Te Tūāpapa Kura Kāinga
Ministry of Housing and Urban Development

HUD2022-000641

s 9(2)(a)

Dear s 9(2)(a)

Thank you for your email of 24 August 2022 requesting the following information under the Official Information Act 1982 (the Act):

> *"copies of correspondence since **1 January 2020** between ESR and the Min of Housing and Urban Development over the development of a regulation under the Residential Tenancies Act around the maximum acceptable level for meth contamination, processes for testing, and decontamination of rental properties."*

On 14 September 2022 you refined your request to:

> *"copies of correspondence since **1 January 2022** between ESR and the Min of Housing and Urban Development over the development of a regulation under the Residential Tenancies Act around the maximum acceptable level for meth contamination, processes for testing, and decontamination of rental properties."*

Ninety-six emails across 15 email chains, and 18 documents (email attachments) have been found to be within scope of your request. Ten documents are withheld in full under section 9(2)(f)(iv), one document is being refused under section 18(d), and 96 emails and seven documents are released to you. Some information has been withheld under the following sections of the Act:

Section of Act	Reason to withhold
9(2)(a)	To protect the privacy of natural persons.
9(2)(b)(ii)	To protect information where the making available of the information would be likely unreasonably to prejudice the commercial position of the person who supplied or who is the subject of the information.
9(2)(f)(iv)	To maintain the constitutional conventions for the time being which protect the confidentiality of advice tendered by Ministers of the Crown and officials.
18(d)	The information is publicly available.

The documents are detailed in the attached document schedule.

The Ministry is currently working on proposals for regulations under the Residential Tenancies Act relating to the maximum acceptable level for meth contamination, the processes for testing and decontamination of rental properties, and related matters. Subject to the Minister's consideration of the current proposals, later in the year she expects to seek Cabinet's agreement to publicly consult on regulatory proposals.

In terms of section 9(1) of the Act, I am satisfied that, in the circumstances, the decision to withhold information under section 9 of the Act is not outweighed by other considerations that render it desirable to make the information available in the public interest.

You have the right to seek an investigation and review of my response by the Ombudsman, in accordance with section 28(3) of the Act. The relevant details can be found on the Ombudsman's website at: www.ombudsman.parliament.nz.

As part of our ongoing commitment to openness and transparency, the Ministry proactively releases information and documents that may be of interest to the public. As such, this response, with your personal details removed, may be published on our website.

Yours sincerely

C.D. Leadbetter

Claire Leadbetter
Manager, Policy and Legislation Design

Annex 1: Document schedule

Documents released – HUD2022-000641			
#	**Date**	**Title**	**Sections of the Act applied**
1	06/04/2022-27/04/2022	**Email chain (6 emails)** RE: Meth contamination work at HUD has restarted: quick question	9(2)(a) 9(2)(f)(iv)
2	27/04/2022-11/05/2022	**Email chain (9 emails)** RE: Meth regulations: topics to discuss	9(2)(a) 9(2)(f)(iv)
2a		Attachment: DRAFT Consultation Document Meth Regs Consultation with ESR.docx	9(2)(f)(iv)
3	11/05/2022	**Email chain (6 emails)** RE: Can we make another time to discuss a few remaining meth science issues?	9(2)(a) 9(2)(f)(iv)
3a		Attachment: SSIF Methamphetamine Contamination 201802.1 Final Report.pdf	9(2)(a)
4	17/05/2022	**Email** RE: Few further questions on meth for tomorrow	9(2)(a) 9(2)(f)(iv)
5	01/06/2022-13/06/2022	**Email chain (8 emails)** RE: Follow up on possible further meth advice needed	9(2)(a) 9(2)(f)(iv)
6	03/06/2022-13/06/2022	**Email chain (2 emails)** RE: ESR/HUD discussion: further meth work commissioning	9(2)(a)
7	15/06/2022-17/06/2022	**Email chain (8 emails)** RE: Discussion this afternoon	9(2)(a)
8	22/06/2022-13/07/2022	**Email chain (22 emails)** RE: Meth regulations work for HUD: further commission relating to "remediation level"	9(2)(a) 9(2)(b)(ii) 9(2)(f)(iv)
8a		Attachment: FW20045 HUD_meth-evidence FINAL 17 February 2021	Withheld in full 9(2)(f)(iv)
8b		Attachment: Draft ESR contract June 2022	9(2)(b)(ii) 9(2)(f)(iv)
9	13/07/2022-02/08/2022	**Email chain (9 emails)** RE: Contract: Final Details	9(2)(a) 9(2)(b)(ii) 9(2)(f)(iv)
9a		Attachment: Draft ESR contract July 2022	9(2)(b)(ii) 9(2)(f)(iv)
9b		Attachment: FW22024 HUD_meth limits DRAFT July 2022	Withheld in full 9(2)(f)(iv)
10	29/07/2022-02/08/2022	**Email chain (6 emails)** RE: Final ESR contract	9(2)(a) 9(2)(b)(ii)

			9(2)(f)(iv)
10a		Attachment: ESR Signed - Final ESR contract July 2022 for signing	9(2)(b)(ii) 9(2)(f)(iv)
11	02/08/2022	**Email** RE: Final signed ESR/ HUD contract: July 2022	9(2)(b)(ii) 9(2)(f)(iv)
11a		Attachment: 20220802153550893	9(2)(b)(ii) 9(2)(f)(iv)
12	03/08/2022-09/08/2022	**Email chain (16 emails)** RE: Meth regulations: would you have a chance to review briefing text?	9(2)(a) 9(2)(b)(ii) 9(2)(f)(iv)
12a		Attachment: IANZ 2021	Refused under 18(d). Publicly available here.
12b		Attachment: Decisions briefing August 22 ESR consult 090822	Withheld in full 9(2)(f)(iv)
12c		Attachment: Decisions briefing August 22 version for ESR_PC comments	Withheld in full 9(2)(f)(iv)
12d		Attachment: Decisions briefing August 22 version for ESR_PC comments2	Withheld in full 9(2)(f)(iv)
13	16/08/2022-22/08/2022	**Email chain (8 emails)** RE: Minor comments on remediation level report and request to finalise	9(2)(a) 9(2)(b)(ii) 9(2)(f)(iv)
13a		Attachment: FW22024 HUD_meth limits FINAL August 2022.doc	Withheld in full 9(2)(f)(iv)
13b		Attachment: FW22024 HUD_meth limits FINAL August 2022.pdf	Withheld in full 9(2)(f)(iv)
13c		Attachment: FW22024 HUD_meth limits FINAL August 2022_IC removed.doc	Withheld in full 9(2)(f)(iv)
13d		Attachment: FW22024 HUD_meth limits FINAL August 2022_IC removed.pdf	Withheld in full 9(2)(f)(iv)
13e		Attachment: FW22024 HUD_meth limits DRAFT July 2022 (002)	Withheld in full 9(2)(f)(iv)
14	23/08/2022-16/09/2022	**Email chain (11 emails)** RE: Scope of possible further ESR work relating to meth regulations	9(2)(a) 9(2)(b)(ii) 9(2)(f)(iv)
15	06/09/2022-08/09/2022	**Email chain (4 emails)** RE: Quick data question from HUD	9(2)(a) 9(2)(f)(iv)
15a		Attachment: FSI Article	N/A

Liam Collins

From: Lucy Saunders
Sent: Wednesday, 27 April 2022 9:24 am
To: 'Erina Mayo'
Subject: RE: Meth contamination work at HUD has restarted: quick question

Kia ora Erina

Does sometime this Friday suit you to chat?

I'm free between 10-12 or otherwise after 3.30: an hour should be plenty. I have various technical questions for you, eg about the s 9(2)(f)(iv) [redacted] I'll compile a list and send it through so you have a bit of warning. (It won't be that complex I don't think, I'm just still getting up to speed).

Can you let me know what time might suit, and I'll send through a teams invite.

Many thanks in advance.

Ngā mihi,

Lucy Saunders (she/her)
Principal Policy Advisor | Policy and Legislation Design
Solutions Design and Implementation
lucy.saunders@hud.govt.nz | +64 4-832 2490
www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 20 April 2022 3:12 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

No problem!
Look forward to catching up next week, my calendar is fairly free so just let me know when suits.
Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Wednesday, 13 April 2022 4:57 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

Hi Erina

No problem at all – sorry that I've been chasing 😊.

I'm away next week, actually, so maybe we can catch up in the week of 26 April? IN the meantime, I will be sending the draft proposals out to agencies but I think they're clear enough for that purpose, and you and I can iron out any minor details.

Many thanks for getting back to me.

Ngā mihi,

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[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 13 April 2022 10:33 am
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

Hi Lucy
Sorry for the delayed response, I have been out of the office at scenes and then sick leave.

I am just catching up on emails now but am happy to have a chat about this. Unfortunately, the rest of my week is full up with meetings etc so it will have to be sometime next week if that suits you? Asides from being on call my calendar is looking pretty clear so happy to work with a time that suits you.
Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Tuesday, 12 April 2022 3:14 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

Kia ora ano Erina

I have now looked further through the files, and found your thorough comments from the middle of last year sent to Vanessa James, s 9(2)(f)(iv) [redacted] thank you!

I have a couple of further questions about the testing proposals in the current paper, mainly to clarify whether:

- s 9(2)(f)(iv) [redacted]

s 9(2)(f)(iv) [redacted]

Would you be available for a chat at some point? Claire, the manager on this work (cc'd), has said that if needed, there may be an opportunity to enter a short further contract with you to cover your time on this work: let me know if you'd like me to look into that further.

I look forward to hearing from you.

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[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Wednesday, 6 April 2022 4:11 pm
To: Erina.Mayo@esr.cri.nz
Subject: Meth contamination work at HUD has restarted: quick question

Kia ora Erina

I have recently started at HUD, and have picked up the paused meth regs work, which I know ESR has extensively advised on. Are you still the best person to ask about this? Please let me know if there's someone else I should contact.

The previous person working on this left at the end of last year, so I am trying to get to the bottom of a few outstanding issues. s 9(2)(f)(iv) [redacted]. I have a copy of an email from Vanessa James to you asking about your views on this, but I'm not sure I have a copy of your reply.

s 9(2)(f)(iv) [redacted]

Please let me know. Very happy to chat if that's easier.

Ngā mihi,

Lucy Saunders (she/her)
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Liam Collins

From: Lucy Saunders
Sent: Wednesday, 11 May 2022 4:26 pm
To: Erina Mayo
Cc: Liam Collins
Subject: RE: Meth regulations: topics to discuss

Thank you! This is really helpful.

I'll pop a meeting in for next Wednesday just to cover off anything else which may have popped up by then. And yes, if you could send through the s 9(2)(f)(iv) that would be great – I've found lots of other papers saved in our files, but not that one.

Ngā mihi, Lucy

[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 11 May 2022 4:15 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth regulations: topics to discuss

Hi Lucy
Playing catch-up after being away delivering Police training in Wellington.

What you have described is almost spot on, but I just have the following comments.

s 9(2)(f)(iv)

s 9(2)(f)(iv) [redacted]

[redacted]

I can't find reference to this in the current ESR report, but I may have just misunderstood some key aspects. Can you let me know if this statement is from the report, and if so, where? Or alternatively if you know what other scientific source this is based on? (I'll also look through our previous files to see if I can find the source).

s 9(2)(f)(iv) [redacted] I think we may have supplied it to Vanessa previously.
I just saw your other email, and yes that publication is the correct one…I will see if I can find it to email through. We have done further work since then though and may be able to word things a bit differently.

1. s 9(2)(f)(iv) [redacted]

I suspect the science answer is in the report, ie:

s 9(2)(f)(iv) [redacted]

Correct, I (ESR) can't comment on that. However, you may be able to speak to Peter Cressey for further info. He was the toxicologist that authored the report you have.

I think that has covered most things. Sorry if it is still confusing, I was confusing myself!

Happy to catch up over Teams, Wednesday next week is looking free for me!

Cheers

Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Monday, 9 May 2022 11:44 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Meth regulations: topics to discuss

Kia ora ano Erina

Apologies – another couple of science questions for you, s 9(2)(f)(iv) [redacted]

1. Our current paper states:

s 9(2)(f)(iv) [redacted]

I can't find reference to this in the current ESR report, but I may have just misunderstood some key aspects. Can you let me know if this statement is from the report, and if so where? Or alternatively if you know what other scientific source this is based on? (I'll also look through our previous files to see if I can find the source).

s 9(2)(f)(iv) [redacted]

I suspect the science answer is in the report, ie:

s 9(2)(f)(iv) [redacted]

[redacted]

I look forward to hearing from you. Happy to chat by phone if that's easier.

Lucy

[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Friday, 6 May 2022 8:56 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth regulations: topics to discuss

Kia ora Erina

Sorry to pester – but are you able to let me know if my understanding below is right, or not? I'm hoping to send the doc to various people today for another look, but I want to make sure I'm clear on the testing proposals. If it's not possible for you to look at this today, no worries - I'll just put a placeholder in that bit saying I'm still checking.

In thinking about it further, I'm wondering if, s 9(2)(f)(iv) [redacted]

Fine to call me if that's easier/ quicker – either on teams or +64 4-832 2490

Ngā mihi,

Lucy Saunders (she/her)
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Solutions Design and Implementation
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He kāinga ora, he hapori ora - our purpose is thriving communities where everyone has a place to call home.

[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Wednesday, 4 May 2022 5:03 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth regulations: topics to discuss

Thank you. It was so helpful speaking to you, and your comments are great.

I have tried to summarise s 9(2)(f)(iv) [redacted] in my own words to double check that I understand it all. So, I think we're proposing that:

s 9(2)(f)(iv) [redacted]

s 9(2)(f)(iv) [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Let me know about all this when you get a chance. Thanks again.

Ngā mihi,

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www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 4 May 2022 3:20 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth regulations: topics to discuss

Hi Lucy
It was lovely speaking with you today.
I have made some further comments on the attached document for you to choose to address or ignore!
If you have any additional questions, then please don't hesitate to contact me.
Cheers
Erina

Erina Mayo BSc, MSc (Hons)
Team Leader, Clandestine Drug Laboratory
Forensic Drug Chemistry
Mt Albert Science Centre, 120 Mt Albert Road, Auckland 1025
DDI: +64 9 815 3963
M: +64 21 413 687

E: erina.mayo@esr.cri.nz
W: www.esr.cri.nz

Science for Communities

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Thursday, 28 April 2022 3:21 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth regulations: topics to discuss

Thank you! This sounds great. s 9(2)(a) [redacted]

Next week should be OK – I'll send through an appointment for Wednesday - the Tuesday times are tricky for me.

Looking forward to the discussion.

Ngā mihi,

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Ministry of Housing and Urban Development

He kāinga ora, he hapori ora - our purpose is thriving communities where everyone has a place to call home.

Lucy

[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Thursday, 28 April 2022 3:02 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth regulations: topics to discuss

Hi Lucy
Thank you for sending that through and I have no problem helping you get up to speed with all of this. If we find that after our meeting more time is required then I might look at a new contract for the time, however happy to get this first meeting completed first and see how we go.

s 9(2)(a) [redacted] so next week does suit me better to meet. I could do Tuesday anytime from 11am – 2pm, or Wednesday from 1pm onwards. Wednesday is better for me but I can also make Tuesday work.

Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Wednesday, 27 April 2022 3:20 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: Meth regulations: topics to discuss

Kia ora ano Erina

In preparation for our possible meeting on Friday, I attach a version of the current discussion document with a number of questions/ comments marked up to discuss with you, s 9(2)(f)(iv) [redacted] My questions may be a bit more complicated than I anticipated when I emailed this morning, sorry! This document was 95% written by my predecessors, so I'm still coming up to speed with lots of the detail. You may not have seen this document before – apologies if so. I welcome your comments on any aspects, not only those I have asked above.

I'm aware that all this may take reasonable amounts of your time. If you'd like me to investigate a new contract for you to cover your time on all this, please let me know: as I think I said earlier, Claire has confirmed that we can do this if needed. Also, if you need a bit more time to consider the issues, then we could meet early next week instead – let me know. We now have slightly more time to get these things resolved, which is a relief.

I look forward to hearing from you.

Ngā mihi,

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www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Wednesday, 27 April 2022 9:24 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

Kia ora Erina

Does sometime this Friday suit you to chat?

I'm free between 10-12 or otherwise after 3.30: an hour should be plenty. I have various technical questions for you, s 9(2)(f)(iv) [redacted] 'll compile a list and send it through so you have a bit of warning. (It won't be that complex I don't think, I'm just still getting up to speed).

Can you let me know what time might suit, and I'll send through a teams invite.

Many thanks in advance.

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www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 20 April 2022 3:12 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

No problem!
Look forward to catching up next week, my calendar is fairly free so just let me know when suits.
Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Wednesday, 13 April 2022 4:57 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

Hi Erina

No problem at all – sorry that I've been chasing 😊.

I'm away next week, actually, so maybe we can catch up in the week of 26 April? IN the meantime, I will be sending the draft proposals out to agencies but I think they're clear enough for that purpose, and you and I can iron out any minor details.

Many thanks for getting back to me.

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[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 13 April 2022 10:33 am
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

Hi Lucy
Sorry for the delayed response, I have been out of the office at scenes and then sick leave.

I am just catching up on emails now but am happy to have a chat about this. Unfortunately, the rest of my week is full up with meetings etc so it will have to be sometime next week if that suits you? Asides from being on call my calendar is looking pretty clear so happy to work with a time that suits you.
Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Tuesday, 12 April 2022 3:14 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

Kia ora ano Erina

I have now looked further through the files, and found your thorough comments from the middle of last year sent to Vanessa James, where you cover your thoughts on a level a property should test to following cleaning: thank you!

I have a couple of further questions about the s 9(2)(f)(iv) in the current paper, mainly to clarify whether:

[redacted]

Would you be available for a chat at some point? Claire, the manager on this work (cc'd), has said that if needed, there may be an opportunity to enter a short further contract with you to cover your time on this work: let me know if you'd like me to look into that further.

I look forward to hearing from you.

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[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Wednesday, 6 April 2022 4:11 pm
To: Erina.Mayo@esr.cri.nz
Subject: Meth contamination work at HUD has restarted: quick question

Kia ora Erina

I have recently started at HUD, and have picked up the paused meth regs work, which I know ESR has extensively advised on. Are you still the best person to ask about this? Please let me know if there's someone else I should contact.

The previous person working on this left at the end of last year, so I am trying to get to the bottom of a few outstanding issues. s 9(2)(f)(iv) I have a copy of an email from Vanessa James to you asking about your views on this, but I'm not sure I have a copy of your reply.

s 9(2)(f)(iv)

Please let me know. Very happy to chat if that's easier.

Ngā mihi,

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Liam Collins

From: Lucy Saunders
Sent: Wednesday, 11 May 2022 5:42 pm
To: Erina Mayo
Cc: Liam Collins
Subject: RE: Can we make another time to discuss a few remaining meth science issues?

Thanks – noted. Does the confidentiality concern also mean that we shouldn't specifically footnote it in the consultation doc? I note that the Gluckman report did (as you know), but we're OK to go with whatever you advise. It is really helpful to have solid sources when we can, though, even just for the future policy/ legal/ science people who may be looking at all this!

Cheers, Lucy

[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 11 May 2022 4:23 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Can we make another time to discuss a few remaining meth science issues?

Hi Lucy
I have found the internal report and have attached for your review. Please treat this as confidential and do not distribute further.

s 9(2)(f)(iv) [redacted]

Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Wednesday, 11 May 2022 3:22 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>
Subject: Can we make another time to discuss a few remaining meth science issues?

Hi again Erina

I'm conscious that you must be away from your desk at the moment, so my apologies for all the emails. In any case, I wondered whether it would be possible to meet you again for an hour or so and go through some of these questions? Please let me know. I don't work on Thursdays, but any other day is good.

