedge

THE COMMISSIONER: Ms Reece.

MS REECE: Thank you, Commissioner.

Commissioner, as this Inquiry enters its final weeks, we are now in a position to explore the handling of the DNA evidence in relation to the murder of Ms Shandee Blackburn.

It's fair to observe that this case has loomed large in the life of the Commission, and it seems fitting that it forms part of this final chapter.

It is compelling for its tragedy, for the humanity of the loss of a life, lack of closure for a family, but it's also illuminating in the insights it has given us into the functioning of the lab at that time almost ten years ago.

In the early hours of the morning of 9 February 2013 Ms Blackburn was walking home from work in Mackay. She was attacked on Boddington Street when she was not far from home. She was stabbed multiple times. There was very little evidence to assist police in identifying her killer.

The forensic investigation of the scene and other sites commenced in the early hours of the following morning, or that morning, and spanned a number of weeks. It did not result in compelling evidence identifying an individual, but in time police did identify a suspect and a man was tried for and acquitted of her murder in 2017. There was no DNA evidence linking him to the scene or to the murder of Ms Blackburn.

In 2020, as, Commissioner, you're aware, there was a Coronial Investigation and in February of this year the Coroner announced that that investigation or that Inquest would be reopened.

As senior counsel assisting Mr Hodge KC noted in earlier hearings, we have been acutely aware of the need to be careful in our approach to this aspect of the work of the Commission and how any public scrutiny of the aspects of the evidence might effect or overlap with processes that are ongoing.

One feature of this approach today is that we will not be making public large amounts of material in the way that we have for other modules.

For just over a year there has been considerable public interest in and concern about this case. This is due to the reporting on the case in podcast format by Mr Hedley Thomas of The Australian newspaper.

This concern, initially over the death of Ms Blackburn and the acquittal of the accused man, broadened over time and became attached to the work of the lab itself. Mr Thomas, assisted by forensic biologist Dr Kirsty Wright, raised a series of concerns as to the results obtained by the lab from samples collected in the Blackburn investigation. They considered and discussed the possible reasons relating to the functioning of the lab in 2013 for what were seen as anomalous results. They did this, of course, based on the information that they had available to them at the time.

The samples of concern, and these are from two sites, or perhaps three. There are three sites that the samples were taken from. One is from Ms Blackburn herself, the other is from the scene of the murder, and the other is from the car of the suspect.

The samples of concern then themselves fall broadly into five categories and they are samples of bloods, or swabs of blood from the scene; samples of the bloodstained shirt Ms Blackburn was wearing when she was attacked; trace DNA located on Ms Blackburn's trousers, which became controversial at trial; samples taken following presumptive screening for blood in the car of the suspect, and samples from a T-shirt found near the scene.

Our approach, as you know, Commissioner, has been to carefully investigate the DNA testing undertaken by the Queensland Health Forensic Scientific Services Laboratory. We have obtained a large amount of material, spoken to investigators, briefed two experts, Johanna Veth and Dr Bruce Bedowle.

Dr Bedowle is known to the Commission, having given evidence in earlier modules. Ms Veth is a senior scientist in the Forensic Biology Group at ESR in New Zealand. She has over twenty years of experience analysing, interpreting and reporting DNA profiling results in a variety of criminal and disaster victim identification investigations.

Ms Veth and Dr Bedowle were tasked with providing a review

of the validations of STRMix and PowerPlex 21, both of which occurred in late 2012. The introduction of those two, of STRMix and PowerPlex21, constituted a major change for the lab.

Insofar as the introduction of both relates to the Blackburn case it's covered in their review of the case, which is a separate report, but they do identify in their review of the validations a somewhat premature setting of the thresholds, which was not supported by the data and that it created a great risk of not detecting potentially probative exculpatory or otherwise informative profiling results. This, of course, has some resonance with matters that we have already heard in the Commission hearings thus far.

When looking at the Blackburn case, in addition to conducting their own review of the DNA results, we asked Ms Veth and Dr Bedowle to review a report about the case by Dr Wright and to test the soundness of her opinions.

We have provided Dr Wright with material and facilitated a discussion between her and our experts in order to identify where the points of difference lie in their analysis of the evidence and today, to further that approach, they will be called together in order to ensure that these differences can be properly ventilated and explored.

THE COMMISSIONER: And as I recall, when Dr Wright gave us her report, her statement, she invited its review by qualified people. So what's been done now has been done in accordance with her wishes and in the spirit of open scientific inquiry.

MS REECE: Yes. As the Commission has already heard on many occasion, the tradition of peer review or critical review of scientific work by others is an instrumental part of the scientific process and certainly Dr Wright had expressed a desire to have exactly that take place and it is in the spirit of that that first the conclave between those witnesses was organised, and that they are to give evidence today in this way.

THE COMMISSIONER: Yes.

MS REECE: Importantly, it must be noted that in the evidence that you will hear from Ms Veth and Dr Bedowle,

there is no allegation of deliberate wrongdoing on the part of the lab, no concealment of errors or misleading of the police, even those issues which remain in contention around issues of lab processes and failures, questions of interpretation and the classification of presumptive blood screening results.

Putting aside those points of difference, the evidence does indicate that there systemic issues affecting the lab in 2013 which has similarities with those about which we've heard so much in other modules. A major change of process, the introduction that I've just spoken of of PowerPlex 21 and STRMix in late 2012, had caused significant disruption to the efficiency of the lab. Police were concerned about turn around times. Correspondence between the lab and police reveals the attempts on the part of the lab to respond to those concerns.

In December 2012 a decision was made not to process further major crime samples under a certain quant level. That was a change previously, was the case with the change with the Options Paper in 2018. Previously certain quantitation - samples at certain levels of quantitation had been delineated as no DNA detected or DNA insufficient for further processing and not submitted for further testing.

In December 2012 that was extended to major crime samples from the volume crime samples which had previously had that approach taken to them.

If I can explain that change or illuminate that change, Commissioner, with some emails which passed between the managing scientist at the lab, Cathie Allen, and Officer Dave Neville of the QPS in February of 2013 and that's best done by looking at document FSS.1000.0262.3143.

THE COMMISSIONER: Yes.

MS REECE: Operator, if you could go to the bottom of that email chain, please.

Commissioner, you can see here an email from Cathie Allen to David Neville on 8 February 2013 where Ms Allen provides a summary of some information which had been proved to Inspector Carstensen by Justin Howes regarding the current situation of the lab.

The email details the implementation of PP21 and STRMix as the biggest change to forensic biology, that implementing a new profiling kit hadn't been done since early 1999, and that implementing a new statistical software program as, Commissioner, you'd be aware STRMix is, for mixture interpretation has never been coupled with a new profiling kit, so the lab was introducing one new process and one new profiling kit at the same time.

Ms Allen notes that Queensland was the only jurisdiction that implemented this change of process by the ANZPAA deadline of the end of December 2012, and she also outlines some practical difficulties which the lab had encountered with the Christmas closure and the receipt of numerous items in January. Ms Allen really sets out there an explanation of how the lab was functioning and she undertakes or she gives an opinion and some advice where she asks essentially for some streamlining to occur with police in sampling or deciding which samples are sent for processing.

Mr Operator, if you could scroll up. You see here, Commissioner, that on 11 February 2013 Officer Neville responded acknowledging that this had been a significant change and, Mr Operator, perhaps if you could clip out that text of the email and blow it up, please, for the ease of reference for those watching.

Commissioner, in this email Officer Neville acknowledges that there had been a significant change and it was having an unavoidable impact on laboratory throughput. He goes on to say:

> *However, I am cognisant that the turn around times are growing. It is imperative to police that offenders are identified rapidly so that they are arrested and prevented from creating more victims. I am very interested to know when you think you will be positioned to provide the same turn around time as previously enjoyed.*

And then there's a request for Ms Allen to keep in close contact with police to keep them abreast of what was happening and that Officer Neville would be asking Inspector Carstensen to report to him on a regular basis on those turn around times.

Mr Operator, if you could continue to scroll up, and clip out that response from Ms Allen.

Commissioner, it's not my intention to take you through each of these emails but this is an exchange between the lab and police which does underline, on our view of things, that there was considerable pressure in terms of volume of samples coming through the lab at that time and also pressure from the police in the now well understood way which relates to turn around times in the processing of results from samples of crime scenes.

There's a further email exchange, Commissioner, or a further email in March of 2013 which then sets out the process change which had occurred in late 2012. That exchange is found at FSS.1000.0262.4607. It's an email from Cathie Allen to Dave Neville on 1 March 2013. And this email again, it's not necessary for me to read it in its entirety into the record, Commissioner, it will be tendered, and I'll tender these emails together because they - if that's convenient.

THE COMMISSIONER: Yes. We'll do that in due course. Yes, when you've got a bundle of them tender them and I've give them an exhibit number as a bundle.

MS REECE: It's just these two, Commissioner.

EXHIBIT #217 EMAIL CHAIN BETWEEN CATHIE ALLEN AND INSPECTOR NEVILLE IN EARLY FEBRUARY 2013 AND THE EMAIL FROM MS ALLEN TO INSPECTOR NEVILLE OF 1 MARCH

MS REECE: Commissioner, the thrust of this email is providing information to forensic coordinators about the change of process in the lab and it does highlight or it brought to our attention that this process change in late 2012 had extended to the applying of a threshold to major crime cases, which is set out in the Procedure for Case Management which was valid from December 2012 and I can take you to it briefly, Commissioner. It's at WIT.0016.0105.0007. I understand this was tendered previously, Commissioner. I'm just getting the exhibit number. Mr Howes attached it to one of his statements.

THE COMMISSIONER: The exhibit number doesn't matter. The database number is the important one.

MS REECE: Thank you, Commissioner. It's at p7 that I'd seek to take you to and you can see there, Commissioner, about two-thirds of the way down the page, or just under halfway down the page:

> *For samples that have not been amplified, samples with an undetermined quantitation value (is this at the second dot point) will be reported in their associate exhibit as no DNA detected regardless of priority, and any sample with a quantitation value less than .01 nanograms per microlitre will not be amplified or sent for a microcon as this will not yield enough template DNA to allow for reliable DNA profile interpretation. This result will be communicated using the DNA insufficient for further processing exhibit line.*

It does go on to say that occasionally a sample --

THE COMMISSIONER: Just to put it into context, any sample with a quantitation value of less than 0.01 nanograms per microlitre, what was called the DIFP range in earlier evidence, topped out at .0088.

MS REECE: Yes.

THE COMMISSIONER: Which is close enough to .01.

MS REECE: Yes.

THE COMMISSIONER: But is a little less than .01. So this was applying the DIFP regime at that time.

MS REECE: Yes.

THE COMMISSIONER: To quants below .0088 and, indeed, at a higher point, .01.

MS REECE: Yes.

THE COMMISSIONER: Yes, thank you.

MS REECE: Yes. It's a previous example of a threshold being applied and it did change in 2015, but at the time

that we're concerned with in this module, this was the threshold which was operating.

THE COMMISSIONER: Yes.

MS REECE: And the no DNA detected threshold was samples with quantitations of less than .0021 nanograms per microlitre.

THE COMMISSIONER: Which was the manufacturer's standard limit of detection but, as I understand it, had not been validated in the lab and you're going to talk about that.

MS REECE: Yes.

THE COMMISSIONER: Yes, all right, thank you.

MS REECE: Thank you, Mr Operator, we don't need that exhibit any longer.

Commissioner, in their report, Ms Veth and Dr Bedowle write of a busy lab under considerable pressure. Correspondence between Inspector Neville and Ms Allen is clear illumination of that or evidence for that proposition. It seems that reporting the results as soon as possible to police remained a priority despite there being significant issues in the lab which included at least two large quality investigations, an apparent increase in drop-in contamination and ongoing electrophoresis carry over concerns, which is the type of contamination, and difficulties adjusting to PowerPlex 21 and incorporating STRMix into the work flow.

Ms Veth has also identified a potentially significant anomaly in the batches in which many of the samples of concern in Blackburn were extracted, and this is an issue which has arisen almost fortuitously, really, in the last short period. While the cause of the anomaly has not been identified and is potentially not identifiable, the results between the two methods of extraction being used by the lab at the time are so stark that it appears indicative of a systemic issue with the functioning of the lab. This is an issue they appear to have been completely unaware of.

I'm only going to speak that issue in broad brush, Commissioner, because, of course, it's a matter which our experts are better placed to speak to in detail, but the

essential difference is that the samples at the time were being extracted either on the Maxwell Automated System or using the multi-probe system, which was partially automated and partially manual. There was a further fully manual extraction method but that's not what we're concerned with here.

The difference between the Maxwell extractions and the multi-probe extractions and the results being obtained from those two methods of extraction at the time are what we are concerned with. The reason why this is particularly compelling is because when you look at those poor results from the multi-probe extraction method they cover off almost completely with the samples in Blackburn which returned poor results. So the samples of concern, almost all of the samples of concern that have been identified by both Dr Wright and Ms Veth and Dr Bedowle were processed using this extraction method, and that's a matter which we'll explore further in evidence today.

THE COMMISSIONER: Yes.

MS REECE: Among the number of other issues raised by Ms Veth and Dr Bedowle in their report is that there were misguided policies which were related to the interpretation of DNA profiles or designed even to avoid generating potentially complex DNA profiles, and that these policies resulted in very low level results in mixed DNA profiles being used for comparison purposes, apparent single source but incomplete and interpretable profiles not being interpreted, and samples stopped after quantification and reported as no DNA detected.

Commissioner, you will recall that at the conclusion of their evidence on the present functioning of the lab, Dr Kogios and Ms Baker raised with the Commission the issue of the use of swabs with a wetting agent of 70 per cent ethanol used by officers for swabbing blood, particularly dried blood, by scientific officers and scenes of crime officers.

QPS collection procedures at the time of Ms Blackburn's death required officers to swab liquid blood with dry swabs and to apply a wetting agent to a swab used on a dry stain. The swab taken from the concrete gutter in Boddington Street in the early hours of 9 February, just hours after the murder, returned a good profile, whereas the swabs

taken that night did not on the same location.

THE COMMISSIONER: Can you say that again, please.

MS REECE: A swab was taken, Exhibit A. It was taken - that's what it's referred to in the police material - it was taken in the early hours of 9 February, so not long after Ms Blackburn was attacked. It returned a good profile. It was taken when the blood was fresh, if I can put it that way. The swabs which were taken later that night after the passage of a day did not return good results. They are the now somewhat - well, one of them is the somewhat notorious now S14 sample, which returned a result of no DNA detected, which has caused significant concern given that it was really from what should be a good source of DNA.

The potential for the use of that wetting agent to have impacted on the ability for the lab to obtain a result from that swab will be explored in evidence with the experts today.

You will also hear Ms Veth and Dr Bedowle speak of the potential for degradation of DNA when a bloodstain is exposed to sun and heat over an extended period of time.

Commissioner, the reason I have taken you to those swabbing methods or testing methods is that there's also a concern, which will be developed further by my fellow counsel assisting Mr Jones with Professor Wilson-Wilde in her evidence tomorrow - well, it's not really another concern, it follows on from what Dr Kogios and Ms Baker raised, that the use of 70 per cent ethanol as a wetting agent or a swab to take a sample of blood, the use of that substance may not be best practice, with studies indicating that ethanol is less effective at lifting bloodstains from particular surfaces.

THE COMMISSIONER: So what we're talking about is using a swab, like a cotton bud, to pick up a part of a bloodstain or some other kind of stain, but relevantly here blood, and the need to wet the cotton bud so that, in the case of dry bloodstains, you wet the dry bloodstain and pick some up with the cotton.

MS REECE: Yes.

THE COMMISSIONER: And police had been using water, pure water, and then they switched to using an alcohol solution, 70 percent ethanol and no doubt 30 percent pure water, that's what we're talking about?

MS REECE: Yes.

THE COMMISSIONER: Yes. Go on.

MS REECE: That's correct. I'm not going to go to into what the expert evidence will be, that's for Mr Jones tomorrow, but there is an indication that in particular in relation to semi porous and porous surfaces like concrete, using that wetting agent really may not be the ideal form for collecting samples of blood.

This issue will be explored in evidence as it relates to Ms Blackburn's case today, but again a number of matters which I've just spoken of, the potential for degradation, the use of swabs, it's really impossible for anyone to say with certainty whether one of these things, or both in conjunction, had an impact on the return of poor results from those swabs.

THE COMMISSIONER: That is to say, is the effect of the evidence that the matters that you've just mentioned, and no doubt other matters, were capable of prejudicing the collection of DNA?

MS REECE: Yes.

THE COMMISSIONER: Or biological material containing DNA, and therefore capable of causing a result that there was nothing to profile, there was nothing to yield a profile, when had some other method been used there might have been a usable profile derived from the biological material that was available?

MS REECE: Yes.

THE COMMISSIONER: But we can't tell whether any of this actually had an effect in Ms Blackburn's case?

MS REECE: That's right.

THE COMMISSIONER: Yes.

MS REECE: Yes, and picking up on that, Commissioner, it hasn't --

THE COMMISSIONER: I suppose, and you might think about this, the logical consequence, though, is that the results obtained from the samples submitted by police in that case were unreliable, is that right?

MS REECE: The samples --

THE COMMISSIONER: That is to say, one can't have confidence in them. They might accurately reflect what was there and what was available to be taken, notwithstanding that it was evidently a dried bloodstain on the concrete.

MS REECE: Yes.

THE COMMISSIONER: No effort would have derived any usable profile from that.

MS REECE: From the lab's point of view.

THE COMMISSIONER: From one end of the spectrum.

MS REECE: Yes.

THE COMMISSIONER: And at the other end of the spectrum the possibility is that incompetent methods were used and the result was not profile was obtained, although one could have been obtained, but we don't know which it is, which is why I say the result was unreliable because you can't have confidence in it.

MS REECE: Yes.

THE COMMISSIONER: Yes. Thank you.

MS REECE: Commissioner, really picking up on that theme, on the evidence that we will tender today it hasn't been possible to establish that any one failure or combination of failures on the part of the lab did not contribute to the failure to obtain useful DNA evidence in the Blackburn case, but similarly it is not possible to say with any certainty that such failures did not.

THE COMMISSIONER: I'm sorry, I'm just thinking out loud, Ms Reece, and it's not a concluded thought, I just put it

to you and to others so that they can consider it. The consequence is that the evidence in the end in relation to these samples, the expert evidence in the end, knowing what we know now, which will be developed by the experts you're calling, is that it's not possible to conclude that the offender's DNA was not on Ms Blackburn's body or clothing and it's not possible to conclude that Ms Blackburn's DNA was not present in the car of the person who had been suspected of the killing, that is to say, it was not correct to say that there was no DNA, it would have been correct to say that having regard to the methods employed it was not possible to say whether or not there was any DNA in relevant places. But you can answer that later and think about it because I'm just thinking out loud and I'm posing the question.

MS REECE: No, thank you, commissioner.

THE COMMISSIONER: About what the proper conclusion is to be drawn from the kind of evidence you're going to lead. We'll come back to that.

MS REECE: Ultimately there will remain really at the end of that evidence, and having considered that question, the matter which will remain for consideration by you at the conclusion of the hearing, Commissioner, will be what findings you might make as to the functioning of the lab at the time and any possible recommendations that you might make.

THE COMMISSIONER: Yes.

MS REECE: And in considering the later, and the fact that this is now almost ten years ago, you'll no doubt be informed by the review of the current functioning of the lab by Dr Kogios and Ms Baker and any recommendations already in contemplation.

Given the evidence relating to the apparent discrepancy in the extraction of DNA using the multi-probe extraction method in 2013, it may also be appropriate for recommendations to be made regarding further investigation of that issue by the lab given its potential to have affected samples beyond that in the case of Blackburn.

Commissioner, those were my remarks I wished to make in opening and I'll now call Dr Bedowle, Ms Veth and

Dr Wright. Dr Wright is here in person. I'll just ask that the link be established with Dr Bedowle and Ms Veth.

Perhaps we might swear Dr Wright.

THE COMMISSIONER: Yes, I'll take them one by one as soon as I can see them on my screen.

MS VETH: This is Johanna Veth speaking. I can see you.

THE COMMISSIONER: Dr Bedowle, can you see and hear me?

DR BEDOWLE: Yes, I can.

<KIRSTY WRIGHT, affirmed and examined: [9.17 AM]

<JOHANNA VETH, affirmed and examined: [9.17 AM]

<BRUCE BEDOWLE, affirmed and examined: [9.17 AM]

MS REECE: I just might ask if the sound could be increased, Commissioner. I note that Ms Veth and Dr Bedowle are very faint in the courtroom.

