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REPORT

Report to: Walter Sofronoff QC, Commissioner
Commissioner of Inquiry into Forensic DNA Testing in Queensland

Report Date: 20 September 2022

Request: To provide opinions regarding the Queensland Health Forensic Scientific Services (QHFSS) Options Paper.

Information Reviewed:

Document	Date Issued
Instructions letter from Commissioner Sofronof	01-09-2022
Documents as listed in the document entitled '*Index – Opinion – Options Paper*' including • Email communication within QHFSS • Email communication between QHFSS and Queensland Police Service (QPS) • Draft of Project #163 Report entitled '*Assessment of results obtained from 'automatic microcon' samples*'. • Project #184 Proposal • Project #184 Plan • Various versions of the Project #184 Report entitled '*Evaluation of the Efficacy of a Post-Extraction Concentration Step Using the Microcon® Centrifugal Filter Devices in Yielding DNA Profile Intelligence*'. • Document entitled '*A review of the automatic concentration of DNA extracts using Microcon® Centrifugal Filter Devices: Options for QPS consideration'.* • Draft Update Paper entitled '*An assessment of the ability to obtain DNA profiles when further work is requested on samples with low-level Quantification values*'. • Update Paper entitled '*Assessment of Low quantification Value DNA Samples*'.	31-08-2022
DNA IQ™ Extraction Using the Maxwell® FSC, 35605V2	10-03-2022
DNA IQ™ Extraction using the Maxwell® 16, 34044V5	10-03-2022
DNA Extraction and Quantification of Samples Using the QIAsymphony® SP and AS Modules, 34132V6	10-05-2021
Project 11. Report on the Validation of a manual method for Extracting DNA using the DNA IQ™ System	August 2008
PowerPlex®21 – Amplification of Extracted DNA Validation	2012
Draft Statement of Paul Csoban	Draft

Comments and Opinions

Process

Q1 From a laboratory management perspective, is the presentation of an Options Paper to police a standard or appropriate way to implement a change in process of this nature? Why/Why not?

1. There is no standard structure to options papers, this includes papers where decisions are required. However, I consider that these types of papers should have language that is neutral, not leading, and free from emotive words. In regard to content, it would be appropriate to provide:
   1.1. background information regarding the issue and impetus for the options paper,
   1.2. the different options that should be considered,
   1.3. data that underpins the options provided,
   1.4. the impact or outcomes of each option,
   1.5. the risks and benefits of each option, and
   1.6. a recommendation for the preferred option.

Q2 Provide any comments you have on the relationship between FSS and QPS evidenced in the correspondence regarding the Options Paper.

2. Reading some of the email exchange between QHFSS and QPS, and in particularly the emails between Cathie Allen and David Neville dated 1 December 2021 to 1 April 2022, I note an increasing tension in the exchange of emails. Response timings and the language of the emails give a sense of a fractured and dysfunctional relationship.

Methodology

Q3 Identify any problems or concerns you have regarding:

Q3a) The data that was selected for inclusion in the Options Paper, and

3. I appreciate the intent of the study detailed in the document entitled '*A review of the automatic concentration of DNA extracts using Microcon® Centrifugal Filter Devices: Options for QPS consideration*' (Options Paper), which appears to be to reduce the analysis resource impost by reducing the number of samples that progress through to Polymerase Chain Reaction (PCR) (amplification/copying of the DNA fragments in the samples) and interpretation (resulting in the DNA profile). This is an understandable intent when laboratory resources are limited, and the number of cases and samples being received by a laboratory is high.
4. Some of the balanced and independent qualities that should be in a report of this nature appear to be missing, due to a focus on uploadable DNA profiles, that are unique within that case, as the particular measure of success and impact for the recovery of DNA profiles.
5. The data chosen appears to be that which is particularly supportive of the apparent intent, i.e. to reduce the resource impost on the laboratory. This is evidenced in Figure 3 on page 7 which highlights the small percentage of samples that produce a cold or warm link. This is opposed to Figures 4, 5, 6 and 8 in the document entitled '*Evaluation of the Efficacy of a Post-Extraction Concentration Step Using the Microcon® Centrifugal Filter Devices in Yielding DNA Profile Intelligence*.' (Evaluation Paper), which held data that would have been of interest to QPS as it provided information on the success rates as related to biological material, quantitation range and as a function of total microns. This data could have provided more clarity regarding the impact of the hard bar quantitation cut off.