I have been doing a bit more reading, and I see that s 9(2)(f)(iv) [redacted]

[redacted]

However, I can't find this paper saved in our files anywhere, nor available on the internet (although I might just not have known where to look). Are you able to send me a copy of it, or let me know where/how I could access it?

s 9(2)(f)(iv) [redacted]

Anyway, let me know if there's a time which would suit you to chat.

Ngā mihi,

Lucy Saunders (she/her)
Principal Policy Advisor | Policy and Legislation Design
Solutions Design and Implementation
lucy.saunders@hud.govt.nz | +64 4-832 2490
www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Monday, 9 May 2022 11:44 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Meth regulations: topics to discuss

Kia ora ano Erina

s 9(2)(f)(iv) [redacted]

s 9(2)(f)(iv) [redacted]

I look forward to hearing from you. Happy to chat by phone if that's easier.

Lucy

[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Friday, 6 May 2022 8:56 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth regulations: topics to discuss

Kia ora Erina

Sorry to pester – but are you able to let me know if my understanding below is right, or not? I'm hoping to send the doc to various people today for another look, but s 9(2)(f)(iv) [redacted] If it's not possible for you to look at this today, no worries - I'll just put a placeholder in that bit saying I'm still checking.

s 9(2)(f)(iv) [redacted]

Fine to call me if that's easier/ quicker – either on teams or +64 4-832 2490

Ngā mihi,

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[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Wednesday, 4 May 2022 5:03 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth regulations: topics to discuss

Thank you. It was so helpful speaking to you, and your comments are great.

I have tried to summarise the s 9(2)(f)(iv) [redacted] in my own words to double check that I understand it all. So, I think we're proposing that:

s 9(2)(f)(iv) [redacted]

[redacted]

Is there anything else obvious I have forgotten? s 9(2)(f)(iv) [redacted]

[redacted]

Let me know about all this when you get a chance. Thanks again.

Ngā mihi,

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[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 4 May 2022 3:20 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth regulations: topics to discuss

Hi Lucy
It was lovely speaking with you today.
I have made some further comments on the attached document for you to choose to address or ignore!
If you have any additional questions, then please don't hesitate to contact me.
Cheers
Erina

Erina Mayo BSc, MSc (Hons)
Team Leader, Clandestine Drug Laboratory
Forensic Drug Chemistry
Mt Albert Science Centre, 120 Mt Albert Road, Auckland 1025
DDI: +64 9 815 3963
M: +64 21 413 687
E: erina.mayo@esr.cri.nz
W: www.esr.cri.nz

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Thursday, 28 April 2022 3:21 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth regulations: topics to discuss

Thank you! This sounds great. s 9(2)(a) [redacted]

Next week should be OK – I'll send through an appointment for Wednesday - the Tuesday times are tricky for me.

Looking forward to the discussion.

Ngā mihi,

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Lucy

[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Thursday, 28 April 2022 3:02 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth regulations: topics to discuss

Hi Lucy
Thank you for sending that through and I have no problem helping you get up to speed with all of this. If we find that after our meeting more time is required then I might look at a new contract for the time, however happy to get this first meeting completed first and see how we go.

s 9(2)(a) I could do Tuesday anytime from 11am – 2pm, or Wednesday from 1pm onwards. Wednesday is better for me but I can also make Tuesday work.

Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Wednesday, 27 April 2022 3:20 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: Meth regulations: topics to discuss

Kia ora ano Erina

In preparation for our possible meeting on Friday, I attach a version of the current discussion document with a number of questions/ comments marked up to discuss with you, in particular relating to testing/ sampling and abandoned goods. My questions may be a bit more complicated than I anticipated when I emailed this morning, sorry! This document was 95% written by my predecessors, so I'm still coming up to speed with lots of the detail. You may not have seen this document before – apologies if so. I welcome your comments on any aspects, not only those I have asked above.

I'm aware that all this may take reasonable amounts of your time. If you'd like me to investigate a new contract for you to cover your time on all this, please let me know: as I think I said earlier, Claire has confirmed that we can do this if needed. Also, if you need a bit more time to consider the issues, then we could meet early next week instead – let me know. We now have slightly more time to get these things resolved, which is a relief.

I look forward to hearing from you.

Ngā mihi,

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[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Wednesday, 27 April 2022 9:24 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

Kia ora Erina

Does sometime this Friday suit you to chat?

I'm free between 10-12 or otherwise after 3.30: an hour should be plenty. I have various technical questions for you, s 9(2)(f)(iv) [redacted] I'll compile a list and send it through so you have a bit of warning. (It won't be that complex I don't think, I'm just still getting up to speed).

Can you let me know what time might suit, and I'll send through a teams invite.

Many thanks in advance.

Ngā mihi,

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www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 20 April 2022 3:12 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

No problem!
Look forward to catching up next week, my calendar is fairly free so just let me know when suits.
Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Wednesday, 13 April 2022 4:57 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

Hi Erina

No problem at all – sorry that I've been chasing 😊.

I'm away next week, actually, so maybe we can catch up in the week of 26 April? IN the meantime, I will be sending the draft proposals out to agencies but I think they're clear enough for that purpose, and you and I can iron out any minor details.

Many thanks for getting back to me.

Ngā mihi,

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[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 13 April 2022 10:33 am
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

Hi Lucy
Sorry for the delayed response, I have been out of the office at scenes and then sick leave.

I am just catching up on emails now but am happy to have a chat about this. Unfortunately, the rest of my week is full up with meetings etc so it will have to be sometime next week if that suits you? Asides from being on call my calendar is looking pretty clear so happy to work with a time that suits you.
Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Tuesday, 12 April 2022 3:14 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

Kia ora ano Erina

I have now looked further through the files, and found your thorough comments from the middle of last year sent to Vanessa James, where you cover your thoughts on a level a property should test to following cleaning: thank you!

I have a couple of further questions about the s 9(2)(f)(iv) in the current paper, mainly to clarify whether:

s 9(2)(f)(iv) [redacted]

Would you be available for a chat at some point? Claire, the manager on this work (cc'd), has said that if needed, there may be an opportunity to enter a short further contract with you to cover your time on this work: let me know if you'd like me to look into that further.

I look forward to hearing from you.

Ngā mihi,

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[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Wednesday, 6 April 2022 4:11 pm
To: Erina.Mayo@esr.cri.nz
Subject: Meth contamination work at HUD has restarted: quick question

Kia ora Erina

I have recently started at HUD, and have picked up the paused meth regs work, which I know ESR has extensively advised on. Are you still the best person to ask about this? Please let me know if there's someone else I should contact.

The previous person working on this left at the end of last year, so I am trying to get to the bottom of a few outstanding issues. s 9(2)(f)(iv) [redacted] I have a copy of an email from Vanessa James to you asking about your views on this, but I'm not sure I have a copy of your reply.

s 9(2)(f)(iv) [redacted]

Please let me know. Very happy to chat if that's easier.

Ngā mihi,

Lucy Saunders (she/her)

Principal Policy Advisor | Policy and Legislation Design
Solutions Design and Implementation
lucy.saunders@hud.govt.nz | Phone: +64 22 647 3047
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Science for Communities

Methamphetamine Contamination

Forensic Internal Report 2018/02
March 2018

Authors:

Matthew Russell, Megan McKinnel, Bradley Ivory

ACKNOWLEDGEMENTS

Author	Peer reviewer / Author	Author
		
Bradley Ivory	Megan McKinnel	Matthew Russell
Project Data Analyst – Forensic Chemistry	Senior Scientist – Forensic Chemistry	Senior Scientist – Forensic Chemistry

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ABBREVIATIONS

cm^2	centimetres squared
g	grams
kg	kilograms
m^2	metres squared
mg	milligram
mL	millilitres
mm	millimetres
µg	microgram
ppm	parts per million

BEMA	benzylethyltrimethylammonium
BMN	1-benzyl-3-methylnaphthalene
DIMA	*N,N*-dimethylamphetamine
DMPA	1,2-dimethyl-3-phenylaziridine
DMPN	1,3-dimethyl-2-phenylnaphthalene
NIOSH	National Institute for Occupational Safety and Health (USA)
P2P	1-phenyl-2-propanone

1. EXECUTIVE SUMMARY

This report provides an in depth scientific assessment of methamphetamine contamination specific to New Zealand properties. The purpose of the project behind this report was to study the nature, source and extent of the contamination affecting so many New Zealand properties. As a result, ESR has compiled and analysed data from a number of sources, along with its own data accumulated from the analysis of samples from suspected clandestine laboratories. Additionally, along with the introduction of the NZS 8510:2017 Standard [1], it is intended that ESR's involvement will lead to a more resourceful approach in the subsequent testing and decontamination of methamphetamine-contaminated properties and put ESR in a strong position to be consultants in this area.

This document will familiarise the reader with:

- Methamphetamine manufacturing methods in New Zealand and the associated chemicals and hazards.
- Contamination caused by clandestine methamphetamine manufacture in New Zealand and the associated potential exposure risks.
- Contamination caused by smoking methamphetamine and the associated potential exposure risks.
- The methods of analysis of swabs/wipes from contaminated properties and suspected clandestine laboratories and the interpretation of the results.
- The levels of contamination observed at clandestine laboratories and an evaluation of the associated data.
- The levels of contamination observed in general housing and an evaluation of the associated data.
- Challenges associated with determining the extent and source of the contamination.

2. INTRODUCTION

A large industry has grown having capitalised on the need to assess and decontaminate methamphetamine-contaminated properties to an acceptable “standard”, initially determined by the Ministry of Health in their 2010 Guidelines for the Remediation of Clandestine Methamphetamine Laboratory Sites [2] and since June 2017 by the guidelines in NZS8510:2017, the New Zealand Standard for the testing and decontamination of methamphetamine-contaminated properties [1]. The industry is unregulated and many inconsistencies in the testing and decontamination of affected properties were noted by its largest single customer, the Housing New Zealand Corporation (HNZ).

The Institute of Environmental Science and Research (ESR) Ltd has frequently been asked to make sense of the science behind “methamphetamine contamination”, and have been involved with a review of the remediation standards [3] to assist in the determination of an appropriate “clean-up level” for methamphetamine-contaminated properties and the development and implementation of a new standard [1]. As such, ESR has been asked to act as an authority on certain aspects, including the assessment of site testing, associated products and devices, in our role as scientific consultants. ESR’s invitation into this space is justified by the experience of the Forensic Group’s Clandestine Laboratory Team who, over almost two decades, have attended numerous contaminated properties through their attendance at in excess of 1000 suspected clandestine laboratory sites and associated premises.

In November 2016, whilst in draft, the forthcoming Standard for the “testing and decontamination of methamphetamine-contaminated properties” considered two acceptable post-decontamination re-occupancy levels; 1.5µg/100cm^2 if the contamination was caused by smoking methamphetamine and 0.5µg/100cm^2 if the contamination was caused by the manufacture of methamphetamine [3]. In response to this, an associated Pioneer One project [4] initiated an “exercise” to scope for a method that might be able to determine the source of methamphetamine contamination in a property. The results of this exercise would potentially influence the direction of this project and ESR’s potential involvement in this market. The final standard, released in June 2017, set a single decontamination level for high-use areas of 1.5µg/100cm^2 and a less stringent decontamination level for limited-use areas of 3.8µg/100cm^2.

Although the scope of the project has changed as a result, the outcome of the Pioneer One project remains an important element. A scientific opinion on the source of the contamination often provides key evidence in Police investigations. Other agencies have also indicated the usefulness of such an assessment and/or the associated data that may inform a decontamination strategy in line with a relative ‘level’ of contamination. Homebuyers and property investors may feel differently about a purchase if a source of contamination could be confirmed. As such, ESR will be an important service provider in this area and suggestions for expanding/improving our current methods and the potential for engaging in new work streams forms part of the scope of this project.

3. PROJECT INFLUENCES

3.1 SMOKING OR MANUFACTURE?

Previously, the Ministry of Health guidelines [2], recommended that residual methamphetamine measured using surface wipes should not exceed 0.5µg/100cm^2 as the acceptable post-decontamination re-occupancy level for a dwelling that has been used as a "clan meth lab". Although there is no reference made to any contamination caused by smoking, other than scientific opinion, there is no method that can distinguish one source of methamphetamine contamination from another. This left homeowners, hoteliers, landlords and social housing corporations at loggerheads with their insurance companies when addressing the costs of decontamination since, in most circumstances, the source of the contamination is unknown.

Most insurance policies exclude cover for damage that happens gradually. Initially insurance companies were treating any damage thought to be caused by methamphetamine smoking as "gradual damage" and were declining claims unless policy holders could prove that the damage was "sudden and unforeseen", for example, caused by a one-off event where methamphetamine was smoked by a large number of people, or was manufactured. Due to the difficulties associated with proving or disproving if methamphetamine contamination was "sudden and unforeseen" or "gradual damage", insurers have moved towards an approach whereby methamphetamine contamination, whatever the cause, is excluded or by capping the amount of cover provided by the policy.

Attempts to fill this "scientific gap" in the commercial testing field have been relatively unscientific and/or based on assumptions rather than robust evidence. Frequently, ESR has been contacted in relation to this issue but have not been in a position to assist having not been involved with the sampling or analysis. The overall effect was, particularly for the agencies bearing the costs of decontamination, that the process favoured the testing and decontamination market. This cost to New Zealand was the driving force behind the development of the NZS8510 standard and this project.

3.2 NZS8510: THE NEW ZEALAND STANDARD FOR TESTING AND DECONTAMINATION OF METHAMPHETAMINE-CONTAMINATED PROPERTIES

The appropriate decontamination level determined by the committee tasked with developing the new standard was based on expert advice on exposure risk from ESR in a report commission by the Ministry of Health [3], the past and current methamphetamine manufacturing methods commonly observed in New Zealand and the review of a large number of public comments on a draft of the standard.

The ESR report recommended the following decontamination levels:

- Former clan labs: 0.5µg/100cm^2
- Non-lab houses (without carpet): 2.0µg/100cm^2
- Non-lab houses (with carpet): 1.5µg/100cm^2

The committee decided that if multiple decontamination levels were applied, it would be unclear who would be responsible for determining which level should be used for a particular property and therefore hold the liability. The final standard, released in June 2017 [1], set a single decontamination level for high-use areas of 1.5µg/100cm^2 and a less stringent decontamination level for limited-use areas, such as crawl spaces, of 3.8µg/100cm^2.

It was acknowledged that a post-decontamination level of 1.5µg/100cm^2 was conservative, with a number of in built safety factors, to ensure it is health protective and future occupiers of properties that have been decontaminated or have low levels of residual methamphetamine present can be confident that adverse effects are highly unlikely, even for young children, and dwellings are safe to occupy.

4. SOURCES OF METHAMPHETAMINE CONTAMINATION

4.1 METHAMPHETAMINE MANUFACTURE IN NEW ZEALAND

The most common method of methamphetamine manufacture in New Zealand involves the "conversion" of pseudoephedrine or ephedrine to methamphetamine using the "reducing agent", hydrogen iodide (HI). HI can be obtained in the form of hydriodic acid (rarely observed in NZ), or generated *in situ* by combing iodine (I) with one of the following; red phosphorus (P), hypophosphorous acid (H_3PO_2) or phosphorous acid (H_3PO_3) in an aqueous medium. These three combinations are frequently observed in NZ and are often referred to as the HI/Red P or "Nazi" method.

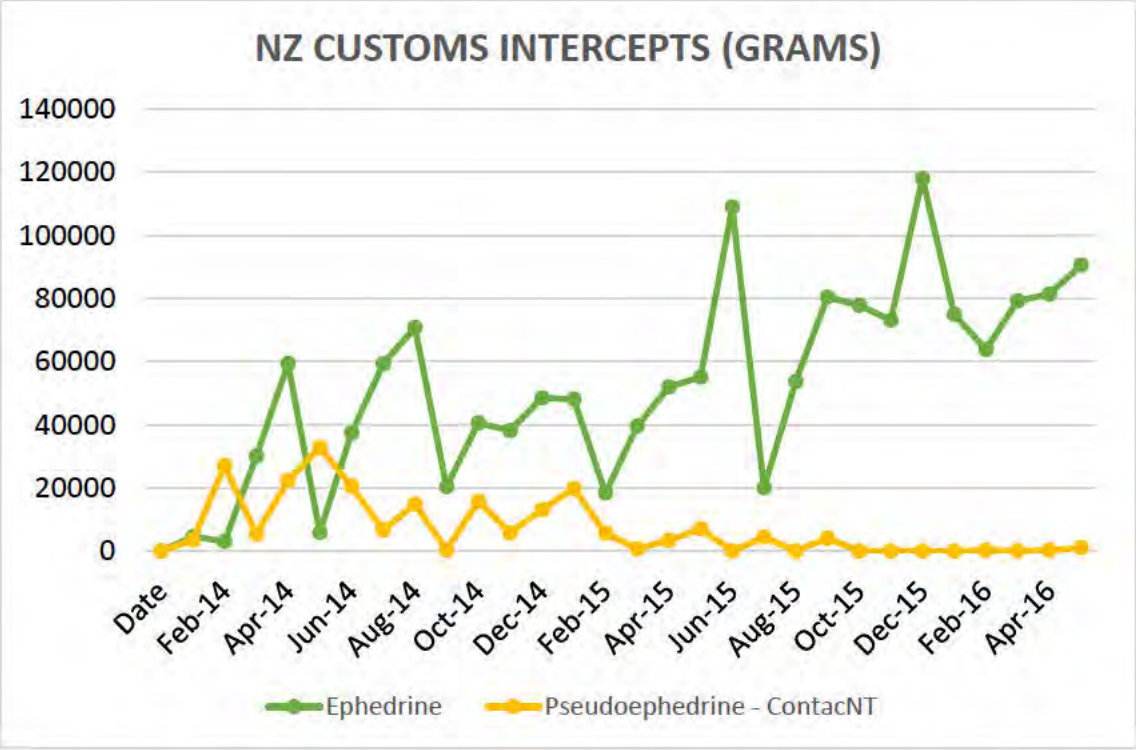


Figure 1: New Zealand Customs' Intercepts – Comparison of ContacNT and Ephedrine (hydrochloride) seizures.

Up until recently, the overseas pharmaceutical preparation, ContacNT, was the primary source of the precursor, pseudoephedrine [5]. Now, however, ephedrine hydrochloride seizures at the border have outnumbered ContacNT seizures almost to the point where the latter is rarely encountered [5] (Figure 1). On very few occasions *Ephedra* plant material has been observed as the natural source of the precursor [5]. Ephedra's alkaloid content

includes ephedrine, pseudoephedrine, cathine (norpseudoephedrine), phenylpropanolamine (norephedrine), N-methylephedrine and N-methylpseudoephedrine. The alkaloid content in Ephedra can range between 0.5 and 2.5% for plant material and more for the powdered extract (up to 25%) [6, 7].

Sources of iodine and phosphorous remain the subject of chemical diversion and are generally falsely declared goods smuggled across the border in large quantities (Figure 2), or stolen from legitimate industrial users of these chemicals [8].

Figure 2: Seizures of iodine at the border. The iodine is being diverted for use in the manufacture of methamphetamine.

The other chemicals required to carry out the full synthesis are few. In addition to the "ingredients" required to carry out the conversion described above, the "work-up" can be accomplished by obtaining sodium hydroxide (caustic soda) and hydrochloric acid (spirits of salts). Whilst these materials are hazardous and caustic/corrosive, they are readily available for purchase as drain cleaner and concrete cleaner, respectively. Commercial grade forms such as "Diggers" and "Amazing Haste" are more than adequate for the job. Traditional methods have included the use of a solvent, such as toluene or light hydrocarbon liquid (e.g. Fuelite), but a more recent "solventless" method has developed largely because the source of the precursor has changed (ephedrine hydrochloride), for which no extraction process is required [9, 10].

Figure 3: Parr Bombs – Pressure reaction vessels used to carry out the manufacture of methamphetamine in New Zealand.

