COMMISSION OF INQUIRY INTO DNA PROJECT 13

IN QUEENSLAND

STATEMENT OF DESLEY JANE PITCHER

I, Desley Jane Pitcher, of [redacted]
do solemnly and sincerely declare that:

Background

1. I hold a Bachelor of Applied Science, majoring in Chemistry with First Class Honours from Central Queensland University, and a Master of Applied Science from Central Queensland University.

2. In June 2000, I was employed by Natural Product Discovery (**NPD**). NPD was a collaboration between Griffith University and AstraZeneca. It has since been replaced by the Griffith Institute of Drug Discovery.

3. I was employed by NPD as a Research Assistant. In that role, I was responsible for running high-throughput screening assays of natural product libraries through various biochemical and cell-based assays. I was responsible for automated liquid handling systems including maintenance, training, programming and liaison with vendors.

4. One automation system for which I was responsible whilst employed by NPD was the MultiPROBE II (**MPII**) machine.

5. As a result of my work with the MPII at NPD, I was hired by PerkinElmer Australia as an Application Specialist for Automation and Drug Discovery in 2005.

6. From 2005 to 2010, I was responsible for all PerkinElmer automated liquid handling systems in Australia. This involved installation, customer training, troubleshooting and application development. This included the MPII machine.

7. I transitioned to the role of Queensland Sales Manager for PerkinElmer in 2010 until 2013.

8. I transitioned to the role of Senior Automation Specialist from 2013 to 2014.

9. I left PerkinElmer in April 2014.

10. I have no formal qualification in forensics. My expertise was in automated liquid handling. PerkinElmer provided official training for me in their Chicago lab.

MPII Settings and Customer Support Provided by PerkinElmer

11. The MPII was what is known as an "open" automation platform, meaning that protocols from any kit manufacturer can be developed, rather than being "married" to a single kit manufacturer.

12. The MPII is an eight-tip syringe-based liquid handling system. The eight tips can move independently of each other. Each tip can hold different volumes of liquid because each tip is

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connected by tubing to a different liquid-filled syringe. The syringes can each be controlled independently.

13. The MPII was generally usable for liquid handling applications in research laboratories, hospitals, forensics laboratories and testing laboratories.

14. The MPII was usually sold without any protocols installed. During my time at PerkinElmer Australia, protocols had only been developed for use in forensics. It would take the steps from the reagent kit as outlined by the reagent kit's manufacturer and convert those into an automated process. There were not many reagent kits available at the time that were "automation friendly", meaning that they were developed specifically for use with automation.

15. Customers would be provided with a three-day training course, teaching them how to use and maintain the MPII system, as well as how to write their own protocols for their applications.

16. Customers were also trained how to perform maintenance and troubleshooting for themselves, but PerkinElmer Australia engineers and specialists were available to support them. In my experience, this support from PerkinElmer Australia would typically occur on a weekly to fortnightly basis for the first couple of months, after which the frequency would reduce to two to three times a year. For breakdowns of the MPII, PerkinElmer Australia engineers were available within 24-48 hours.

17. On installation of an MPII, PerkinElmer service engineers performed an "Installation Qualification" **(IQ)**. IQ was an optional paid service.

18. The IQ process verifies that the instrument has been installed and configured according to the manufacturer's specifications. For the liquid handling process, this is done using a highly accurate (I believe to four decimal places) balance to weigh the liquid dispensed by each tip of the system. A number of replicates are done for a number of different volumes. A standard curve is created from the results and then the settings for each syringe are adjusted to ensure that each tip is delivering the same volume of liquid across the range of volumes supported by that tip.

19. The IQ process was performed at Queensland Health Forensic and Scientific Services (**Queensland Forensics Lab**) by PerkinElmer Australia service engineers. I assisted the Sales Manager at the time with setting up the quotation and I also saw the Purchase Order from Queensland Forensics Lab and this was included. I was also onsite when the service engineer performed the IQ.