THE COMMISSIONER: Let's see how that works.

MS REECE: Yes. Ms Veth, perhaps if I can start with you. Can you hear me?

MS VETH: Yes, I can.

MS REECE: And Dr Bedowle, can you hear me?

DR BEDOWLE: Yes, very well.

MS REECE: I still think that's quite low, the sound, Commissioner.

Ms Veth and Dr Bedowle, you've provided two reports to the Commission. The first is a review of DNA analysis undertaken in the Blackburn case dated 23 November 2022?

DR VETH: That is correct, yes.

MS REECE: And the second is a review of PowerPlex 21 and STRMix Vol.1.05 validations, of version 1.05 validations?

DR VETH: Yes, that's correct.

MS REECE: And that was dated 20 November 2022?

DR VETH: Yes.

MS REECE: Is there anything you wish to correct or change in those reports?

DR VETH: No, not to my knowledge.

MS REECE: Dr Bedowle?

DR BEDOWLE: No, I'm fine with both reports.

MS REECE: I tender first the review of DNA analysis undertaken in the Blackburn case, Commissioner.

EXHIBIT #218 REVIEW OF DNA ANALYSIS UNDERTAKEN IN THE BLACKBURN CASE

MS REECE: And the review of PowerPlex 21 and STRMix V1.05 validation dated 20 November 2022.

EXHIBIT #219 REVIEW OF POWERPLEX 21 AND STARMIX V1.05 VALIDATION DATED 20 NOVEMBER 2022

MS REECE: Dr Wright, you've also provided reports to the Commission?

DR WRIGHT: Yes.

MS REECE: And I believe it's actually an undated document but it was provided in November of this year?

DR WRIGHT: Correct.

MS REECE: And it is the Review of Blackburn DNA analysis for the Commission of Inquiry into Forensic DNA testing in Queensland?

DR WRIGHT: Yes.

MS REECE: And it's authored by you and it says version 2 at the bottom?

DR WRIGHT: Correct.

MS REECE: And you also provided an addendum report on 18 November 2022 title 'Addendum report review of Blackburn DNA analysis'. Those two reports, is there anything that you wish to add or amend in relation to them?

DR WRIGHT: No, there's not.

MS REECE: Commissioner, I tender the review of the Blackburn DNA analysis by Dr Wright.

EXHIBIT #220 REVIEW OF THE BLACKBURN DNA ANALYSIS BY DR WRIGHT

MS REECE: And the addendum report.

EXHIBIT #221 ADDENDUM REPORT OF DR WRIGHT

MS REECE: Review of the Blackburn DNA analysis. Commissioner, I know it's probably slightly inconvenient but I've become aware that people really are having significant difficulty hearing. I wonder if there may be some merit in standing down briefly?

THE COMMISSIONER: All right, I'll adjourn until I hear from you.

MS REECE: Thank you.

SHORT ADJOURNMENT

THE COMMISSIONER: Ms Reece.

MS REECE: Thank you, Commissioner. Commissioner, thank you for that time. I understand that there has now been a different connection made with Dr Bedowle and Ms Veth and we should now both at the Bar table and at the Bench and in the courtroom be able to hear.

THE COMMISSIONER: All right, good.

MS REECE: Thank you, Dr Bedowle, Ms Veth and Dr Wright. We'll see if we can start your evidence again. I'd just taken you to each of your reports and when I opened the case to the Commissioner this morning I explained that the three of you had been able to meet and discuss your evidence previously and I understand that as a result of

that discussion you felt that you had reached a degree of agreement about the DNA testing or the results in the Blackburn case.

DR WRIGHT: Yes, that's correct.

DR BEDOWLE: I believe so, yes.

MS VETH: Yes.

MS REECE: There are a number of matters which remain outstanding but there was at least some ability to agree and form a common view?

DR WRIGHT: Yes.

DR VETH: Yes, I agree.

MS REECE: Sorry?

DR VETH: Yes, I agree with that.

MS REECE: Okay, thank you. The approach I'm going to take with you now is just to talk to you initially about some of the samples which have been referred to perhaps as samples of concern or samples which didn't return DNA results in the Blackburn investigation. We might start with the samples taken from the road on the evening after Ms Blackburn was killed in Mackay. The sample S14, as you'd all be aware, is one which returned a DNA result, or a result of no DNA detected. I understand that this might be an opportunity for you to explain the differences in your opinion. Dr Bedowle and Ms Veth, could you perhaps explain to the Commissioner what your view is of the poor results, the explanation that might be put forward for the poor results from that swab of a bloodstain on the road at about perhaps 8 or 9 pm on the day after the murder?

DR VETH: Certainly I can take that question. So there are a couple of factors that may be in play here. One may be that the DNA has degraded during the day. I understand that it was a hot and sunny day. There is a possibility that one factor in the inability to obtain DNA from the sample could be environmental from the sunlight, for example, and the heat. Another factor may have something to do with the surface that the blood was sitting on. It may be (indistinct) associated with the concrete or any

matter that is sitting on top of the concrete in between the concrete and the blood that may have inhibited the DNA profiling reaction, thus causing inability for DNA profiling results to be obtained. We also had concern, we had some concerns about the possibility that the extraction method that was used for this particular sample may also be a factor. Unfortunately we cannot say with any certainty which of these factors or indeed if a combination of these factors has resulted in the inability to obtain DNA profiling results from this particular sample.

MS REECE: And that extraction method that you're referring to, that's the issue which you've discovered as between the results from the Maxwell extraction method and the multiprobe extraction method?

DR VETH: That is correct, yes.

MS REECE: I'll take you to that issue in due course, and that will be the three of you can talk to that evidence when we get to that. The reason I'm using the example of blood now is for exactly the reasons, Ms Veth, that you've just outlined, that for some of these samples there may be a number of different explanations for why a result wasn't obtained. With the blood on the road, I've just explained to the Commissioner that at the time, and in fact I understand it's still the case, QPS scientific officers and scenes of crime officers who attended crime scenes where there were bloodstains or suspected bloodstains would use a wetting agent on a swab, a wetting agent of 70 per cent ethanol. We're going to hear some expert evidence tomorrow about the use of such swabs. With a dry swab with the ethanol being applied to it, does that raise any concerns for either of you in relation to the potential impact on the ability of that swab to pick up a bloodstain from a porous surface?

DR VETH: I understand that swabs treated with significant ethanol have poorer recovery of bloodstaining, and I also understand that there has been some research that has determined that the ability to obtain DNA - that there's less DNA recovery from swabs that have been treated with 70 per cent ethanol. Again these could be factors in why this particular sample was reported as no DNA detected. And again, we can't be sure whether this or a combination of the other factors that I've already mentioned are all or partially in play here.

MS REECE: Dr Bedowle, did you want to add anything to that?

DR BEDOWLE: Only that we don't know for sure because I would say both Ms Veth and I haven't done studies actually trying to recover DNA with 70 per cent ethanol, it just isn't the standard or typical method that's been used in crime scene collection.

MS REECE: All right, thank you. What you've then outlined, Ms Veth and Dr Bedowle, is a number of matters which are, if I can say, extraneous to the lab, that is matters which may have impacted on the samples prior to the lab processing them, that is the degradation?

DR BEDOWLE: Yes, that's correct.

MS REECE: And there is also now this extraction method issue which is fair and square under the responsibility of the lab?

DR VETH: Correct.

DR BEDOWLE: Yes.

MS REECE: Dr Wright, I understand that while you feel it's correct to highlight other possibilities like degradation, the use of swabs and extraction methods used, your position is that it's more likely that the samples or some of the samples provided anyway, and I'll get you to say specifically whether it's one of these, whether the samples provided poor profiles due to processes in the lab? And I think by that you're talking about the (indistinct) K incident?

DR WRIGHT: Yeah, I agree with Dr Veth and Dr Bedowle that there are other reasons that could have provided a poor profile from what we've seen. I looked at two other samples that were collected from that location on that day, samples S1 and S10 were collected on the footpath just near that location and that was relating to a previous bloodletting event. They both provided good quality profiles and that's why I'm leaning away from the possibility of DNA degradation if those earlier samples from the earlier event obtained profiles. And also several years working in the Queensland Health forensic biology lab

as a technician and as a reporting scientist, we get samples in from mid-Queensland and North Queensland where the weather is very hot and humid and it has been my expectation based on that experience to be able obtain profiles even from that kind of environment. We're simply left with a question mark over the reliability of these results, whether it was the way they were collected, is there some kind of inhibitor, or is it the processes in the lab? So my position is the results that were presented for those samples are potentially unreliable.

MS REECE: It's not possible to say with any certainty though what was impacting on those results, is it?

DR WRIGHT: Correct.

MS REECE: The only remedy really left with a sample like that would perhaps be a re-extraction from a remnant?

DR WRIGHT: Potentially, and that depends on what the cause of the poor profiling results are. If it is an issue with the extraction method, that issue may have caused the DNA to be degraded or to have been lost in that first extraction step. So that's a possibility that can't be excluded either, if those samples are retested they may provide poor profiles or no profiles at all. So yeah, we're simply left with a question mark unfortunately, in my opinion.

MS REECE: The evidence of Officer Geesu, G-e-e-s-u, who was the first scenes of crime officer on the scene, or the first scenes of crime officer who took photographs and took swabs, his evidence was that when he arrived at the scene there'd been a light shower of rain and it was after that that he took a swab from the gutter, which was a swab which returned a good profile. Does the advent of rain during the day have any bearing on your evidence about the results from this particular swab?

DR WRIGHT: So the DNA profiling processes that are used by forensic labs and the methods that were used by the Queensland lab are incredibly sensitive. They can pick up, you know, very small numbers of cells, you know, 10, 11 cells. I saw a picture of S14 or the location from where S14 was collected and there was a very large amount of biological material present. So in my opinion even if there had been a light shower there still should have been

more than enough biological material to be able to obtain a DNA profiling if all of the processes, collection processes and lab processing methods were working accurately.

MS REECE: All right. Ms Veth, do you have a different view or anything that you want to say about the advent of rain and its potential impact on the sample?

DR VETH: No, I'd agree with Dr Wright on this matter. It's a large area of bloodstaining. The rain might have been a factor we're talking about (indistinct) trace amounts of DNA but I don't think that's the case here.

MS REECE: Dr Wright has just referred to a number of samples which it's apparent became something of a red herring early in the investigation as there was a trail of blood drops leading to a different location. You're aware of that evidence? That's the other blood droplets in the S series which she's just referred to.

DR VETH: Yes.

MS REECE: The point that Dr Wright is making is that profiles were able to be obtained from some of those droplets of blood on the concrete which had been there for some time. I understand Dr Wright is using that to support her theory that degradation wasn't a factor, or wasn't a major factor, in why there's no result obtained from this swab. In your mind is that a reasonable explanation, a reasonable rebuttal of your theory of degradation?

DR VETH: Yes, I mean it's difficult at this distance to say for sure which of these factors had been the primary factor, if any of them, the primary factor for the failure to obtain DNA from this particular sample. We felt that we needed to raise all of the possible factors in our report. The ability to obtain - also I wasn't really aware of the significance of those particular samples that had DNA from another person in them when the report was being written. I am aware of that now. Yes, I mean this does tend to point to perhaps something in the laboratory but in all fairness we cannot ignore all of the other factors that may be in play here.

THE COMMISSIONER: Dr Veth, do I understand that your conclusion, and that of Dr Bedowle I think, to be that while you have to give due weight to Dr Wright's experience

in obtaining profiles from samples obtained from environments where the degrading features that are present in this case also appeared, you're not prepared to exclude environmental factors such as heat, humidity as well as the concrete and some other matter that might be on the concrete as factors that led to no profile being obtained, that is to say you would defer to the point being made that that would reduce the likelihood of environmental factors being significant but not to the point that you're prepared to exclude them?

DR VETH: Yes, I wouldn't want to exclude them altogether, primarily because it's possible that all of these factors had some --

THE COMMISSIONER: Cumulative effect?

DR VETH: Exactly, exactly. Or with further research or further investigation we may determine that there was one factor that overwhelmingly led to the failure to obtain results. At this point because that would be quite a large investigation we just can't establish that right at this moment.

THE COMMISSIONER: Yes. I think you'd agree with that, Dr Wright, is that right?

DR WRIGHT: Yes, I do.

THE COMMISSIONER: Go ahead, Ms Reece.

MS REECE: Commissioner, if it assists I'm going to take the witnesses through the samples of concern, talk about the potential explanation for results.

THE COMMISSIONER: Yes, go ahead.

MS REECE: And then turn to this extraction method in more detail as it does loom large in the discussion now of the evidence.

THE COMMISSIONER: Yes.

MS REECE: If we can turn to, there are two shirts which have been of some interest. One of course is the shirt that Shandee Blackburn herself was wearing at the time and there were samples taken of that shirt. There was also -

and I'll speak about this one first - there was a shirt at the scene which was referred to as the bloodstained T-shirt and again no DNA was detected in that shirt. Again what I'll do I'll start with you, Ms Veth, I'll ask you, Dr Bedowle, if you have any questions and then I'll come to you, Dr Wright.

Ms Veth, if we turn to first of all the shirt at the scene. Can you explain to the Commissioner your view of what the possible reasons might be for the lack of a DNA result in that case, because as I understand it with that sample the nature of the stain itself might lend itself to a conclusion that it wasn't in fact blood?

DR VETH: Yes, so this is the white (indistinct) T-shirt as I understand it.

MS REECE: Yes.

DR VETH: And the scientific officer who undertook the subsequent testing, or the bio screening of that shirt described the findings as a slow weak on the reaction, also described the staining on the shirt as dirty stains. A slow weak (indistinct) reaction can occur from the absence of blood and can occur on dirty fabric where there is no bloodstaining. So the conclusion that we reached is that it is quite possible that the staining is not actually blood. Some further testing could perhaps have been done, for example with a test known as Hematrace. But based on those notes of the scientific officers and the notes that he took during the bio screening we can't conclude that there is actually blood present in those samples.

MS REECE: With the Combur test, Combur is the presumptive screening test, or one of the presumptive screening tests for blood. It does also react to rust, doesn't it?

DR VETH: It reacts to quite a number of different agents such as rust - I'm trying to remember here - some plant materials, some paints. So while it is reasonably specific there are some substances that do not react, that cause a positive reaction and the positive reactions can occur in the absence of blood.

MS REECE: Dr Bedowle, is there anything you wanted to add to that or to say about what Ms Veth has just said?

DR BEDOWLE: Only that presumptive tests are just what they are, they don't confirm the presence of any material and usually there is a subsequent test called a confirmatory test for actually obtaining DNA to support that it would be blood. So we always have to be cautious when we're looking at samples of unknown origin, and especially with the descriptions, on making a positive assignment to them being blood at this stage.

THE COMMISSIONER: Dr Bedowle, is another way to describe the significance of a positive presumptive test that a positive result to a presumptive test means that the presence of blood cannot be excluded?

DR BEDOWLE: That is correct.

THE COMMISSIONER: Thank you.

DR BEDOWLE: But it doesn't mean that it is there.

THE COMMISSIONER: Exactly, that's right. Yes, thank you.

MS REECE: Dr Wright, I see you've been nodding during Ms Veth and Dr Bedowle's evidence. Do you agree with what they've said about the T-shirt?

DR WRIGHT: Yes, I agree with all of their opinions. I think that what has led to I guess some concern is the way that the scientific officer labelled three or four of those samples as being blood soaked, but I agree 100 per cent with Dr Veth and Dr Bedowle, we simply don't know if that was blood or not.

MS REECE: So some of that classification at the scene, is what you're saying that that has led to perhaps a misapprehension of in fact what those exhibits might have been or what evidence there was to support calling them blood at the time that they were sampled?

DR WRIGHT: I rely on the experience of the Queensland Police scientific officers and I know this particular scientific officer has or had 20 years of experience. So for me if a scientific officer is willing to label something blood soaked, you know, I would trust that that's based on experience. But I still absolutely agree, we simply don't know, particularly given the DNA results from these samples, if it really was blood or not.

MS REECE: All right. Perhaps then that T-shirt can be put to one side in one sense in that it doesn't appear to be one where there is any real disagreement. In any case I think it's fair to say is it, Ms Veth, that that one was - that that T-shirt, samples from that were part of the batches which may have been impacted by the multiprobe extraction?

DR VETH: Yes, that's correct.

MS REECE: So that provides again that potential reason, if there was biological matter on that T-shirt, for the lack of results in relation to it, but the indications are not as strong, for example, as that bloodstain on the concrete?

DR VETH: That's correct, yes, yes. And also I'd like to point out that, just picking up on something that Dr Wright said, when the samples were described as blood soaked but the description of the shirt doesn't suggest that it had the appearance of bloodstaining, (indistinct words) the way those samples were described.

MS REECE: Yes, and we'll come to that perhaps in relation to the car as well. But if I can now turn to Ms Blackburn's own clothing. I spoke before about her shirt but of course there was also trace DNA tape lifts taken across two pieces of her clothing in particular. If we start with the shirt, Ms Veth. You in your report talk about potential inhibitor on a DNA result being the dye in the fabric. Could you explain that to the Commissioner?

DR VETH: Certainly. This is a well-known issue with fabric samples that if you take a cutting of the fabric the dyes in the fabric can inhibit the DNA profiling reaction. This shirt was black in colour and that was one of the theories that we posited as a reason why the DNA profiling results from these samples were less than what we would expect from bloodstaining. And we also considered that the trace DNA samples that were taken from the shirt were taken using a tape lift. So with a tape lift the dye is no longer a factor because the tape lift just lifts the (indistinct words), it doesn't - there's no fabric in the actual DNA extraction. These trace samples performed very well in comparison to the blood samples, so we had to consider whether because the dye in the fabric that was causing some sort of inhibition in the DNA profiling

reaction for the bloodstain.

MS REECE: You've also raised a concern, it perhaps goes to the mode of sampling, that is that the samples of the shirt were taken around the points of incision, that is whether the knife went through the shirt in the attack on Ms Blackburn. If you're looking for an offender's DNA is the point of the incision the best place to look for that DNA?

DR VETH: No, so this - an investigator might hypothesise that perhaps the offender may have cut him or herself during the commission of the crime and, if so, blood may have ended up on the shirt as well as blood from the victim. If that's the case it's useful to look for areas of bloodstaining perhaps away from the penetration point, so discrete from the penetration point. But if no such staining is visible then I can understand why perhaps samples were taken from other areas of the shirt that were perhaps closer to the penetration point.

MS REECE: Dr Bedowle, did you want to add anything to what Ms Veth has just said?

DR BEDOWLE: Only in the sense that we don't know if there was inhibition on the shirt. Some of the tests that are done to determine the quantity of DNA also give an indication if there's a potential inhibitor. Those tests didn't support that there was inhibition in that analysis, however not all inhibitors will always show up. The best way to resolve that question is to actually take a cutting of the shirt that wasn't stained and add some known DNA to it and see if there's inhibition. So we can debate these questions. There is a simple way to resolve it if one is interested.

MS REECE: And that's really resampling of the exhibit itself?

DR BEDOWLE: In part, it's also just testing on the hypothesis. I mean it's reasonable to hypothesise inhibition given the tape lift versus extracting from the cloth. But the best way to test this is actually to take some cloth and add some known DNA to it that has nothing to do with the case and see if that's inhibited. If it is that strongly supports inhibition as a cause for the loss of signal or DNA typing. If it doesn't support inhibition

then it tends to favour something else like the laboratory processes may have had a greater impact on the result. Or the third is there's no DNA there to begin on the ones that were sampled.

THE COMMISSIONER: Dr Bedowle, in your experience have scientists in labs testing for DNA undertaken examinations of the kind that you've described, that is the work that's done here as I've understood it, is work to test samples strictly so-called, the testing process is applied to whatever sample comes through the laboratory? What you're proposing is an approach in which a scientist who gets the negative results decides to conduct an experiment of the kind that you've described to exclude a potential cause of absence of a profile with a view to focusing upon the true answer to the lack of a profile. Is that something that in your experience scientists in DNA laboratories have done?

DR BEDOWLE: Some have done it, I wouldn't say it's something that's done routinely because of the workload of labs and (indistinct) processing and it always depends on whether there were some other samples that were probative to give information on whether you need to process another sample that gave low results. But if you had a shirt, whether it was an incision and so you expect a lot of blood to be on it from the victim, that that might saturate the shirt and you didn't get a result from that, that might lead some labs to do that and it has been done in the past.