The conversion/reduction reaction itself is carried out in a reaction vessel. Traditional laboratory glassware has long since been replaced in the field by purpose built pressure reaction vessels, known as “Parr bombs”. Constructed from gas pipe steel and associated fittings, these heavy, metal cylinders have increased in popularity since they were first observed over a decade ago and remain relatively unique to New Zealand [9].

Distillation follows the synthesis upon the addition of caustic soda. Again, purpose built equipment, usually constructed or modified from stainless steel alcohol distillation equipment, urns and kegs, are being used for the “work-up”. Household steam/water distillers are also commonly used. Although, they are effective [9], they are cumbersome and not particularly durable. Distillation negates the need for a solvent if hydrochloric acid is added directly to the distillate and New Zealand “cooks” appear to have mastered this process with the help of a pH meter [9].

Acetone is the only solvent that is frequently encountered but its use is cosmetic. As in nail varnish remover, acetone is very good at removing colour. It also removes excess water and will leave the crystalline product, “P”, drier and more visually appealing.

In summary, methamphetamine can be manufactured using only five ingredients namely; ephedrine/pseudoephedrine, iodine (or hydriodic acid), hypophosphorous acid (or phosphorous acid, or red phosphorus), caustic soda and hydrochloric acid. As such, it is not uncommon to find only these substances being used at clandestine laboratories in New Zealand.

Other methods, commonly observed overseas such as the Leuckhardt, Birch, Emde and modern Mexican methods, are not being observed in New Zealand. Since 2005 (over 2000 case files), there has been no ESR forensic report that has provided evidence to an alternative method of methamphetamine manufacture having taken place in New Zealand [10, 11].

Evidence relating to the manufacture of other illicit drugs has been encountered but the associated files are few and only account for approximately one percent of ESR clandestine laboratory casework [10, 11].

4.2 METHAMPHETAMINE USE – SMOKING

Methamphetamine hydrochloride can be insufflated (snorted) as a powder, dissolved in an aqueous solution and injected or, more commonly, smoked from a glass pipe. Some publications reference the use of aluminium foil [12], commonly known as “chasing the dragon” [13,14], however, this is not commonly observed in New Zealand.

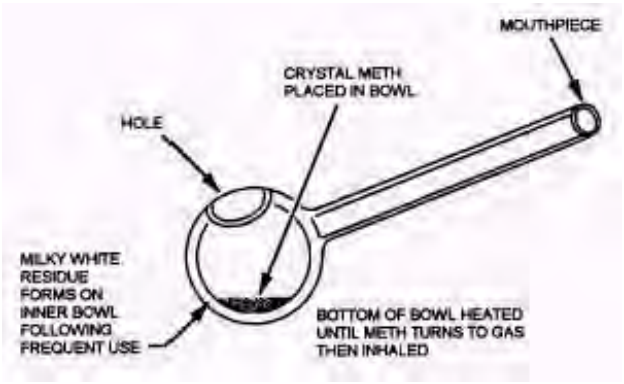


Figure 4: A “P pipe” – A glass pipe used to smoke methamphetamine hydrochloride, “P”.

The bowl of the pipe (Figure 4) is heated underneath using a butane gas (cigarette) lighter (Figure 5) or a small butane torch. Upon heating, vapours are released and inhaled through the mouthpiece.

Figure 5: A hand-held butane torch and a disposable cigarette lighter – commonly used to heat a "P-pipe".

Drug use forums [13,14] describe the crystals melting and "advisers" suggest withdrawing the heat at this point, covering the "carb" (hole) and allowing the liquid to cool or even recrystallize, to avoid over-heating/burning. The intention of the user here is also not to lose vapours either through the carb or by exhalation, having inhaled too much. Some forums suggest "holding in the hit". Others warn against this as causing recrystallization in the lungs. Most conversations tend to agree that most of what is inhaled is absorbed (up to 90%) which happens to agree with scientific research [15,16].

The dose is variable and will largely depend on the user's habit. Again, the internet is the best source of information on what comprises a "hit" with one website regarding anything above 50 mg to be "strong".

4.3 CONTAMINATION CAUSED BY METHAMPHETAMINE MANUFACTURE IN NEW ZEALAND

The main contaminant (observed using conventional analytical methods) produced during the manufacture of methamphetamine, is methamphetamine itself. This is, of course, unless the careless use/disposal of materials and equipment has taken place. Such activity is common and in these situations, caustic/corrosive and toxic residues from the precursors and reagents, such as iodine, hydrochloric acid and caustic soda, could be more concerning as contaminants than the methamphetamine itself. For example, an historical case involved a child being seriously injured having drunk from a soda bottle, containing liquid residues thought to have been associated with the manufacture of methamphetamine. The causticity of the liquid would have been as, if not more damaging, than any traces of methamphetamine present.

During the HI reduction of pseudoephedrine/ephedrine to methamphetamine, synthetic by-products are produced namely; 1,2-dimethyl-3-phenylaziridine (DMPA), 1-phenyl-2-propanone (P2P), 1-benzyl-3-methylnaphthalene (BMN) and 1,3-dimethyl-2-phenylnaphthalene (DMPN) [17]. These by-products are frequently detected in waste liquids and rinses of equipment that have been produced and used during the manufacture of methamphetamine. Although, their quantity relative to the amount of methamphetamine produced is miniscule, they are usually detected on surface swabs in association with exorbitant levels of methamphetamine. Despite this, nothing is known of their toxicity.

Other products of the reaction include the *N*-methylated and demethylated equivalents of methamphetamine, namely; *N,N*-dimethylamphetamine and amphetamine. Both are produced if *Ephedra* is the source of the precursor [6]. However, both have been observed in trace amounts, often along with *N*-ethylamphetamine and *N*-methyl-*N*-ethylamphetamine, in clandestine laboratory samples, indicating there may be an additional hypothesis for their occurrence. These compounds are amphetamine type substances (ATS) in their own right and as potential contaminants, should be considered as significant as methamphetamine itself.

Other potential contaminants, include the toxic gases hydrogen iodide (HI) and phosphine. HI is a corrosive gas and is likely to be liberated during the reaction along with iodine itself, especially if it is added or produced in excess. Iodine is a dark solid with a pungent odour that readily by-passes the liquid phase, instead subliming straight into a gas upon exposure to the air. Iodine is toxic and will leave evidence of its presence in the form of yellow/brown staining on any surface it comes into contact with.

Phosphine is explosive as well as being extremely poisonous. Phosphine is documented [18] as being produced during the manufacture of methamphetamine in variable amounts, some of which exceeded the short term exposure limit (STEL) of 1ppm. However, excessive levels are produced if the reaction conditions become unfavourable, when the temperature exceeds 180ºC, due to the loss of water. Above this temperature, phosphorous acid produced during the reaction becomes unstable and decomposes to phosphine gas and phosphoric acid [19]. Although phosphine exposure is symptomatic at concentrations above 1ppm and is lethal at concentrations above 400ppm [19], there has been no reported associated instances of a phosphine gas poisoning in New Zealand. Nevertheless, exposure to phosphine presents one of the greatest risks for those attending clandestine laboratory sites, particularly when active.

Carrying out the reaction in a sealed vessel virtually eliminates the production of fumes and contaminants that would otherwise be emitted using traditional glassware. It has been shown, in an initial assessment using glassware [19], that methamphetamine is not aerosolised in a detectable quantity during the synthesis stage. Methamphetamine commonly goes undetected in condensers (reflux glassware used for the reaction). This provides some evidence to show that methamphetamine is extremely soluble in the reaction mixture and little is lost during synthesis.

The following steps involve the extraction of methamphetamine from the acidic reaction liquid, initially by raising the pH above 12. This step yields crude methamphetamine base, an oily liquid that is many times more volatile than its acidified form [20]. This procedure, is usually followed by distillation, a purification step that separates the methamphetamine base from the waste components of the reaction. Subsequently, the addition of hydrochloric acid to the distillate yields crystalline methamphetamine hydrochloride, upon evaporation. This activity; removing the reaction liquid from the Parr bomb, adding caustic soda, carrying out a distillation and “salting-out”, is thought to be the stages where most of the methamphetamine contamination occurs [20]. Although no by-products are being produced during these stages, the corrosive gas, hydrogen chloride, is likely to be produced.

A previous study carried out for a court case, investigated the methamphetamine contamination produced by the recrystallization of methamphetamine hydrochloride. In this case (R v SOWMAN, March 2016) the defence was that the contamination observed on the swabs was due to the defendant rinsing out “point bags” of methamphetamine and recrystallizing out the residues. A summary of the work carried out which ultimately supported the prosecution hypothesis that the contamination was due the manufacture of methamphetamine, is detailed in Section 9.3.

In summary, the common aerosolised contaminants produced as a result of methamphetamine manufacture in New Zealand are; methamphetamine, ephedrine/pseudoephedrine, 1,2-dimethyl-3-phenylaziridine (DMPA), 1-phenyl-2-propanone (P2P), 1-benzyl-3-methylnaphthalene (BMN), 1,3-dimethyl-2-phenylnaphthalene (DMPN), iodine, hydrogen iodide and hydrogen chloride. Other potential sources of surface contamination are sodium hydroxide and hydrochloric acid.

Methamphetamine, in its base form, is reactive to other chemicals, particularly acidic (proton donating) substances and therefore has the potential to form other compounds. This could contribute to methamphetamine's ability to bind to a variety of surfaces in variable amounts and remain *in situ* for lengthy periods. Volatile organic compounds (VOCs) arising from solvents (if used) could be produced but, due to the many legitimate household uses, it is unlikely that their detection would be easily attributed to the manufacture of methamphetamine. As such, solvent detection is not considered a reliable indicator of illicit drug manufacture.

Other chemicals are encountered at clandestine laboratories in New Zealand but often their occurrence is incidental with most, if not all, showing no evidence of them being used. The five occurrences of mercuric (II) chloride recorded to date, were either incidental or were found along with methylamine and other chemicals associated with the synthesis of 'ecstasy' type compounds. Of the lead salts that have been encountered so far, most were attributed to explosive materials or their synthesis. As stated before, a method of methamphetamine manufacture using toxic compounds such as lead and mercury has not been encountered in New Zealand [10].

4.4 CONTAMINATION FROM "SMOKED" METHAMPHETAMINE IN NEW ZEALAND

The production of crystalline methamphetamine hydrochloride in New Zealand yields a relatively pure product. A methamphetamine profiling project undertaken by ESR showed that pure (uncut) "P" methamphetamine in NZ has an average purity of 76% [21], the equivalent potency of a product at this purity is approximately 96%. Note that the hydrochloride (HCl) portion accounts for approximately 20% of the molecular weight of the molecule, methamphetamine hydrochloride i.e. the highest achievable purity for methamphetamine hydrochloride is fraction over 80%.

In those instances where the methamphetamine was "cut", on nine out of ten occasions, the material used was dimethylsulphone (MSM). MSM is a purported dietary supplement with a crystalline appearance similar to crystalline methamphetamine hydrochloride. Creatine was the only other component encountered in this project [21]. It could be inferred, therefore, that approximately 90% of the methamphetamine smoked in NZ is relatively pure and even in the cases where it is not, it is likely that the primary contaminants through smoking are methamphetamine and its associated pyrolysis products.

A significant presence of *N,N*-dimethylamphetamine (DIMA) and amphetamine in swabs could indicate smoking as the source of the methamphetamine contamination. These along with benzylethyltrimethylammonium (BEMA) may also help the case for smoking as they are all pyrolysis products that readily form above 315ºC [11], Butane lighters/torches burn at temperatures up to 1970ºC. Although such temperatures are not expected during synthesis (the reaction occurs at around 118ºC), as mentioned previously, very little is known about the occurrence of trace amounts of demethylated/methylated methamphetamine in clandestine laboratory samples. It is conceivable that such “pyrolysis-products” could form at <315ºC if under pressure i.e. in a Parr bomb. Also, such temperatures could be achieved if certain equipment is overheated (e.g. distillations or reactions running dry, spillages on a heated surface).

As previously discussed, if *Ephedra* is used as the source of the precursor, due to the presence of the *Ephedra* alkaloids (cathine, phenylpropanolamine, *N*-methylephedrine and *N*-methylpseudoephedrine), amphetamine and DIMA are produced along with methamphetamine [6, 7] However, *Ephedra* is not a frequently encountered source of the precursor. Only one incidence in recent years has documented the use of *Ephedra* in a Clandestine Laboratory in New Zealand [10].

5. MEASURING CONTAMINATION

ESR and several methamphetamine testing companies have methods that are able to assess the level of contamination. Contamination in a property is generally measured by obtaining a swab/wipe of a surface and quantifying the amount of residual methamphetamine present on the swab/wipe, usually as an amount (µg) per area (cm^2). For ESR forensic casework, the method is only semi-quantitative as it assesses the level of methamphetamine contamination against an "excessive" threshold (see Section 5.3). Commercial testing should follow the approved NIOSH methods [22, 23, 24] and are fully quantitative as they are required to report accurate levels against the current standard of 1.5µg/100cm^2 as outlined in the New Zealand Standard: Testing and decontamination of methamphetamine-contaminated properties (NZS8510:2017).

5.1 LIMITATIONS

Analytically, the contamination being measured is at "trace" levels. That is, the methamphetamine in the residues is not visible to the naked eye and only small surface areas (usually 10cm x 10cm) are swabbed and analysed. These assays generally provide "methamphetamine levels" in the region of 0.01 - 1000µg/100cm^2 [25]. ESR clan-lab scientists will often swab larger areas to be able to determine whether or not any other minor contaminants, such as manufacturing by-products, are present. The presence of these additional compounds can provide evidence in relation to the source of the contamination.

The presence of methamphetamine itself does not provide any evidence that distinguishes the activities of smoking and manufacture. At trace levels, using current analytical instrumentation, there is no known method that identifies/distinguishes methamphetamine base (produced during the manufacture of methamphetamine) from the powder. Previous scoping experiments [4] showed no significant differences in the isotopic ratios between the smoked/burned methamphetamine and the source powder. Although the technique was not sensitive enough to detect methamphetamine base at trace levels, there would be no logical explanation for observing a difference in the isotopic ratios of methamphetamine base and its corresponding hydrochloride salt [4]. To complicate matters, it is highly unlikely that the manufacture of methamphetamine is an event independent of methamphetamine use.

Without the ability to determine the source of the methamphetamine in surface swabs, it is important to consider all the evidence when forming an opinion in relation to its origin and the relative extent of the contamination. Particularly in forensic casework, litigation, insurance claims and loss adjustments, every case should be treated as a single event, the evidence backed by sufficient data and the resulting opinion(s) peer reviewed.

Contamination caused by smoking or manufacture can affect any surface which subsequently is transferable through contact (i.e. secondary transfer). For the purposes of decontamination, it is important to gauge the extent of the contamination through a property by taking samples from various surfaces. In these assessments, the cause of surface contamination may not necessarily be limited to the aerosols produced by smoking and/or manufacture. On flat surfaces and objects in particular, the presence of methamphetamine could have been caused by contact with, or secondary transfer of, the source powder. As such, the results of these assessments are not often useful as evidence in relation to the cause/origin of the contamination.

To properly assess the extent of contamination caused by an aerosol, and therefore be able to offer an opinion on the origin of the contamination (i.e. smoking or manufacture), a surface thought only to have been exposed to the aerosol should be analysed. Reachable, horizontal and other surfaces susceptible to regular contact (either by the source powder itself or from secondary transfer) are avoided. To offer a scientific opinion in these cases, other hypotheses regarding the source of contamination need to be addressed and this is made easier by minimising them in the first place. At the microgram (μg) level, it is conceivable that a contaminated hand, cloth or garment could easily contribute to the level of contamination observed on a cupboard door or light switch, for example. Flat surfaces such as kitchen work-surfaces, furniture and floors offer even more alternatives. Drafts, extractor fans, ventilation systems, dehumidifiers, heat pumps, vacuum cleaners and even hair dryers all have potential as contributing factors in the observed results. As such, it may not be possible or appropriate to form a meaningful, scientific conclusion in relation to the source of the contamination from a commercial test report.

5.2 COMMERCIAL "TESTING"

There are several methamphetamine testing companies in New Zealand using a method of swab-taking (referred to as wipe samples in NZS8510), followed by analysis, with some subcontracting a commercial testing laboratory to analyse the samples. The results are gathered by the testing company who then report a "level of methamphetamine contamination" in relation to NZS8510. If the testing result from any wipe sample exceeds 1.5µg/100cm^2, the property is considered to be contaminated and the testing company is required to make recommendations on the next steps the owner/occupier should take in relation to the decontamination of the property.

The wipe sampling process and the subsequent analytical stream should follow NIOSH methods 9106, 9109 or 9111 [22, 23, 24]. The areas being sampled are 100cm^2, in-line with NZS8510 in which the decontamination level is set against this surface area. However, the amount of methamphetamine being removed from the surface will depend on the surface itself and the effectiveness of the wipe sampling which includes the technique used by the person carrying out the sampling process. Although a sampling technique is outlined in the NIOSH methods and the commercial testing companies should have obtained, or be obtaining, ISO17020 accreditation, there is currently no associated formal training or assessment process.

Analysis is generally carried out by a high-throughput analytical service using quantitative LCMS/MS or GCMS. In some cases the method being applied is calibrated for pseudoephedrine and ephedrine as well as methamphetamine. With a generally rigorous procedure backed by ISO17025 accreditation, one would expect little variation between the services providing a given result. Again though, this will depend on the company's continuous assessments and training.

Particularly in initial testing, the wipes are sometimes combined (composite samples) and the results are averaged. Much data is lost following this method and there is little left to interpret if the level of contamination per wipe sample is unknown. This is likely to have connotations when it comes to determining whether or not a property requires further assessment since it will be unknown if a level of, say 5.6µg/100cm^2, was caused by the combination of four wipe samples at 1.4µg/100cm^2 or 3 negative wipes samples and one at 5.6µg/100cm^2. In fact, for four wipe samples the result would have to be in excess of 6.0µg/100cm^2 before you could be sure at least one of them exceeded the 1.5µg/100cm^2 decontamination level in NZS8510. The danger here is that further testing and/or

decontamination projects might be carried out unnecessarily. Therefore, the use of composite samples requires careful consideration.

When reporting the testing results, some companies offer their opinion as to whether or not the contamination was caused by smoking or manufacture [25]. In most instances this opinion appears to have been formed from the assumption that the levels are too high to have been caused by any other scenario and/or the origin of any pseudoephedrine/ephedrine detected is as a result of the manufacture of methamphetamine. The interpretation may be correct but it is often unscientific and does not seem to take into account the surface/location of the contamination, the size of the room or the various other hypotheses that might account for the presence of minute amounts pseudoephedrine and/or ephedrine in the sample.

5.3 "EXCESSIVE" SMOKING THRESHOLD AND THE "SIGNIFICANT LEVEL"

The Clandestine Laboratory team at ESR issue a number of reports per year that provide evidence in relation to the manufacture of illicit drugs. This evidence often helps address Crown Prosecution charges in relation to offences under Section 12, "Use of Premises, Vehicle etc." of The Misuse of Drugs Act 1975 [26]. ESR does not carry out work in relation to property decontamination. As such, it is not necessary that their procedures follow the approved NIOSH methods [22, 23, 24].