20. Another optional paid service offered by PerkinElmer for customers who purchased the MPII was Operational Qualification (**OQ**), used to ensure that the system was operating according to the manufacturer's specifications. For the liquid handling process, the same method of weighing liquids described above at paragraph [18] was carried out. This can be run at intervals throughout the year as required by the customer to ensure ongoing accuracy. This was recommended for the Queensland Forensics Lab, and they did purchase this. From what I recall, the Queensland Forensics Lab had the OQ service performed twice per year by the service engineer.

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21. For some very specific applications, such as forensics, PerkinElmer partnered with companies such as Promega to develop automated protocols for their reagent kits. These companies produced reagent kits designed specifically for use on automation platforms.

22. PerkinElmer Australia scientists developed MPII protocols using those reagent kits, including the Promega DNA IQ automation kit, and the protocols were set up according to the Promega kit specifications.

23. It is important to note the difference between "Protocol Steps" and "Liquid Settings":

    a. **Protocol Steps**: These are steps required to complete the entire protocol according to the manufacturer's recommendations. For example, transfer of 100uL of lysis buffer from container one to container two is a "protocol step" (containers are 8 x 12 arrays of small "wells" allowing for 96 reactions to be performed at once).

    b. **Liquid Settings**: There are also a number of Liquid Settings that can be modified to ensure that liquid is moved between containers in an accurate manner. There are a large number of these settings, and they can be changed to accommodate different liquid types and densities. I am unsure of the exact total number of Liquid Settings, but I would estimate there are more than 100. Most commonly, the changes would be made to the speed that the tips move in and out of the container, the heights at which the tips would aspirate or dispense liquid, and any air gaps used to hold liquid in the tips.

       For example, transferring a very dense liquid would require the robot to pause at the end of the aspiration step (which is where the liquid is sucked up into the tips to allow the liquid to completely rise up the tip. This would also require the tip to move slowly out of the liquid so that it doesn't drag excess liquid out on the outside of the tip. Conversely, "thinner" liquids require a small air gap to be drawn up into the tip after aspiration to create a small air gap at the end of the tip to hold the liquid in place.

       These and many others are all very common Liquid Settings that are modified to ensure there are no droplets or excess liquid on the tips, both of which could lead to contamination.

24. It was standard practice for customers to be taught how to make these modifications. In my experience it was normal for them to do so, and still produce valid results; that is, accurate results for their positive and negative controls, and therefore a robust assay. However, the system must be fully tested and validated after such changes. Validation was the responsibility of the customer. In my experience, PerkinElmer Australia would typically hear back from customers if validation failed and be asked to visit and help troubleshoot the problem.

25. In the case of forensics protocols, it was not recommended to change Protocol Steps, as these were developed specifically for the reagent kits provided by Promega.

26. PerkinElmer Australia provided support to assist their customers with protocol development and troubleshooting. This was limited to ensuring the platform was operating according to the manufacturer's standards.

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27. The validation of actual protocols used on the MPII was the responsibility of the customer.

28. As the Automation Specialist, from 2005-2010, and later as the Senior Automation Specialist from 2013-2014, I was responsible only for instruments sold and used in Australia. I am unable to speak to any use of the MPII in any laboratory outside of Australia.

29. MPII machines were being installed in the PathWest (in Western Australia) and Forensic Science South Australia (**FSSA**) laboratories when I joined PerkinElmer in 2005. The PerkinElmer Australia specialist, whom I was replacing, had resigned and one of the PerkinElmer specialists from the United States came out to install and set up those machines. I was involved at the end of their installations, assisting the US Specialist, and then became responsible for supporting those customers.

30. I do not remember whether any protocol changes were made to any of the extraction protocols at PathWest or FSSA. They each performed their own validations and may have made changes.

31. Typically, MPII protocols such as the Promega DNA IQ protocol contained a large number of steps and some machines had different starting points in terms of how the samples were presented to the machine.

32. At FSSA, the MPII included an optional automated tube barcode scanning system, which meant that this machine had samples presented in tubes.

33. I do not recall the PathWest laboratory having the tube scanning system, but I recall that the Queensland Forensics Lab did not have the tube scanning system. This would mean that the protocol steps were different because the starting point was different. In my experience it was not typical to change other protocol steps from the installed protocol.

