Amended Minutes of public meeting of the PFAS Scientific Advisory Panel on Teams 10.00 – 12:00 on 6th September 2023

Panel Members present:	Dr Steve Hajioff – Independent Chair Dr Tony Fletcher – PFAS and Health member Professor Ian Cousins – PFAS and Environment member
In attendance:	Grace Norman – Deputy Director Public Health Plus support staff

Welcome:
The Chair welcomed everyone to the Panel meeting in public, and reminded people the meeting was being recorded.

A recording of the meeting is available upon request via the publichealth@gov.je mailbox. There is a slight delay in the recording being available as appropriate checks are made to ensure anonymity of the observers attending.

The Chair recapped in the meeting that the Panel would be producing a series of five reports:

1. The 1st report is the current report which is in progress and is an interim report on the feasibility of therapeutic phlebotomy as a way of supporting people who have elevated PFAS levels in their serum. Also collecting evidence and data on how much this may help or otherwise. The interim report is being done now to offer something relatively quickly before deliberations are done for the final conclusions.
2. The 2nd report is more detailed, on the health impacts of PFAS exposure and particular groups of the population that might be at increased risk or reduced risk. Also, what parts of the body it can impact upon and potentially the levels at which those impacts happen, depending on what evidence is found.
3. The 3rd report is more detailed and will look at all potential treatments for people who have been exposed to PFAS, and the evidence on how effective those treatments are as well as looking at other interventions and testing. Therapeutic phlebotomy will be looked at again at that point.
4. The 4th report focuses on the environment, how to reduce exposure, environmental interventions, and how to help manage PFAS in environment.
5. The 5th report is an update to first 4 reports, and any further information and evidence available and any changes locally.

The chair mentioned that people could email the panel at pfaspanel@gov.je.

Introductions:
The Chair and Panel members introduced themselves.

Dr Steve Hajioff, Independent Panel Chair: A background as a physician and a retired Director of Public Health from an area of London with two major international airports and a variety of other environmental challenges. He also worked for many years in designing and conducting clinical trials.

Dr Tony Fletcher, PFAS and Health Panel Member: Epidemiologist at the London School of Hygiene and Tropical Medicine, working on PFAS since 2006 and member of the panel with experience of studies on the health effects of PFAS in West Virginia in the United States, in the Veneto region, in Italy, and in Ronneby, Sweden.

Professor Ian Cousins, PFAS and Environment Panel Member: A Professor at Stockholm University, an expert on PFAS, appointed as the environmental expert on this Panel and whose expertise on PFAS is on the sources, transport, fate, and exposure of PFAS.

Grace Norman, Deputy Director of Public Health for the Government of Jersey, the Commissioner for this work, and a standing observer at these meetings.

Support staff, for programme management and administration were also in attendance.

Declarations of Interest
No additional declarations.

Minutes of last meeting
Agreed.

Matters arising
None.

Additional findings since last meeting
The Chair and Scientific Advisory Panel attended the PERFORCE3 PFAS symposium and FLUOROS 2023, in Germany last week (organised by Professor Ian Cousins) and met a number of experts who will be able to help inform the reports being produced by this Panel. This also gave an opportunity to speak again with the experts who had presented to the Panel previously.

Grace Norman gave an updated presentation titled “PFAS Blood Test Results” regarding the testing of Islanders last year. This took into account the results not previously available when presented to Islanders in December (at that time all the results were not in). The meeting noted there were difficulties in interpreting results due to no approved methodology or scientific agreement regarding interpreting blood test results.

Grace Norman gave an overview of the process:

- Referral from GP
- Triaged by Public Health about whether they met the eligibility criteria
- Appeals process
- Blood sampled in July 2022 – Islanders given a choice of 9 or 35 analytes to be tested
- Results to Islanders provided through GP to support with interpretation of what the results mean

The eligibility criteria were:

- Lived (or worked) in plume area 1991-2006 for 1 (or 2) years, AND
- Regularly consumed water from private water supplies, AND
- Have 1+ symptom consistent with health concerns described in the literature, AND
- Have a GP referral

There was an expectation they were over 18 years old. There was no clear definition of the plume area, but Islanders who live or had lived in the west of the island were included. No Islanders were excluded based on geographical eligibility.