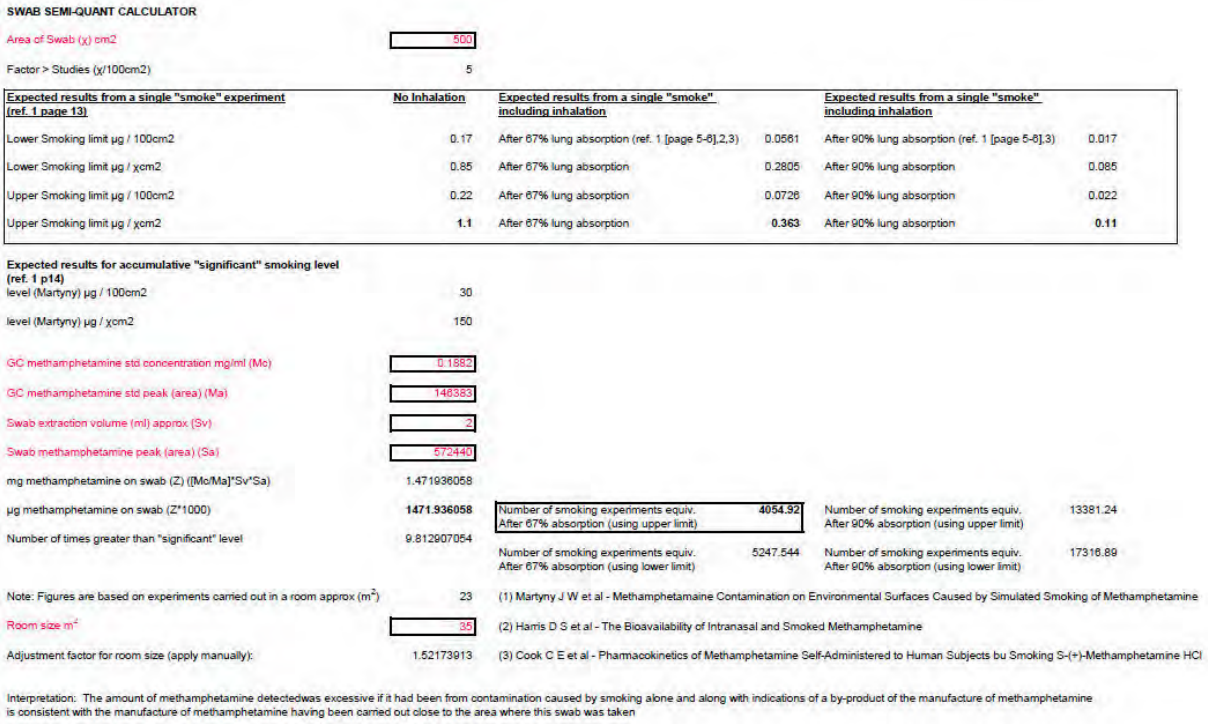
Note first that this method does not "determine" the source of the contamination. The analytical results of swabs taken from various surfaces in a dwelling/room help the reporting scientists assess a level of contamination against levels obtained from published research in relation to the deposition of residues through methamphetamine smoking [27]. This approach is taken since smoking is the only parameter that has been somewhat unit quantified in research.

This research by J Martyny *et al.* [27] recorded levels between 0.17 and 0.22µg/100cm^2 on vertical surfaces after a single "smoke". Only the vertical surface data is used as only vertical surfaces are assessed for reasons already described in Section 5.1. Other surfaces, such as ceilings are swabbed but consideration needs to be given to their location as there is no associated data in this reference. It is expected that the surface material will also produce variable results. These variables and influences to the current method is the subject of further research which was carried out as part of this project.

The scientist's overall opinion on whether the manufacture of methamphetamine had occurred on the premises is largely influenced by the level of methamphetamine exceeding (or not) levels that would otherwise be considered excessive if it had been caused by smoking alone. This threshold is reported as a "significant amount of smoking" in the same published literature [27] and is consistent with levels produced during the manufacture of methamphetamine [28, 29, 30] along with the general acceptance that, despite the different methods, all will produce significantly more contamination than smoking due to the production of volatile methamphetamine base. The extraction and "salting-out" phases of the manufacture of methamphetamine are generally consistent among the various methods and it is at this stage that most of the contamination is thought to be produced (personal communication with H. Skinner who worked with J. Martyny).

From this data [27], a method has been validated and implemented; The Analysis and Interpretation of Surface Swabs", (DRC/SOP/023) [31]. Since it relates to an approximate and theoretical threshold, from which an opinion is drawn (often in combination with other evidence), the method is only semi-quantitative. The method does, however, include an algorithm that accounts for the absorption of methamphetamine by the smoker and in doing so, calculates the estimated equivalent number of individual "smoking events" that theoretically could have caused such contamination. The number of smoking events that would have had to be carried out to achieve this "significant" level ($30\mu g/100cm^2$) [27], is approximately 1500, assuming a smoker had captured 90% of the methamphetamine [15]. This level is still high (approximately 400) if only 67% is absorbed [16].

In reporting casework, the ESR Clandestine Laboratory team will observe the methamphetamine levels in relation to this significant level provided by a Microsoft® Excel semi-quantitative "Swab Calculator" [31]. An example is shown in Figure 6. The number of smoking experiments are measured and the minimum value is highlighted. The minimum number of smoking experiments value is calculated from the highest level of contamination produced by a single "smoke" and using the lowest amount of absorption by the user. This gives a figure for the least number of smoking events that would have caused the contamination and is considered the default when making an assessment, although the range is clear and relevant.



SWAB SEMI-QUANT CALCULATOR

Area of Swab (χ) cm2	500				
Factor > Studies (χ/100cm2)	5				
Expected results from a single "smoke" experiment (ref. 1 page 13)	**No Inhalation**	**Expected results from a single "smoke" including inhalation**		**Expected results from a single "smoke" including inhalation**	
Lower Smoking limit µg / 100cm2	0.17	After 67% lung absorption (ref. 1 [page 5-6],2,3)	0.0561	After 90% lung absorption (ref. 1 [page 5-6],3)	0.017
Lower Smoking limit µg / χcm2	0.85	After 67% lung absorption	0.2805	After 90% lung absorption	0.085
Upper Smoking limit µg / 100cm2	0.22	After 67% lung absorption	0.0726	After 90% lung absorption	0.022
Upper Smoking limit µg / χcm2	**1.1**	After 67% lung absorption	**0.363**	After 90% lung absorption	**0.11**
Expected results for accumulative "significant" smoking level (ref. 1 p14)					
level (Martyny) µg / 100cm2	30				
level (Martyny) µg / χcm2	150				
GC methamphetamine std concentration mg/ml (Mc)	0.1882				
GC methamphetamine std peak (area) (Ma)	148383				
Swab extraction volume (ml) approx (Sv)	2				
Swab methamphetamine peak (area) (Sa)	572440				
mg methamphetamine on swab (Z) ([Mc/Ma]*Sv*Sa)	1.471936058				
µg methamphetamine on swab (Z*1000)	**1471.936058**	Number of smoking experiments equiv. After 67% absorption (using upper limit)	**4054.92**	Number of smoking experiments equiv. After 90% absorption (using upper limit)	13381.24
Number of times greater than "significant" level	9.812907054	Number of smoking experiments equiv. After 67% absorption (using lower limit)	5247.544	Number of smoking experiments equiv. After 90% absorption (using lower limit)	17316.89
Note: Figures are based on experiments carried out in a room approx (m^2)	23	(1) Martyny J W et al - Methamphetamaine Contamination on Environmental Surfaces Caused by Simulated Smoking of Methamphetamine			
Room size m^2	35	(2) Harris D S et al - The Bioavailability of Intranasal and Smoked Methamphetamine			
Adjustment factor for room size (apply manually):	1.52173913	(3) Cook C E et al - Pharmacokinetics of Methamphetamine Self-Administered to Human Subjects bu Smoking S-(+)-Methamphetamine HCl			

Interpretation: The amount of methamphetamine detectedwas excessive if it had been from contamination caused by smoking alone and along with indications of a by-product of the manufacture of methamphetamine is consistent with the manufacture of methamphetamine having been carried out close to the area where this swab was taken

Figure 6: An example of the "Swab Calculator" used in case work for the interpretation of surface swabs.

The approximate size of the swabbed area is measured along with the approximate size of the room (cm^2 and m^2, respectively). These values, along with the instrument/method parameters and standard measurements are inputted into the calculator's editable fields. Consideration is given to the size of the room since the work these calculations are based on used a room size of approximately $23m^2$ [27].

An interpretation based on the level of contamination is formed which leads to an overall opinion as to whether the contamination is excessive (if it had been caused by contamination through smoking), and in which case the manufacture of the drug is a more likely cause. Subsequently, an opinion in relation to the "Use of Premises" [26] is considered, usually in conjunction with other evidence. If the level of contamination is below the significant threshold (having also accounted for room size), it is often not possible to form an opinion either way since methamphetamine is often the only detectable contaminant and either scenario (smoking or manufacture) is possible.

The size of the swabbed area somewhat relates to the likelihood of being able to detect minor components (i.e. ephedrine/pseudoephedrine and manufacturing by-products) if the manufacture of methamphetamine had been carried out. In such cases, a surface area of $2500cm^2$ will often show indications of these components if the level of methamphetamine is also high. Confirmation of their presence however, is made difficult due to instrument

sensitivity and/or subsequent confirmatory (derivatisation) analysis. This is an area targeted for improving the current method along with the development of the calculator into a valid marketable tool having been backed up by experiments and data evaluated as part of this project.

6. HOUSING NEW ZEALAND (HNZ) CORPORATION – DATA

Upon the announcement of NZS8510 and ESR's potential involvement, a significant portion of this project has been concerned with equipping ESR with the tools to consult in this area. This included looking at ways to improve current methods through research and data analysis.

Up until now, ESR Forensic Chemistry has steered clear of this market despite weekly, if not daily, enquiries either asking ESR to carry out associated analysis or offer some form of consultancy. Enquirers have included HNZ and, along with our involvement with the NZS8510, there has been a clear need for some scientific input. As a result, HNZ have provided ESR in excess of 2500 reports from methamphetamine-tested properties [25].

During the accumulation of this data, surveys have been carried out in answer to some queries from HNZ. Through this communication and issuing HNZ with regular updates [32], ESR has secured a good working relationship and the unofficial position of scientific adviser to the largest consumer of these services.

6.1 SCIENTIFIC RELEVANCE

HNZ have approximately 65,000 properties across New Zealand and they regularly commission methamphetamine testing at their properties for pre-tenancy checks or where they have reasonable cause to believe the drug has been used. The reports cover the period since July 2014 and have proved to be a valuable source of data as it is reasonable to assume that the vast majority of these properties, if contaminated, are likely to have been contaminated as a result of methamphetamine use (smoking) rather than its manufacture. This assumption is based on HNZ's overall suspicion of use and that none of the addresses provided are familiar to recent ESR casework. In any case, suspicions of manufacture would normally lead to a Police enquiry.

Therefore, the data extrapolated from the reports is likely to inform this project with a potential “Baseline Level” of contamination caused by smoking. We accept that the duration of residency may be a factor in these circumstances but also point out that the rental and private housing markets are also subject to regular exchanges of tenants and owners. No similar assessment is known to have been carried-out or published and it is hoped that the results of this extensive examination will support current theories and therefore result in an associated scientific paper put forward for publication.

6.2 CAPTURING THE DATA

The reports include all the quantitative data, location, size and surface type, to name but a few, for approximately 20,000 surface wipes/swabs along with the pre and post decontamination reports and associated findings. The data set was vast and it was decided to use the web-based data capturing software application, REDCap™ to import the data. It was calculated that it would take over 1000 FTE hours to import all the data, so we refined the dataset to the information that could be captured from the surface wipe samples, with the intention of uploading at least half of the data.

At this point it was established that refining the data at the address/property level would be no help in trying to assess “contamination”. Using the surface wipes/swabs, rather than the addresses would provide us with a dataset in excess of 10,000 events that could be refined/manipulated by criteria such as concentration level, location, room, surface type, surface material and even postcode. Only the pre-decontamination wipes were used as post-decontamination wipes only serve at testing the effectiveness of the previous decontamination process. As such a REDCap™ “project” was designed to capture this data (Figure 7).

It should be noted that the overall results produced from the analysis of this data are only as good as the data itself, since a number reports were incomplete or not as comprehensive as others. Incomplete reports were generally avoided. Less comprehensive reports were utilised as much as possible but still left some knowledge gaps (resulting in “not stated” categories).

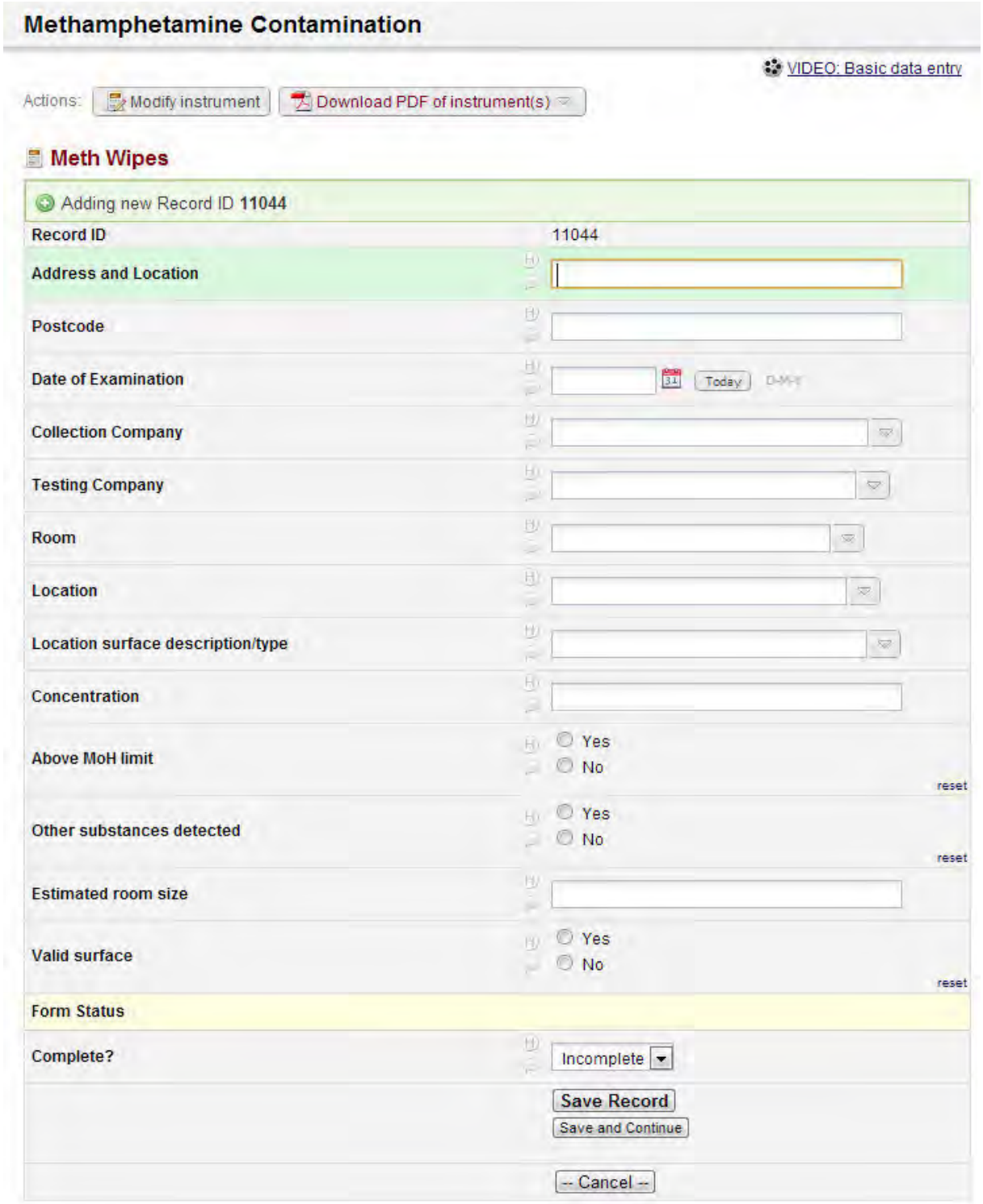


Figure 7: REDCapTM "project" page – this project could export grouped data to a Microsoft® Excel spreadsheet(s) that could then be further manipulated.

6.3 ANALYSIS AND DISCUSSION

More than 13,000 surface wipes have been analysed from over 1,100 properties (properties that showed no methamphetamine contamination have not been included for this data analysis). The REDCap™ "project" grouped data and exported the parameters to a Microsoft® Excel spreadsheet for further analysis. The concentration of methamphetamine varies and is depicted in the pie chart in Figure 8.

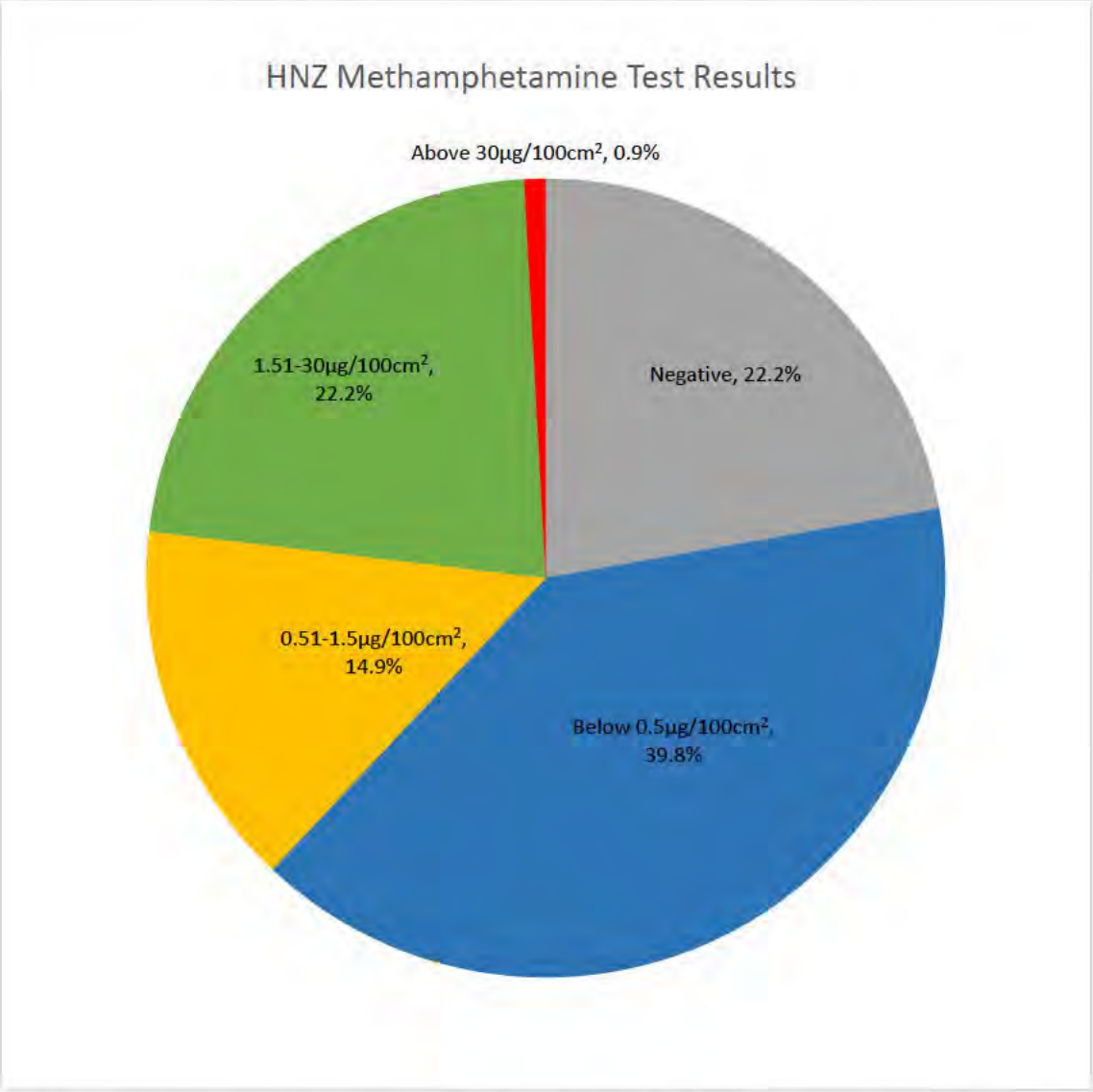


Figure 8: Pie chart grouping ranges of methamphetamine contamination levels (µg/100cm²).