34. In my experience it was typical to modify the Liquid Settings as described above at paragraph [23], and customers and I, working together, had to do this in all three laboratories (Queensland Forensics Lab, FSSA and PathWest). I believe this is due to the different temperatures and humidities in the different laboratories, and perhaps the different water qualities used to fill the system tubes and syringes.

35. I visited each laboratory regularly in the beginning to assist them with their systems. This involved checking the performance, ensuring that the spatial calibration was accurate and discussing any future needs.

The Queensland Forensics Lab

36. Since being contacted by the Commission of Inquiry to provide this statement, I have been informed that the Queensland Forensics Lab removed the lysis step from the MPII and instead performed this step manually. I do not know why this was done.

37. Performing the lysis step manually before continuing the DNA extraction process on the MPII is against manufacturer's recommendations, but if the protocol was validated to show that it was producing consistent and accurate results from the DNA extraction process through accurate results from their positive and negative control samples, then this may not have been

a problem. One of the dangers of taking any part of a protocol offline is that it can introduce human error into the process, for example by the mixing up of which sample goes where.

38. I am unable to remember each time I was in contact with, or visited, the Queensland Forensics Lab.

39. In the beginning I dealt with both Iman Murahan (Iman) and Allan McNevin (Allan). It was normal for me to visit each of the laboratories regularly. I do not remember dates at all.

40. By 2008 we had sold a large number of liquid handling systems across Australia, and I was supporting all of them. On average, I would say I visited each laboratory quarterly for the first two years.

41. I was living in Brisbane at the time and did visit the Queensland Forensics Lab more regularly. This was likely more often than most laboratories, but part of the reason for this may have been that I was living in the same city. Some customers, however, do require more help than others.

42. There seemed to be more users using the MPII in the Queensland Forensics Lab than there were in the PathWest and FSSA laboratories and I do not know how many of them were allowed by senior staff to modify settings. The protocols were not locked down, so anyone could have made modifications at any time.

43. I recall being asked by Iman and Allan (usually Allan) to come in a number of times. They were not getting the results they expected, so they asked me to watch the protocol run and see if there was anything unusual happening that could be fixed. This occurred between 2006 and 2009, but I do not recall specific dates. I have been provided with an email which I sent to Iman on 12 August 2008. This was the first time I had been asked to document my changes to the Liquid Settings and I am unable to say what other dates I was asked to attend or work with staff of the Queensland Forensics Lab. Please refer to **Exhibit 'DJP-1'** – Email from Pitcher, Desley to Iman_Muharam (MPII test changes).

44. I noticed a number of steps where the liquid handling was not optimal (mainly droplets on the tips, which will cause contamination). I considered it strange that this would be happening, given that we performed regular OQs and the system was operating without these issues each time I left.

45. I had assumed that the customers, being persons at the Queensland Forensics Lab, had modified the settings, so I watched the protocol, noting which steps had droplets or other issues and then I made the changes for them to fix those problems. I re-ran the whole protocol to ensure these problems were resolved. I think I did three or four complete runs. This was the first time I was asked to keep a record of what I changed and produce a report. I outlined these changes in my report from 3 October 2008. I have been provided with a copy of this report by the Commission and produce that with my statement. Please refer to **Exhibit 'DJP-2'** – Report of Desley J Pitcher (3 October 2008).

46. Unless every single Liquid Setting was recorded it is difficult to know which settings were changed between my visits. There may be hundreds of settings in each protocol because Liquid Settings can be changed every time a tip picks up or dispenses liquid.

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47. In all cases, my changes were tested without DNA or any real sample present. We used actual reagents from the Promega DNA IQ kits, but there was no actual extraction taking place.

48. It was the responsibility of the customer to validate the changes by running positive and negative control samples through the full protocol. I do not remember being told of the outcome of the modifications noted above at paragraph [47]

All the facts and circumstances declared in my statement are within my own knowledge and belief, except for the facts and circumstances declared from information only, and where applicable, my means of knowledge and sources of information are contained in this statement.

I make this solemn declaration conscientiously believing the same to be true and by virtue of the provisions of the *Oaths Act 1867* (Qld) / *Oaths and Affirmations Act 2018* (Vic).

TAKEN AND DECLARED before me at North Melbourne in the State of Victoria this 30th day of October 2023.