Summary of blood test results:

- 88 results
- 10 different PFAS analytes were detected
    - 3 analytes (PFHxS, PFOS, PFOA) were detected in all samples tested
    - 7 analytes were detected in some samples but not others (shown in table)
    - The remaining 25 analytes were not detected in any of the samples

A summary table was presented:

Analyte	Number of Samples with Detectable Concentration	Number of samples	Percentage of samples analyte detected in
PFHxS	88	88	100%
PFOA	88	88	100%
PFOS	88	88	100%
PFNA	59	88	67%
PFHpS	43	75	57%
PFPeS	5	75	7%
MeFOSAA	<5	88	Less than 5%
PFDA	<5	88	Less than 5%
PFBA	<5	75	Less than 5%
PFHpA	<5	75	Less than 5%

A comparison was made to results from a US population study, the only one known about at the time of the analysis, as follows:

- A “threshold” was taken from the USA population results (the upper 95th percentile)
- The Jersey results were compared to this threshold, to see whether they fell above or below it
- 4 analytes were above the threshold in over 10% of Jersey samples (in yellow)

Analyte	Reference Population NHANES*		Results from Jersey Samples	
	Average (95% CI)	Threshold	Number (%) of Jersey samples above 95th percentile of reference population ^	
PFHxS	1.08 (0.20-1.18)	3.7	70	80%
PFOS	4.25 (3.90-4.62)	14.6	26	30%
PFHpS	0.22 (0.18-0.26)	1	15	20%
PFOA	1.42 (1.33-1.52)	3.77	16	18%
PFNA	0.41 (0.36-0.46)	1.4	<5	<5%
PFHpA	Unavailable	0.2	<5	<5%
MeFOSAA	0.20 (0.18-0.21)	1	0	0%
PFDA	0.19 (0.18-0.21)	0.6	0	0%
PFOSA	Unavailable	< LOD	0	0%
PFUnA	0.13 (0.12-0.14)	0.4	0	0%
PFPeS	Unavailable	Unavailable	0	0%

Grace Norman was thanked for her presentation.

Grace Norman mentioned that there is a report on the results being developed and will be shared in due course.

The Chair noted that it will be useful to know the threshold data on PFOS and PFOA.
Dr Tony Fletcher said it will be useful to see the sum of PFAS and see this grouping above the thresholds as agreed.

Dr Tony Fletcher asked about the eligibility criteria wording “symptom” and suggested it would be easier to say sign or symptoms and investigations. Grace Norman confirmed that this would have been more appropriate.

This helps to set the discussions in context. The Chair felt it was better not to have too much detailed data before they make their recommendations, to enable recommendations based on the science and for the Panel to have a purer discussion.

Developing the recommendations and timeline

- The completed draft and recommendations (for this report 1) to be presented at a public consultation event on 11th October.
- The second half of this event will be to look at the scope for report 2.
- The draft to then go to a brief public consultation.
- Panel to review, edit and release the final report in November *(or December, date to be confirmed).*

Headings for recommendations from the Panel:

1. Inclusion criteria, at what threshold levels of PFAS would phlebotomy be offered and when would it stop?
2. Exclusion criteria – who might not be suitable for phlebotomy. some of which will be left to the clinical judgement of those running the service
3. What blood tests should be done and what other data should be collected?
4. How often and how much blood taken?
5. Are there risk groups requiring additional attention?
6. Do we recommend such a programme or not?

Inclusion criteria – PFAS levels

Prioritising people with higher levels of PFAS; if you are close to background levels there is less risk to exposure and less gain from phlebotomy. The German HBM *(Human Bio Monitoring)* II value is 20 ng/ml (*nanograms per millilitre)* and can be a starting point for the general population (PFOS) and 10ng/ml (PFOA). HBM levels are lower for women of reproductive age at 10 ng/ml (PFOS) and 5 ng/ml (PFOA).

The Panel have not found a measure for measuring total PFAS. However, do have some additional analyte information. The challenge with using HBM levels is that they only include PFOA and PFOS and don't take account of PFHxS, which is an important analyte in the Jersey results. The National Academy of Science (NAS) cover wider PFAS substances and wrote about a sum of wider PFAS *(adding up the results for the different analytes),* stating that there is understood to be 'no risk to health' below 2 ng/ml and an 'increase of risks to health' above 20 ng/ml.