THE COMMISSIONER: In order for that to be able to be done or able to be considered to be done even, it would follow that at some point a scientist must be in possession of knowledge of the whole relevant context of the case and of the nature of the primary sample, the shirt, where it was found and what it was said to be covered in, so that kind of thinking can be applied. That must be so, that a scientist must have command of the investigation from the lab's point of view?

DR BEDOWLE: Yes, in fact this is a critical point of what people try to do to avoid bias in their decision process and it's a balance between knowing information that helps you assess process such as you've just indicated, which I agree whole-heartedly, and knowing things that might affect your ability to objectively assess the evidence. So for instance if someone says, you know, the investigating officer says, "We know it's this person and we just need a

DNA profile to nail him", that would be inappropriate information. But the information of where the sample may have been taken from or the conditions in the environment and such, those could be actually germane to making a judicious decision on how to proceed.

THE COMMISSIONER: Dr Wright, have you seen that kind of approach being undertaken?

DR WRIGHT: Yes, yes.

THE COMMISSIONER: Where have you seen that?

DR WRIGHT: In literature.

THE COMMISSIONER: Yes, thank you. By the way, would you be able to give me some references to that kind of literature?

DR WRIGHT: Yes.

THE COMMISSIONER: Just if you could email it to the Commission, thank you. Yes, Ms Reece.

MS REECE: Thank you, Commissioner. Just picking up on that point that the Commissioner's just been developing with you, Dr Bedowle, as I understand it there's really a single criticism of the reporting scientist in Ms Blackburn's case which is in your joint report with Ms Veth, which is that had he perhaps been more curious about some of these results that there might have been an opportunity for either further investigation at the time or an approach which sought at least to understand those results in a more timely way. That kind of curiosity is assisted by exactly that case context that you've just spoken of, isn't it?

DR BEDOWLE: Well yes. I mean to be informed helps you make better decisions. If a system is such that you don't have that information by working closely with the crime scene officers or having the detailed information and you only have say a cutting that's sent to you, it becomes more difficult to be inquisitive. I don't know if I can put that on the scientist or put that on the system. So we put more towards the system than to the individual under the circumstances how this lab processes case work.

MS REECE: Ms Veth, that really ties in to exactly how you've articulated it in the report, that the workflow and the pattern of reporting samples as they came through contributed significantly to that state of affairs?

DR VETH: The initial reporting is sample by sample so there doesn't seem to be any consideration of the results in the context of the case, or even perhaps in the context of what type of sample it is. So we don't lay this criticism at the feet of the reporting scientist as such. It's possible that he didn't consider the whole case as a whole until some months, perhaps years after these results were initially reported. At that point it becomes quite difficult to think about how you're going to retest these samples or what could have gone wrong with anything, what could have caused these results.

DR BEDOWLE: If I may add to that, it did appear from our investigation that the lab was reporting results as they came off the process and that's usually a very poor way of handling it. One should get a whole case together, assess everything before they make a final report. And so this process of responding quickly contributes to a process where you wouldn't think about the case, you wouldn't be informed about all the aspects of the case as you're analysing it.

MS REECE: Understood. Dr Wright, is there anything you'd like to add to that discussion?

DR WRIGHT: I agree with everything both of the experts have said. We all agree that the several profiles obtained from Shandee Blackburn's shirt were really poor quality, surprisingly poor. That wasn't evident in the DNA statement. The DNA statement revealed that it was a single contributor profile that matched Shandee Blackburn. It wasn't until I looked at the actual raw results, the electropherogram, that you could see the actual - while each of the pieces of DNA were amplified, it did show, whether it's degradation or inhibition, really a quite poor and unexpected profile. In relation to looking at the samples in the context of the case, I agree that - and I just want to highlight none of my criticism has been towards the reporting scientist or the peer reviewer, it's directed at the lab's processes. I think that's where the concern lies, with the processes within the lab.

MS REECE: On that note perhaps, Dr Wright, you would agree at this juncture, having reviewed the material, that there's really no evidence to suggest a deliberate concealment of evidence on the part of the lab or deliberate concealment of issues in the lab impacting on samples, for example?

DR WRIGHT: Not in relation to this specific case. When I looked at the case it was clear that the reporting scientist definitely did not take shortcuts. They really, you know, went to the nth degree to try to obtain DNA profiles. I guess where there is some concern for me is, and I believe we'll be discussing it later, is with some of the issues surrounding the implementation of PowerPlex 21 and STRmix and some of the concerns that were observed in those validations, and yet the methods were implemented and used on case work samples, including for this case. That's where I have a concern. I wouldn't say it's deliberate concealment but I would say that it's reckless.

MS REECE: And your concern there, and thank you because I was going to ask you what exactly you meant by recklessness which is in your introductory comments. Your concern there is that after the introduction of PP21 and STRmix the lab changed its processes again, but then after doing so didn't go back and retest the samples which had been processed in the meantime, is that the issue that you're raising?

DR WRIGHT: The issue I'm raising is yes, there appears to be some issues with the way that they implemented the method and I believe that they should have been gone back and either retested or reinterpreted some of the evidence, or quite a lot of the evidence, in the Blackburn case. I think the way that they were presented, particularly the mixture, I'm sure we'll get to that later, L45 I believe was incorrectly reported.

MS REECE: All right. We can probably, as you've already identified, we can probably consider that when we talk about those two validations and what occurred thereafter. But just before we move on from the shirt itself, Ms Veth, the samples from the shirt again fall into the batches which were extracted using the Multi-probe extraction process, don't they?

DR VETH: That's correct. The first batch of samples from that shirt were processed using the Multi-probe. It was

(indistinct) subsequent batch that was processed using the Maxwell.

MS REECE: And is there a difference between the results observable between those two batches?

DR VETH: It's very difficult to be sure because the datasets are reasonably small. The second batch does appear to have slightly better quantitation results. The actual results from, the actual DNA profile results are still lowish, but they're still not quite what I would expect from bloodstained fabric, but again we're dealing with factors that may be working and causing a cumulative result so it's really difficult to path way exactly what is happening with these two sets of samples.

MS REECE: Dr Bedowle, did you want to add anything to that?

DR BEDOWLE: No, I think Ms Veth covered it well.

MS REECE: Dr Wright, with the shirts, what's your view of the theory relating to inhibition by the dye?

DR WRIGHT: Yeah, I think Dr Bedowle did some analysis on the internal positive controls for those samples and while there was no indication of inhibition, that doesn't mean that there wasn't another kind of inhibitor that just didn't show up on the internal positive control, so we're just left with - you know, we don't know whether it was a dye and we don't know if it was poor processes within the lab.

MS REECE: Okay. Before we move on from those samples and go to the car, you express in your report a concern that the extent of the Proteinase K reagent, this particular batch of or lot of Proteinase K which appears to have created much higher PH levels in some samples and thereby impacting on their results, what is the state of your evidence on the impact of that?

DR WRIGHT: Yes. So the laboratory identified in an opportunity for quality improvement 34043 which was raised on 22 March, that there was a poorly performing batch of Proteinase K. Proteinase K is used in that first stage, the extraction stage. Proteinase K is used to break down the cell wall which will release the DNA and it will also

help in deactivating nucleases. Nucleases are contained within the cell which, once they're released, will start to degrade any DNA.

Importantly also with the extraction method used by Queensland Health, it's a PH dependent method. So if the solution is high in PH, it means that the DNA won't bind to these little silica magnetic beads while everything is being washed through, so potentially the DNA may be washed through and removed. In that OQI 34043 it states categorically that only one batch of Proteinase K was affected, and they did test that and found that it was I think PH14, where it should be PH7 or 8.

I requested further documentation from the Inquiry to see if batches used on the evidence of concern that we've been discussing, if they were tested as part of this OQI, and to be clear the batch that they identified as the defective batch was not used on any of the Blackburn evidence, but there's no documents supporting that the lab tested the Proteinase K batches that were used on the Blackburn evidence and I think that's probably because it was used prior to the OQI being revealed and probably because all of the Proteinase K in those batches had already been consumed, so they probably didn't have an opportunity to test for it. So I can't say for sure that that was an issue or not.

The laboratory identified in that OQI that a faulty dishwasher may have been the cause of this defective batch because of caustic detergent contaminating glassware and potentially a measuring cylinder used to make up the Proteinase K. I think we all agree that it would be unusual for a faulty dishwasher to just effect one measuring cylinder and one batch of Proteinase K. The faulty dishwasher, there's really no real investigation that was conducted on that. We requested that information also so we could evaluate that possibility and it was really quite deeply concerning that the laboratory really doesn't have much information at all about that particular issue and they didn't raise an OQI.

So I'm left with I don't know if faulty reagents were the cause of some of these poorly performing results or if it's the issue that Dr Veth identified with the extraction methods, or if it's a series of, as we discussed, DNA degradation, inhibition and so forth. But I look at it in

the context of the entirety of the evidence and this is occurring in a lab that does have quality issues and I'm of the opinion that there's a genuine question mark about the reliability of the evidence due to possibly poorly performing processes.

MS REECE: That's a general statement though?

DR WRIGHT: Yes.

MS REECE: If I could take you though to the Proteinase K. You'd agree, wouldn't you, with either your concern now is one which exists in an absence of evidence rather than anything which directly informs you that there was this impact which you had previously suspected, given the material that you had at the time?

DR WRIGHT: Correct. There's no evidence to say it definitively affected the Blackburn samples, we're just left with a large range of samples with issues. So, no, there's no evidence to support that directly.

MS REECE: All right. And with the dishwasher, while there wasn't an OQI raised in relation to it, it is referred to in the Proteinase K OQI itself, isn't it?

DR WRIGHT: Yes.

MS REECE: That's where it's identified?

DR WRIGHT: Yes.

MS REECE: And there's a note at the end that action was taken to ensure that the dishwasher was serviced?

DR WRIGHT: Yes, I believe that it ended up being removed from service and they got a quote from another one. There was another document to say on - there was an email on 26 March 2013 that the week prior one of the operational officers noticed pooling of water underneath the dishwasher, which further suggests that it was, you know, malfunctioning or not working correctly.

MS REECE: Before you said that you thought that the three of you agreed - forgive me if I'm misquoting you and do correct me - you said you thought that you all agreed that it was unlikely that a faulty dishwasher would have only

had an impact on one vial. I'm just going to put that to Ms Veth and Dr Bedowle.

This issue with the dishwasher and its potential impact on the lot of Proteinase K which caused this particular batch such problems, Dr Bedowle and Ms Veth, Ms Veth perhaps if you could answer initially. What do you think we can understand from the role of the dishwasher in this incident?

DR VETH: I don't think we can conclude anything. As we pointed out in our report the investigation, the investigation documents into the Proteinase K issue lacked in detail and didn't contain some pretty standard trouble shooting. The dishwasher, it was almost like it was thrown in as a (indistinct words) maybe this had an effect on this Proteinase K, but we just feel lack of - if there had been something significantly wrong with the dishwasher that was causing detergent to build up on the glassware that is used in the lab, that there would have been more far reaching consequences that surely the lab would have spotted.

I mean we were disappointed that there was no actual investigation exploring this. So we're really left with the dishwasher (indistinct words) almost did it actually had some effect. I guess we're inclined to think that there are other avenues that perhaps provide a better explanation for why one vial of Proteinase K was defective, rather than a number of reagents that are used in the laboratory. Dr Bedowle, what do you think?

DR BEDOWLE: I only say we usually try to use (indistinct words) when we try to explain things and when (indistinct words) uncertainty because the documentation and the review wasn't sufficient to point to the dishwasher as a culprit for this, a simpler explanation might be someone just prepared that particular lot, that particular lot of Proteinase K, incorrectly and since it seems to be isolated that may be a more plausible explanation. The dishwasher may have been bad. Replacing it may have been a good thing. I agree with Ms Veth that if there had been a problem since the lab was unaware of it till the Proteinase K actually went bad, we would have expected to see other events might have been documented. So from a simplicity point of view I would lead towards a poor preparation of the sample. Can't prove it but that's what I would lean towards.

MS REECE: With this quality investigation, and I'll come back to you in a moment, Dr Wright, but with this quality investigation, Ms Veth, really the only two even potential explanations that were considered were the fact that the batch, the lot had actually expired prior to use?

DR VETH: Yes, that was considered, but I don't actually think that even documented any of the investigation of document.

MS REECE: No, there's (indistinct words).

DR VETH: That would be in an email trail and it seems germane to the quality investigation, so I can't account for why it wasn't actually included in the actual quality explanation document. And also the point that Dr Bedowle raised, who made up the aliquots from this vial of Proteinase K. You know, the details around how the aliquots were created also was not included in the investigation. We understand there were three vials of the particular lot of Proteinase K. The other two vials apparently worked as expected, which is why we're leaning towards something specific about the way the aliquots were created from this particular vial, but again none of this was actually in the investigation document.

THE COMMISSIONER: You're saying you saw no evidence that anybody even looked at how the bad batch was put together?

DR VETH: That's correct, there's no detail around the aliquots that were taken from that vial, how the agent was made up (indistinct) to the laboratory.

THE COMMISSIONER: And, secondly, while it was hypothesised that the dishwasher might have had something to do with it, because it had malfunctioned in some other evident way anyway, nobody investigated whether in fact the dishwasher had anything to do with it?

DR VETH: As far as we're aware there was no investigation as to the effects of the malfunctioning dishwasher.

THE COMMISSIONER: And that's the next point really, that if it had been the dishwasher leaving contaminating detritus, chemical detritus on glassware, all of you have said you would have expected there to have been other

significant consequences elsewhere in the lab, but there's no record of that having happened and there's no record of anybody having considered that point?

DR VETH: Correct.

THE COMMISSIONER: Thank you.

MS REECE: There's also no documentation about how long the dishwasher was taken off line, for example, or whether the corrective action in fact took place, it's really prospective at the time the OQI is finalised, isn't it?

DR VETH: Yes. Yes.

MS REECE: Dr Wright, is there anything you would like to add to that discussion about the (indistinct) investigation of this particular incident?

DR WRIGHT: Typically when there's poorly performing results or a quality concern a root cause analysis is conducted, that's quite standard, and that's a thorough investigation to work out what exactly has caused the issue and it's an opportunity to learn and improve, but also to really identify the scope of the issue, including the samples and the cases involved, and both for the dishwasher and the Proteinase K, both potentially are quite catastrophic issues. The quality investigation was really quite poor and I think that lends to a laboratory that has a poor quality culture.

MS REECE: And, Ms Veth, when you looked at the case file, one of the comments that you make about the DNA case file for Ms Blackburn is the lack of documentation around exactly this kind of issue which has arisen and is apparently relevant to the DNA case file of Ms Blackburn, but the level of detail provided on the case file was such that there was really, it was really inadequate, wasn't it, for a proper consideration of how that quality incident might have impacted on the results in her case?

DR VETH: For this particular OQI related to the Proteinase K, the document was in the case file and because only reference samples from the Blackburn case were effected by the Proteinase K, and because reference samples are not evidence samples, I was less concerned that the individual reference samples may not have been identified.

I actually can't recall. It was actually the other OQI that I had more concerns about, the forensic and (indistinct) data OUI. That was the one that raised more concerns for me, because it was very difficult to tell from the case file which samples were effected and, indeed, there were this Blackburn case samples, evidence samples that were effected. That one caused me more concern than considering the documentation that was present in the case file.

THE COMMISSIONER: Sorry to interrupt you, Ms Reece. Dr Bedowle, in well run labs with which you've had experience is there generally a person whose primary responsibility it is to ensure that investigations of lapses in quality and proper procedure are investigated thoroughly?

DR BEDOWLE: There should be a person or persons actually at different levels that are involved in the process to determine what was the root cause, then of course the corrective action. A good lab will also use a team of individuals to address that to come to a better conclusion. For example, in this lab they had a corrective action (indistinct) which was to assess the preservation of the agents later on, in the future, in case a similar situation arose, assuming that the dishwasher had an impact on the quality of the reagents.

I wouldn't do it that way, if the dishwasher was the real culprit, I would go to the root cause and monitor the dishwasher so I wouldn't consume samples, or reagents that are costly then have to redo them if there was a problem with the dishwasher. So if a root cause points to one thing you want to try to correct it at that level and not at some subsequent level. Having dedicated people and a team of people involved can actually come up with these kinds of solutions to better equip the lab, so most labs have a process with a quality manager. We would also put quality people in part of the process or train people that are within the units to be aware of issues, to raise them, and then when an issue occurs, put members of that operating team not involved in the issue itself if possible on the solution of the problem.

THE COMMISSIONER: And the core of that system would be that there would at least be a single person who, when such an issue arises, regards it as his or her primary

responsibility to get to the bottom of these issues rather than attending to other work?

DR BEDOWLE: One would hope there'd be somebody that would organise and control that, yes.

THE COMMISSIONER: Yes, thanks. Because I understand here with an issue like this it devolved upon whatever scientist happened to be allocated the task of considering the matter and pushing it in amongst his or her other duties?

DR BEDOWLE: That wouldn't be the best way. The scientist who's involved should be the one that's aware, recognise it and then bring it forward as a quality incident that needs to be addressed at a global issue because most of these instances when they're a system, as this may have been, may effect others who may not be aware at the moment, so you want to immediately get it to somebody who can assess it and get the information out to as many people as possible within the laboratory system.

THE COMMISSIONER: Yes. Dr Wright, do you want to add anything to that?

DR WRIGHT: No, I don't.

THE COMMISSIONER: Dr Veth?

DR VETH: No.

THE COMMISSIONER: Thank you. Yes, Ms Reece.

MS REECE: Thank you Commissioner. Ms Veth, while we're on that issue that I was talking to you just now about the case file, I'm just going to take you to recommendation 10 on p2 of your joint report. It's just a useful opportunity now just to talk about what was missing from that case file and what difficulties that poses, someone picking it up and trying to understand what's happened in a particular investigation. You note that some documentation was missing from the case file which made a review of lab processing and interpretation of profiling results challenging. You were then able to get further documentation, because we requested it for you, but the case file as it stood when it was provided initially, was missing information which you say includes, but is not limited to, a lack of detail in relation to what samples

were affected by quality incidents, I think that's that 3130 issue you've just raised?

DR VETH: That's correct, yes.

MS REECE: And any decision made as to the reworking and reporting of results arising from those quality incidents. Secondly, batch and batch quality information such as the performance of positive and negative controls which has now actually been quite significant, would you agree, in your understanding of this case?

DR VETH: Yes, that's correct.

MS REECE: And the third item that you felt was missing was quantification results and quality flags for case samples and extraction controls?

DR VETH: Correct. It's very hard to determine whether your DNA profiling results are in line with what you expect if you don't actually know how much DNA is in the sample to begin with. And the batch quality information is really crucial. Batch quality information is not limited to just the results on the positive and negative controls, but also any, any within batch comparisons that are made. Now I understand that this is, they're not actually doing within batch comparison, but it's a simple way of determining whether there is cross contamination between samples that are present in a batch of results. But I understand that the FSS wasn't actually doing that with the crime sample batches, which is interesting in of itself, and also the nature of the actual type of batches that the samples are on, that information also wasn't on the case file and it wasn't until we received it quite late in the day that we realised that perhaps there was some amiss with one particular extraction method compared to the other.

So these are all the sorts of things that we would expect to find in a case file. Some sort of independent review is required, and I'm not talking about this particular type of review but, for example, a (indistinct) analyst reviewing the case notes prior to court, for example, or another scientist reviewing the results for (indistinct words).

MS REECE: And that could include a scientist who hasn't had carriage of a job but who ultimately then has to report on it for reasons of illness of their colleague, that's the

model that's set up at FSS, isn't it, that scientists sub in for each other?

DR VETH: Yes, and I'm assuming that information is available to them through whatever laboratory information management systems they are using, but I'm just more familiar with this information being made available when it's in a case file as disclosed.

MS REECE: Dr Wright, I notice you've been nodding and agreeing as Ms Veth has been giving that evidence and I assume that's because you yourself were in exactly this position when you got this case file, there was clearly material which you didn't have and which would have been of great assistance to you?

DR WRIGHT: Yes, that's right. So when somebody's evaluating the reliability and accuracy of DNA profiling evidence that's going to be presented to courts, you need to understand if there are any significant issues. So what Dr Veth has outlined in terms of the missing documentation is really needed. So possibly if some of this documentation was available within the case file and for the courts, they may have placed maybe like a warning or maybe there was some risk potentially in accepting the reliability of some of these samples or they may have had the opportunity to do some retesting before the trial.

MS REECE: And when you yourself were looking through this and trying to understand the case, that lack of detail in relation, for example, to what samples were affected by the quality incidence, that's something that caused you concern?