[redacted]

Desley Jane Pitcher

[redacted]

Witness

Melbourne North Police
36 Wreckyn St,
North Melbourne Vic, 3051

DJP-1

From: "Pitcher, Desley" <[redacted]>
To: <[redacted]>
Date: 12/08/2008 11:28 pm
Subject: MPII test changes

Hi Iman - sorry this is quick, but it's quite hectic at the moment:

On almost every step, I decreased the system air gap to 5ul and increased the transport air gap to 10ul.

The system air gap was often very high. When using disposable tips, there is really no need for a system air gap because one exists inside the entire length of the disposable tip. Having a large system gap (sometimes it was up to 20ul) will just increase inaccuracy and cause drips.

The transport air gap was added to hold the sample in the tip and avoid drips.

On all remove lysis steps, I decreased the scan in speed and the aspirate speed, I also retracted from the liquid a lot more slowly.

I also adjusted the heights for dispensing the lysis into the storage plate so that the liquid dispensed just under the liquid.

Mix steps are often a problem because people want to use liquid sensing. With already quite wet tips, it makes sense to dispense at specific heights. I adjusted the heights so that the tips were low enough in the well for good mixing without overflowing the well.

Let me know if you have any questions.

Thanks,

Desley

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Desley J. Pitcher
National Product Manager

Automation | Liquid Handling | Screening Reagents

PerkinElmer(r)

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DNA Analysis (Forensic Biology) | Forensic & Scientific Services | Queensland Health

The FSS DNA Analysis laboratory was experiences programming problems with their extraction robotics. The problems included drops forming on the tips, leading to cross-contamination. I was asked to take a look at the programming to determine whether any of the liquid handling settings could be improved. The test was physically set up and run and observed for problems. Following is a list of the steps which required some modifications to the liquid handling settings.

9. ADD LYSIS BUFFER
    - Increased dispense height
    - Increased tracking
    - Inserted a *post-dispense transport air gap* to remove bubbles
    - Decreased dispense height after mix step

17. REMOVE LYSIS
    - Decreased scan in speed
    - Decreased aspirate speed
    - Decreased *Retract From Liquid* speed
    - Decreased dispense height
    - Inserted a *post-dispense transport air gap* to remove bubbles

20. DISPENSE LYSIS BUFFER
    - Was splashing, bubbles after dispense
    - Decreased dispense speed

28. REMOVE LYSIS
    - Increased dispense height
    - Inserted a *post-dispense transport air gap* to remove bubbles
    - Decrease tracking on second "remove"

37. ADD WASH
    - Use dispense speed from 20

38. REMOVE WASH
    - Inserted a *post-dispense transport air gap* to remove bubbles

62. ADD ELUTION BUFFER
    Remove Flush

72. TRANSFER ELUANT
    Decreased apirate and dispense speeds
    Decreased *Retract From Liquid* speed

74. ADD ELUTION 2
    Remove Flush

Where possible, dispense heights were used to allow the liquid to just touch the tip as dispensing ended. For example, if adding 600ul to a well, dispense at 550-600ul from the bottom. This enables any drops to be drawn off of the tip by the liquid in the well.

Using a *post-dispense transport air gap* ensures that any liquid remaining in the tip is drawn back up before the pipetting arm moves in an X or Y direction, thus negating any contamination of neighbouring wells.

Slowing down the *tip retraction speed* also helps to remove droplets from the test. After dispensing, if the tips come out of the liquid at the "usual" speeds (100mm/sec), you can often see drops being pulled out with the tip. This is just due to the surface tension in the well. By slowing down the tip retraction speed, the tip comes out of the liquid slowly, allowing any excess liquid on the outside of the tip to drain off the tip and remain in the well.

In many steps in this extraction test, the volume of liquid in the wells is quite high. As a result, it was useful to slow down the dispense speeds to avoid splashing.

While observing the test, the problems were noted and then the modifications done and the test carried out again. Actual extraction protocol liquids were used to completely mimic a "real" extraction run. The test was run several times with continuous modifications to improve the liquid handling settings. The final runs showed no dripping and a much neater and cleaner test.