The options for inclusion criteria for the Panel to recommend include 1) the HBM levels *(only reflects PFOS and PFOA)*, 2) the NAS levels, or 3) the Panel can look at something different to either of those. Professor Cousins noted the precautionary guidelines set out in the NAS report suggesting concerns at low levels.

Dr Tony Fletcher suggested looking at applying the NAS approach using the sum of (*several)* PFAS as a screening tool and then take in to account the HMB values, and include people whose (*sum of several) PFAS* value is over 10ng/ml. This could be a cut-off point (the sum of *several* PFAS not just one substance) and would make it more available and inclusive (not withstanding exclusions to individuals). Therefore, 10 ng/ml for either sex with no differentiation for childbearing women.

To help move the decision-making process forward, the Chair asked if the Panel want to use a higher level of 20ng/ml for a threshold for phlebotomy? The answer was no. Therefore, the Panel are looking at HBM or lower for the inclusion criteria. Dr Tony Fletcher said that consideration should be given to including those who have not already been tested. The panel have assumed that the only people offered phlebotomy at present *(if agreed)* will be the 88 who were tested last year *(July 2022)*.

It was explained that the panel could recommend wider testing before launching the programme, but this would delay the programme for the people who have already been tested.

The Chair asked the Panel if they want to look at a wider population at this time. The Panel felt they would want to know more about the size of the affected population in the plume area. The Panel could recommend that the Government of Jersey consider offering a phlebotomy programme for others who met the other criteria but were not symptomatic at that time. It makes sense for report 3 to cover this which will look at testing of the broader population and other modes of interventions.

The Panel discussion explored a range of levels. The recommended thresholds may cause a problem as if the Panel follow NAS, it should include a sum above 2ng/ml which would be a lot of people at the population level. This may be closer for HMB I (lower risk) and could be a risk of adverse effects between 2-20 ng/ml in 'sensitive' populations (although it was not clear what the definition of 'sensitive' was). The Panel have not yet reviewed health effects. There is 'increasing concern' up to 20 ng/ml. The NAS report was a consensus across a

wider range of stakeholder's opinions, so including all concerns rather than looking specifically at the risk to health based on published literature.

PFOA and PFOS levels being stricter for women seems to make sense (in the German HBM levels, *because of the potential for harm associated with childbearing)*. The Panel could look at general figures for the general population being 20 ng/ml cut-off. The Chair then asked is it lower than this?

HBM do not recommend criterion for PFHxS, which is one of the analytes that is highest in the affected population. The Panel could say 20 ng/ml for everyone and consider lower for vulnerable groups (including women of childbearing age).The Chair was initially thinking that appropriate levels would be 20ng/ml for the majority of the affected population and 10 ng/ml for women of childbearing potential, but the Chair is comfortable with Dr Fletcher's suggestion of using total PFAS at greater than 10ng/ml which is a compromise (looking at the evidence).

The recommendation is to offer the intervention to anyone identified in the testing pilot with PFAS (in blood serum) sum *of named PFAS* of greater than 10 ng/ml.

This is in the region of other studies where phlebotomy has been used, e.g., the Australian study.

This recommendation is made with the caveat to look at how the NAS got to their recommendation in report 3. This evidence can inform a longer-term offer in the future. The NAS report concludes whilst phlebotomy can be effective, no specific recommendations on the use of phlebotomy or levels are included.

It was suggested that the stop level would be at background level and establish the background level in the Jersey population by testing donated blood samples from elsewhere on the Island (anonymous samples). The population background level would be the stop criteria. Twice the background level is probably the level below which the impact of phlebotomy becomes increasingly undetectable.

The recommendation is when an individual's PFAS levels reach the background level in the programme, they would no longer be eligible for the intervention.

Exclusion criteria

An age range of 18-65 years and minimum body weight of 50kg is applicable for altruistic blood donation. Therefore, the Panel could take a different view for the criteria and look at clinical judgement on this criterion.

The programme lead or Haematologist would input into other clinical criteria i.e., blood pressure, iron levels and haemoglobin. Depending on whether the blood results were abnormal or normal the clinical lead would decide if a person continued with the programme. It was felt it would not be appropriate to exclude individuals just because they didn't meet the criteria for altruistic donation and that input from a specialist would be appropriate, because, unlike altruistic donation, there is the potential for benefit for the individual in therapeutic phlebotomy, which changes the risk profile:

1. Under 18 years old - defer to clinical judgement
2. Over 65 years old –defer to clinical judgement
3. Pregnancy – not usually done in pregnancy, exclude on the basis of safety

4. Body weight cut-off – leave to clinical judgement (could take less blood for people below 50kg)

In summary, it was agreed all except pregnancy should be left to clinical judgement.