Q3b) how that data was presented and /or interpreted

6. I would have preferred to see a greater focus on the impact of the concentration process on samples and on the different sample types. I also believe the effect of the concentration process should have been presented in quantitation ranges, so that the data was normalised and not skewed by the samples in the lower quantitation range.

Q4 How, if at all, would you improve the methodology?

7. I would have approached this study by collecting data for all samples analysed within a set time period, breaking down the samples by quantitation values (and grouped in defined and equal ranges), whether they were concentrated, progressing all samples through PCR and interpretation and recording the end result (reported by number/percentage of alleles obtained). This would facilitate a data-based assessment of the potential results when progressing samples through PCR with varying quantitation values, and the impact of concentration of the samples against their end profile results.

Consultation

Q5 Should anyone in addition to the QPS have been consulted about the options Paper?

8. The consultation for the Options Paper included the QHFSS DNA team management and senior scientists. There is no formal approval for release by Paul Csoban, Director of QHFSS detailed in the Options Paper. I have read the statement of Paul Csoban, where he specifies that he was briefed regarding the issue and was present at relevant meetings. Consultation with senior scientists within the DNA area reflects a relatively standard consultation process. Communication of the outcomes of the report could have included a broader audience, such as prosecution, defence or judiciary, however this is not standard practice for a review of this nature.

Q6 Do you think the concerns raised by FSS scientists during the feedback process of Project 184 were valid or appropriate? Why/why not?

9. It is clear from feedback on drafts of the Evaluation Report provided, that concerns and feedback regarding the report were raised. Of note is the feedback provided by Kylie Rikka, Amanda Reeves and Allan McNevin contained in documents 13a, 14a and 20a and the emails from Emma Caunt dated 7 and 8 February 2018. Based on the final version of the Evaluation Report or Options Report, there is no evidence that any of the major concerns and feedback raised were taken into consideration in the final versions of the reports.
10. Themes regarding valid concerns raised that were not addressed in the Evaluation Report or Options Paper include:
    - 10.1. the extrapolation of results derived from volume crime samples should not be applied to major crime samples,
    - 10.2. that a 10% success rate might be more suitable for QPS,
    - 10.3. DNA profile upload onto NCIDD (the DNA database) is not the only determination of success, and
    - 10.4. the quantification results should be normalised, and
    - 10.5. the mean success rates should be calculated at smaller increment intervals (see page 21 to 23 of the Evaluation Paper containing staff comments (document 20a).
11. Inclusion of the information above would have provided QPS with relevant information to allow them to make an informed decision on what was more important, either the potential for additional DNA profile results or the potential for improved turn-around-times.

Q7 Do you think the concerns raised by staff were adequately addressed or incorporated into the Options Paper?

12. It is not clear why the comments, detailed above in paragraphs 9 and 10 provided by the QHFSS scientists, did not have a greater impact on the content of the report. I was not provided with any material that detailed a response to the concerns raised and whether there was a scientific or policy decision as to why they were not included in the Options paper.

Definition of 'Success' and 'Fail'

13. 'Fail' was defined in the Options Paper as 'DNA profile interpretation outcomes of 'Complex unsuitable for interpretation', 'No DNA profile', 'Partial unsuitable for interpretation', and 'No DNA Detected''.
14. 'Success' was defined as all other DNA profile outcomes including single source DNA profiles matching assumed known contributors or different DNA profiles, mixtures that were suitable for comparison to reference DNA profiles, DNA profiles that were suitable for loading to NCIDD.

Q8 Explain whether the above is a suitable categorisation from:

Q8a) a forensic science perspective

15. From a forensic science perspective, the criteria for 'fail' and 'success' are valid, although greater clarity may have been achieved through including allele numbers/percentages obtained.
16. Figure 2 in the Options Paper demonstrates that profiles categorised as 'success' could be obtained from samples with low quantitation values. This figure demonstrates that you need to analyse an increasing number of samples that 'fail' in order to find a comparatively smaller number of 'success' samples. The policy consideration should contemplate how many 'fail' samples are willing to be tolerated on a routine basis in order to identify the 'success' samples. For example, for higher quantitation values it might be that 10 'fail' samples need to be analysed to obtain one 'success' sample. As the quantitation value reduces this might increase to 50 or 100 'fail' samples that need to be analysed to obtain one 'success' sample. This is the policy decision that is required and is a balance between factors such as sample numbers, cost and resources. It should be noted that the policy decision may change depending on the case type (volume crime versus major/serious crime).