DR WRIGHT: Definitely, and it's those question marks that really have to be answered so you can understand exactly what the evidence means.

MS REECE: And the information, for example, of batch and batch quality information around the performance of positive controls, you agree, don't you, that that's now given us perhaps quite a significant insight into what happened with some of these samples, or what may have occurred?

DR WRIGHT: Yes, definitely, and it appears as though the Queensland lab weren't evaluating their positive controls,

their extraction positive controls appropriately. So one way of evaluating the success of your DNA extraction batch is to get a known blood sample, a good quality sample, you've prepared it in the lab, you know that it's blood. That's run through the batch with the other crime scene samples, because the ground truth of crime scene samples, you really don't know if there's DNA there or not, so this is your positive control, it's run through. It's made in a standard way and we're able to see the standard operational procedure for the preparation of blood extraction controls and it's 30 microlitres of blood is added, so a fairly consistent amount of DNA, but you do expect some variation. So it appears as though the laboratory were looking at the electropherograms at the end of the procedure and the electropherograms with these batches of concerns looks like a pass, they were really strong, good quality profiles, but what we were able to figure out is there's an automated function where software takes the concentration value of each sample, including the positive control, and if the concentration is low it will automatically calculate for more DNA to be added to the next stage, the amplification stage, so you can actually have a positive control that's performing really quite poorly, or a series of positive controls performing really quite poorly, which is what we have observed, but more DNA is added which inadvertently masks the issues and creates these electropherograms that are looking quite good. So it appears as though the laboratory were just looking at the electropherograms at the end, so in my opinion they were unaware of these potential quality issues with their extractions.

THE COMMISSIONER: Dr Wright, can I just understand that, ensure that I understand that properly. You put a sample in for quantification and let's assume it's a positive control which should return a good quant, and if in fact it returns a poor quant because of some kind of a defect that exists, then the machine works automatically and it doesn't know that there's been a defect, it just sees there's a low quant. So when the sample goes on for amplification, then instead of using the standard volume of reagent containing DNA, the machine will add to the quantity of reagent, the solution containing the DNA, taking into account the low quant, in an effort to achieve a greater amplification result. You then at the end get an electropherogram that looks in order, but unless you look at the sequence that has taken place you're unaware that the machine has done some extra work to augment the poor quant. But if you knew

that, that that had happened, you'd be aware that there ought not have been a poor quant because it's a positive control. Consequently you stop and you work out why you're getting a poor quant from a positive control because that may be likely to give, wrongly give a poor result for a crime scene sample in due course. Is that - have I understood it correctly?

DR WRIGHT: Yes, that's correct. The positive control, if you're getting poorly performing positive controls, it indicates a poor extraction batch has occurred which may indicate that other crime scene samples on that batch may also be negatively effected.

THE COMMISSIONER: I must have misunderstood the process because I thought that there's an extraction process and then a part of the sample is taken for quantitation. The quantitation appears and somebody looks at it before moving on to amplification because there's a question whether, for example, it ought to be concentrated first before amplification. But in the description you've given of a low quant and an automatic process to increase the volume to try to achieve better amplification, has nobody looked at the quant itself before the next step is undertaken?

DR WRIGHT: It doesn't appear so, otherwise I think it would have been very evident very quickly that these extraction positive controls were performing quite poorly. So I think it's an oversight in the way the laboratory reviewed its controls and, as Dr Veth said, because of the lack of information in the case file, actually having these concentration values in the case file, perhaps the case scientists couldn't make that evaluation either.

THE COMMISSIONER: I just want to understand this because it sounds important to me. I know that when a sample is quantitated, then those that used to be within this range below 0088 would automatically be referred by the computer to a particular work list and the remaining ones that are above .0088 would go to a different work list for amplification and so on?

DR WRIGHT: Yes.

THE COMMISSIONER: So the work list, I've been told that the work list would not be processed further, the quants would actually be looked at by a scientist to confirm that

the quants are such that they belong in that list, and then they'd be ignored after that, but the quants that were above that value, do I understand you to be saying that although it was possible for each of those to be examined and let me say in an ideal system, maybe a proper system, but in any event in an ideal system, each quant should be considered in relation to the sample from which it came, so that if, for example, to take the most extreme case, it was a positive control blood sample, you would immediately see something is wrong, and if for the same reason you saw this was taken from a sample that was evidently dried blood or liquid blood, you would immediately see that there was something wrong, but you saw no suggestion that anything like that was done. Instead, after quantitation, if the sample was not relegated to the rubbish pile because it fell below 0088, it would automatically go for amplification and the automatic processes in place would augment the volume automatically to give the best prospect of getting a profile and therefore masking the anomalous result on the positive control. Is that - have I understood it?

DR WRIGHT: Yes, absolutely. So a positive control performing poorly could be automatically calculated to have two, three, even five or ten times more DNA than it should to provide a good quality profile, so, yes, that's correct.

THE COMMISSIONER: And do you know of other labs that work this way, not looking at quants and comparing them to samples?

DR WRIGHT: I'm not aware of that, no.

THE COMMISSIONER: Thank you.

MS REECE: Ms Veth, when you received the batch information which showed you the performance of the positive controls in the Blackburn case, this was what really indicated to you that there might be a problem with the extraction of the DNA --

THE COMMISSIONER: I'm sorry, Ms Reece, I'm sorry to interrupt you. Just while it's in my mind. When I said one ought to look at the quants, you were given some documents and you were able to see that quants before amplification, is that right, is that what led you to your conclusion, or were you given something more than what I've

called the quants, were you given some kind of data in relation to the quantitation more than what I've called the quant?

DR WRIGHT: So given the concentration of the positive controls that were in the Blackburn batches and the question was is this concentration value within the expected range, and we didn't know what the expected range was, so we asked for one year's worth of positive control concentration values from mid 2012 to mid 2013 to understand what the upper and lower range was and it was clear that in some of the batches, that the Blackburn evidence was processed on the - the positive controls were falling outside that.

THE COMMISSIONER: I understand. You compared it to past history, I think I saw the graft in your document.

DR WRIGHT: Yes.

THE COMMISSIONER: Yes, thank. Yes, Ms Reece.

MS REECE: Commissioner, would it assist to put that graph up or are you content to --

THE COMMISSIONER: No, no, I understand it now.

MS REECE: Ms Veth, when you got that positive control data for the Blackburn batches, that was when you first suspected that there might have been an issue in fact with the extraction of those samples?

DR VETH: That's right. We could see that the samples that we were referring to as problem samples. The (indistinct) batches consistently had a much lower quantification level for the positive control when compared to the batches that were processed within a different system which had much much higher DNA concentration (indistinct words) positive controls, and really it was only because the data was presented in this way that we actually saw a marked difference and which led I think, led to the request for one year's worth of data just to see what we were seeing in the small snapshot from the Blackburn case actually could be seen over a longer period of time.

MS REECE: Just staying on the Blackburn case itself for a moment. If I could ask, Mr Operator, to please put up on

the screen document EXP.0008.0003.0001. Dr Wright, this is a Box and Whisker plot that you have created with the data that Ms Veth has just been talking about?

DR WRIGHT: That's correct, that's all of the positive controls that were used on batches containing the Blackburn samples and what you're seeing is, on that vertical axis is the concentration value of each positive control.

MS REECE: And you have there 'manual'. Do you understand now from further information that perhaps the method might be referred to as multi-probe extraction?

DR WRIGHT: Yes.

MS REECE: And that right-hand set, dataset, it relates to that multi-probe extraction?

DR WRIGHT: Correct.

MS REECE: Ms Veth, that really demonstrates in I suppose a visual way at least what you've described in relation to the Maxwell extraction positive quality quants and the multi-probe equivalents?

DR VETH: Correct, yes.

MS REECE: What was the sample size of each box, do you know, for those two datasets?

DR VETH: In relation to the Blackburn case the datasets are small because there's only a limited number of batches that we used.

MS REECE: And the smaller dataset means that it's more informative to understand whether this was a pattern to, or a systemic issue to look at that greater amount of data?

DR VETH: That's correct. As Dr Wright said, we needed to get an idea of the pattern over a longer period of time rather than just isolate it to these few batches, that's then a couple of months maybe that these samples were processed.

MS REECE: So it's fair to say this data piqued your interest and is it the case then that the data that you've seen, which was a year's worth of data of the positive

control quantitation, that that data confirms that concern?

DR VETH: I think so. It's certainly describing the difference between the quantitation results or the DNA concentrations from the multiprobe extracted positive controls and Maxwells over a much longer period of time than was just the case for the Blackburn samples.

MS REECE: Just on that note I'll ask Mr Operator to go to document COI.00009.0076.0001.

THE COMMISSIONER: While that's being recovered. Ms Reece, the diagram with the blue box and the orange box, what's that in, which report is that in?

MS REECE: It's additional, Dr Wright has provided it subsequent to her addendum report because this issue has been developing quite lately.

THE COMMISSIONER: You'll give it to me in due course then because I don't think I've seen it.

MS REECE: No, thank you Commissioner. I can hand up a copy if that will be of assistance.

THE COMMISSIONER: Thank you very much. Better make it an exhibit.

MS REECE: I tender that.

THE COMMISSIONER: Yes.

EXHIBIT #222 DOCUMENT EXP.0008.0003.0001

MS REECE: Thank you, Commissioner. Ms Veth, I might just get you just to explain broadly what this spreadsheet is?

DR VETH: I'll do my best. So this is a spreadsheet that has been provided by the laboratory and it shows in column A the code, if you will, that denotes a particular type of extraction positive control, and the ones that we are most concerned with are the ones - row 2 which is blood. These are the extraction positive controls that are used in the Maxwell extraction batches. And in row 8 it's the DNA which are the extraction positive controls used in the multiprobe extraction method. I can't really speak to the rest of them other than what you can (indistinct words).

MS REECE: Mr Operator, if you could go across two tabs to the tab F bot and then there's a series of numbers cumulative. Ms Veth, this appears to be anyway a set of data of concentration levels in positive controls in the lab over that year period?

DR VETH: That's correct, yes, for the Maxwell and the multiprobe extractions for (indistinct).

MS REECE: And you see in there in this particular chronological format they are really intertwined, you see the Maxwell and the multiprobe extraction results in a chronological series here?

DR VETH: That's right. And you can sort the data differently. If you sort it on column C from lowest to highest you'll see a general trend that the multiprobe quantitation values are lower.

MS REECE: That's just being done now?

DR VETH: Yes.

MS REECE: Mr Operator, if you go back up to the top of that spreadsheet.

Ms Veth, what we're seeing here is really multiprobe extraction with this lower range, this lower range of quantitation results or concentration results, overwhelmingly those lower results appear to have been extracted using the multiprobe extraction method?

DR VETH: That's correct. And if you scroll down eventually you'll get to the Maxwell and you'll see that in general they are much higher.

MS REECE: That continues for some time before Maxwell starts to appear. Mr Operator is just highlighting a couple as he goes?

DR VETH: Yeah, and there are some anomalous Maxwell results and that may be due to normal variation, I can't really account for them. If you just keep scrolling down eventually we will get to - so now we're getting into the realms that we would normally expect from positive controls that are created in the laboratory. So these are samples

that have usually more than 1 ng/µL DNA concentration and that's what we're seeing here, that as we get into the higher concentrations we are seeing that these are being achieved mostly from the Maxwells. We find that to be quite suggestive.

MS REECE: In the absence of any reason why or any potential for misinterpretation, it's a fairly compelling indication, isn't it, that there was at least a difference in what those two extraction methods were outputting?

DR VETH: Yes, and I haven't scrutinised this data by date range or anything like that. It could be that there was a particular period of time when perhaps the multiprobe extractions DNA concentrations were better and then perhaps there was some tailing off (indistinct) you know, that we detected in the Blackburn case. But just on the basis of seeing this data we do think there's cause for concern, we do think there's quite a difference in what was being achieved from the multiprobe extraction method compared to the Maxwell extraction method.

MS REECE: And the effect of that dataset would tend to support your theory that this may be an explanation for the poor results, at least in those results in the Blackburn case which were processed in this multiprobe batch set?

DR VETH: We certainly think it warrants further investigation.

MS REECE: And it is, if I can put it, perhaps not the right word and you might be able to think of a better one, but the multiprobe extraction issue becomes something of an umbrella explanation, doesn't it, because it does have the potential to account for each of these sets of samples that for some reason didn't perform well?

DR VETH: For almost all of the samples that we had concerns about were in multiprobe batches.

THE COMMISSIONER: Sorry, what proportion of them, Dr Veth?

DR VETH: I can't give you a proportion but most of the samples from Ms Blackburn's shirt, the bloodstain samples, most of the S series which were samples taken from the street, and the samples that were described as bloodstains taken from the vehicle (indistinct) may be something else

going on there as well. All of those types of samples were processed in multiprobe batches.

THE COMMISSIONER: Thank you.

MS REECE: Commissioner, those affected samples are set out at pages 10 and 11 of Ms Veth and Dr Bedowle's report.

THE COMMISSIONER: Thank you.

MS REECE: Dr Wright, I saw you nodding while Ms Veth was explaining that data to us. You'd agree with that analysis, wouldn't you, that that longer or that greater dataset at least on that viewing of it does tend to support the theory that the extraction method may have played a role in the poor performance of some samples in the Blackburn case?

DR WRIGHT: That's right. The 12 months of data is a really good sample size. It was somewhere about 1,700 positive controls, so I think that's a good sample size to I guess make this inference and it really is quite clear there is a difference. I did perform some descriptive statistics between the two DNA extraction methods for the Blackburn case and that suggested that the Maxwell method was providing three times, at least three times as much DNA as the multiprobe method which, you know, when you're talking about trace samples could be quite significant, yep.

MS REECE: Dr Bedowle, I might just ask you, is there anything in your understanding of the difference between the Maxwell extraction method and the multiprobe extraction method which could account for such a difference in quantitation levels?

DR BEDOWLE: We didn't look at it in depth to figure that out because it would take a lot more testing and evaluation of the components. Generally looked to be similar. There are probably some volumes of steps or washes that might be different. I just couldn't say at this point other than there's a clear difference in the performance between the two of them that could have an impact on yield.

MS REECE: Ms Veth, I understand that there is a manual component to the multiprobe extraction method, is that right?

DR VETH: There's an actual manual component to both and it can be a little bit confusing trying to tease out what's happening, but it's actually fairly common for there to be a manual, we call it a pre-processing step prior to the samples going on to the robot. The liquid handling robots are good at performing a lot of the tasks that a human would normally do but there are some steps that are quite difficult for a robot to perform so those steps can be processed - or are usually processed manually prior to a batch going on to the robot.

MS REECE: I guess what I'm trying to understand, and I'll put it to all of you and you can respond in turn really, is there's no immediate obvious explanation that you're aware of which might account for the performance of positive controls in the Maxwell extraction compared to the multiprobe extraction, Ms Veth?

DR VETH: That's correct. At this stage we don't know if it's something do with that manual pre-processing step, something to do with the combination of reagents that are used or particular steps that are used or something to do with the robots themselves, the (indistinct) robots themselves causing the difference. Unfortunately this is probably going to be a fairly significant investigation to try determine what's going on here if it is accepted that there is something that is happening there that is causing this difference, again a recovery.

MS REECE: The investigation - I'm sorry, go on, Dr Bedowle?

DR BEDOWLE: I was just going to add having compared how much manual requirements there are on the multiprobe versus the Maxwell, because there are parts (indistinct), manual procedures often require art not just science. We tend to see some people are really good at it and get great yields and other people following the same procedure get poor yields, hence why people have moved towards automated procedures when possible. It sort of democratised the capability of the analysts or technicians in a laboratory. So it could just be that those who developed it in the beginning may have had great hands and good art skills and produced great things but as you transferred the technology to others they just may not be performing it exactly the same way and therefore have lower yield. So something you

might look into is the human component in the manual process.

MS REECE: And any such an investigation, while it may indicate both how widespread this issue was, what it was caused by, and I suppose whether it is an issue, whether there's something we failed to understand, but an investigation, it really has the limitation, doesn't it, when it relates to this particular case, Blackburn, that while it might indicate that something went wrong it doesn't have the effect of answering the question as to what actually lay in those samples to begin with. That would have to be achieved by either resampling or retesting of some sort?

DR VETH: That's correct, yes.

DR BEDOWLE: Yes.

MS REECE: Dr Wright, I'll give you an opportunity to comment on both those things. My first question to Ms Veth and Dr Bedowle was obviously, you agree there wasn't anything obviously apparent in either of these extraction methods that would account for those poor results?

DR WRIGHT: I didn't thoroughly examine the standard operational procedures so I'm probably not best placed to answer that. This discovery was only made last week but I agree with Dr Bedowle and Dr Veth.

MS REECE: And in relation to the second point which is the remedy, if I can call it that, for the Blackburn case, while further examination might explain what happened or the extent of what happened, the remedy really for this case would be in the retesting or resampling of exhibits, wouldn't it?

DR WRIGHT: It would, but what we're seeing is a loss of DNA. We're seeing positive controls that were prepared with the same amount of biological material yet some of these positive controls have a lot less DNA, and that strongly suggests or demonstrates that for some reason DNA is being lost in the multiprobe method. So while I absolutely agree with the possibility for retesting, if no result is obtained we don't know if that's because there was DNA there to begin with but then it was lost, and we don't know if there wasn't DNA there to begin with and what

we're seeing is accurate. But what I am confident of is that there is quite a significant loss of DNA in the multiprobe method.

MS REECE: I shouldn't have suggested that it was a full remedy, merely that it is what remains able to be done when you have such concerns. There is the potential, as I understand it, when a sample has been extracted to go back to the spin basket, so to the - I'm going to put it in a way which I'm sure will be wrong, but the tip of the swab has been cut off or has been placed into a tube and then it's been spun and what remains then and what is retained by the lab is called the spin basket, is that right?

DR WRIGHT: Yeah, that's right. So in the first stage of DNA extraction you've got the cells that were recovered on the swab from the scientific officer, if there was in fact cells recovered. That first process is basically to try to remove the cells from the swab and put it in a tube with solution and then that solution goes on to DNA extraction. Now that isn't 100 per cent effective, meaning that in that swab that is retained by the laboratory you could have one remaining cell that didn't get into the DNA extraction process, you could have ten, you could have 50 or you could have none. So definitely going back to the spin basket may be a possibility of obtaining intact cells that could be further processed.

MS REECE: I understand your point though and of course probably a related point is that the smaller amount of DNA present in the first place will impact on how much there might be residual in the spin basket?

DR WRIGHT: Correct, so even --

MS REECE: And when trace DNA is involved that's particularly problematic?

DR WRIGHT: Correct. So even going back to the spin basket, which should give you an unaffected sample so to speak, you may not get the number of cells you require so a negative test from that again may not be indicative of the (indistinct) truth of that sample.

MS REECE: Ms Veth and Dr Bedowle, would you agree with that discussion I've just had with Dr Wright about the limitations on retesting?

DR BEDOWLE: I mean there's always going to be limitations because we don't know which samples are really probative, we don't know how much has been consumed, we don't know how much is left over. But you can't put an absolute cause on what happened to samples. In some sense if you really want to get to an answer of who is the source of the samples, nothing solves that by hypothesis or even demonstrating there was a poor extraction whatever. You can only work with what's left over and take the best chance we can when we try to decipher with good laboratory practices to achieve whatever may be available. And it may just be a chance effort at this point or it may be that there's a good effort depending on the sample.

MS REECE: What would an investigation look like if the lab was to conduct an investigation of this, what we see as this potential anomaly between the two extraction methods at this time, what would an investigation like that require? Ms Veth, you said that it would probably be quite a large investigation for the lab presumably to understand the extent of it?

DR VETH: Correct, because they'll need to establish how localised or how much time the issue was occurring, assuming again that it is an issue, and then at what point through the process may be causing these issues (indistinct). It's going to be very difficult. Dr Bedowle mentioned that it could be something to do with that manual pre-processing step. I guess it would be possible to have a look at whether this is actually technician related but I suspect this is looking like it was going on for quite a long period of time, but it wouldn't be one technician but perhaps there a training issue, as Dr Bedowle has indicated, that has resulted in a - has evolved over time to the detriment of the method overall. It's not - is it something to do with the reagents that were used at the time? Again we're talking about quite a long period of time by the looks of it. It seems to be unlikely that it would be need to be investigated. Is it something to do with the actual functioning of the robot itself? That is a possible explanation.

THE COMMISSIONER: Dr Veth, you may have explained this in your report or in oral evidence and I've forgotten it, but can you just tell me how it was that you discovered this anomaly?