6.3.1 Key Statistics

From this HNZ surface wipe dataset:

- Approximately 78% of the pre-decontamination surface wipes from the assessed HNZ properties were “positive”.
- More than 75% of the surface wipes, in total, were below a methamphetamine concentration of 1.5µg/100cm^2, of which approximately one third were negative.
- The average level of methamphetamine on the “positive” wipes was 2.73µg/100cm^2.
- The average highest level of methamphetamine within the properties surveyed was 8.14µg/100cm^2.
- Less than 1% of surface wipes were above a methamphetamine concentration of 30µg/100cm^2.

6.3.2 “Positive” Results

Approximately 78% of surface wipes were “positive”, i.e. methamphetamine was detected. The ranges chosen have some relevance. The original MOH guidelines referred to 0.5µg/100cm^2 as the acceptable post-decontamination re-occupancy level for a dwelling that has been used as a “clan meth lab” and HNZ were decontaminating to this level before the introduction of NZS8510.

Although 38% of HNZ surface wipe results were above 0.5µg/100cm^2, a further 14.9% are at 1.5µg/100cm^2 or below. HNZ could expect an equivalent reduction (approximately 15%) in their decontamination costs with the new decontamination level in NZS8510 of 1.5µg/100cm^2.

23.1% of surface wipes were above 1.5µg/100cm^2 with less than one percent over 30µg/100cm^2. Contamination at this level would normally be accompanied by further interpretation at ESR, since the levels are excessive if they had been caused by contamination through smoking alone (see Section 5.3). Nevertheless, the relative infrequency that such high levels are detected supports the significant/excessive threshold.

The average concentration of all the surface wipes processed, including the “negative” surface wipes, was 2.12 µg/100cm^2. The average concentration of the positive surface wipes (those that detected any level of methamphetamine) was 2.73 µg/100cm^2. The majority of surface wipes taken from HNZ properties show methamphetamine contamination levels below 1.5 µg/100cm^2 (Figure 9).

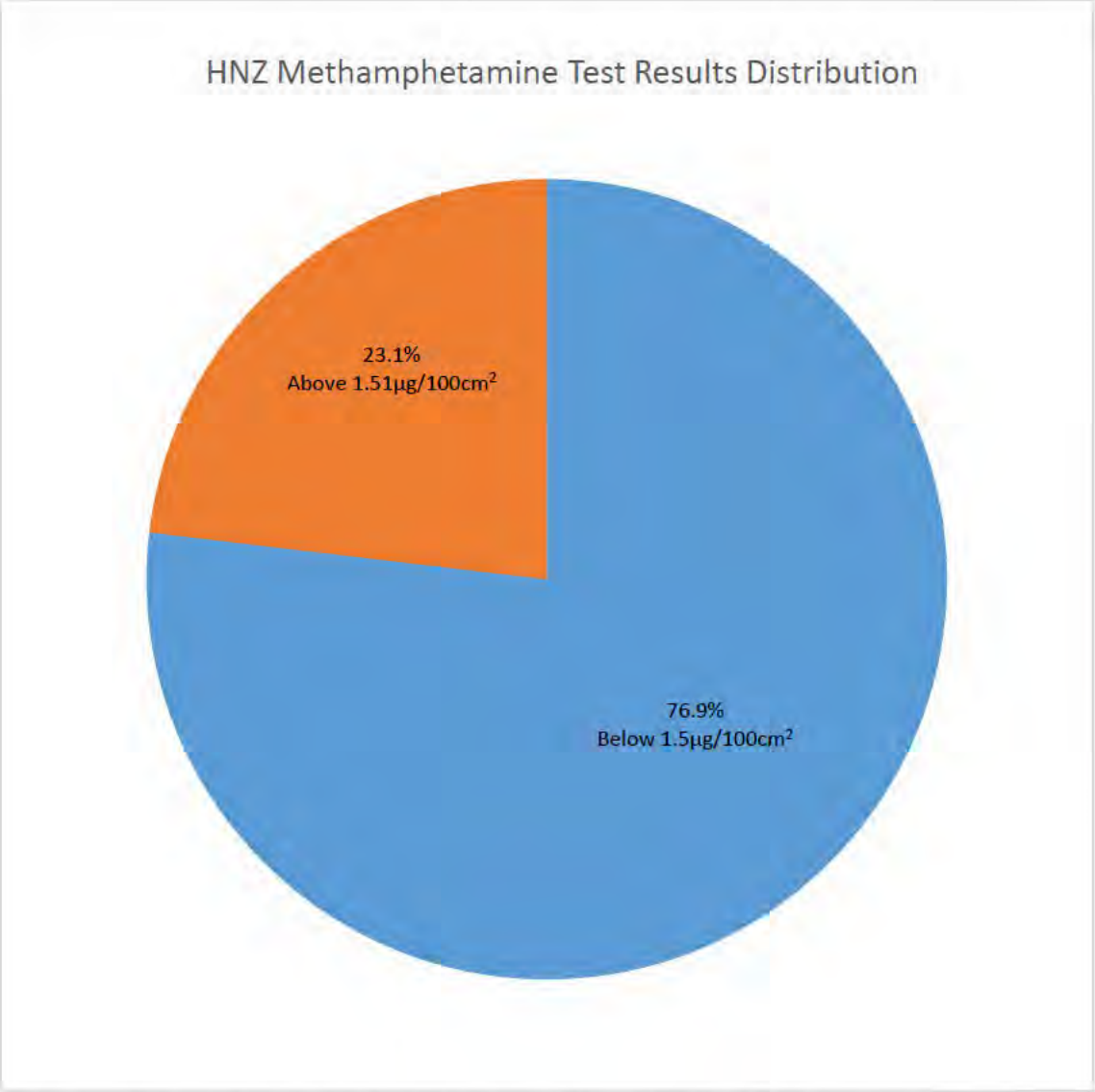


Figure 9: Pie chart depicting the breakdown of surface wipes above or below 1.5 µg/100cm².

6.3.3 Room Type

A variety of room types have been tested with the most common being the bedroom, lounge, kitchen, hallway, bathroom and laundry. Figure 10 shows the number of wipe samples taken from each room type. Bedrooms show a significantly higher wipe count simply because there is generally more than one bedroom within HNZ properties.

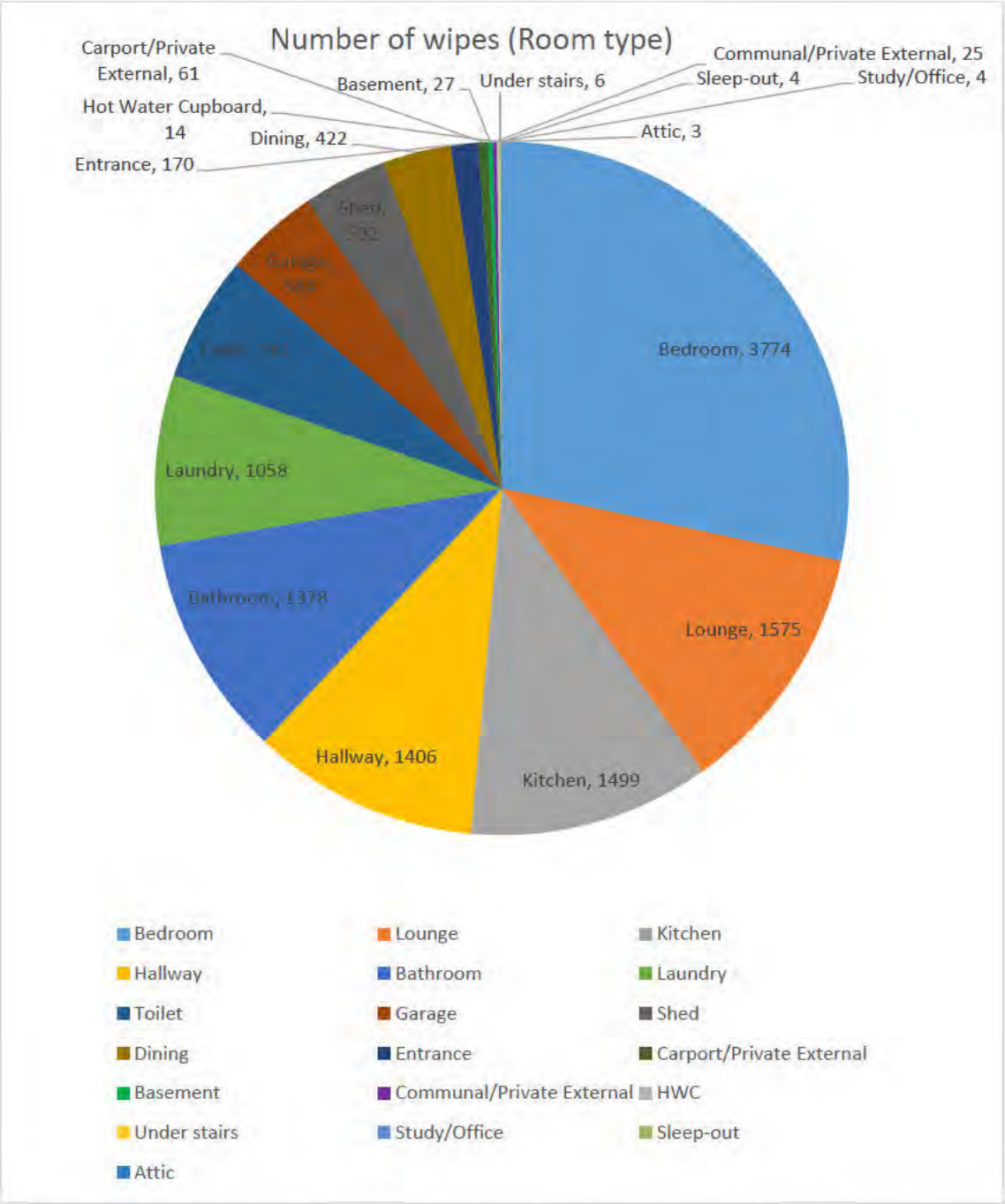


Figure 10: Pie chart of the number of wipe samples taken in each room type (all wipes).

The average levels of contamination (for positive wipes only) for the main room types are shown in the graph in Figure 11, where the red bars indicate the rooms where the average levels of contamination are greater than the average "positive" surface wipe concentration (>2.73µg/100cm^2), the yellow bars indicate the rooms where the average levels of contamination are less than the average "positive" surface wipe concentration but greater than the current decontamination level and the blue bar indicates the room where the average levels of contamination are less than the level required for decontamination

(1.5µg/100cm^2). The kitchen and entrance show the highest average surface wipe concentrations, followed by the lounge, hallway, dining area and basement.

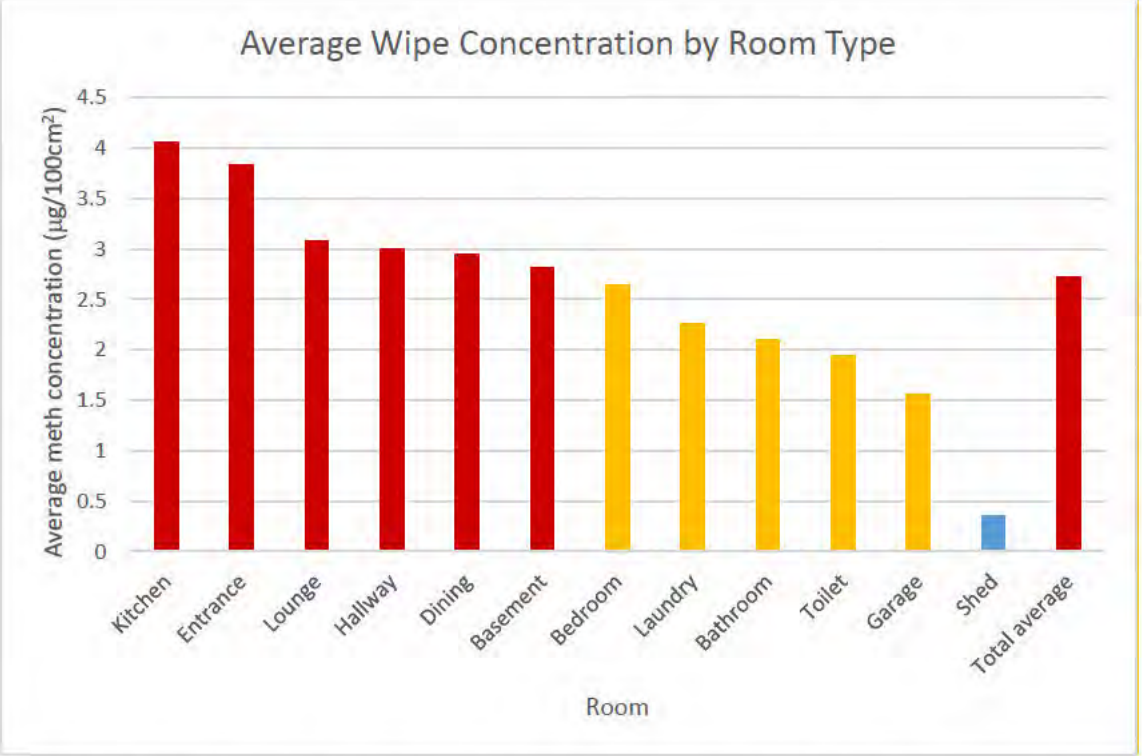


Figure 11: Bar graph depicting the average methamphetamine concentration in surface wipes by room type (for positive surface wipes only).

Since it is proposed that the majority of the data accumulated from HNZ properties can be reasonably attributed to smoking, this information shows where this activity is most likely taking place.

As expected, the common living areas, such as the kitchen, lounge and dining areas show higher levels of methamphetamine contamination. However, the results show that the access ways, such as the entrance and hallways are also quite high. This could be showing that contamination readily spreads from connecting rooms with higher levels of contamination, rather than these areas being the location of the activity.

Interestingly, the data indicates a trend in 'private' areas being utilised, such as bedrooms, bathrooms and toilets. However, the size of the room is not accounted for in this data set and a smaller room, such as a toilet, is likely to show a higher level of contamination relative to the larger, common areas where most of the activity is likely to be taking place.

Having analysed the data, the average levels can be misleading when taking into consideration the median and mode values of the results within the different room types. Remember that 76.9% of surface wipes in this dataset are 1.5µg/100cm^2 or lower. So, the median and mode values are also much lower than the calculated averages indicating that there are a minority of surface wipes, with methamphetamine concentrations above 1.5µg/100cm^2, affecting the averages.

Room Type	Positive Results	Mean (µg/100cm^2)	Median (µg/100cm^2)	Mode (µg/100cm^2)
Kitchen	1270	4.06	0.76	0.03
Entrance	134	3.83	0.54	0.03
Lounge	1260	3.08	0.49	0.03
Hallway	1168	3.00	0.59	0.03
Dining	339	2.95	0.58	0.03
Basement	14	2.81	0.19	0.06
Bedroom	3021	2.65	0.47	0.03
Laundry	818	2.26	0.37	0.03
Bathroom	1096	2.11	0.46	0.03
Toilet	629	1.95	0.42	0.03
Garage	394	1.55	0.25	0.03
Shed	154	0.35	0.06	0.03
All positive results	10355	2.73	0.48	0.03

Table 1: Mean, median and mode of the methamphetamine levels from the main room types (positive surface wipes only).

The median and mode values are compared in Table 1 alongside the mean (average) values for the most common room types. This provides a more realistic "range of contamination" for smoking which, in most cases is likely to extend to levels much less than the average. For all room types, the most common result (the mode) is much lower still.

6.3.4 Surface Type

The number of surface wipes collected from different surface types (both positive and negative surface wipes) are shown in the graph in Figure 12.

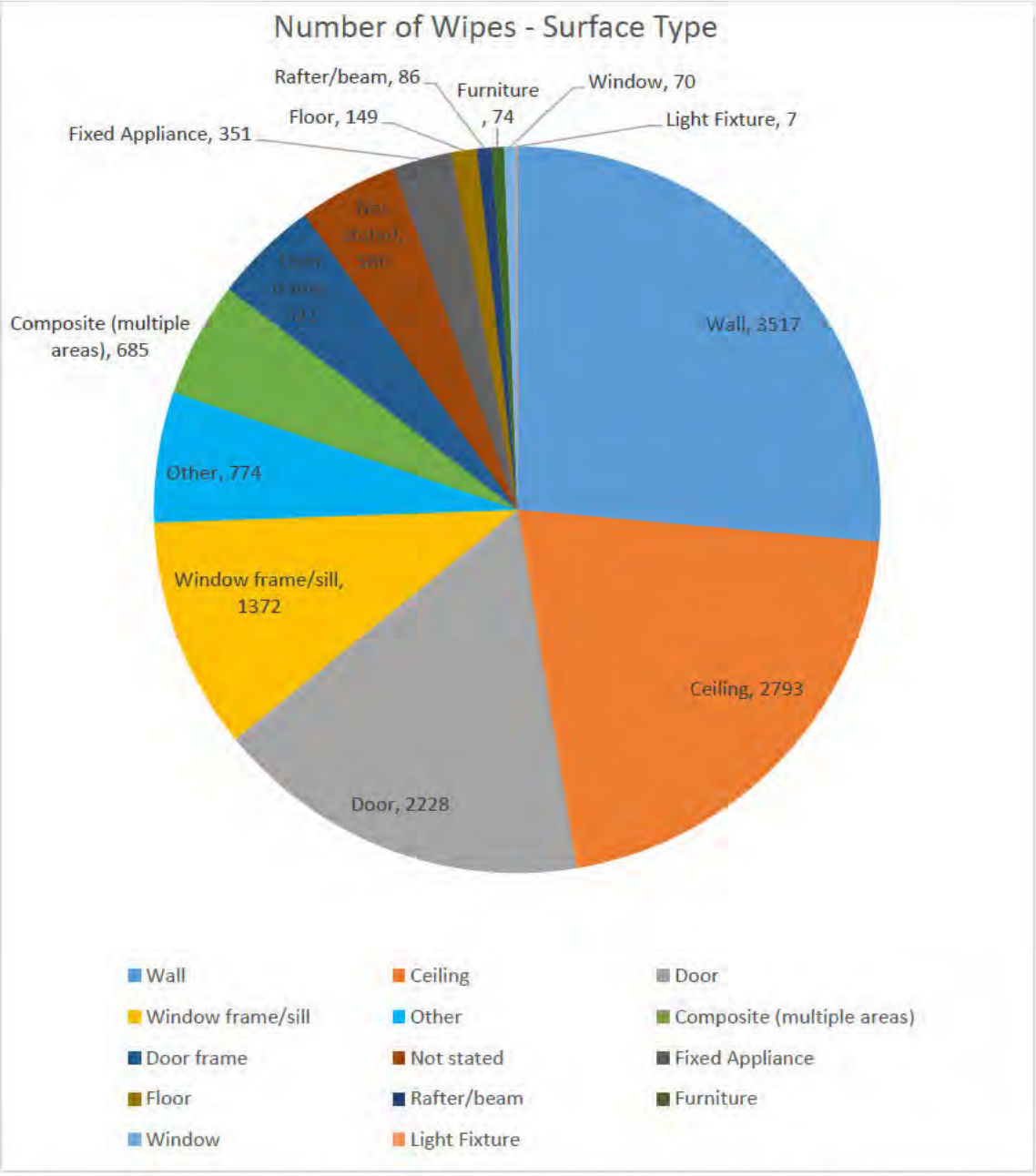


Figure 12: Pie chart showing the sampling distribution by surface type (all surface wipes positive and negative) taken within HNZ properties.

Walls and ceilings were the most frequently sampled surface types, with almost half of all wipes being taken from these surfaces. Other commonly sampled areas included various surfaces on or around internal doors, window frames and sills as well as fixed appliances such as range hoods, heat pumps etc. “Other” surfaces included power-boards/meters (presumably the casing), shelving and other uncommon locations. “Composite” surface wipes are those taken from multiple surface locations generally sampled during initial/preliminary screening tests.