Q8b) an investigative policing perspective

17. From an investigative policing perspective, the criteria for 'fail' may not be valid as police may be interested in reviewing results where even a partial profile is found. This position may also be valid for defence, prosecution and the judiciary.
18. Figure 1 I the Options Paper describes samples that are categorised as 'success' and 'fail'. The report indicates that 10.6% of samples that are concentrated lead to profiles categorised as 'success'. These are profiles that can be compared to references samples, other samples in the case, or samples held on a database.
19. For example, partial profiles may be useful to exclude or include an individual connected with a crime, police may be interested in whether a suspect or victim's DNA profile may be found on different items at a scene.

NCIDD Interaction

Q9 Is an NCIDD upload relevant to how informative a sample is? If so, why and how?

20. It is not completely clear why NCIDD upload was a categorisation factor in the outcomes of the Option Paper. Even partial DNA profiles could yield information for an investigator. For example, the presence of a victim's DNA profile may be useful information if it was found on a particular item or place, such as at a suspect's house, however such a profile would not be uploaded to NCIDD. It may also be useful to find the offender's profile on various items at a scene that can provide information to police regarding a sequence of events.
21. The ability to upload a DNA profile to NCIDD is relevant in some circumstances, however it is not the only criterion that should be considered when determining analysis thresholds. A partial profile may still have the ability to exclude a suspect or link a victim's or suspect's profile to a particular item or surface, which may have evidential significance beyond a database upload.

Q10 What other factors may be relevant to determining whether a DNA sample is informative within the context of a police investigations?

22. Whether a profile is informative is a matter for the investigator and a number of examples have been provided above in paragraphs 20 and 21.

Q11 What is the significance of a sample providing a 'cold-link' or a 'future link'?

23. A 'warm link' is a DNA database (NCIDD) link that was previously suspected and is often within the case, for example a suspect's profile found on various items at a scene. A 'cold link' is a link on the database between a person's DNA profile and a DNA profile from a crime which was not previously known, i.e., prior to the link, the suspect was not connected with the crime. 'Cold links' are important as they maximise the benefit of DNA profiling and the DNA database as it reflects the ability to 'solve' previously 'unsolved' crime.

Q12 Do you agree that the 1.45% figure was 'the pertinent value' for the QPS to assess if the auto-microcon process should be performed? Why/Why not?

24. The 1.45% figure represents a subset of the total number of DNA profiles (10.6% 'success' samples) that potentially would have been informative to police. Police may instead be interested in all samples that produce a profile result, not just those uploaded to NCIDD. As discussed above, profiles (full, partial or mixed) obtained may have relevance in an investigation beyond an NCIDD upload of a unique profile. As mentioned above, DNA profile results may also be useful to the broader justice system.
25. Additionally, DNA profiles uploaded to NCIDD that are currently unlinked still have value as they represent a future opportunity to generate a link and potentially solve a crime.

Useable DNA Profile

Q13 Is the ability to compare a DNA profile with a reference sample informative for the QPS or the criminal justice system? If so, why and how? Include reference to both identifying the likelihood of contribution or excluding contribution.

26. DNA profiles, even partial DNA profiles with a few alleles, can be useful to investigators to include or exclude an individual from a connection with a crime.
27. Finding a connection between a suspect (or victim) to a specific object or surface may have relevance to the investigation or prosecution of an offence beyond what the scientist is

aware. For example, establishing a blood trail belongs to one or more people, or locating a victim's profile in the living room versus the bedroom in a suspect's house in a rape case. Obtaining a profile on an object or surface could also be important for exclusionary purposes, such as if a DNA profile does not belong to the suspect. To this end, any DNA profile provided can be significant in serious investigations.

Q14 In your view, was the statistic (10.6%) measuring this criteria a 'pertinent value' for QPS's interests? Why? Was it more or less important in your view that the 1.45% figure?