It was suggested to test haemoglobin and iron levels as indicator to ensure that individuals are well enough to continue phlebotomy, also test cholesterol given the association with PFAS, check PFAS levels in testing and discuss what PFAS to test for. Symptom scoring and wellbeing score, for example, EQ-5D-5L *(a self-assessed, health-related quality of life questionnaire)* could also be used.

It was hoped all PFAS tests could be done by the labs. Professor Cousins was confident labs can test a number of analytes. The Chair suggested 7 analytes to test. Also, to check the cost implications and proportionality of this.

The recommendations were:

- PFAS levels should be monitored, including the ones found most commonly in the affected population
- Haemoglobin and blood iron to be measured regularly
- Cholesterol measured regularly
- Scorings of symptoms recorded, and quality of life score monitored

Frequency and volume

For altruistic donation there is a difference between donation time for men and women for a standard 480ml donation. However, in altruistic donation there is no benefit to the individual. The Panel discussed if the amount donated should this be the same, or down to clinical judgement.

The Chair suggested a frequency of every 2 months for everyone, and clinical judgement needed if this is too frequent. Also, the Panel could look at 2 monthly but a smaller volume for women (the volume can be varied). The need to be mindful of menstrual blood loss in women and changes in iron levels was also noted. The clinical lead would advise on issues for men and women (low weight, blood pressure etc).

The Panel suggested a pre-test (-1month), then a programme every 2 month, then testing, and discussed whether there is a need to confirm if using the PFAS test baseline or the -1month month test? The Chair said that the pre-test is mainly about safety to proceed. The blood tests from last year will be the marker for eligibility.

Recommendation: Default frequency of 1 blood draw every 2 months with clinical judgement as to whether this frequency or quantity is reduced and whether each intervention would go ahead.

Risk groups

The Panel had already discussed pregnancy and inclusion criteria above. The discussion included whether other risk groups should be left to clinical judgement. For example, if a heart condition made an individual more at risk. This will be picked up by clinical judgement.

Dr Fletcher said that regarding the potential reduction from phlebotomy, there is a big range of variability in natural excretion rates between individuals, and it would be interesting to know the natural excretion rate in the population. The Panel could compare the excretion rate with phlebotomy compared to the excretion rate in the population without phlebotomy.

PFAS is held in proteins and plasma more than blood cells and held in other parts of the body and leaches out back to the blood (volume of distribution). It would be useful to know excretion information from the participants, for the longer term and in the context of a global model to see the benefits of phlebotomy.

The Panel would like to consider taking additional samples from some individuals to plot the recovery period and the rate of the PFAS leaching back into the body. Consideration can be given to adding a research component and could consider compensation for people who may participate. The Chair said this would add some complexity to the delivery of the service and suggested this be revisited as part of a later report.

There may be scope to add additional monitoring at the end of the programme, or when people cease the therapeutic phlebotomy. It was agreed to look at the feasibility.

Recommendation: Additional testing should be undertaken 12 weeks after someone completes therapeutic phlebotomy.

Given that the starting point is using results from a year ago, it would be helpful to take a thorough clinical history which should include any interventions they have tried previously to reduce blood levels of PFAS, for example, blood donation and medicines.

The Chair said for the background levels he suggests using the subject matter expert suggestion to use anonymous sampling from other parts of the island and test them for PFAS to ascertain the Jersey background levels.

Do we recommend that Jersey proceed with a programme of phlebotomy to lower PFAS body burden in effected individuals and to gather data for further research?

Recommendation: Yes. Agreed by the Panel.

The Chair agreed to discuss separately with Public Health the need for a questionnaire, including capturing adverse risk and benefits of intervention.

Any other business

The Panel was reminded of the next steps in the process:

- To incorporate the recommendations from today's meeting into the draft report
- The draft report to go to the public event on 11th October
- The draft report to be subject to comments for 2 weeks after the public event
- Final report to be completed second half of November

Date of next meeting

The date of the next Panel meeting is 12th October, at 10am *(Online).*

The Chair thanked all participants and observers.

There being no further business, the meeting was closed.