DR VETH: There was a particular spreadsheet that was sent through that had all of the Blackburn case samples listed on it, the extraction batches that those samples were on and then the quantitation results from the positive control. And when I scanned down the positive control DNA concentration column I could see that their samples were being processed in this multiprobe method. Positive control DNA concentrations were significantly less than those that were obtained from the Maxwell extracted positive controls. And then it just so happened to coincide that the (indistinct) evidence samples that we have been talking about happened to be in those same batches that were done on the multiprobe device.

THE COMMISSIONER: As a matter of routine in a decently run laboratory how would an anomaly like this be discovered, be noticed, as a routine matter, and I ask you if it would be noticed as a routine matter?

DR VETH: Yes, so there's a few different points at which this could be or clues could be detected. One is the point that Dr Wright was discussing earlier when the batches have been quantified, reviewing the results of the positive control to make sure it's within the sort of expected range. Another point might be a little later on after the profiles have been analysed and say a case manager of a case is reviewing the result, they see that a batch of bloodstains for their case has come off, all the results are quite poor, the quantitation results for those bloodstains are quite poor, and at that point you might be asking yourself, "Is this a problem with just my samples, was the whole batch like this?" So in a lab where cases are being managed sort of from beginning to end by one person you can get a feel for the sorts of results that you're getting. And there may be other points in the process also that will provide some clues. Perhaps the analyst who is analysing the electropherograms has they come off the capillary electrophoresis, those analysts may not actually know what sample types they are dealing with. It might not be so obvious that there's a problem with the whole batch, the entire batch of results. So really it's that initial quant data and also the review of the results by the person who has the understanding of the context of those particular samples.

THE COMMISSIONER: Could I ask you this, we have positive

and negative controls for a reason because you know what you ought to get and therefore an anomalous or a result that's inconsistent with what you ought to get raises questions, that's why you do it. So it seems to me to follow that whatever else you might do in relation to looking at quants, one thing you have to do in every case is to examine the quant for the positive and negative controls?

DR VETH: That's correct, because it's equally important to ensure that your negative control doesn't contain DNA but also very important and that's critical at that early stage.

THE COMMISSIONER: So if you - sorry, go ahead?

DR VETH: Quantitation (indistinct).

THE COMMISSIONER: Yes. So if you posit a reasonably competent scientist looking at the quants derived for these positive controls, then that scientist should have noticed that they were strangely low, that any one of them should have appeared strangely low?

DR VETH: Yes, we're not entirely sure, as Dr Wright pointed out we're not entirely sure of the process, whether there is a person who reviews quantitation results as they become available or whether this is a very automated process. We're just unsure about what quality checks are being done at that particular stage of the DNA profiling process.

THE COMMISSIONER: But am I right in thinking that if positive controls are to have any meaning then before any conclusions are drawn from anything somebody ought to look at the actual quant achieved from every relevant positive control to see if it's in order?

DR VETH: Yes. Certainly that is a good marker for - that is the point of the positive control, one of the points of the positive control, is to determine whether your extraction method has performed adequately. And we're suggesting that for these particular extractions positive control data has indicated that the extraction may not have been (indistinct) adequately.

THE COMMISSIONER: Yes. Do you want to say anything about

that, Dr Wright?

DR WRIGHT: I agree with Dr Veth. The analysis that I conducted last week highlighted that in a different way. In figure 1 of my addendum report I looked at the 12 months worth of positive control data.

MS REECE: We can get that up on the screen if it assists, Dr Wright. Mr Operator, that's Dr Wright's second report, or addendum report, which is EXP.0008.0001.0001 and the figure --

DR WRIGHT: Figure 1 on page 7.

MS REECE: Page 7, thank you.

DR WRIGHT: To answer your question, Commissioner, I guess a laboratory or a scientist that's inquisitive about the performance of their samples, this is what I did when I saw the positive control concentration values from the evidence of concern. So what you're seeing there is a histogram and that shows the distribution of concentration values for those positive controls and I really wanted to see where the Blackburn evidence fitted in. Was it within that middle range, I guess that expected range, or was it out to the left-hand tail? That left-hand tail indicates a much lower concentration and poorly performing batches. So it was interesting Dr Veth and I looked at the spreadsheet data differently and this is the analysis that I undertook to demonstrate that that Blackburn evidence is, you know, when you look at a year's worth of data it is really at that poorly performing range.

THE COMMISSIONER: So I just want to - what I'm looking at is whether somebody ought to have noticed this without the benefit of having thought for some reason, "I need to get three years of data". I take it looking at your addendum report that you looked at several batches of evidence that had been sampled in that case and you noticed you say at page 6 that three of the four positive controls provided a low concentration of value, that is below .7 ng/µL. So you saw from your own knowledge as a scientist in this field that those positive controlled quants appeared to be low?

DR WRIGHT: They appeared to be low but I didn't have information from the laboratory to understand what they expected a positive control could be.

THE COMMISSIONER: No, I understand that, yes.

DR WRIGHT: The OPI 34043 stated that the expected range for a positive control was 1 ng/µL to 3 ng/µL.

THE COMMISSIONER: Yes, but the point is put yourself in the position of a scientist looking at this case, you notice that three out of the four positive controls appear to you to be low?

DR WRIGHT: Yes.

THE COMMISSIONER: But you don't know if that's normal for the lab but they appear to you to be low?

DR WRIGHT: Yes.

THE COMMISSIONER: Therefore a person proceeding with reasonable competence ought to notice that - if that person has oversight of all the samples, of course. If you're doing it sample by sample you might never come to this point. But looking at all of them you notice the positive controls appear to be low. That raises a question. So you ask the question, "What do we normally get?"

DR WRIGHT: Yes.

THE COMMISSIONER: One source of information is OPI 34043 which says we generally expect between 1 and 3 ng/µL?

DR WRIGHT: Yes.

THE COMMISSIONER: Well that's something. You then ask for a year's data or two years' data and you see what you've reproduced in the histogram on page 7, that these positive controls in this particular case are at the wrong end of the scale?

DR WRIGHT: Yes.

THE COMMISSIONER: You then raise the question in your own mind what's happened to the actual crime scene samples and then we're on a train of inquiry, is that the process?

DR WRIGHT: Yes.

THE COMMISSIONER: Yes, thank you. Dr Bedowle, did you want to add anything to my question about the expectation that somebody would have noticed this at the time and the reasons why somebody might not have noticed it at the time that are proper reasons or reasons that show a lack of reasonable care?

DR BEDOWLE: Again, an ideal way to do this is to have what's called a control chart, where you're mapping out your controls over time. Because any one event, as you can see just from the Excel spreadsheet, could give it a poorer result or a greater result in isolation. And so if an analyst doesn't know what is the expected range, routinely because they're focused on the case, they may just see this as part of that wide range of values, not where the optimum should be or where the majority are. So they may be uninformed on what is an expected range because case by case, "I see this every once in a while so it must be okay" visualisation. Had someone been collecting the information all along, they could have seen trends as you were mapping it. So let's say in the month of July you get better results than you do in January, that could be a hint of something to do with the humidity or the temperature, who knows what it could be, but it gives you an indication. You're (indistinct words) expecting that the analyst in the lab didn't have so they may not have been able to appreciate that it was performing lowly on a whole bunch of samples or under one methodology without having the composite data or someone mapping that for them so that they could be more appreciative of the trends that may have been observed. Because if you do it one at a time you may not pick up on it yourself as you focus on the case. I'm just trying to see if I can get a result and interpret it as opposed to what is happening long-term.

THE COMMISSIONER: Thank you for that.

MS REECE: Ms Veth, if I can just jump in there. You were talking earlier in your evidence about that the EPGs for these controls may very well have, and in fact I think ou said were performing well, that there were, you know, readable profiles being produced. And so to that extent if someone was checking the EPGs would have shown nothing of concern. Your point I think earlier was that it's not apparent that the lab was monitoring positive controls quantitation and that that's really a process issue or a lab issue rather than an individual scientist keeping track

of that detail. Is that a fair summary of what you said?

DR VETH: It is fair summary but just to - if I partially answer the question the Commissioner was asking, it may also be a limitation of the laboratory information management system. We were talking earlier about the paperwork that was missing from the case file. It seems - if I can just talk about my own laboratory for the moment, we can generate a report for a particular case that shows all of the quantitation, that is all of the case samples and all of the controls associated with those case samples. And even a report such as that would, does alert the case manager to issues with particular batches because they can see all of the results in one place and it demonstrates how, "This batch isn't what I expected it to be. Oh, the positive control's really poor". So while the batch may have been passed because the EPG for the positive control was as expected, quantitation results when you see them all together is really useful for being able to determine if there's something anomalous happening. So there's two issues. One is it is better if the laboratory was monitoring the positive controls in a more centralised fashion, but also the reporting scientist should have access to this information when they are considering the results for a particular case because obviously they are germane to the interpretation of the results.

MS REECE: Dr Wright, again I saw you nodding as Ms Veth was speaking, you agree with what she said?

DR WRIGHT: Yes.

MS REECE: Before I move on from this topic, I understand you've all in some way expressed that there are some unknowns at this point, that we can't say to a definitive level that there was an issue with this extraction method, but you would all I think agree that the apparent issue is such that an investigation is imperative? Ms Veth?

DR VETH: Yes.

MS REECE: Dr Bedowle?

DR BEDOWLE: Yes.

MS REECE: Dr Wright?

DR WRIGHT: Yeah, definitely and affected samples retested potentially.

MS REECE: Commissioner, I thought we might - just because of the actual period we've now been in session I wonder if we might break for ten minutes?

THE COMMISSIONER: Certainly, just give me a moment. Dr Bedowle, I'm conscious of the difference in time so I think where you are it'll be 9 o'clock at night?

DR BEDOWLE: Yeah, but sleep is for mortals so don't worry.

MS REECE: With that in mind, Commissioner --

THE COMMISSIONER: Well then a 20 minute break.

SHORT ADJOURNMENT

THE COMMISSIONER: Yes, Ms Reece.

MS REECE: Commissioner, just before we move on from that last topic that I was, that we were talking about before the break, I'm reminded that it might be useful to ask each of the experts whether there's anything in particular that they would require to be done in the investigation, or will that become - is there anything in particular, Ms Veth, for example, that you would say needs to be done in order to investigate this potential issue with the extraction methods?

DR VETH: Well, I think it needs to be investigated because there are implications beyond this particular case. I'm not sure what I can say beyond that other than that it really does need to be investigated.

MS REECE: And an investigation would involve presumably initially looking at exactly that kind of dataset but over a longer period of time to see the potential scope or extent of that low performing quant being derived from those batches?

DR VETH: Yes, it's going to be quite - I think it will be difficult if they no longer have the technology for use. I'm not sure whether they're still using the Multi-probe extraction technique method.

MS REECE: No, I don't understand that they are.

DR VETH: So there are going to be (indistinct words) part of the investigation might have been to try and recreate the problem, (indistinct words) retrospectively and I suspect it is going to be quite a complex matter.

MS REECE: All right. You really then would be almost looking at the symptoms or the evidence of the issue rather than being able to interrogate the machine itself for example?

DR VETH: Exactly. Exactly.

MS REECE: All right. And do you agree with that, Dr Wright?

DR WRIGHT: I do. I think obtaining positive control concentration data from the time of implementation and then doing a temporal analysis to see in those concentration values are changing over time and also looking at the original validation data to see if that validation data was producing similar kinds of results and to see if that was ever compared against the other DNA extraction methods. So essentially they need to do a root cause analysis to understand what is causing the issue, how long it has been persisting for and what cases and what samples may have been effected.

MS REECE: It did sound, Dr Bedowle, from what you were saying earlier that potentially looking at how staff were being trained in this particular process may also need to form part of that investigation?

DR BEDOWLE: Well I think there's three parts to this. The first part is that you're asking about the specific case. It's not going to matter so much about a specific case because pragmatically retesting, re-analysing is going to address the samples in the specific case.

The second part is, as has already been mentioned, what is the effect over a long term?

The third part is not just then assessing every case, but doing a materiality review because it wouldn't be necessary to go back to every case if there was an exoneration or there was no decision made in it or there's other evidence

that supports well. That's not a scientist's job, obviously, that's more on the judicial side, the legal side. So depending on what you want to do some strategies would fall into place to address the circumstances. But I wouldn't just make a blanket: Would I do this. It depends on what it is you're concerned about.

MS REECE: And in layman's terms, the concern arising out of this analysis of the data is that there may have been a loss of usable DNA evidence through the malfunctioning or the poorly performing extraction method?

DR BEDOWLE: Yes, that's a major concern and we don't know the impact of that, especially for (indistinct) data that could be exculpatory, if there were data, or lead to other individuals so that the defence could make their own argument that the other individuals might have been involved, could have an impact, as well as there may have been inculpatory data that could have been lost that could have helped identify a potential perpetrator or (indistinct) perpetrator. You just don't know because, if a loss of DNA had that kind of impact on case evidence.

MS REECE: Ms Veth, you were saying something I think? Or were you agreeing?

DR VETH: I was agreeing, yes.

MS REECE: All right. The next issue I was going to take you all to is the issue of the samples in the car and I might start by going to your report, your joint report, Ms Veth and Dr Bedowle. No, I'm sorry, to Dr Wright's addendum report which is document ID EXP.0008.0001.0001. And, Mr Operator, there's table 1 there on p1 which spans two pages. Is it possible to clip out both parts of that table and show it as one on the screen.

Dr Wright, you provided this table really as a handy aid to understanding the sequence of the sample collection from the car, is that right?

DR WRIGHT: Yes.

MS REECE: And bearing in mind that this happened not immediately after Ms Blackburn's death, but a couple of weeks later, the officer investigating, scientific officer was the same one who had taken the blood swabs at night.

DR WRIGHT: Yes.

MS REECE: On the day after her murder. And he followed a procedure, as I understand the evidence, that he first applied a presumptive test, either a Combur test or a luminol test to areas of the car?

DR WRIGHT: Yes.

MS REECE: And after applying that initial presumptive test he then swabbed?

DR WRIGHT: Yes.

MS REECE: And then he carried out a second test?

DR WRIGHT: Yes.

MS REECE: I'll come to you in a moment but I'll go to Dr Bedowle first. Dr Bedowle, is this approach to testing for potential blood or biological matter controversial?

DR BEDOWLE: No, not at all.

MS REECE: Essentially it creates - the first presumptive test gives you some information. The swab is taken and then is there what's called a confirmatory test taken second?

DR BEDOWLE: Well, what would happen is the confirmatory test would most likely occur in the laboratory setting. So if the crime scene officers are trying to identify biological material, often it's invisible, especially if it's touched or it's been diluted in some fashion, so this gives them a better chance on focusing on collecting potential evidence, as opposed to blindly swabbing, and so that would be the first part. They could send the swabs to the lab and if the lab had a protocol or policy in place to do so, then they would, you know, analyse samples with confirmatory tests if that would help in the reconstruction of the crime if they're, you know, depending on the evidence.

But some labs bypass the confirmatory tests in some situations, relying solely on the DNA on that. I'm not a fan of that in a number of cases because sometimes the

biological material can be germane to the actual crime that's committed, but in some cases it may be okay.

MS REECE: In this case the second test was carried out. For example, in those first few samples that you can see, the Combur test was a very slow negative. I'm sorry, it was a negative test with a very slow reaction. You can see that there in the second column?

DR BEDOWLE: Yes.

MS REECE: And then the sample or the swab was taken and then luminol was applied?

DR BEDOWLE: Apparently. I guess that's the way it was done, I just don't know the procedure, but it would appear so.

MS REECE: All right. And the luminol test in that case could itself be a confirmatory test if it also tested positively at that stage?

DR BEDOWLE: Not necessarily a confirmatory test, it's still a presumptive test, especially if the chemicals or materials that the Combur test has a false positive or similar to ones that luminol may have a false positive, you may not get that. You still need a test that's specific for both human blood or firm visualisation or seminal fluid that would confirm that if so desired.

MS REECE: So does that also mean that, for example, if the presumptive tests are both positive, the blood or the sample still can't really be called a blood sample until that confirmatory test has been carried out?

DR BEDOWLE: That's correct.

MS REECE: In fact there is some hesitation, isn't there, in forensic science to give evidence positively of the presence of blood when there's not also visual evidence consistent with the presence of blood?

DR BEDOWLE: Often I think that's the case but again if something was diluted down, you know, tried to wash away where it may not be visible, if you had a test that was sensitive enough to confirm it I think some individuals, many individuals would then say it's blood, but when you

get to very low levels the question then becomes is it blood or something you didn't test for such as sweat or skin cells that may have had DNA in it? So it becomes complicated depending on the case and scenario.

MS REECE: Sure. And you've just spoken about false positives. False positives are results obtained from presumptive tests which appear to demonstrate the presence of biological evidence or matter, but in fact may cause that reaction because of their own inherent properties of something which is not human blood or any other human substance. That's a false positive, isn't it?

DR BEDOWLE: Well I guess I should clarify. Maybe I shouldn't use the word false positive. The test as it is is detecting what it should detect, whatever that is. If you believe that the test is solely to identify blood, then it would be a false positive, but since we know these tests do cross react with other materials, it's giving a correct answer, it's just not conclusive for the presence of blood.

MS REECE: What kind of substances react similarly with presumptive testing for blood?

DR BEDOWLE: Often materials that have oxidative properties in them. So it could be like (indistinct words) could do that, we've heard rust. Sometimes, you know, depending on (indistinct) tomato sauce, other kind of objects can do this as well. Meat, you know like steak, also would do that because you would expect blood to be in beef and other materials, so they would give a positive reaction. They may not be indicative of human blood.

MS REECE: All right. And, Ms Veth, is there anything you wanted to add to what Dr Bedowle has just said about presumptive testing for blood?

DR VETH: Only that it is presumptive and if you get a strong positive, even in the presence of a strong positive it is still presumptive for blood.

MS REECE: And, Dr Wright, I again see you nodding and so I'll bring you in at this point. You agree, don't you, that presumptive testing for blood doesn't, of itself, demonstrate that blood is present?

DR WRIGHT: Absolutely. Even if you apply two presumptive

tests and they were both positive, that still doesn't mean it's confirmatory. So we simply don't know from these samples from the vehicle if they really were blood or not.

MS REECE: One of the theories you put forward in your addendum report, bearing in mind, and perhaps for those listening who don't know this evidence quite as well as you all do, these samples that are up here are from the car and the majority of these samples did not return good DNA results.

DR WRIGHT: All twelve samples were reported by the lab as no DNA detected.

MS REECE: There were some items in the car, but they were a water bottle and another item I think?

DR WRIGHT: A cigarette butt, yes.

MS REECE: The samples that you're talking about, these ones are swabs for blood?

DR WRIGHT: Correct.

MS REECE: And there were some trace samples taken as well?

DR WRIGHT: Correct.

MS REECE: But when we're looking at these blood samples one theory that you have put forward for why - to explain perhaps the absence of the second presumptive test coming up positive, so we're really talking about the four final examples, so V48 the steering wheel, V49 the ignition, V50, V51, your theory, as I understand it, is that there's a positive response to luminol?

DR WRIGHT: Correct.

MS REECE: But then a negative to the Combur testing?

DR WRIGHT: That's correct.

MS REECE: And your theory is that what happens in the intervening method of collection may have removed all of the biological material from the swab area?

DR WRIGHT: Correct. These were non visible stains, so

latent, if there even was biological material there. So that would indicate that if there was biological material there it would be present in very small amounts. So swabbing that area would potentially remove all or most of that material so when you applied a second presumptive test it may show even negative or weakly positive results.

MS REECE: And just on that point about being small amounts of or small traces, the method employed with luminol is to spray an area with a spray which then luminesces with - perhaps you can explain it, I'm not doing a very good job. How does a police officer apply luminol to a search area?

DR WRIGHT: It's in a spray bottle, the chemical is mixed up and a fine miss is sprayed over the surfaces of interest and if there's biological material or other material that may cause a false positive, there'll be a colour change to a bright blue.

MS REECE: And that then luminesces with particular light, doesn't it?

DR WRIGHT: Correct. So the lights are turned off and you can see a luminescence, which would then direct the operator towards a particular area and in this instance the operator swabbed that particular area in the hope that it would remove biological material if it was present.

MS REECE: I'm just going to, just so the people in the court are aware, I'm just going to show a photograph of the vehicle. I'm not going to show any photographs of other samples, but these photographs I think are useful, Dr Wright, perhaps in exploring this theory that you have. So I'll just ask for QPS.0001.0099.0001 to be shown please, Mr Operator. And it's at p0080. I'm just looking for p80. Thank you. Dr Wright, what you see there is the driver's side of a vehicle?