Methamphetamine sampling companies in New Zealand do not have a strict regime on where to test within a room. These agencies are attempting to assess the general level of contamination within a property, which is used to determine if the property is safe for human habitation. Unlike ESR scientists, the type of surface being tested is not restricted to high vertical or ‘non-contactable’ surfaces and are therefore more varied. Often they are not described at all (not stated).

The average wipe concentration by surface type for positive wipes only are shown in the graph in Figure 13.

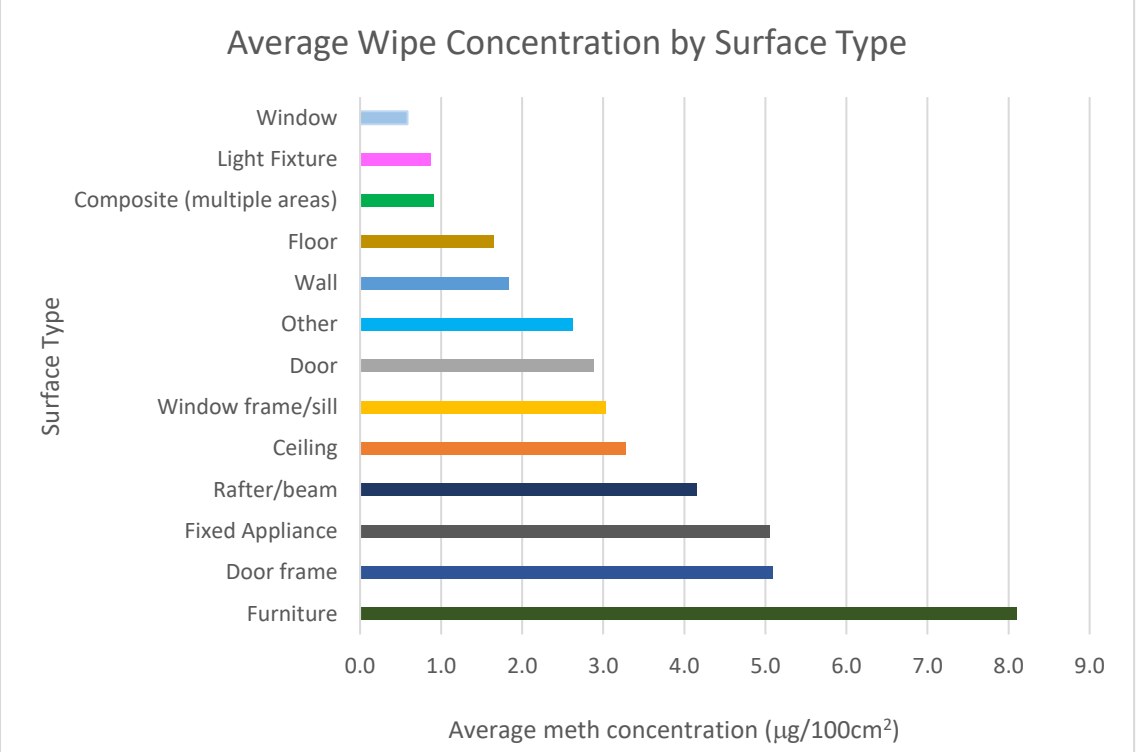


Figure 13: Bar chart showing the average wipe concentration (positive surface wipes only) of each of the surface types.

The surface type showing the highest average methamphetamine concentration was "furniture". However, the sample count was low (74) and furniture was usually only sampled if preliminary screening had shown relatively high methamphetamine contamination levels in the property. In these instances, the furniture was being tested in order to assess if it could be kept by the owners or HNZ. Door surfaces, fixed appliances and rafters/beams showed the next highest average methamphetamine contamination levels. The high levels exhibited by doors and door frames could be explained by the surface material of this surface type e.g. smooth painted surfaces which allow easier removal of residual methamphetamine. Also, the comparatively higher level of door frames to doors is probably because door frames offer a horizontal surface at the apex of the jamb. Particularly for an open door, this part of the door frame may also be more susceptible to the general flow of rising smoke as would be observed in a house fire, for example.

The median and mode values are compared in Table 2 alongside the mean (average) values for the most common surface types.

Surface Type	Positive Results	Average (µg/100cm^2)	Median (µg/100cm^2)	Mode (µg/100cm^2)
Furniture	48	8.09	0.47	0.04
Door frame	589	5.08	1.10	0.05
Fixed Appliance	243	5.05	0.40	0.06
Rafter/beam	62	4.15	0.57	0.03
Ceiling	2295	3.28	0.67	0.03
Window frame/sill	1140	3.03	0.67	0.03
Door	1822	2.88	0.67	0.03
Other	590	2.62	0.49	0.03
Wall	2564	1.83	0.30	0.03
Floor	103	1.64	0.29	0.03
Composite (multiple types)	586	0.91	0.24	0.02
Light fixture	3	0.87	0.29	NA
Window	23	0.59	0.09	0.09
All positive results	10355	2.73	0.48	0.03

Table 2: Average, median and mode for the methamphetamine concentration values per surface type (positive surface wipes only, negative surface wipes excluded).

As observed in the data for “room type” presented in Section 6.3.3, the median and mode values for the methamphetamine concentrations for “surface type” also suggest a similar minority of high values contributing to a disproportionately high average value. Again, the median and mode values, as shown in Table 2, provide a more realistic “range of contamination” for smoking that extends to levels much less than the average.

The data also shows that when furniture, fixed appliances and other surfaces that may have upward facing horizontal surfaces (including window sills and the upper reaches of door frames) are excluded, the higher average levels of contamination are observed on ceiling and rafters rather than the walls and windows. This indicates that methamphetamine smoke contamination tends to be more concentrated higher up in a room and/or, a downward facing horizontal surface is more susceptible to contamination than a vertical surface. This is the subject of further work carried out (refer to Section 9) and directly relates to the issue that previously published work [27] did not include downward facing surfaces, such as ceilings, in their experiments.

6.3.5 Surface Material

The data presented in Figure 14 includes the number of wipes taken from different surface materials within HNZ properties. Those wipes that did not state a surface material are excluded from this dataset.

Using surface material as a primary filter in relation to the levels of methamphetamine has provided some interesting results; perhaps going as far to suggest how well methamphetamine adheres to a certain surface and/or whether it is being absorbed. Alternatively, the data may relate to the efficiency of the wipe itself in removing the methamphetamine from different surface types.

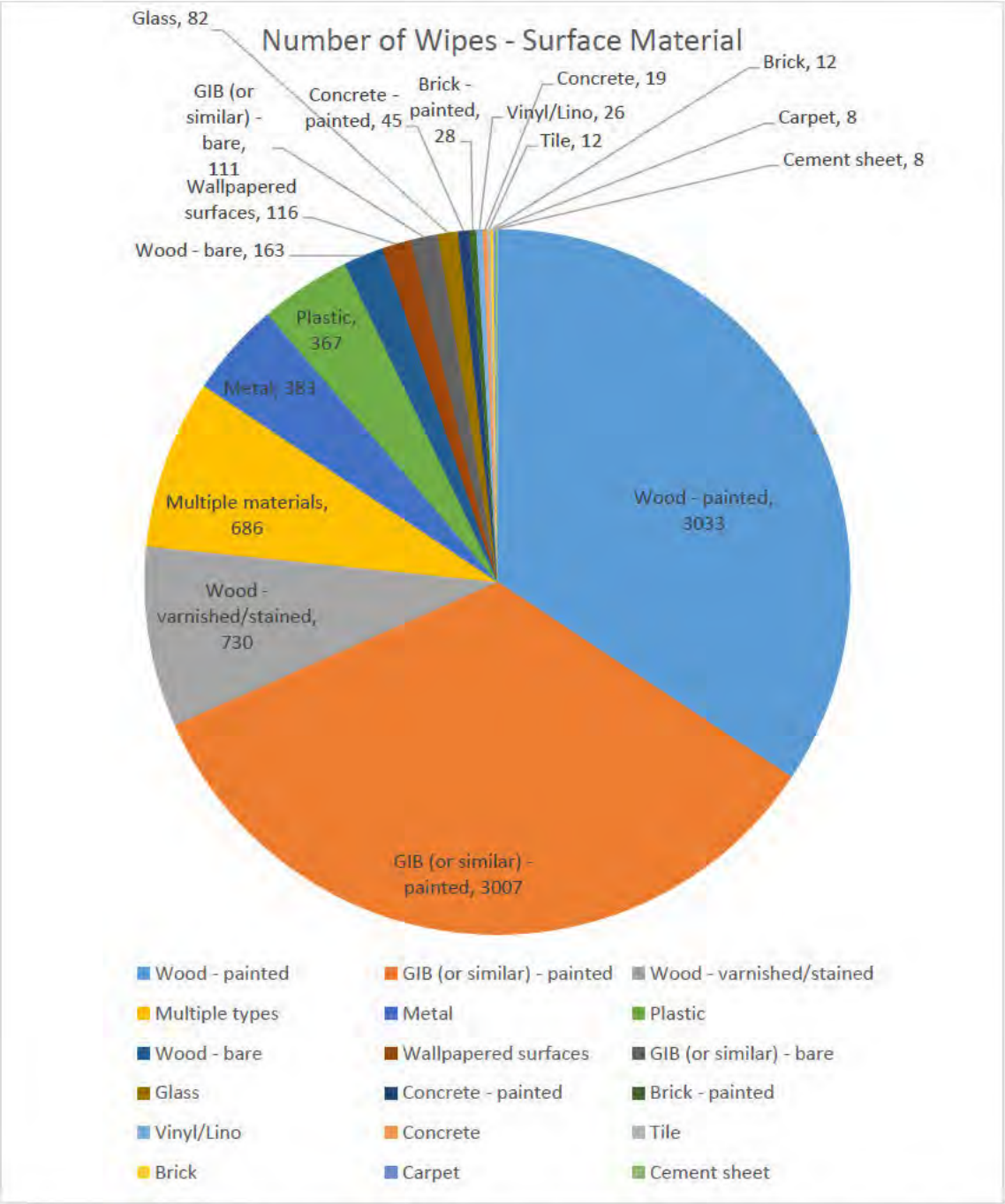


Figure 14: Chart showing the distribution of the different surface materials wipes were taken from (positive and negative) within HNZ properties.

Almost a third of the data had no associated surface material due to many reports not stating the surface material and focussing on the methamphetamine contamination level relative to the location. This data has therefore not been included. Otherwise, the surface materials that were most often sampled included painted wood and painted GIB (or similar), which make up roughly two thirds of the total number of wipes taken. Other significant types include varnished wood, metal and plastic.

The “multiple materials” category relates to the composite wipes taken during initial/preliminary screening tests, where different surface materials are being sampled before being combined for analysis. Due to the difficulty in interpretation, this category is excluded from any further discussion. Similarly, floor coverings are understandably sampled but given the variable circumstances by which these surfaces could be contaminated, including the immeasurable number of different contact transfer possibilities, data for this surface type is not useful in determining overall contamination trends associated with smoking.

The average methamphetamine concentrations measured in the positive wipes from common surface materials are shown in Figure 15.

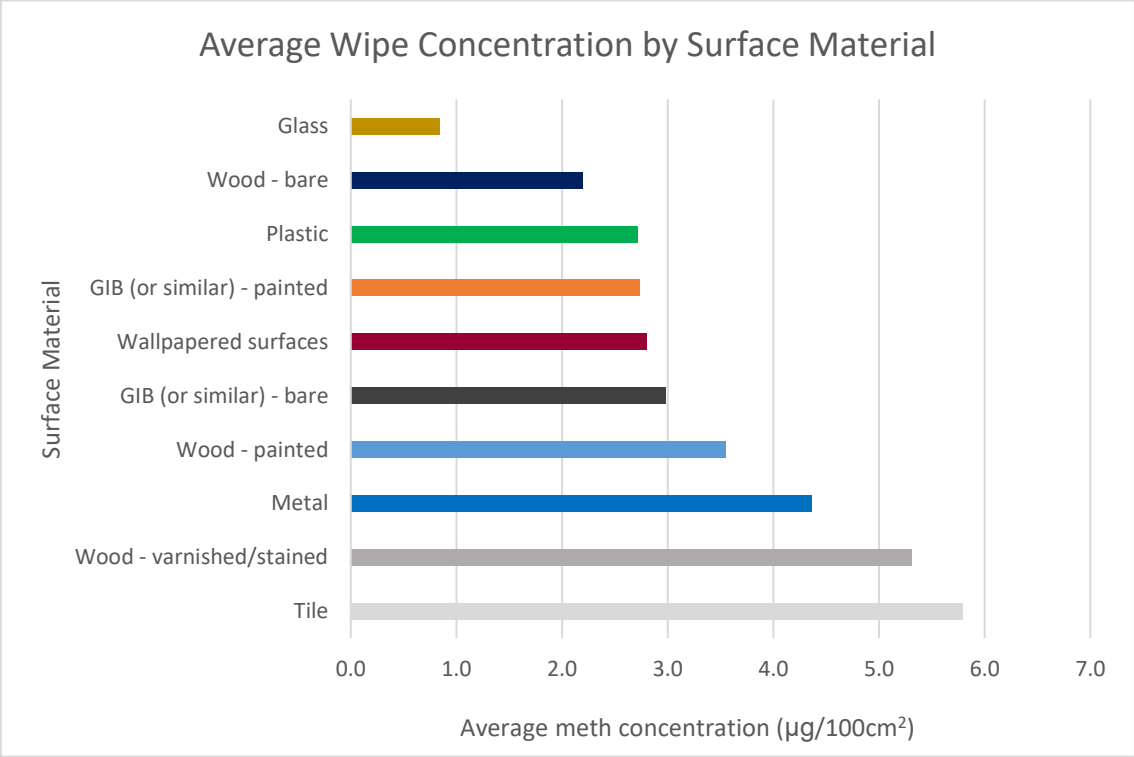


Figure 15: Bar chart showing the average concentrations measured on the common surface materials (positive wipes only, negative wipes excluded).

The surface materials that showed the highest average methamphetamine contamination concentrations were cement sheet and tile, however these surface types were rarely sampled. Therefore, these high readings are most likely influenced by few relatively high methamphetamine contamination readings (with 8 and 12 wipes taken, respectively). Apart from “tiles” which have been included in Figure 15 for comparison with clan-lab data (Figure 28), these surfaces, along with other low sample sets, such as brick and concrete, have not been discussed in further detail.

Along with tiles, the two surface materials that show interesting results are the varnished/stained wood and the metal, where they show high average methamphetamine contamination concentrations and have had a significant number of wipes taken from these surface materials. The smooth nature of these surfaces perhaps indicate that they are not only favourable surfaces for methamphetamine to adhere-to, but also easily removed-from by the action of a wipe. These surface materials were included in some further experimental work (Section 9).

The smooth surface hypothesis doesn't seem to apply to glass. However, only 29 samples make up the dataset for this surface material of which the majority are from the 23 window surface types. This indicates a general avoidance of sampling this surface material in the industry. Window coverings, cleaning frequency and condensation are all valid explanations as to why glass, or at least windows, present relatively low readings in a room where higher reading(s) are observed elsewhere. The average level of contamination for windows was 0.59µg/100cm^2.

Surface Material	Positive Results	Average (µg/100cm^2)	Median (µg/100cm^2)	Mode (µg/100cm^2)
Tile	6	5.79	5.50	NA
Wood – varnished/stained	697	5.31	1.40	0.05
Metal	247	4.36	0.45	0.03
Wood - painted	2687	3.55	0.96	0.03
GIB (or similar) – bare	96	2.98	0.65	0.04
Wallpapered surfaces	98	2.80	0.62	0.19
GIB (or similar) - painted	2592	2.73	0.56	0.03
Plastic	285	2.72	0.62	0.03
Wood - bare	95	2.20	0.32	0.03
Glass	29	0.84	0.13	0.03
All positive results	10355	2.73	0.48	0.03

Table 3: Average, median and mode values for the methamphetamine concentration values per surface material (positive wipes only).

Once again, the median and mode values indicate that the true level of methamphetamine contamination may be lower than that suggested by the average methamphetamine concentrations for each surface material.

6.3.6 Surface Position

Table 4 compares the most common surface materials for ceilings and walls, i.e. GIB (or similar) painted/bare and plastic relative to their position, i.e. downward facing surfaces versus vertical surfaces, respectively, with the average methamphetamine concentrations for positive wipes in those groups.

Surface Type	Position	Surface Material	Positive Wipes	Average (µg/100cm^2)
Ceiling	DF	GIB (or similar) – painted	1069	3.68
	DF	GIB (or similar) – bare	76	3.52
	DF	Plastic	84	2.55
Wall	V	GIB (or similar) – painted	1516	2.07
	V	GIB (or similar) – bare	20	0.96
	V	Plastic	98	1.43
Door	V	Wood – painted	805	3.08
	V	Wood – varnished/stained	447	4.25
Door frame	V	Wood – painted	393	4.74
	V	Wood – varnished/stained	101	10.16
Rafter/beam	DF	Wood – painted	3	1.26
	DF	Wood – varnished/stained	10	8.48
	DF	Wood - bare	33	4.20

Table 4: Relationship between average methamphetamine concentrations on the common surface types/materials relative to their position (DF = downward facing, V = vertical).

All surface materials show higher average methamphetamine concentrations on ceilings when compared to walls supporting the previous observation (Section 6.3.4) that a downward facing horizontal surface is more susceptible to contamination than a vertical surface and/or methamphetamine smoke may be more concentrated towards the ceiling. Regardless of the material, this certainly indicates that ceilings are a more appropriate

surface location to sample for a measure of methamphetamine contamination in a room compared with walls.

Furthermore, common wooden surface locations (i.e. doors, door frames and rafters/beams) have shown that varnished/stained surface materials show higher average methamphetamine concentrations compared with painted wood for the same surface type (or bare wood for the rafter/beam surface type). This observation goes hand in hand with the general observation that smoother surfaces are producing higher results. The data seems to suggest that this has more to do with the effectiveness of wiping these surfaces rather than the surface itself being more contaminated. It could also suggest that these surfaces would be relatively easy to clean and/or prevent methamphetamine being absorbed into the material beneath.

6.3.7 Detection of Other Compounds

Approximately one quarter of the total number of wipes recorded in this data set detected other substances in the wipe samples as shown in Table 5. However, this is likely to be inaccurate as one of the testing companies (Forensic and Industrial Science Ltd) used a GC/MS method where only methamphetamine presence and concentration was recorded. However, of those wipes that did record other substances, amphetamine was the "other" substance detected in most cases and was present on almost all of them.

Substance(s) detected	Number of wipes on which these substances were detected	Percentage of wipes where at least one other substance was detected
Amphetamine	3135	98.8%
Ephedrine and/or Pseudoephedrine	640	20.1%
Total number of wipes where other substances detected	3170	23.81%

Table 5: Figures showing the number of wipes where amphetamine, ephedrine and/or pseudoephedrine were detected.

Amphetamine is a pyrolysis product of methamphetamine and is the likely reason for its presence on surface wipes (see Section 4.4) rather than its role as a precursor. *N,N*-dimethylamphetamine is produced in comparable amounts although is not reported in the commercial testing field. This could be either because they are unable to detect or confirm

its presence, or, because they are reporting amphetamine as a "precursor" and the pyrolysis products are overlooked.

The detection of pseudoephedrine or ephedrine was generally associated with a high level of methamphetamine, increasing the likelihood that the manufacture of methamphetamine may have been an additional source of contamination. Although some testing companies have interpreted this as proof of such activity, no alternative hypothesis appears to have been considered, leaving parameters such as location, room size, surface type and material unaccounted for and unexplained.