28. The important figure in assessing a step in the DNA analysis process should be its contribution to obtaining a DNA profile (partial, single sources, mixed), not just whether it matches to another DNA profile on NCIDD. To this end the 10.6% 'success' rate figure should be important to QPS as a measure of potential DNA profiles that could be useful in an investigation.
29. The 1.45% figure represents only a subset of the possible useful DNA profiles and therefore may not measure the true potential of success.

Options for Consideration

Q15 Would the option presented in the Options Paper give the best chance of obtaining a useable DNA profile for every sample delivered to the laboratory?

30. As results can be obtained even if the quantitation result is zero, any sample that is not progressed to PCR and interpretation, is a sample that has lost the potential to provide a result.
31. The option presented in the Options Paper is a balance between optimising laboratory resources to be able to analyse the number of samples being received. However, this option does not facilitate the maximum number of results that could be obtained from submitted samples, as not all samples are progressing through to PCR and interpretation. This is not an unusual position for laboratories, many of whom have budget restraints forcing policy decisions to reduce resourcing imposts.

Q16 If not, are there other considerations which could justify the approach in the Options Paper? What consideration are those?

32. As discussed previously, decisions regarding how a laboratory approaches thresholds are a balance between scientific, resource, funding, and output (case numbers and turn-around-times) considerations. These considerations were discussed briefly, but not extrapolated as to the impact that the threshold options would have on them. These discussions could have been useful to QPS in understanding the impact of the decision on investigations.

Q17 Is there reference to any of these considerations in the paper? Were those considerations explained adequately in you review?

33. The final version of the Options Papers did not reference the consideration listed in paragraph 32 above.

Q18 Is the balance struck by the option in the Options Paper one you would consider to constitute international best practice?

34. Whilst I understand the approach taken in the Options Paper, I do not think it provides an ability for QPS to make an informed decision, particularly considering the possible levels of scientific understanding within the police organisation.

35. These decisions are generally made in collaboration between the forensic laboratory and the police (if the forensic laboratory is outside of the police agency).
36. I note that a funding model where police specifically pay for forensic services from the government forensic laboratory is one that promotes a client-provider relationship. This relationship can focus the attention of the forensic service provider solely to services and processes required by police and not the broader justice system. In doing so it can reduce the independence of decision making by the laboratory. The model in South Australia is that the forensic laboratory is funded by Treasury through the Attorney-General's Department and the laboratory provides services to police, the coroner, other government departments, defence, and the public.
37. It would have been useful for the Options Paper to discuss in real numbers as well as percentage values the results (in number of alleles) obtained from samples with different quantitation value ranges. It should have discussed that potential results would be lost. Essentially comparing the number of samples analysed that provide an informative result versus those that do not.
38. Other options that could have been compared include eluting the extract in a smaller elution volume. QHFSS elutes to 100uL, as the extraction method is a magnetic resin-based system, it is relatively efficient at minimising inhibitors. The elution volume can be set at various amounts. By eluting to a smaller volume (for example 50uL), sufficient extract could be obtained so that at least three PCR reactions could be conducted.

Threshold

Q20 Was the work done in Project 163 and Project 184 sufficient to make any determination of a threshold below which stochastic effects were identified?

39. The data analysed in Project 163 and Project 184 is sufficient to provide enough information to make a determination. The total number of samples included in the study and the date range provide a robust set of data from which conclusions can be drawn. However, this would still require a policy decision regarding the tolerance of 'success' versus 'fail' samples that require analysis. The cut off can be higher if there is no hard bar and scientists can use discretion to progress samples regardless of the quantitation value when they take into consideration sample and case factors as described previously.

Q21 Is the threshold of 0.0088ng/uL too low or too high?

40. The threshold of 0.0088ng/uL is within the range sufficient for a standard workflow.
41. Different laboratories set different thresholds and it is determined by their methods, processes and validation results.
42. One option not considered in the Evaluation Report or Options Paper, is to reduce the elution (final) volume in the extraction process. QHFSS have a final extraction elution volume of 100uL, other laboratories reduce this to approximately 50uL, increasing the concentration of the extracted DNA and minimising the need to concentrate the sample. This would increase the number of samples that have DNA concentrations above the 0.0088ng/uL threshold and result in more streamlined processes.

Q22 What would you consider to be an appropriate threshold at which to cease processing a sample?