DR WRIGHT: Yes.

MS REECE: This is the vehicle of interest that was searched by Officer Brock?

DR WRIGHT: Yes.

MS REECE: Am I right in understanding the blue, the bluish purple substance which you can see on the steering wheel

shaft there and around the steering wheel and ignition, that that's the luminol, at least as apparent as it can be to a photograph?

DR WRIGHT: That's correct, it's a luminol positive area.

MS REECE: And this is what correlates to sample V48 and V49, the steering wheel and the ignition?

DR WRIGHT: That's correct. So there's two different areas that are luminol positive, around the steering wheel there you see and slightly to the right and lower is around the ignition and to be honest I think the sample from the ignition is potentially a positive negative. It's uniform in shape and I think reacting with the metal, but I think the officer took that sample anyway just in case there was a true positive being masked by a false positive.

MS REECE: And with V48, which is the steering wheel, is that the one where you think it's more likely to have been - where you don't have the same concern as the ignition?

DR WRIGHT: Correct. I think V49, the ignition, I think that's potentially reacting with the surface of the vehicle.

MS REECE: Okay. So if I could ask that we see p44 of that same - no, sorry, there's a new document. QPS.0001.0100.0001 at p44. All right, that's not what I was expecting. So I will just move on from that anyway. Dr Wright - and, Mr Operator, if we could go back to the previous photograph. Do you need me to read you the document number? So while that previous photo is coming up, Dr Wright, the reason I show it to you is at least to a totally lay-person the luminol apparent or what appears to have reacted with luminol in that picture does appear to be quite a large area?

DR WRIGHT: Yes.

MS REECE: Would you agree with that?

DR WRIGHT: Yes.

MS REECE: So I guess I'm asking whether this explanation that you've given about the swab removing the biological material, do you think that that is, does that cause you

any concern when you look at the size of that luminol, of that area that's luminesced, that all of the DNA material may have been removed by swabbing it?

DR WRIGHT: I think it's possible, depending on how the operator collected the sample, how wet the swab was. Typically you keep on running the swab over the surface until the wetting agent isn't wet any more. So it is possible and it depends on then which location the second test, the Combur test, was applied. So the Combur test strips are really only small, very small squares, so if they can't actually run over a large area - so the scientific officer potentially would have chosen a smaller area within that luminol positive area to do the Combur test. So again we're left with the question we really don't know if it's blood or not.

MS REECE: You agree with what you heard Dr Bedowle say, that there are a number of things that can create a false positive with luminol?

DR WRIGHT: Yes.

MS REECE: And one of them is meat?

DR WRIGHT: Yes.

MS REECE: It's difficult in a pretty dirty car like this really to rule out perhaps some of those potential matters that may have been interacting with the luminol?

DR WRIGHT: Absolutely, we can't be sure.

MS REECE: It just leaves question marks really, doesn't it, rather than any indication that there was blood presence in the car?

DR WRIGHT: That's right. The table you showed before and the reason that I highlighted the sequence is, I know there was a lot of confusion about the either Combur negative or luminol negative results and why that would be. The table you showed before is really to demonstrate it should be that first presumptive test which should be relied upon the most to indicate whether blood may be present or not. The second test I think is unreliable because I believe that if there was any biological material there, that it may have been removed by the swabbing.

MS REECE: And just on that point about the swabbing, I suppose that poses the same question. You'd agree, wouldn't you, that at this juncture later in February when these swabs are taken a wetting agent would have been used. Luminol itself doesn't wet the surface to the extent that blood can then be removed, do you still have to use a wetting agent on a swab?

DR WRIGHT: Yes, with luminol when you spray the mist you don't want to spray too much because it may dilute any blood that's there. So if you've applied it correctly you should then still definitely need a wetting agent to collect any sample.

MS REECE: And I suppose that then means that these swabs used in the car may have been impacted by that same ethanol issue that we discussed earlier today?

DR WRIGHT: Absolutely.

MS REECE: I'm not sure if at the time I gave you an opportunity to comment about that, that is I think you talked about the fact that you had received, in your work in the lab you'd received samples from North Queensland without any difficulty?

DR WRIGHT: Yes.

MS REECE: Does the use of ethanol on swabs cause you any concern?

DR WRIGHT: It's not something that I've looked into thoroughly so I'll refer it to the experts who have.

MS REECE: Ms Veth, you've heard the discussion with Dr Wright about the evidence in the car and really what can and can't be said when you have a luminol positive result like that. Is there anything that you want to say about the state of the evidence from the car?

DR VETH: Only to note that no visible bloodstaining was detected in the vehicle and the results of these tests whether you consider just the first test or the results of both tests, still leave you in the same position which is to say they were inconclusive for the presence of blood, we simply do not know if blood was present or not.

MS REECE: Dr Bedowle, do you want to anything to that?

DR BEDOWLE: I just wouldn't rely so much these tests first or second. Swabbing is a (indistinct words) art as well and when you swab a large area you should be rotating the swab to the clean area so that eventually you cover the whole swab. If you continued to swab after a certain point you actually leave the positive material. So if it's large you may not have sampled --

MS REECE: I think we may have lost you.

THE COMMISSIONER: The problem might be at our end, if you can hear us, Dr Bedowle, and somebody I think is looking as well.

MS REECE: Ms Veth as well. She says her phone connection has been terminated.

THE COMMISSIONER: If you just hang on we'll see what we can sort out.

MS REECE: Dr Bedowle and Ms Veth, we're just making some efforts to reconnect with you. Just bear with us. We'll need to stand down briefly, Commissioner, while we re-establish the link.

THE COMMISSIONER: All right. Well it's ten to 1. So I just might ask the other there - ladies and gentlemen, those of you who are going to be asking questions, is there anybody who is going to be asking questions first?

MR HUNTER: We will be.

THE COMMISSIONER: How long do you think you'll be, Mr Hunter? It doesn't matter, I just want to know for planning purposes.

MR HUNTER: Perhaps 10 or 15 minutes.

THE COMMISSIONER: Yes. Mr Rice?

MR RICE: I wouldn't be any longer than that, Mr Commissioner.

THE COMMISSIONER: About ten minutes did you say?

MR RICE: No more.

THE COMMISSIONER: Yes. Anyone else? I just wonder whether we should just proceed through and not break for lunch after this break, having regard to the fact that it's 10 o'clock where Dr Bedowle is?

MS REECE: I'm in your hands, Commissioner.

THE COMMISSIONER: All right, that's what we'll do, we'll just continue through until you finish. How much longer have you got, Ms Reece?

MS REECE: Not much longer. I would say --

THE COMMISSIONER: All right, then we'll just break until the thing's fixed and we'll continue through to the end of this set of evidence. Were you able to hear me by the way? No. Okay. You might email them and let them know.

MS REECE: I will.

THE COMMISSIONER: Thanks.

SHORT ADJOURNMENT.

THE COMMISSIONER: Ms Reece.

MS REECE: Thank you, Commissioner. I'll turn now to the implementation of STRMix and PowerPlex 21 in late 2012. Ms Veth and Dr Bedowle, I might ask you to - I'll take you to your report about those validations.

DR BEDOWLE: Okay.

MS REECE: And while you find that in general the design of PP21 validation was consistent with best practice and that the STRmix validation appears to have been competently undertaken, demonstrating a good understanding of the software, you did have some concerns that flawed interpretation of data was evident in both validations, and you've raised a concern about the 132 picogram threshold being set prior to the completion of the two validations. Ms Veth and Dr Bedowle, perhaps in that order, can you explain on what basis you draw that - on which basis you hold that concern, and what does it mean for the processing

of samples in the lab at the time?

DR VETH: What I think both Dr Bedowle and I in our respective reviews (indistinct) that data significantly below the 132 picograms was able to be obtained from low template DNA profiles. And also that mixtures from these low template DNA profiles could indeed be interpreted using the STRmix software. So we felt that there seemed to be efforts to use the data to support the 132 picogram threshold, in actual fact the data was telling us that that threshold was set far too high and that interpretable DNA profile results were obtainable from DNA samples containing significantly less DNA than that.

MS REECE: That 132 picogram threshold, is that a factory setting or a recommended setting? How did the lab arrive at that particular threshold?

DR VETH: So we think that because samples that have left a less amount of DNA in the exhibit, what we call stochastic issues, which means that the peaks aren't nicely balanced and you get (indistinct) from the DNA profile. Perhaps the laboratory was setting a threshold to avoid having to interpret these types of more complicated DNA profiles. However these profiles are interpretable and especially when you're using a tool like STRmix. Dr Bedowle, do you want to add to that?

DR BEDOWLE: Sure. I think what it is, the 132 picogram is probably a derivative of issues that predate the use of STRmix and other probabilistic genotyping tools that would facilitate typing. So it would be part of that - let me start back further. Every sample has stochastic effects. There are always some random effects on the analysis, they don't come out perfect every time. Just as the amount of DNA reduces, the effects become greater and at some point they become too great to manage with any tool, whether you do it manually or by software. The software allowed and was to go beyond what you could do manually as it could handle far more complex situations that the human brain's not capable of doing. So prior to these methods somewhere between 100 to 150 picograms, maybe even 200, were called low copy threshold areas that the effects were exaggerated, became more difficult for laboratories to interpret. It didn't mean that all samples that were below that level couldn't be interpreted, it just meant that a good portion of them were more difficult. So I believe based on the

lab's own verbiage in their validation studies they locked on to this value a priority as a low copy area, and then after that they then, whatever data they had, if it didn't meet that they just assumed it did. For example, as Dr Veth said, samples could be below that. The lab was concerned with drop-out, missing data and so they did studies to assess where the missing data would occur. But at 132 picograms or in that range, all the samples that they tested, the vast majority didn't have any missing data. And even down at the 50 picogram level, which is closer to a - slightly more than a third of the 132 picograms, only one sample in the study showed an allele that was missing. So the vast majority of the data supported that drop-out did not occur. Now the stochastic effects were greater, as one might expect, at 50 versus 132 or greater amounts, but they didn't support that data were dropping out at a much lower level. So it's probably a bias that was developed based on what was the concerns of the - or the state-of-the-art prior to probabilistic genotyping but they carried that over into the post probabilistic genotyping arena and more sensitive tests that were available.

MS REECE: What impact do you say that that would have had on the reporting of results in --

DR BEDOWLE: I think it goes to the fundamental issues that have been discussed already in previous hearings that they chose a threshold to not analyse samples. So if the - as the Commissioner had said, if the .0088 ng/µL was not met they didn't proceed unless there was a request. That number - that value was way too high for the data that they generated, suggesting that a much lower amount could have been done that would have given viable data for either inculpatory or exculpatory data.

MS REECE: So again you're really talking about a loss of potential evidence?

DR BEDOWLE: Yes.

MS REECE: Ms Veth, with the implementation of the STRmix modelling software, what issues do you perceive arose for the lab in the immediate period after the implementation of that software?

DR VETH: I just prefix my answer to say that the

implementation of STRmix, especially the very first version, was - did require quite a large mind shift for reporting scientists. They had to think about mixture interpretation in an entirely different way. So just recalling my own experience, it's quite - it takes some time to get to grips with what STRmix can do. But with the validation - (indistinct) mixtures were interpreted through STRmix and these mixtures would contain more DNA from a particular contributor and much less DNA from another contributor and its software usually could actually interpret all of the contributor DNA profiles quite well. But there are certain types of mixtures where you have a very, very low-level contributor compared to the other contributors where the software quite rightly generates a very low-level likelihood ratio, close to 1, and this is to be expected because the software is trying to interpret very little material, you know, a very small amount of DNA. But the laboratory sort of - because these mixtures were less than the 132 picograms the laboratory used this as a reason to not progress samples that were less than 132 picograms, not realising that the software was doing a very good job at determining the DNA profiles of the major contributors to a mixture, quite rightly, but not always determine the DNA profile of the trace contributor because there simply just isn't enough information available for that particular contributor. So that decision supported the 132 picogram threshold. But then when they implemented STRmix (indistinct words) it seems like there was no appreciation for the fact that half the mixture can be interpreted quite well but there may be a contributor that can not be contributed quite well. So if we take the Blackburn case in particular, there were several samples where the majority of the DNA profiling result had come from Ms Blackburn, and this was to be expected, these were samples from her clothing for example. But there might be one or two DNA profiling results that have come from someone else, (indistinct) possibly, and instead of thinking about whether those one or two DNA profiling results were reliable for further interpretation, they were interpreted and compared to reference samples that had been significant for the case, and for this particular case there were more than 70 reference profiles that were available for comparison. And likelihood ratios were reported for any (indistinct words) very low-level results. I think that ultimately created quite a lot of confusion. Quite possibly this is one of the first cases where this mass comparison of mixed DNA profiles to a database of

reference profiles was undertaken, I'm not sure about that but it's quite possible that this was one of the earliest cases where this happened. And I just question this policy of reporting these very low-level likelihood ratios based on very little data. There were some other issues in the laboratory that were occurring at the time. We were bringing in a more sensitive DNA profiling kit, such as PowerPlex 21, there was increased sensitivity. You start detect more contamination and other contamination that we call drop in, and also the laboratory was reporting that it was having issues with another phenomenon called carry over which is related to the capillary electrophoresis instrument. All of these things combined, these three types of different contamination. Also they were concerned about the reporting of these very low-level profiling results and the comparison of these very low-level profiling results to the recent samples that you've submitted in relation to this case. I apologise that was a very long answer.

MS REECE: No, it was very useful. I think the sample that has been perhaps discussed in this context is L45, which is the trousers of Ms Blackburn, and the evidence relating to the likelihood ratio of I think initially - you talk about it in your report that there was a likelihood ratio associated with that particular individual of something very close to 1, that's the sample you're talking about, or one of them?

DR VETH: Yes.

MS REECE: And I understand that you're saying you think it was a mistake or you don't understand why results of that which were really, with a likelihood ratio that close to 1 were being reported?

DR VETH: Yes. Now I should clarify. There is some debate over how these low-level or whether these low-level likelihood ratios should be reported and that debate continues, because there are some experts who think that everything - every likelihood ratio generated should be reported. My own personal opinion is that before generating likelihood ratios you must first consider whether the data is suitable for comparison purposes, and that step I don't think was being undertaken in the laboratory, and because of that I think like every ratio quite possibly was being generated based on results that

perhaps weren't (indistinct) to the sample and perhaps were actually evidence of contamination, whether it be the phenomenona drop ins or carry over, or simply just really low-level results that may not actually be DNA at all and may be some other artefact. So I think it's this primary step of making sure that the profiling results that you are using for comparison purposes are robust. And there are mechanisms to try and do that. You can try and replicate the (indistinct) final result. It may not necessarily be successful but can be useful. Or you make a decision that, you know, if you have just one or two DNA profiling results that are foreign, that perhaps there's too few in order to be able to make a meaningful comparison.

MS REECE: My understanding of what you've said and referring to your report as well is that while there are guidelines from a scientific working group on DNA analysis methods which state that likelihood ratios appropriately express the strength of the evidence and should be reported no matter how low or high the numerical value, what you're saying is that policy position really has to occur within a set of circumstances that give you certainty or at least sufficient certainty about contamination of the profile or these other concerns that you've raised about whether that likelihood ratio is reliable?

DR VETH: Actually the laboratory needs to have some robust mechanisms in place to ensure that whatever you're comparing, whatever profile results you're comparing, that they are actually comparing to the sample and not some artefact or evidence of some sort of contamination. And if you do then go ahead, if you have reasonable confidence about your low-level profiling results and reasonable confidence about the number of contributors that have debated that DNA, you go ahead and undertake a likelihood ratio and it ends up being - and it's quite low, that you communicate fully with the recipient of the information, whether it be the investigators or the court, exactly how meaningful that result is or what that result actually means or the limitations, the limitations of the profiling result that you've based that likelihood ratio on. There does also need to be further communication should you elect to perform a likelihood ratio on very sparse or low-level DNA profiling results.

MS REECE: I think that communication issue is an important one and perhaps all of us involved in this inquiry, as

lawyers anyway, have learnt a great deal about DNA over the past while, but it seems evident from the likelihood ratio of perhaps 6 or 7 reported in relation to L45 that there may at times be a misunderstanding of what exactly that means. What does that tell you about whether someone can be included or excluded, or included I suppose, at a crime scene? How would you explain how meaningful a likelihood ratio of 7 is?

DR VETH: We should also remember that in the case of L45 there were five people who generated likelihood ratios close to - there wasn't just one person, there were actually five. And this is to be expected when you are working with very few DNA profiling results and you are comparing them to a database, in this case of some 70-odd reference samples, that you are going to get adventitious matches, matches that occur solely by chance. If these results had been compared to a database of people who had nothing to do with this case you also would have obtained inclusionary likelihood ratios, also likely close to 1. So the point of that, just because five people have been reported as having an inclusionary likelihood ratio or very low, close to 1, we can't assume that any one of them is actually the source of the DNA. But it seems in this case - I'll stop.

THE COMMISSIONER: Dr Veth, you said you can't assume that any of them are the contributor to the DNA or even a contributor to the DNA?

DR VETH: Correct.

THE COMMISSIONER: Thank you.

MS REECE: Dr Wright, this picks up on an issue you've been concerned about, which is the way in which that particular result was relied upon. You'd agree with what Ms Veth has said about how meaningful a likelihood ratio of close to 1 is in an evidentiary sense?

DR WRIGHT: Yeah, that's right. I think that it has a real risk of confusing the recipients of that information, being the court and the jury. I think if you're - if the lab is going to report such low likelihood ratios, which as Dr Veth said may not actually even be part of the DNA profile, L45, my position is I don't even think it's a DNA mixture, I think it's a single source with some drop in.

If those risks and limitations aren't appropriately conveyed to the court then, you know, perhaps the incorrect weighting can be mistakenly placed on that evidence. But a likelihood ratio of 8, essentially that means 12 per cent of the population would have those minor pieces of DNA. If we look in the room today it's probably five people would have, you know, those pieces of DNA just by chance.

MS REECE: Yes, understood. Ms Veth, I've been commenting like this with Dr Wright but I did just see you nodding, do you agree when you look at the electropherogram for L45 that it's possible that what you're actually seeing is not in fact evidence of an additional DNA profile?

DR VETH: Yeah, the additional two profiling results are very low-level, they could well be drop in or some sort of artefact. They haven't been replicated. So given the concerns that the laboratory had raised about this where increased (indistinct words) contamination issues and carry over, I wouldn't want to rely on those two profiling results.

MS REECE: I understand. Those issues of course are developed in your report and we can't cover all of it but I understand that you're saying that that has particular relevance when it comes to interpretation of these low profiles. Dr Bedowle, you've been in DNA science for quite a long time I think it's fair to say?

THE COMMISSIONER: He's an immortal.

MS REECE: He's an immortal.

DR BEDOWLE: Or it's actually you're saying I'm very old is what you're saying.

MS REECE: I guess the reason I put that to you is because over the period of time you've been involved in this science the tension between the science and communicating the science is ever-present, isn't it?

DR BEDOWLE: Yes. Let's look at this in a broad way first. STRmix is a fantastic tool, it has vastly improved what we can do but it's a tool and it's there to assist the scientist in making proper decisions. As Dr Veth said, sometimes you look at a profile you say, "This one is not deep" and move forward. Sometimes you look at it and say

it would. There are some situations with minor profiles that might yield a good strong likelihood ratio depending on where the peaks show up and where they are in relation to the major contributors. So we have to be sure that we're involved in the process of making proper assessments to make full use of the sample, not just running samples through them. This one's a little more challenging, L45, because you've got remember, rightly or wrongly, and I believe wrongly, the laboratory set this 132 picogram threshold as a point of anything below that was unwieldy and uninterpretable. If we take these few peaks that are very low, and I think I remember it was something like 4 per cent contributor at that level, that falls well below the 132 picogram value. So there's a disconnect between those who have set the policy and those who are analysing data, because if the policy says 132 picograms, it makes it difficult and we shouldn't proceed, then there shouldn't be any labelling of peaks at that low-level. However there are (indistinct) peaks and they could be true DNA from a minor contributor, they could be some other artefact. One of the concerns of working with this very low-level was the lab had a serious carry over problem that they couldn't apparently resolve at that timeframe, and therefore the carry over from another sample could be contributing those peaks. We just don't know without further work. So there's a lot of issues with this.