6.3.8 Heavily Contaminated Properties

Within the HNZ dataset, there were a few properties that recorded (on one or more wipes) methamphetamine concentrations above 30µg/100cm^2. This group of wipes represented only 0.86% of the total amount of wipes processed. The distribution of these wipes is presented in Table 6 and only wipes that were considered "valid" (i.e. those that are taken from high vertical/horizontal surfaces, "unreachable" surfaces) have been included and discussed. The average high level (i.e. the average level of methamphetamine over 30µg/100cm^2) is included.

Room	Count >30 µg/100cm^2	Average (µg/100cm^2)
Lounge	12	57.5
Kitchen	10	72.51
Bedroom	11	59.09
Hallway	7	60.60
Laundry	2	51.55
Entrance	1	40.8
Dining	3	61.33
Garage	1	104
Toilet	4	41.29

Table 6: Distribution by room of the "valid" wipes that showed a methamphetamine concentration >30µg/100cm^2.

Although the dataset is small (51 wipes from 34 properties) there is a tentative relationship, between the level of contamination and the expected room size, among those with a higher count. For example, kitchens, because of their relatively smaller size, will show a higher level of contamination than a lounge for the same amount of activity. For the “valid” surface wipes, 37 of the 51 taken were from a ceiling. As such there is little left to compare between surface type and surface materials in this dataset. The data emerging from ESR clan-lab casework contributes more in this area (Section 7). The number of properties (34 out of more than 1100) contributing to a level greater than 30µg/100cm^2 (on valid surfaces) provides a good indication that this level of contamination would not generally be expected to be achieved through methamphetamine use. The data can further show that 13 (approximately one third) of these properties recorded levels of greater than 30µg/100cm^2 on two or more wipes. This type of data assessment could infer that “use” may not be the only activity that has occurred at those properties and further investigation may be worthwhile.

Although methamphetamine concentrations above 30µg/100cm^2 could indicate the manufacture of methamphetamine as an additional source of contamination, the size of the room, which is relative to the level of contamination and the overall interpretation of the level of activity taking place, has not been recorded. Also, the location of the surface where the wipe was taken from is variable and many would not be “valid” for interpretation due to the increased likelihood of that surface coming into contact with the drug itself rather than the aerosol. Nevertheless, the infrequency at which this level is breached supports the relevance of its attribution to excessive smoking and regardless of room size, probably warrants further investigation into the activities taking place at these properties.

6.3.9 Social Science Applications – Postcode Data

By comparing average wipe concentration with the regions or postcodes from where they were collected, a correlation could be made with that particular area and its potential problems associated with methamphetamine use and abuse. Also, this data shows where the majority of HNZ property testing has been carried out. Comparing this to the average methamphetamine levels could inform whether resources are being directed to the right places or not. For this reason, the negative results are included when generating the averages.

From this data we can see there are certain areas where a lot of testing has been conducted (higher number of wipes) however the average methamphetamine concentrations from these areas are low, indicating more of a demand for routine testing perhaps because of a larger

concentration of HNZ properties and/or the frequency of tenant exchanges are greater. For opposing reasons, perhaps, other areas have undergone little testing. This can result in skewed averages especially if only a few properties have been tested. An extreme example is postcode 8022 – an area in Christchurch, where a single house was tested and the average wipe concentration was over 30µg/100cm^2. This particular case is excluded from the data below (Figure 21) as all other regional averages are below 10µg/100cm^2.
The graphs below use the postcode numbers. The corresponding areas can be deduced from the New Zealand Post Limited or by using the following link:

https://www.nzpost.co.nz/personal/sending-within-nz/how-to-address-mail/postcodes/postcode-maps

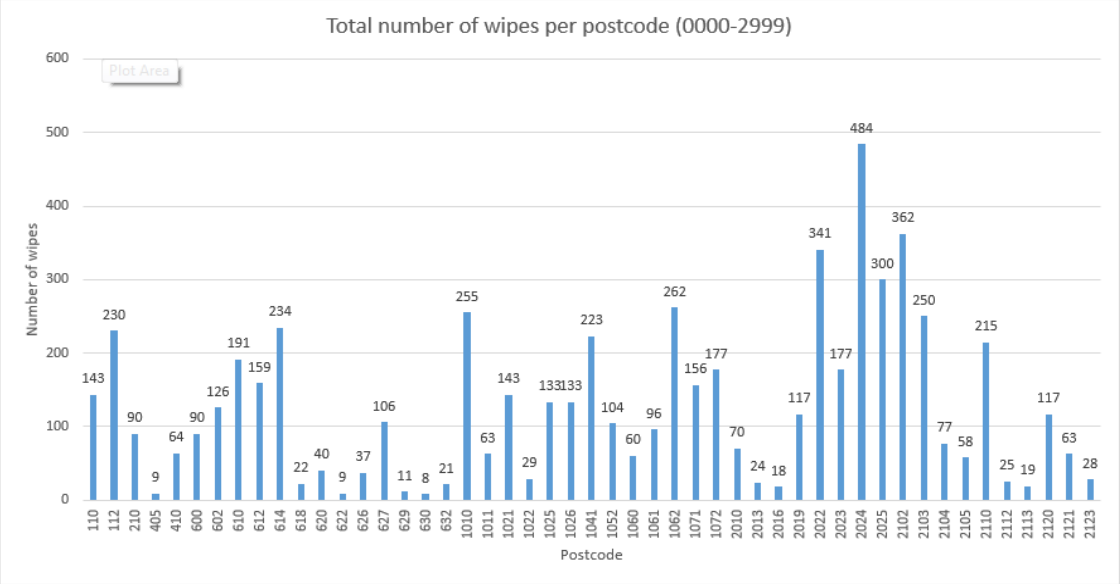


Figure 16: Total number of wipes per postcode (from 0000-2999: upper North Island).

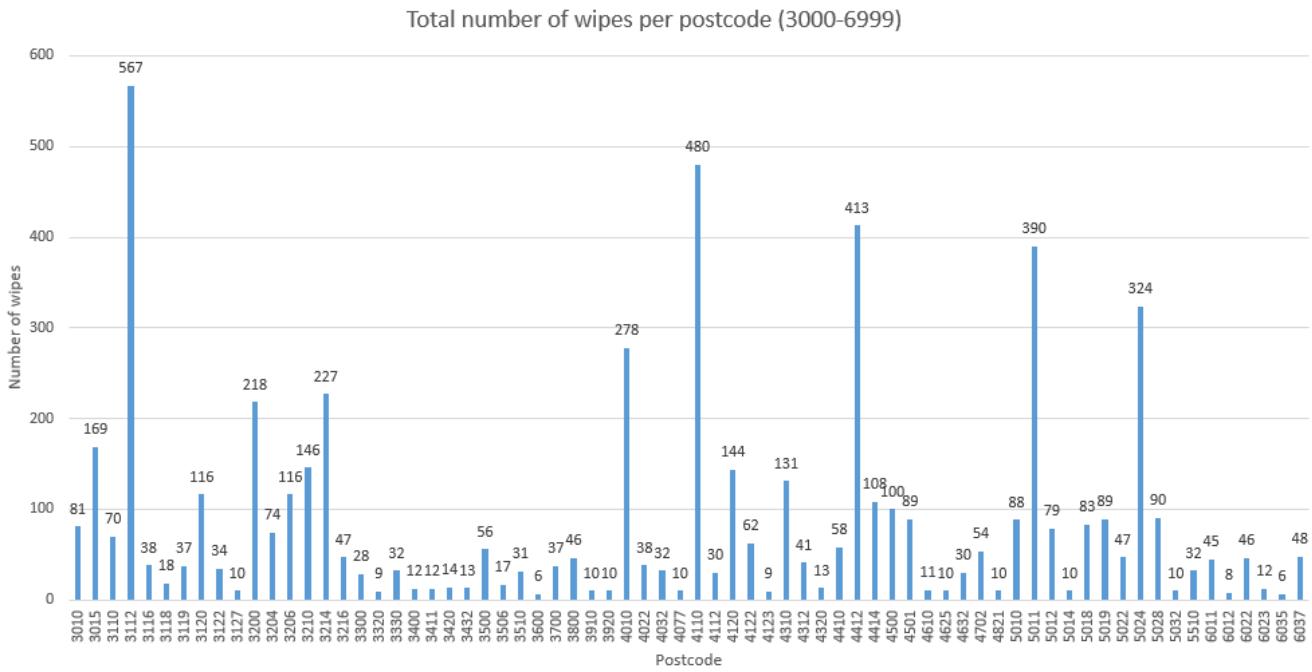


Figure 17: Total number of wipes per postcode (from 3000-6999: central to lower North Island).

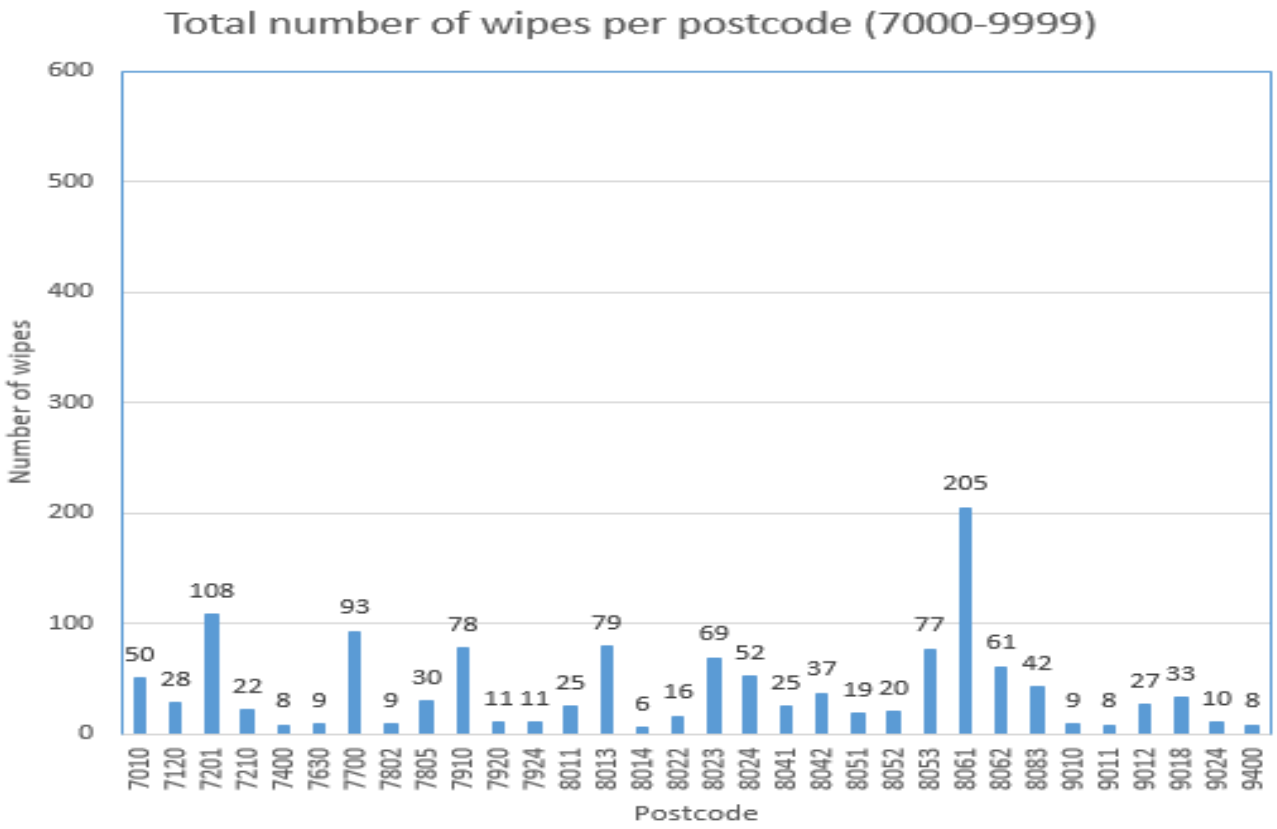


Figure 18: Total number of wipes per postcode (from 7010-9999: South Island).

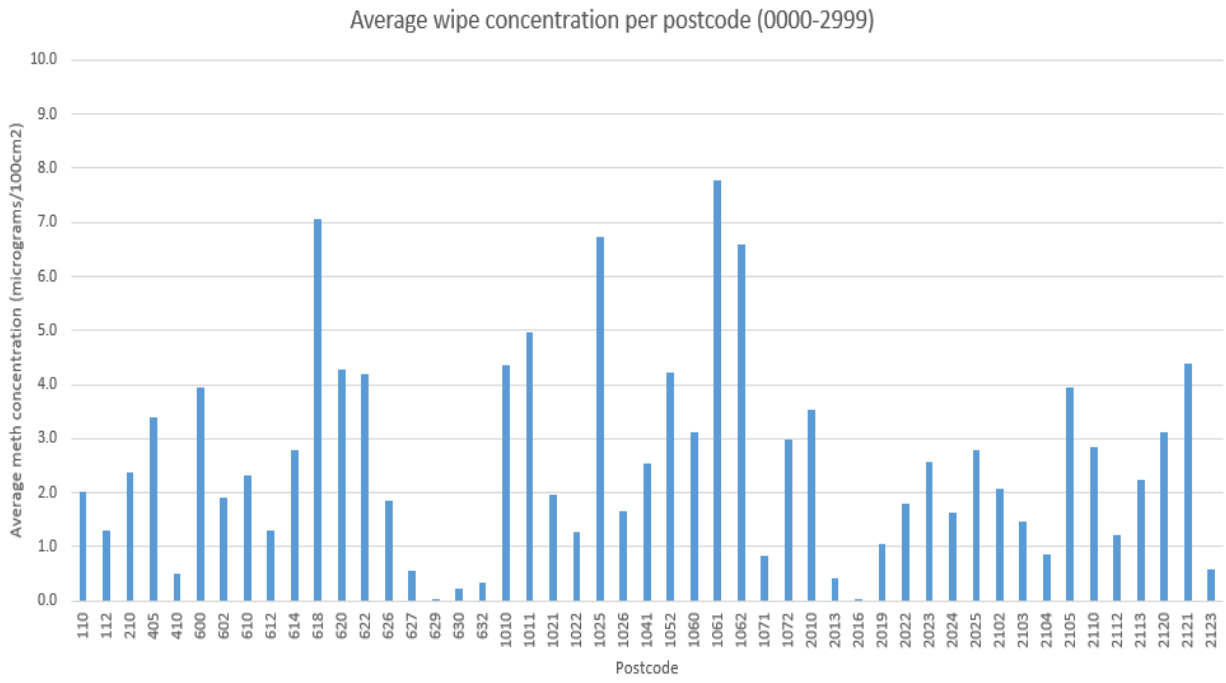


Figure 19: Average methamphetamine concentration (including negative tests) per postcode (µg/100cm^2) (from 0000-2999: upper North Island).

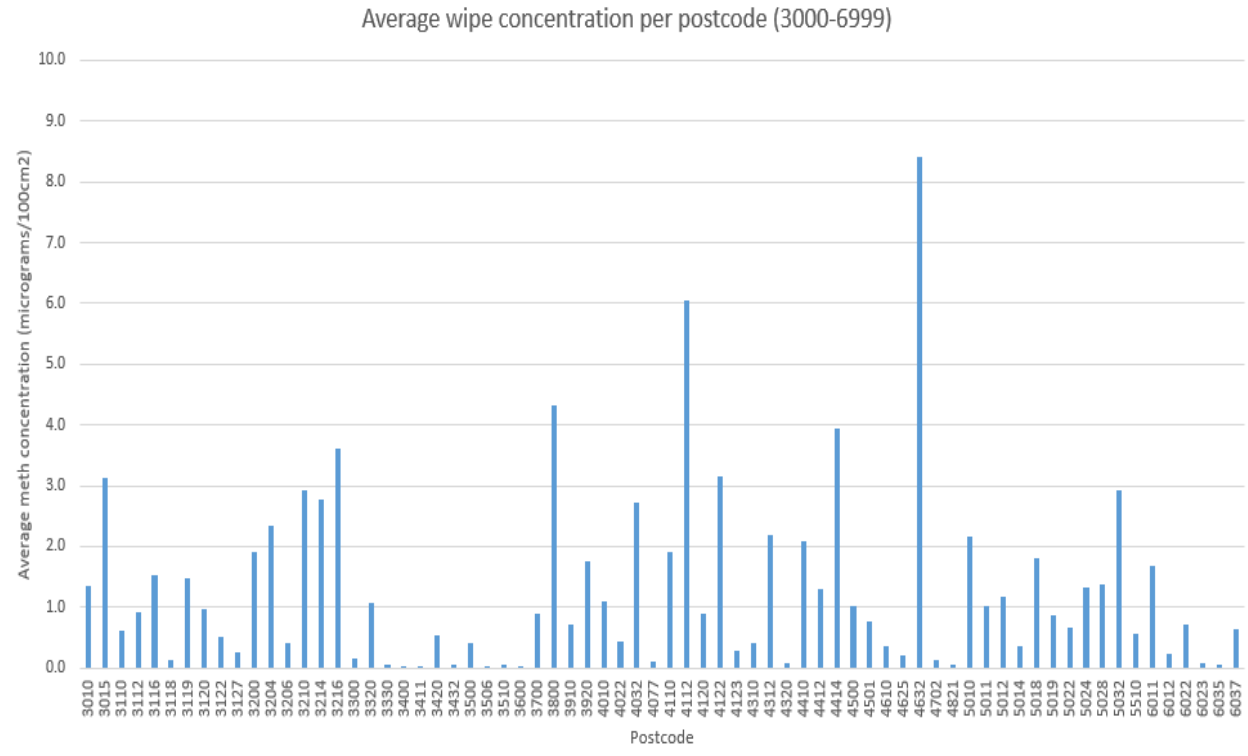


Figure 20: Average methamphetamine concentration (including negative tests) per postcode (µg/100cm^2) (from 3000-6999: central and lower North Island).

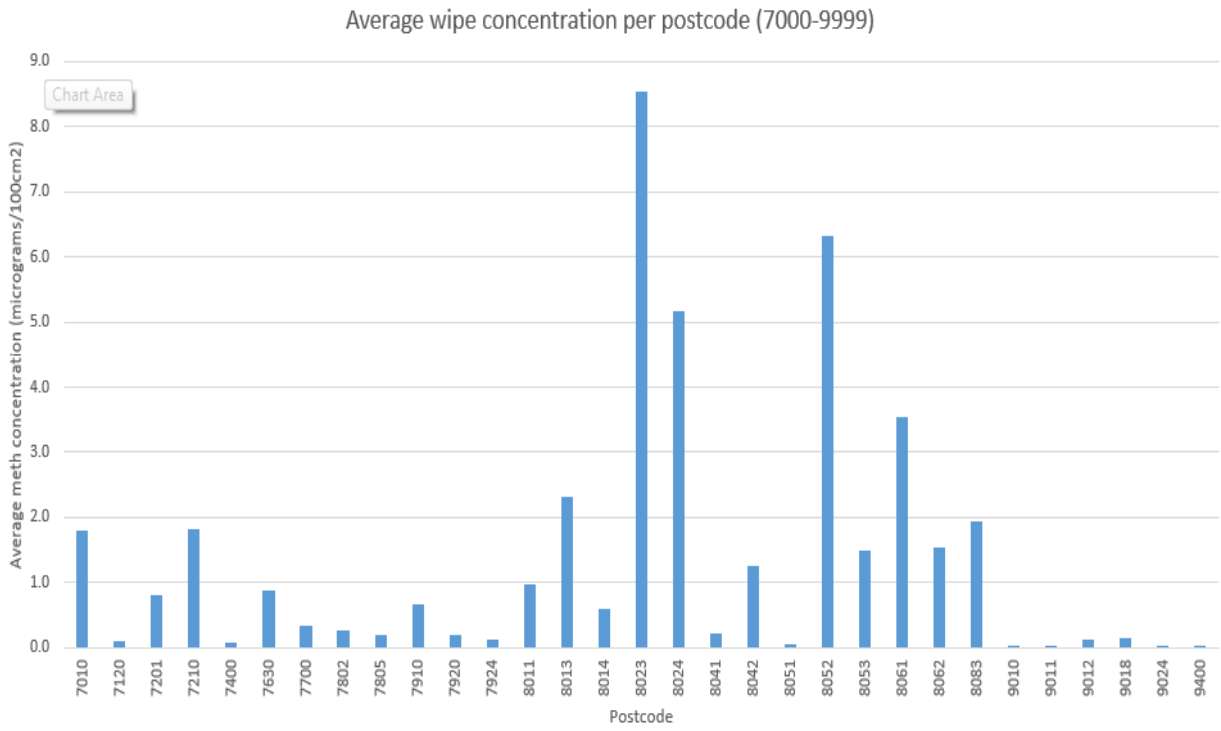


Figure 21: Average methamphetamine concentration (including negative tests) per postcode (µg/100cm2) from 7000-9999). Postcode 8022 is excluded (see Section 6.3.9).