43. A quantification threshold is appropriate in most cases. It reflects a policy decision regarding reducing the number of samples that need to be analysed and interpreted in order to find

the samples that might be informative. For most cases this is appropriate, however, for serious offences (such as murder or sexual assault) this should not be a 'hard barrier' and instead should be at the scientist's discretion whether the sample should proceed to PCR and interpretation.

44. It may be appropriate to introduce a 'hard barrier' after quantitation for some case types (e.g. volume crime such as break and enter).
45. The decision to concentrate a sample should be dependent on the sample type (blood, semen, trace), case type (volume or serious offence) and quantitation result. This should be implemented at the reporting scientist's discretion; however, police should retain the option to progress a sample through to PCR and interpretation.
46. By not progressing samples in serious offence cases, DNA profile information, however limited, may be lost that could assist an the investigation.

3500xL Genetic Analyser

Q27 Should the quantitation threshold of 0.0088ng/uL have been revisited following the introduction of the 3500xL? Why/why not?

47. When major changes in the analysis process are introduced, it may change cut-offs, thresholds and settings used at various stages in the analysis process. Therefore, as part of the validation process these values should be reassessed.
48. The Applied Biosystems® 3500xL genetic analyzer is an automated 24 capillary electrophoresis instrument that uses fluorescence-based detection for human identification analysis. Amplified DNA fragments in the samples have fluorescent dyes attached. The Capillary electrophoresis separates the DNA fragments based on their size to charge ratio. Specialised software then measures the DNA fragments in each sample against known size standards and assigns allele calls for each marker, producing a DNA profile for each sample.
49. A new instrument will have a different sensitivity in detection of the DNA fragments. Therefore, it is important to assess the impact of the new instrument on the workflow and results. This should have been done during the validation/verification of the instrument conducted prior to implementation.

Update Paper

Q28 Identify any limitations of the Update Paper, and the underlying internal report titled 'An assessment of the ability to obtain DNA profiles when further work is requested on samples with low-level Quantification values'.

50. The information on NCIDD suitability is not as informative as it represents only part of the decision-making process.
51. It would be useful for QPS to understand the impact of DNA analysing additional samples on the turn-around-times (TATs), although I appreciate this information may not be currently available and would require data modelling.
52. Document number 24785710 – Assessment of Low Quantitation Value DNA Samples includes a subset of the data presented in the Draft Update Paper and provides options for consideration by QPS.
53. Some of the information and figures presented in the Draft Updated Paper would have been useful for QPS to review, in particular the 'Count of sample results per Quant value range (ng/uL)'. This clearly demonstrates the commensurate impact of reducing the threshold routinely in the number of 'fail' samples that need to be analysed in order to achieve the volume of 'success' samples. Therefore, the impact on scientific resources can be seen.

54. It would be difficult for QPS to assess the various options without understanding the impact in terms of the additional number of samples to be analysed and the impact on TATs. I do note that the paper refers to a further discussion regarding the risks and implications to reach a collaborative decision which would be helpful.

Q29 Identify any problems or concerns you have regarding:

Q29a) the data that was selected for inclusion in the Update Paper and underlying internal report, and

55. The Draft Internal Update Paper demonstrates that if appropriate factors are taken into consideration, 25.4% additional results can be obtained.
56. It also demonstrates that results can be obtained at very low quantitation values.

Q29b) how that data was presented and interpreted.

57. The Draft Internal Update Paper groups the sample results appropriately using the various quantitation level ranges. It illustrates effectively that results can be obtained down to low quantitation values and the limit of detection is demonstrated at 0.001ng/uL (although 1 result was obtained below this level).

Q30 How, if at all, would you improve the Update Paper?

58. Further options that could be considered include reducing the elution volume of the extract (this would need validation) and removing the hard barrier to allow scientist to assert discretion in sample progression to PCE and interpretation.

Other

Q31 Outline any other concerns regarding the Options Paper and/or Update Paper not addressed by the above.

59. It is unclear why the data was split into samples taken from the 'auto-microcon process' and then from all samples undergoing microcon.
60. It is clear the QHFSS analyse a significant number of samples for DNA analysis each year and some ability/method to triage samples is warranted.
61. For volume crime (break and enter, burglary etc) it may not represent value to analyse more than one sample in a case as reanalysing samples or analysing further samples will extend the analysis time and increase laboratory TATs. In these instances, police should consider what is the time duration between offence and result before a result no longer adds value.

[redacted]