The last one is I agree with the working groups that you should report what you get. Communication is a very important part of the process. In writing a report it just gives a value without explaining what it means, especially in the context of finding 50 some odd other individuals and seeing if any of them would match isn't helpful, because reports go to people, lay people who are lawyers, judges and investigators who may not appreciate the significance. So just reporting a number without giving it some meaning within the context of the case or at least informing in some fashion is not being of service to anybody.

MS REECE: Dr Wright, I think I gave you an opportunity to comment on the actual profile itself but you'd agree with these comments being made about education and communication of these sorts of scientific concepts?

DR WRIGHT: Yes, absolutely.

MS REECE: I think you talked about the juries and judges

and the interaction between those groups and this kind of evidence is obviously critical. Ms Veth, Dr Bedowle and Dr Wright, was there anything else any one of you wanted to particularly address in relation to the implementation of PP21 and STRmix before we move on from that topic?

DR BEDOWLE: Yes. I think there's one thing to consider and we put it in the reports. Bringing on PowerPlex 21 itself would have been a challenge but it would have been similar to bringing on previous STR kits or DNA typing kits. Being on STRmix at the same time, which is a fundamental change for laboratories back in that time frame, people were trying to understand and struggling, taking both on and trying to make a deadline that was placed upon them I think was also a failure. One is those who set the deadline didn't appreciate the significance and are part contributors to the problem. But the lab also not recognising the depth of the challenges, in trying to meet it they have failed themselves in properly understanding it and implementing it and training their people. So the combination of the two at once without all the appreciation, and the other labs as I understood asked for extensions, they recognised that it wasn't feasible to do both of these things at one time without more time. I think this lab should have evaluated that as well and perhaps that would have helped them get to a better place. But it's not all their fault, someone else placed the burden on them and they didn't appreciate that part of it as well.

MS REECE: One of the criticisms you do make was that the laboratory was remiss in not conducting a proper six month review after implementing PP21?

DR BEDOWLE: Yes, that's correct.

MS REECE: Dr Wright, I think you had a particular criticism perhaps around the implementation of PP21. Would you like to elaborate on that? I think I cut you off earlier in your evidence about it?

DR WRIGHT: No, that's fine, I agree with Dr Veth and Dr Bedowle. I think the tools themselves are very good quality tools but, as I've previously highlighted, that I don't think they were in, I think they were improperly implemented and inappropriately used, which goes to the lab policies and so forth, creating real potential for error,

false exclusions and false inclusions and, you know, I guess there's a question mark over a large range of evidence and we don't know how long that has persisted for either.

MS REECE: When you say a question mark, you mean this issue where this threshold was imposed under which we may very well have seen results obtained?

DR WRIGHT: The thresholds in relation to the drop-in thresholds used for STRMix and the quantitation thresholds and the limit of reporting thresholds. So the interpretation of the data being produced by the laboratory and reported, I think there's a high risk that there's some genuine errors there.

MS REECE: Dr Bedowle and Ms Veth, would you agree with that concern?

DR BEDOWLE: You can go first.

DR VETH: Okay. Yes. Beginning with the STRMix. Certainly further mixture studies could have been done that would have supported the notion that mixtures from DNA samples with less than 132 picograms couldn't then be interpreted. Then and the drop-in cap, the drop-in cap, as I said, in STRMix, the drop-in cap in the parameters. The laboratory was monitoring drop-in after the implementation of PowerPlex 21, which is great that they were doing that. The drop-in rate said to be increasing and the heights of the drop-in peaks also seemed to be increasing. To our knowledge the drop-in cap, which would sit quite low and based on very little, on a very low rate of drop-in, it came from the PowerPlex validation data. This was set in STRMix version 1.05. In my opinion because they were seeing increasing rates of drop-in and the height of the drop-in peaks, it should have been reassessed in STRMix (indistinct words) six months after PowerPlex 21 implementation when they had some data indicating there was increases in rates in heights. To my knowledge it still hadn't, they still hadn't amended the STRMix settings as late as December 2013 and it seemed that when version 2 was implemented there's actually no mention of drop-in at all in that particular validation. So I'm concerned that with the STRMix interpretation and the way it was set up, the STRMix program was underestimating the rate of drop-in that was actually occurring within the laboratory and its

interpretation.

MS REECE: Dr Bedowle?

DR BEDOWLE: I don't think I have anything more to add to it other than I think the six month reviews flows into what the Commissioner asked earlier about quality management. That when you have a system you put online it's incumbent upon you to assess it after a certain time frame and the lab said there were staffing issues and there were little things that occurred all along, so it wasn't necessarily - they did it three years later which is, in my opinion, way too late for an assessment, especially of a new system. We also saw that this is not unique to this one event, even though in 2016 they recognised the importance of a six months review as part of one of their findings.

In the Options Paper remember they were supposed to do a review of the performance after they enacted the option with the police and that didn't occur in the six months either, so what this all says is there's still a quality issue that needs to be enacted so that they can properly assess performance and some of these things like drop-in maybe would have been found if there was a six month review, (indistinct words) the stutter errors that occurred in the (indistinct words) STRMix or some of the other things that they saw.

Mistakes happen, people don't know everything, you learn sometimes as you go along with any technology, but not assessing them in a timely fashion puts them at a large risk for having errors that can occur or missing important factors that can improve their process.

MS REECE: And the longer time goes on the more difficult that becomes?

DR BEDOWLE: Well, actually the more difficult it becomes to fix it if you have the serious error that might have impacted casework, that means you have to go back and address a lot of cases. If you catch it in six months or three months you have to address fewer cases. If you identify it - in fact, they identified early on a problem with the PP21, the PowerPlex 21, where they were using half volume reactions from the get-go and then immediately, very soon after realised that that wasn't working for them, the interpretation was challenging, they had a lot of issues

(indistinct) them. That's a good sign. I would suggest they should have recognised that during validation but they didn't. They put it online and quickly addressed it because it wasn't working. (Indistinct) reviews, that's an example where having reviews in a timely fashion they might find other examples that would help them improve their process.

So when we put things online we assess them on a routine basis to ensure they're working, because you learn new things when you put them into the real world and they would have learned that you can't assess the real world effectively when you do validation studies, you only capture a portion of it. So it's an important part of the process to have timely assessments and in-depth assessments.

MS REECE: I might move on to what I understand to be perhaps the final issue which is in contention perhaps still between the three of you and after that I'll probably just ask about one or two other things and that will conclude my questions for you. But I understand, Dr Wright, that in relation to the tape lifts from Ms Blackburn's skin you would argue that because the sample from the right wrist provided a really good profile, that that causes concern when you consider the other poorer, in fact poor samples or profiles which were able to be obtained from other skin samples which were processed later. I shouldn't say skin samples, perhaps tape lifts from skin that provided poor profiles. Is that in some - that remains a concern for you?

DR WRIGHT: Yes, I think that there's the three other tape lifts taken from the skin that provided poor results, or what I considered poor results, when I contrasted that to one sample that was taken from the right wrist, so it goes back to the discussion that we were having previously about, you know, some of these samples, we don't know how much DNA is actually recovered and it just fed into the question mark I had about the reliable processing of the samples in conjunction with the other poorly performing samples. But I acknowledge Dr Veth and Dr Bedowle's opinion that you could expect to see that kind of variation and I do accept that.

MS REECE: And my understanding, Dr Wright, from the list of samples that were potentially caught up in this

extraction issue is that that particular tape lift, or those ones that you're talking about, those poorly performing tape lifts, they do not appear on that list?

DR WRIGHT: That's correct.

MS REECE: So they remain somewhat of an anomaly perhaps, if we consider that extraction method as an explanation for some of these poor results?

DR WRIGHT: Yes, that's correct. I was able to obtain the positive control for those tape lifts that I was concerned about and the positive control actually performed quite well, 3.11 nanograms per microlitre, so that suggests to me that that extraction batch was performing well, which would lend itself to me agreeing with Dr Veth and Dr Bedowle that it simply came down to variation within those samples.

MS REECE: I'm sorry, perhaps I don't understand. Are you saying you accept that there may be reasons outside of lab failures for why those tape lifts have performed differently?

DR WRIGHT: I think after looking at its positive control for that batch containing those tape lifts from the skin, I'm confident that they weren't effected, you know, by this issue that we've suggested.

MS REECE: Yes.

DR WRIGHT: That it's more likely to be, as Dr Veth and Dr Bedowle discussed last week with myself, that it's due to just variation within the sample. So I'm no longer concerned about those samples.

MS REECE: All right, I understand. And, Ms Veth, your evidence in relation to taking tape lifts from skin samples, is that essentially that recovery can be quite poor and variable as between tape lifts even from similar areas of the body?

DR VETH: (Indistinct words) unexpected but it's because skin cells are - and I never really quite know how to pronounce this - keratinised, so they no longer contain DNA, and if you get a good result from a skin swab or a tape lift it's possible that what you're actually recovering is some sort of body fluid that happens to be in

that particular area, which can happen if you touch our eyes or, you know, wipe your nose, whatever, you'll get body fluid on your skin and that will have a lot of DNA, compared to the amount of DNA that you recover just mainly from skin cells. So I think what we're seeing here is perhaps not unexpected for us and which is pretty typical of results that we do get from samples taken from skin.

MS REECE: All right, thank you. Dr Wright, was there anything further you wanted to say about that?

DR WRIGHT: No.

MS REECE: I am going to take you now to a question which I did outline somewhat in my opening, which I think Dr Wright heard but perhaps you and Dr Bedowle didn't, Ms Veth. In your report, and this is when you discussed the threshold for reporting at the time or the threshold even for further processing of DNA insufficient or no DNA detected, you paint a picture of a lab which was under significant pressure at the time and had made some decisions around work flow changes. Can you tell the Commission what you, the picture that arose in your mind when you were reading the material about what was happening in late 2012, 2013 and how it was impacting on the lab?

DR VETH: Yes. So Dr Bedowle and I have already spoken about the threshold of 132 picograms that seemed to be imposed to avoid having to interpret more complicated profiling results because of stochastic effects.

As I understand it from the documentation that was provided, prior - let me step back. In the PowerPlex 21 validation there was a recommendation written in it which is called Recommendation 3, that samples with DNA concentrations below 0.01 nanograms per microlitre should not be processed, should not be routinely processed. And I understand that prior to PowerPlex 21 with volume crime samples with (indistinct) DNA concentration also would not be routinely processed in volume crime, but after PowerPlex 21 was implemented it seemed like the threshold was then extended for major crime samples, which I think are referred to as P2 samples. Although the SOP and the recommendation 3 suggests that pretty much any sample that's below that concentration would not be routinely processed. And I say in my report that I wasn't sure whether this was a decision that had been discussed with

QPS in advance. It was communicated to them, but I don't know if it was discussed with them in advance, and we would discuss that, you know, it's entirely possible to obtain interpretable DNA profiling results from samples that had a lower concentration than 0.01 nanograms per microlitre.

We argue in our report that while this threshold may be suitable for volume crime where your purpose is to try and obtain a DNA profile that is suitable for loading to a national database, for example, with major crime samples we don't believe that this is an appropriate threshold. As we've already said, we can get DNA profiling results from samples with much lower DNA concentration and in a major crime, in a major crime investigation the profiling results obtained from such samples could be very informative to the investigation, whether they be exculpatory, inculpatory or just provide more information than what is available from simply not testing the sample to begin with.

MS REECE: In your report at paragraph 86 you say when you refer - you refer to an email exchange which I've put into evidence today, but in short form you say this text seems to suggest that the extension of the policy to major crime samples was designed to offset the longer turn around times anticipated from interpreting and reporting the results obtained from samples processed through PowerPlex 21 and this change was communicated as an advantage because it would likely produce faster turn around times for a significant number of samples that would now be automatically stopped after the quantification step.

In that correspondence that you've seen it's quite clear, isn't it, that police are applying some pressure about turn around times?

DR VETH: (Indistinct) the focus of that email, which was from the FSS to Queensland Police was very much to explain the additional burden that implementing PowerPlex 21 had created because there are more DNA profiling results to interpret, there is an additional burden with having to interpret those profiles. The good news is that we extended this policy and it will mean that the more results will get (indistinct) quickly because we're simply not going to process them.

MS REECE: You formed the view in your report that this potentially did a disservice to the police in that while it

may have had its advantages, it actually also potentially led to a loss of evidence?

DR VETH: Absolutely, absolutely. And we could see that in the Blackburn case where samples (indistinct) QPS requested that samples be tested after they had been stopped by FSS, and even though the results weren't necessarily probative, they were at least more informative than reporting nothing at all would be my view.

MS REECE: A low quantitation is more informative than a no DNA detected result?

DR VETH: Exactly, yes.

MS REECE: That's a matter which has already been discussed at some length in this Commission, so I won't dwell on it. Dr Wright, do you hold similar concerns about the implementation of a threshold at that stage?

DR WRIGHT: Yes, absolutely, I think it was a very high threshold and their own validation data demonstrated that they could obtain profiles, so it just seems at odds with their own data and their own validation.

MS REECE: And, Dr Bedowle, could I ask for your views on that?

DR BEDOWLE: So I mean I look at a lab, because you asked us, look back at 2012 and assess the lab. Here is a lab that had a lot on its plate, not just these events, these two major tasks to implement, but also other quality issues that were beleaguering them and were not solvable, so that's the first problem, that it didn't give them the chance to assess, and so there is a move, I can see, of trying to make a higher value to reduce the effort. It's not a sound way to go. I think it hurts them, as we've said, but it's even more than that, and I personally would question, although I can see the reason for doing volume crime and reducing that to ensure that you address violent crime, but one of the things you have to think about is the long-term and maybe bigger picture, not just for this lab but for the entire Queensland - or for the world for that matter - is why are we doing DNA typing and why are we using databases?

What we have found in the US, and I think in other

countries, and I'm sure it's the same in Australia, is that a number of people who have been associated with violent crimes start out at lesser crimes and graduate upward. If you're not assessing the breaking and entering and the property crimes and the burglaries and whatever and getting those profiles early on, you're not going to get a profile from a violent criminal who had graduated from a lesser crime and so we have multiple victims that may occur, that could have been stopped earlier on in the process. So one has to ask the question: what is the best process in the system and then, of course, more resources are needed and more people, but if you want to look at a database and make value on it, since processing property crime is out (indistinct) concentration or at certain levels may not be the best service for the community at large. So there are a lot of questions in there to think about as you go forward on what's best practice to meet your desires for a safer community.

MS REECE: Thank you. Dr Wright, Ms Veth, and Dr Bedowle, that was going to be the questions I had to ask of you. I will revert to you briefly, Dr Wright.

You provided a report which in some ways extends beyond the Blackburn case and so we really are concerned today with how the lab was functioning at the time and matters to do with the reporting of results in her case and also collection issues. Is there anything that remains, you think, in contention between you, Dr Bedowle and Ms Veth after you've had this opportunity, first of all, to see the same material they saw, to read their report, to meet with them and to give evidence today?

DR WRIGHT: No. I appreciate the opportunity to be able to have those discussions last week with Dr Veth and Dr Bedowle and, no, there's - I think we're in agreement on, you know, a large majority, if not everything, that they've reported.

MS REECE: Commissioner, I've been reminded that I need to tender some documents. Just one in fact. It's the luminol par picture it's QPS.0001.0099.001 at p80.

EXHIBIT #224 LUMINOL PAR PICTURE

MS REECE: Thank you. Commissioner, that's the evidence of these three witnesses.

THE COMMISSIONER: Thank you. Mr Hunter.

<EXAMINED BY MR HUNTER: [1.53 PM]

MR HUNTER: Can I just let the three of you know that I act for the Queensland Police Service and my question or questions are going to revolve around the issue of the use of a rayon swab and the selection of 70 per cent ethanol as the moistening agent. In particular, Ms Veth, I wanted to ask you, given some evidence you gave earlier this morning, about the fact that you understood that the use of 70 per cent ethanol on swabs lead to reduced collection of DNA material from bloodstains. I wanted to ask you in particular what the source was for that opinion?

DR VETH: I believe I have a general article that suggests that - I have to admit this is not an area that I have really expert knowledge on, this is really simply something I read from a study that looked into - and, actually, I might need to correct myself because it possibly was 100 per cent ethanol, it may not have been 70 per cent (indistinct words).

MR HUNTER: Is that a study by an author, the principal author being Alacarenza?

DR VETH: It could well be, yes.

MR HUNTER: And it was a study from this year, 2022?

DR VETH: I guess so. I should have prefaced my statement because a lot of these studies have come out subsequent to the work that was done in this case.

MR HUNTER: I'm not being in any way critical of you, please don't misunderstand me. I suppose my question is: do you accept that there have been a lot of studies on what swab type is best and what moistening agent is best?

DR VETH: I'm not sure about the moistening agent. I know there have been a lot of studies on the swab types. I think the issue here is that as far as we're aware a change was implemented that was not validated correctly. I could be wrong. I've not seen any validation documentation relating to either the (indistinct) of the swab or the choice of wetting agent.

MR HUNTER: You'll get no argument from me about the importance of whatever method was chosen being properly validated. Do you accept this, though, that if what happened was that the swabs were being used with distilled water and a contamination or mold was presenting as a problem, in those circumstances an immediate solution was required?

DR VETH: Yes, I understand that that is the background to the change in wetting agent. That perhaps is quite particular to the way samples are taken because the swabs are taken and they are immediately put into a tube. There are other alternatives, as I understand it, other dessicating agents could be either added to the tube or they actually already contain dessicating agents so, yes, I understand that the change was made in relation to a particular issue that arose. There may have been other alternative --

MR HUNTER: I'm not suggesting that there may not have been other alternatives, but my question was do you accept that something needed to be done immediately, whatever it was?

DR VETH: Yes. If you don't have a system that allows your swabs to dry, then you address it so that mold doesn't grow.

MR HUNTER: In terms of doing a validation study, am I right that there is a wide array of swab types from which to choose?

DR VETH: Yes, that is correct.

MR HUNTER: Some are made from cotton, but others are nylon, rayon, foam pads, that sort of thing?

DR VETH: I think if you look across the forensic community there is actually no perfect swab and different agencies will use different swab types.

MR HUNTER: When one looks at the literature, do you agree that it's quite confusing, and in some cases contradictory, between what is and is not ideal?

DR VETH: I think that's probably true and further complicated by the different types of samples that need to

be taken.

MR HUNTER: Am I right that there are a number of factors to be considered in deciding what is or is not the ideal swab for a particular sample and those factors include how much of the sample material is absorbed into the swab?

DR VETH: Yes, because you need the swab to collect as much material as possible, especially if it's a trace sample. Then you also need the swab to be able to release that DNA or those cells during the extraction, so it's a two-fold picture there.

MR HUNTER: So you need a swab that's able to liberate the material, as well as absorb it?

DR VETH: Exactly.

MR HUNTER: And it also has to be a swab of a type that enables or prevents I should say the degradation of the material that's being sampled?

DR VETH: Yes.

MR HUNTER: Because lots of DNA from a swab is not necessarily what's important, it's the quality of what you get that's important, isn't it?

DR VETH: You can't control that with crime scene samples, we had no control over the quality of the DNA. All we can try and do is have a system that recovers as much as possible in the extraction process.

MR HUNTER: My point is that a small amount of high quality DNA can be preferable to a large amount of local?

DR VETH: Yes, my point is that we actually have no control of the quality of the DNA or the (indistinct) material that is left at a crime scene.

MR HUNTER: I suppose what I'm getting at though is depending on what material you use there might be a greater or lesser degree of degradation once it's been taken and stored?

DR VETH: I think you want to keep degradation to a minimum once the sample is taken, which is why the issue of the

blood swabs being stored directly in the tubes was problematic because there we have an issue of degradation caused by mould that has occurred after the sample has been taken. It's something that we should more in control for, that should be able to be controlled for.

MR HUNTER: Let's say the police service is confronted or was confronted with this problem of mould developing on swabs. Do you agree or disagree with me that it was a reasonable thing for them to ask the laboratory here in Brisbane, "What's the solution to this problem?"

DR VETH: Absolutely.

MR HUNTER: And it was a reasonable thing for them to act on any advice that they received from the laboratory, do you agree?

DR VETH: Yes.

MR HUNTER: It might well be that down the track they ought to have sought some evidence by way of validation of that process but in terms of a short-term solution it was a perfectly reasonable thing for them to ask the lab, "What should we do about this?"

DR VETH: Yes, but I mean the laboratory was the best organisation to ask I think in this particular context.

MR HUNTER: I've been asking you a lot of questions on this topic, I should perhaps at this stage invite Dr Bedowle or Dr Wright, whether either of you have any comment about what I've been discussing with Ms Veth?

DR BEDOWLE: Yeah, I think I could because I've done a lot of work on swabs, I have a lot of knowledge of it. I think the issue of a small amount of high integrity DNA versus a lot of little is a moot point, in the sense that when you're collecting a sample you try to get as much as you can of all the DNA because we don't know how it will play out afterwards and what techniques may be used currently or in the future. So that shouldn't (indistinct). The issue then was how do you properly maintain the swab to protect the integrity once it's collected? That's where I think the problem came in because if someone takes a wet swab and puts in a closed environment it promotes mould and causes degradation. So you don't want to do that. Now I

appreciate the police's position of trying to find a solution. This was a solution offered but it wasn't a good solution as a process perhaps. Now I've not studied collecting 70 per cent ethanol wetted swabs to tell you what the impact may or may not be, I've only studied water that buffers detergents as sources and they seem to work well. The choice of swab, there are impacts on the choice of swab. Some swabs, as Dr Veth said, collect very well but don't release well, and usually those that collect well don't release well, and those that collect poorly release well. So there's always a balance in the decision process that one takes in that if the lab sought advice, I mean if the police sought advice from the lab, that's the proper thing to do, then the advice is what it is. If I were the police I would trust my lab to give me sound advice. I would just say there may have been better quick solutions to address the moulding that could have been better, like letting them air dry under a controlled open, sort of semiopen container or placing them into a tube with drying material which are solutions that were available at the time. If they were not advised on that they would not know. If they were advised on that then it's just a matter of decisions of cost, and again cost may not always be the best answer because it may cost you more later on. So the process is complicated. Last, I'll say there is confusion out there on what is the best swab. People don't process them under the same conditions, and if they do they process it where one swab, say rayon, under a condition that favours rayon but would be poor for nylon and vice versa. So it's very complex for any agency to take from the literature alone to make a decision. It's always important to use the literature and then give some proper studies to ensure you have made a good choice.

THE COMMISSIONER: Dr Bedowle, I gather then from your answer that if you had been asked by a police service the question, "Would rayon and ethanol be good to use", leaving aside the fact that you haven't tested ethanol and would make no comment upon it, if you were asked a question about whether something was good to use as a swab, you would ask, "Why are you asking me? What are you addressing? What's your purpose in asking me? What kind of samples are you going to be applying this to? On what sort of surfaces and under what kinds of environmental and other conditions are you going to be collecting these samples? You might want to tell me also", you might say, "About how you're going to store them and convey them before they're used at

some laboratory?" That is to say before giving any advice about what swab might be useful you'd want to know a lot more than just the fact the police want to use a swab?

DR BEDOWLE: Well I mean if the police were asking me for a swab, of course in this situation I don't think that's the question that you're asking, I think you already had a swab, but yeah, if I was going to take a swab I'd want to know what is your purpose and I would evaluate (indistinct) under their optimum conditions and then give advice to them of what's the best collect evidence. And there are different swabs that can be valuable in different situations. However if I were the police I would want one swab that covers the best it can because it would be too complicated to make decisions, carry different tools and that, so I would try and give them the one that's the best in the majority of situations.

THE COMMISSIONER: Certainly the purposes, assuming you're in a DNA lab, when you're asked this question, the purposes for which you might use a particular swab with a particular wetting agent would not necessarily translate to the purposes for which police want to use swabs and for their particular circumstances, it just wouldn't follow automatically that the swabs you used for your purposes would fit their purposes?

DR BEDOWLE: In some cases that would be true and others it wouldn't. But the swabs in general, as I said, they can collect materials, the wetting agents are very similar for the labs, but we may use in the lab some different kinds of swabs because we're swabbing clothing, for instance, where the police may be collecting off surfaces or entry ways or other kinds of items and that. And so depending on what it is I might use a different swab for different scenarios, and they have a better luxury in the laboratory to do so.

THE COMMISSIONER: Yes, thank you. Mr Hunter.

MR HUNTER: Dr Wright?

DR WRIGHT: I don't have anything to add.

MR HUNTER: Can I ask some questions about the issue of validation then. Given the wide variety of both swabs and wetting agents, assessing the myriad combinations of each in the context of different types of samples, that is

blood, semen, touch DNA and so forth, that would be an enormous undertaking to do a validation study that assessed every conceivable combination?

DR BEDOWLE: If you want to do every conceivable combination yes, it would be enormous. But people can work from some knowledge and information and set some parameters. As I said, usually you get a swab, rayon, nylon, cotton, whatever. The manufacturers have done some study with some laboratory and they produce a procedure. What you would want to do is start with the existing procedure, assess and compare to the existing procedure of the other swabs and then say, "This one or these two seemed to work better. Now I'm going to modify, vary, test under different conditions to see if I can enhance it or see if it I can stress so it doesn't perform as well and make some decisions". SO you can hone that down to a modest number of tests to be able to do that, but still it would take some work.

MR HUNTER: You were going to say something, Ms Veth?

DR VETH: Yes, I was just going to say that initially in this particular scenario that we've been discussing it could have been a recently modest study just comparing the results of things that had been swabbed using ethanol compared to things that have been swabbed using water. That's just changing one variable and seeing what the downstream effects were. It could have been a modest study.

MR HUNTER: In your view, Ms Veth, would that be a sufficient validation study for the purposes of a selection of a swab and moistening agent?

DR VETH: Yeah, I mean I couldn't right off the top of my head come up with an adequate, you know, what the recommended number of samples and types of samples, but I expect it could be done reasonably quickly and sort of trying as many scenarios as possible.

MR HUNTER: Right.

DR BEDOWLE: There is one issue (indistinct). To do it you also need the laboratory to be part of the process because you have to extract the DNA, quantify the DNA, the type. And so if the laboratory is already overstressed with work

that could complicate your ability to form a validation study of the nature. But it's conceivable to say, "I have a swab, I have a current method. I want to change the one thing, 70 per cent ethanol", and test that on the kinds of samples you intend to collect and you do even 20 or 30 of each, but testing them could have been very complicated given the stressors on the laboratory already.

MR HUNTER: But it's certainly not something that the police service could validate on their own, they would need the --

DR BEDOWLE: No.

MR HUNTER: -- analytical services of the laboratory, correct?

DR BEDOWLE: Absolutely.

MR HUNTER: Alternatively the laboratory could undertake the process in its entirety, that is the laboratory could set up the various substrates and samples and do it that way?

DR BEDOWLE: In concert with the police because the police are the ones going to the crime scenes and collecting the samples. You would want to get from them what are the kinds of samples they encounter, what are the challenges so that you might be able to cover some of those confounding factors that may impact the collection of samples.

MR HUNTER: On the subject of 70 per cent ethanol and water, is there something that's inherently wrong or bad about that choice, about that moistening agent with a rayon swab? Is there something about the chemistry or something else that is inherently wrong?

DR BEDOWLE: I don't think there's anything about the rayon swab as an issue per se itself. I think the question is, and I just don't know the answer myself because I have not investigated it, is 70 per cent ethanol an effective method for recovering samples and maintaining the integrity? If it's an effective method, it's comparable to what you have then I say great. If it effects the integrity of the sample in some way, I don't know. To me that would be speculation to say there's something wrong with it or something right with it without more information that I

just don't have in my hands.

MR HUNTER: Do you have any comment, Ms Veth?

DR VETH: No, I'm sorry, I have not looked into this in any depth at all so I really can't add anything.

MR HUNTER: Can I ask you though, Ms Veth, about that (indistinct) study, the one from this year, the one that used 100 per cent ethanol. Am I right that even though there might have been some performance issues when it came to 100 per cent ethanol, nonetheless samples that were taken using 100 per cent ethanol in each case resulted in a full STR profile, that was what the authors --

DR VETH: I can't recall the actual detail of the particular article off the top of my head but the thing that did stick in my brain was the - it just didn't cover the sample quite as well. You need to remember that was blood samples in particular. I'm sorry, I probably shouldn't comment on this any further because I just cannot recall.

MR HUNTER: I was just going to put this sentence to you, the authors wrote:

> *Irrespective of the tissue type, moistening agent and swab storage condition, full STR profiles were obtained from all stains.*

Does that jog your memory?

DR VETH: Yes, that on the surface sounds like a good result. I'd just need to - it just depends on the samples that they are referring to, the stains that they are referring to.

MR HUNTER: They go on to say that 100 per cent ethanol outperformed water when it came to skin cells?

DR VETH: Right, right. Which is good news.

MR HUNTER: So is the issue then that 70 per cent ethanol and 30 per cent water might be best practice but because no one's done a validation study we don't know?

DR VETH: Yes, we don't know.

MR HUNTER: Dr Bedowle, do you agree with that proposition that it might be best practice but we just don't know?

DR BEDOWLE: As I say I have no knowledge without doing some testing on it. Any study, you know, skin cells are different than blood versus saliva, and I don't want to be flippant but, you know, you can't - I won't be flippant because I got the immortal issue a minute ago - but the point is under controlled studies you can still get results. The question is how well does it perform across the spectrum of what you want. We just don't know the answer to that and it would just be incumbent upon people to determine that. Because the goal I think we all want is to get the best recovery possible, not just get an STR profile under one circumstance. Across the range we don't always see when we do these tests, we find out just what the discussions in the lab here, it takes working at the range of possible results or at least 95 per cent of them, those types of samples that you encounter need to be assessed and that would be important to do. Could it be good? Possibly. Could it be bad? Could it be that it works for skin cells great as you've read but doesn't work great for blood? I don't know. These are the questions that should be asked.

MR HUNTER: I should ask you, Dr Wright, whether you have anything to add?

DR WRIGHT: No, nothing to add.

MR HUNTER: Those are the only questions.

THE COMMISSIONER: Mr Hunter, would you mind giving references to any articles on the subject which you have to Ms Reece? I don't know that I'll be able to make findings based upon my own reading but it will give me very valuable context.

MR HUNTER: That article is one that's to referred to by Professor Wilson-Wilde.

THE COMMISSIONER: Okay, I'll find it there then, thank you. Thanks very much.

MR HUNTER: But I'll certainly --

THE COMMISSIONER: No, no, don't worry. I'll find it. Thank you very much. Mr Rice.

<EXAMINATION BY MR RICE: [3.19 PM]

MR RICE: Thank you, Commissioner. I represent Queensland Health, I just have two short matters to take up with you. The first concerns the samples that were - the 12 samples that were taken from the vehicle, and perhaps to assist with what I want to draw attention to I might bring up the table that's represented in your report, Ms Veth, at page 5. The document is the report, it's EXP.0007.0003.0001_2. It's at page 5. Perhaps the table itself might be enlarged. Perhaps my questions might best be directed to you, Ms Veth. The inscription of the table indicates that it represents the results of the bio screening as captured in Aus Lab but it's correct, is it not, that you have actually gone back to the crime scenes officer's case file to inform yourself about the data within it?

DR VETH: That's correct, that was made available to me during the course of the review.

MR RICE: You've actually I think given the page range reference in footnotes 2 and 3 to where you've done that. If we just look at the second column of that table under the heading "description of staining", it is correct, is it not, that in no instance of those 12 is there any positive report by the crime scenes officer of the appearance of blood in the sample?

DR VETH: That's correct, my understanding is that no staining with the appearance of blood was observed in the vehicle.

MR RICE: If we move to the third column, Combur result. We see four samples V31, 32, 33 and 34, we see in that column the words "Combur pos", but having gone back to the case file you draw attention in paragraph 22 of your report to the fact that in fact the contemporaneous note was by the police officer was "Combur negative" in every instance, correct?

DR VETH: I think that's correct, yes.

MR RICE: It seems as though in addition to the Combur test and the Luminol test there was a third test carried out by

way of poly light. Are you able to inform us the content of that test?

DR VETH: As I understand it's a bright light but I'm not a crime scene examiner so I actually have no experience with poly light. I believe it's just a light that - perhaps Dr Wright can chime in.

MR RICE: Do you know, Dr Wright?

DR WRIGHT: Use of the poly light is one of the first in the sequence of screening for blood and it relies on the different absorption and reflection characteristics of certain stains. It's presumptive so there are false positives and typically different coloured lights in combination with different coloured goggles that the operator would wear would lead to contrast if stains were present, a contrast being visible.

MR RICE: Would it be fair to say that given that it involves the application of light it's not intrusive in any way, it doesn't risk degrading or removing any of the biological material?

DR WRIGHT: No, there's been studies done on that to see the effect of the various poly lights and the different wave length ranges and the wave lengths that are used typically by crime scene examiners and the duration that they shine the light on the area doesn't typically affect the biological material.

MR RICE: Thank you. Perhaps back to you, Dr Veth. If we were then to look at the table and assume in the case of column 3 that the police officer's contemporaneous notes about the Combur results are correct, we reach the position, do we not, that for those first eight samples there is no report of visible blood and no positive presumptive test of any kind in relation to them, correct?

DR VETH: Yes, the very slow Combur result, so there is a reaction but it's very slow. I think that's why sometimes they've been called Combur neg and sometimes Combur pos because there was a reaction but a very slow reaction is - can be obtained from substances that did not contain blood. Whereas if blood was present it normally reacts instantaneously. As the blood is diluted the test reacts rapidly so we always have to be very careful about what is

described here as a very slow reaction because it may be indicative of something that simply is not blood.

DR WRIGHT: Can I add to that, if that's okay. In Brock's examination notes for V14, 15, 16 and 17 he originally wrote Combur positive and then crossed it out and replaced it with Combur negative. That's why the very slow is there. That part wasn't crossed out. And adding to Dr Veth, in the transcript of the pre-trial in Brock's evidence he says that there was a colour change within ten seconds, it wasn't immediate but it was within ten seconds, and that's why sometimes he called it positive and sometimes he called it negative. But according to the manufacturer within ten seconds should be considered as a possible positive.

MR HUNTER: If one works on the facts that there is no visible blood and accepts that there is no positive presumptive test as shown in the table and in accordance with the police officer's notes, would it be right to say that on those facts a failure to identify DNA within the samples would actually be unsurprising? Do you have a comment on that, Dr Veth?

DR VETH: We have this confounding factor that these samples were also processed in a batch on the multiprobe, using the multiprobe extraction method and we suspect that there may also be an issue there. So we don't know if blood is present or not for these results that are somewhat inconclusive.

MR RICE: Perhaps you can tell me this then, what is it about those eight samples that points in the direction of there being blood?

DR VETH: In my opinion - the reason why I drew attention to this was because all of these samples were described as bloodstains when they were submitted to the laboratory. The issue I took was there was nothing in the - there's no visible bloodstaining in these presumptive tests, they also don't indicate bloodstaining.

MR RICE: No, precisely.

DR VETH: Therefore the finding of an undetermined DNA quantitation may not have been unexpected because these weren't bloodstains. Sorry, because these were samples

that are inconclusive for bloodstaining.

MR RICE: These samples actually highlight the importance of an accurate description accompanying them so as not to give rise to false expectations, that's really your point?

DR VETH: Absolutely, absolutely. And that was highlighted in the report, that because these samples had been described as bloodstains there was an understanding in the general community that blood had been recovered from the vehicle from which the laboratory was not able to obtain DNA profiling results. And that simply just wasn't the case. These samples should never have been described as bloodstains. As per Sergeant Brock's own statement where it quite clearly says that - I should quote it:

> *The reference to blood in the statement should be interpreted as a substance that has been (indistinct) as blood, presumptive positive to blood and (indistinct) reliably is blood. These samples have failed on all of those criteria.*

MR RICE: In the case of the remaining four where there was a positive Luminol result, given the absence of the appearance of any blood, likewise notwithstanding the positive Luminol result they should not have been reported as blood, as blood swabs?

DR VETH: That's right, they should not have been described as blood swabs when they were submitted.

MR RICE: The other short matter I wanted to ask you about, and again perhaps it's best directed to you, Dr Veth, it concerns the scope of the Proteinase K issue when it arose in March of 2013. Perhaps since your report is available we might go to p24. And it's paragraphs 115 to 117 I wanted to ask you about.

When this issue arose some evidence has already been given to the Commission that the person who was investigating the matter, having noticed the low quantitation results on the reference sample batch, proceeded to go back to all of the extraction batches for that month and observe the performance of the positive extraction control results to see what was anomalous. Does that sound to you like sound

methodology to try to identify the scope of the issue?

DR VETH: Yes, it's a good place to start because you need to determine how long the problem may have been occurring. The problem was very easy to spot in the reference batch because we expected (indistinct words) from all of the samples in the reference batch for the most part. It's much more difficult to spot perhaps with a casework batch where you have low level trace samples (indistinct words).

MR RICE: You've identified from the material that was made available to you that this particular batch of Proteinase K was introduced into the laboratory early in March, correct?

DR VETH: Yes, that seems to be the case, yes.

MR RICE: So looking at the extraction results for the batches during March enabled the investigator to isolate Proteinase K as being the source, that's as you understand it?

DR VETH: Yes. I understand that early on in the investigation they determined that there was a possible problem with the Maxwell extractions because the reference samples had been, as I understand it, processed on the Maxwell automated system. So when - I'll just clarify. When they went back and checked all of the batches is it possible that they only limited the investigation to the Maxwell batches? Because they immediately took the Maxwell robots offline because the initial thought was that it was problem (indistinct) two batches that were being processed on the Maxwell.

MR RICE: At any rate, as we see from paragraph 117, you were satisfied, were you not, that there's no evidence that case samples from the Blackburn case were affected by the quality incident. Now, to reach that conclusion you need to be reasonably satisfied that the scope of the issue has been identified, do you not?

DR VETH: Yes. So we asked for the laboratory paperwork that was associated with the batches that we had concerns about in the Blackburn case where the profiling results were not as expected from bloodstains. We asked for the laboratory paperwork for those batches and determined that the brand of Proteinase K was the Sigma brand, not the USB Affymetrix brand that had been identified as the problem in

the quality instigation.

MR RICE: So that in the end you were satisfied that the Blackburn case samples were not processed using the offending Proteinase K batch, correct.

DR VETH: Exactly, yes.

MR RICE: Thank you. Those are my questions.

THE COMMISSIONER: Thank you Ms Rice. Any re-examination, Ms Reece.

<EXAMINED BY MS REECE: [3.35]

MS REECE: Just very briefly, Commissioner, on the issue of the swabs. I think all three witnesses were asked some questions about this. So if I can start with Dr Bedowle. Dr Bedowle, are you aware that since 2018 sub sampling of DNA samples taken by police has been done by Queensland Police Service laboratories?

DR BEDOWLE: I assume so from some of the work it did, but I don't know the extent of it.

MS REECE: You were asked about, you and Ms Veth in particular were asked about a need to act immediately given the mold issue which had arisen with these swabs. Would you ever advise to resolve an urgent problem with one method by changing to something which hadn't been validated or verified?

DR BEDOWLE: No, I wouldn't have done that, I would have chosen a method - and there were methods that could have been done (indistinct). As I said, I think the most effective would have been to put it in a tube with some drying material.

MS REECE: It's perhaps something of a rhetorical question, but otherwise if you took that approach how would you ever know you weren't going from one bad approach to another bad approach?

DR BEDOWLE: You don't.

MS REECE: And if the need for a change was urgent could there be another way which would be to implement a new

approach and then to validate reviewing after perhaps six months?

DR BEDOWLE: I mean if you had to put something in place because there was urgency. Let's say every sample they were collecting was degrading completely with mold, certainly some fix would be better than no fix. Then I would assess it over, in fact not a six month period, over a month period or a two week, four week period, because I wouldn't have the confidence and I wouldn't want to prolong something if I put something online that was not effective.

MS REECE: All right. Ms Veth, Dr Wright, did you have anything you would like to add to that?

DR VETH: I just - I mean if the matter was urgent they could have returned to the old school method of just putting the swab back into the tube, then cutting a hole at the end of the material and letting the swab dry. I mean that's, that's - a lot of samples are collected, rather than putting it directly into a sealed tube, you put it back into a swab cover and let it dry the old school method and it works pretty well.

MS REECE: All right, thank you very much. Nothing further.

THE COMMISSIONER: Thank you, Ms Reece. Dr Wright, Dr Veth and Dr Bedowle, thank you very much for your assistance, it's greatly appreciated and very valuable and thank you for your time.

Now, we'll adjourn until tomorrow at 9.30.

MS REECE: 9.30 please, Commissioner.

THE COMMISSIONER: Does that suit the rest of you? We'll adjourn until 9.30, thank you very much.

AT 2.38 PM THE COMMISSION ADJOURNED UNTIL FRIDAY 25 NOVEMBER 2022 AT 9.30 AM