6.4 CONCLUSIONS

- The HNZ dataset, with approximately 15% of surface wipes being between 0.51 and 1.5µg/100cm^2, could expect an equivalent reduction in costs when it comes decontaminating properties with the introduction of NZS8510.
- The HNZ dataset, with an average "positive" result of 2.73µg/100cm^2 provides a good indication of the levels of contamination within a property that can be expected through smoking.
- The HNZ dataset, with an "average high" level at 8.14µg/100cm^2 provides a good indication of the levels of contamination that could be expected in high-use areas.
- The HNZ dataset shows that the "significant level", at 30µg/100cm^2, is rarely observed, particularly on two or more (valid) wipes taken from the same property.
- Amphetamine is detected on almost a quarter of the wipes and is almost always present when at least one other substance is detected. This supports its presence as a common pyrolysis product.

- Wipes from smooth surfaces such as metal, painted/varnished wood or plasterboard record high levels of contamination. Wipes from such surfaces provided a more accurate indication of the contamination level a room has been exposed to.
- Wipes taken from ceilings tend to show higher levels of contamination compared with walls, overall. This indicates that methamphetamine contamination is generally greater towards the ceiling.

6.5 ACKNOWLEDGMENTS

Acknowledgments to Housing New Zealand Corporation for allowing us to access this information and especially to Bradley Ivory for creating and populating the REDCap™ project to assess the data.

7. CLAN-LAB DATA

In the past three years, approximately 136 clandestine laboratory cases have undergone "surface swab" analysis and associated interpretation. Combined, these case have provided data for 516 surface swabs representing 17 room types and 13 surface types. Although the clan-lab data could be collected from casework as far back as 2006, this data set was chosen to compare with HNZ data over the same period. It is accepted that a larger amount of data would provide better, more accurate information. However, it would also take a considerable amount of time to survey the data for an entire decade and would stretch beyond the scope of this project. Although the three-year data set is (understandably) smaller than the HNZ data, the analysis has produced some interesting and notable trends in contamination.

7.1 ANALYSIS AND DISCUSSIONS

At sites of suspected clandestine laboratories, the ESR Clan Lab Team will mainly swab in locations that appear to be the site of any related activity. Some clan-lab assessments result in little being recovered and the location of any activity remains unknown. In these circumstances, swabs covering a number of possible locations on the premises will be taken. This will inevitably result in a number of swabs showing a range of levels of contamination (if contamination is found to be present). The data therefore requires careful manipulation when producing figures to best illustrate the trends.

7.1.1 Key Statistics

From this ESR clandestine laboratory surface swab dataset:

- The "average level" of methamphetamine was 54.23µg/100cm^2.
- The "highest level" recorded on a swab was 1355.7µg/100cm^2.
- The case "average highest level" was 135.9µg/100cm^2.
- Approximately 25% of swabs were above 30µg/100cm^2.
- The average level of those swabs above 30µg/100cm^2 was 230.9µg/100cm^2.

7.1.2 Room Type

Figure 22 shows that, kitchens, garages, sheds, workshops and laundries make up the bulk of the locations sampled. The choice of location has not previously focussed on any data and is mostly based on the experience of the attending clan-lab response teams that methamphetamine manufacture mostly occurs in these locations.

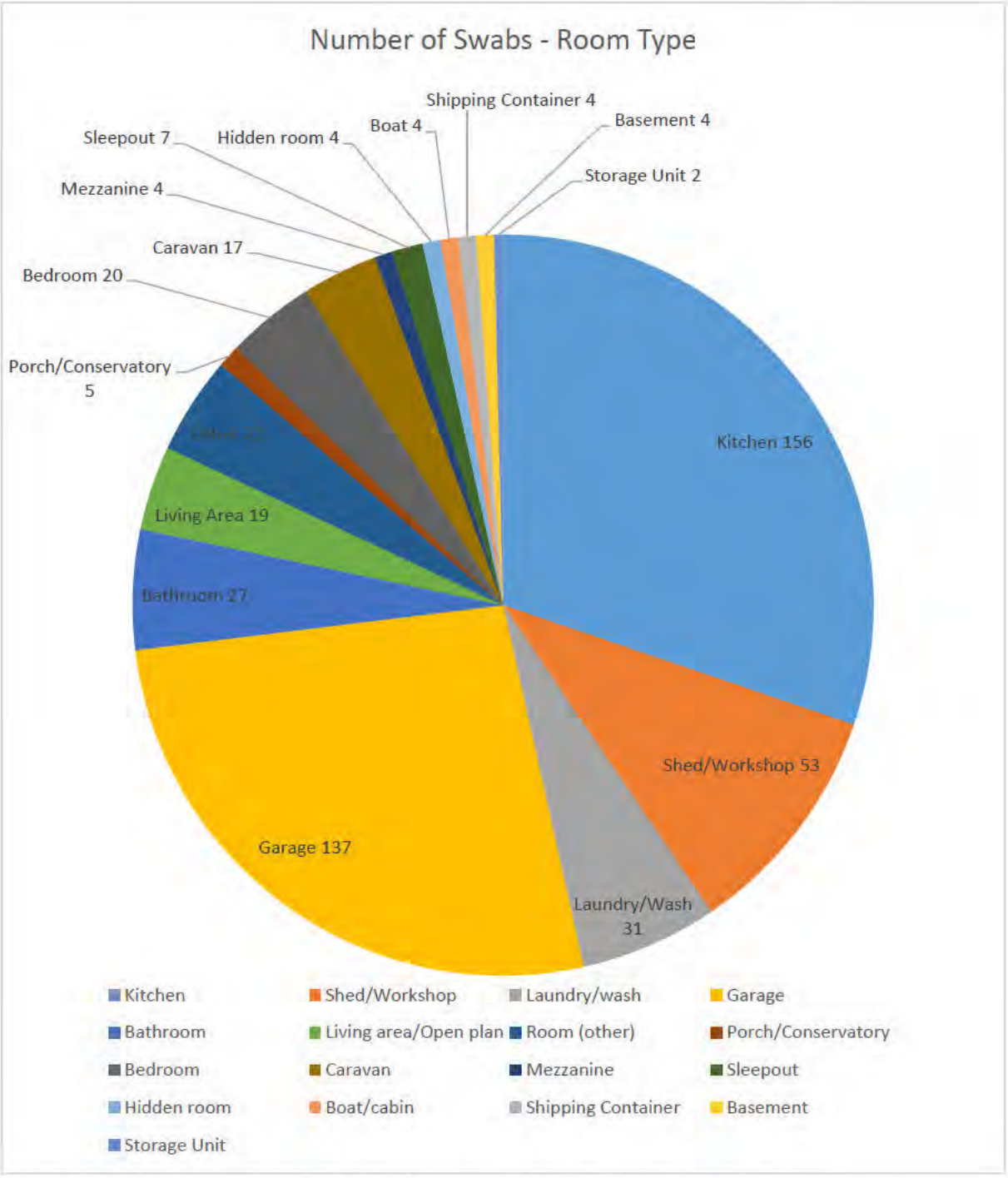


Figure 22:Pie chart of the number of swabs taken in each room type (all swabs).

Of the 136 cases surveyed, the highest level of contamination was observed in those areas that were swabbed the most, as shown in Figure 23. Note that only the swabs returning a quantifiable result have been surveyed.

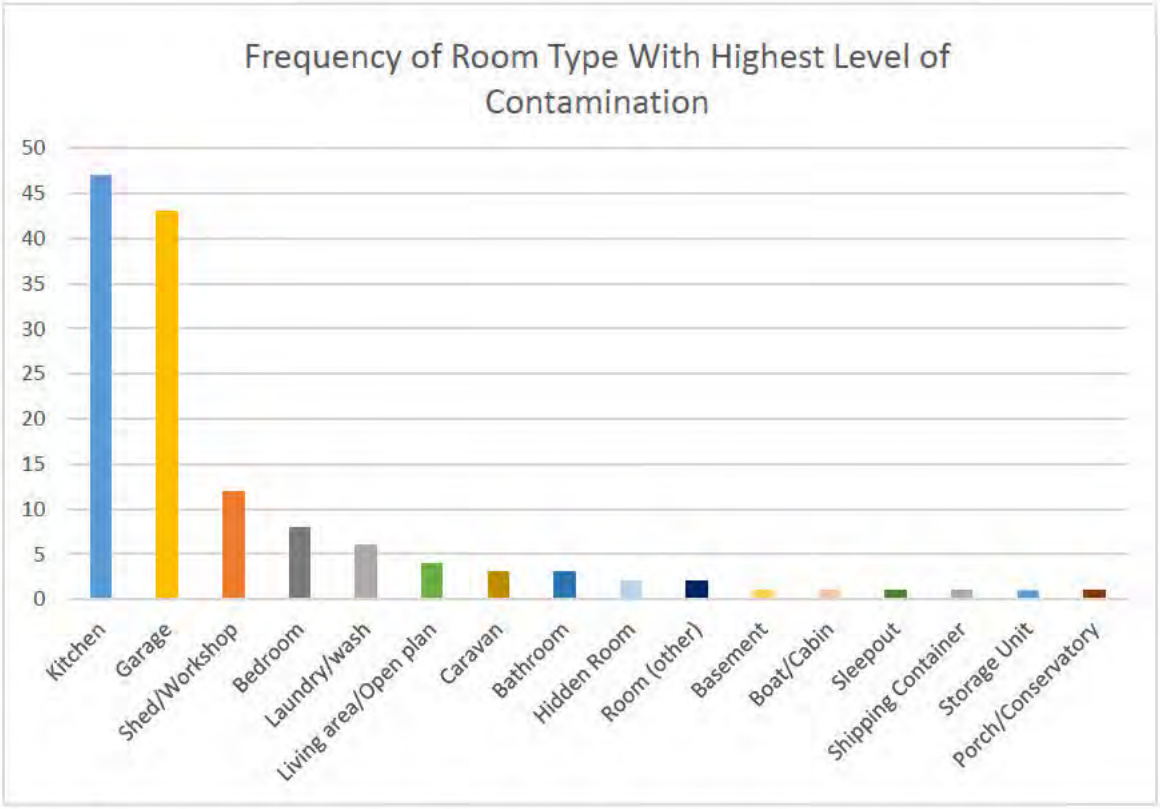


Figure 23: Rooms with the highest levels of methamphetamine (based on number of cases).

For the 136 cases depicted in the graph, the kitchen is the most contaminated area for 46 of them. Similarly, 43 cases have the garage as the most contaminated area. However, although this might make the kitchen look the a more likely place to find a clan-lab we must take into account that it is the most swabbed location (87 cases returning 156 positive results) and, while most properties may have a kitchen, not all will have a garage.

The data can be manipulated to show that, in actual fact, out of the 54 cases where a garage was swabbed, nearly 80 percent of them turned out to be the location with the highest level of contamination. Similarly, if there's a shed at the property. This assessment supports the hypothesis that clandestine manufacturing activity tends to take place away from the main premises if a garage or shed is available.

This type of assessment could also help support the hypothesis that manufacturing activity has not occurred on the premises. For example, out of the 13 cases where a bedroom was

swabbed, surprisingly, seven turned out to be the highest level of contamination for those premises. High levels in a bedroom may support the proposition that this is a high-use area rather than the location of manufacture, for these cases. This is supported by the figures which show that the average level of contamination for those bedrooms among those premises, was 12.9µg/100cm^2 and in only one case was the level above 30µg/100cm^2. To compare, the average level of contamination for the garages that showed the highest level of contamination on the premises, was 199.5µg/100cm^2.

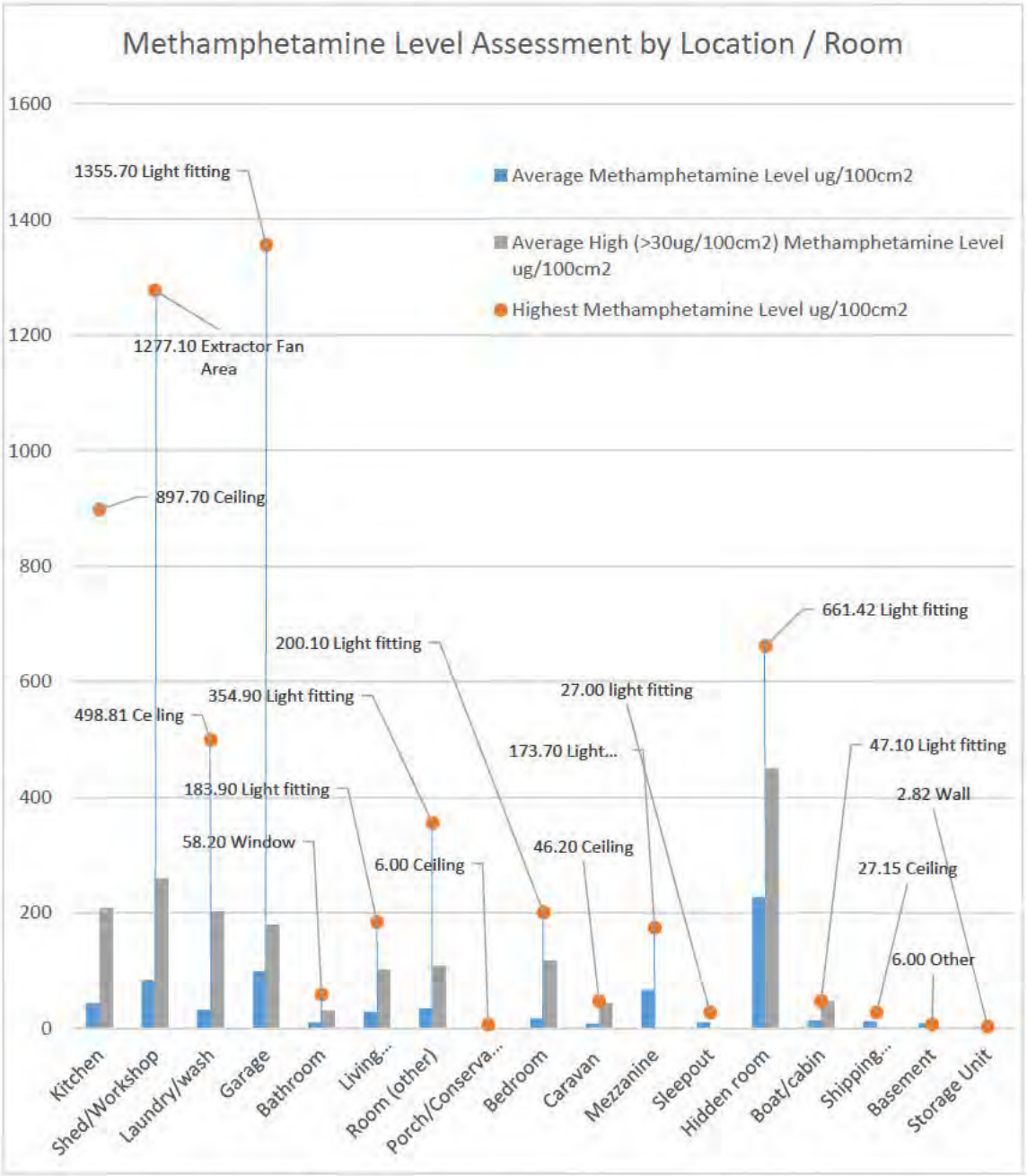


Figure 24: Highest, average high and average levels by room.

This demonstrates how the data can show that such cases (where a bedroom shows a higher level of contamination than other rooms) are more akin to the trends observed in the HNZ data and fit less with the more extreme clan-lab data in Table 7.

Studying the methamphetamine level assessment below, it is clear that bedrooms do not feature as locations of high contamination at suspected clandestine laboratories and are therefore not likely to be the location of the activity. Nevertheless, contamination higher than the average levels observed in the HNZ data, is frequently observed and is probably down to contamination spread from the much higher levels observed elsewhere at those properties.

Location (No. cases / positive swabs)	No. swabs >30µg/100cm^2	No. of cases with swabs >30µg/100cm^2	No. of cases where this location recorded the highest reading	No. of cases where this location recorded the highest reading and that reading was >30µg/100cm^2
Kitchen (87/156)	26	18	46	15
Garage (54/137)	46	17	43	22
Laundry (19/31)	4	2	6	2
Shed/Workshop (25/53)	20	17	12	8
Bathroom (19/27)	3	0	3	0
Living Area (11/19)	4	2	4	1
Bedroom (13/20)	2	2	8	2
Basement (2/4)	0	0	1	0
Hidden Room (2/4)	2	2	2	2
Boat (1/4)	1	1	1	1
Caravan (7/17)	2	1	3	1
Sleep out (3/4)	0	0	1	0
Shipping Container (3/5)	0	0	1	0
Storage Unit (1/2)	0	0	1	0
Other (11/22)	5	1	2	1

Table 7: Assessment of readings above 30µg/100cm^2.

This is partly the reason for also recording the "average high" level per room for swabs showing equivalent levels greater than 30µg/100cm^2 in Figure 24. This data potentially best shows the expected level of contamination for activity associated with the manufacture of methamphetamine in these location(s) because we have excluded those levels that could be

reasonably attributed to smoking. However, for some locations, this has reduced the pool of data and the resulting average can be affected by one or two high level swabs.

Table 7 illustrates the count of swabs (overall and at case level) in excess of the 30µg/100cm^2 level. It also provides data for different scenarios but, it is the last column which identifies those individual cases where we might have clan-lab activity occurring in a particular location since the data has been refined to the location where the level is both over 30ug/100cm^2 and the highest in the case. Although this data has not been further assessed to account for room size, these are the 55 cases, since July 2014, recording the highest levels of contamination in clan-lab casework and would clearly have formed a large proportion of the cases put forward for further opinion in relation to “use of premises”. These particular cases are a reasonable representative group of the contamination levels one could expect to find at a well-established clandestine methamphetamine laboratory.

7.1.3 Room Size

Room size has been omitted from the above data because the intention here (so far) is to show the true levels of contamination being observed in different locations rather than the level of activity which has caused it (which is dependent on room size). Also, the HNZ data is much easier to compare like this because the room size is not routinely recorded during commercial site testing.

Accounting for room size does not alter the level of contamination and is used, instead, to interpret the amount of smoking activity that would had to have taken place to cause the contamination. The experiments previously [27] were carried out in a room of an abandoned motel with a floor area of approximately 250 square feet (23m^2). However, the average size of a garage in this data set, for example, is approximately 53m^2. It is a reasonable proposition then, that had the same experiments been carried out in a room this size, the equivalent level of contamination observed could be less than half the amount.

Accounting for the room size in such calculations will often show that, had the room been 23m^2, the level of smoking activity would have in fact been excessive. The reverse would apply had the room been smaller.

The graph in Figure 25 captures the average room size for the main swabbing locations in this survey and compares their equivalent “significant level”, if rooms of that size were used in the experiments. For the motel room experiment, this level was deemed to be

30µg/100cm^2 (highlighted) but for a garage of 53m^2 this would be 12.9µg/100cm^2. Similarly, in a laundry of 7.8m^2 the level could be expected to be 88µg/100cm^2.

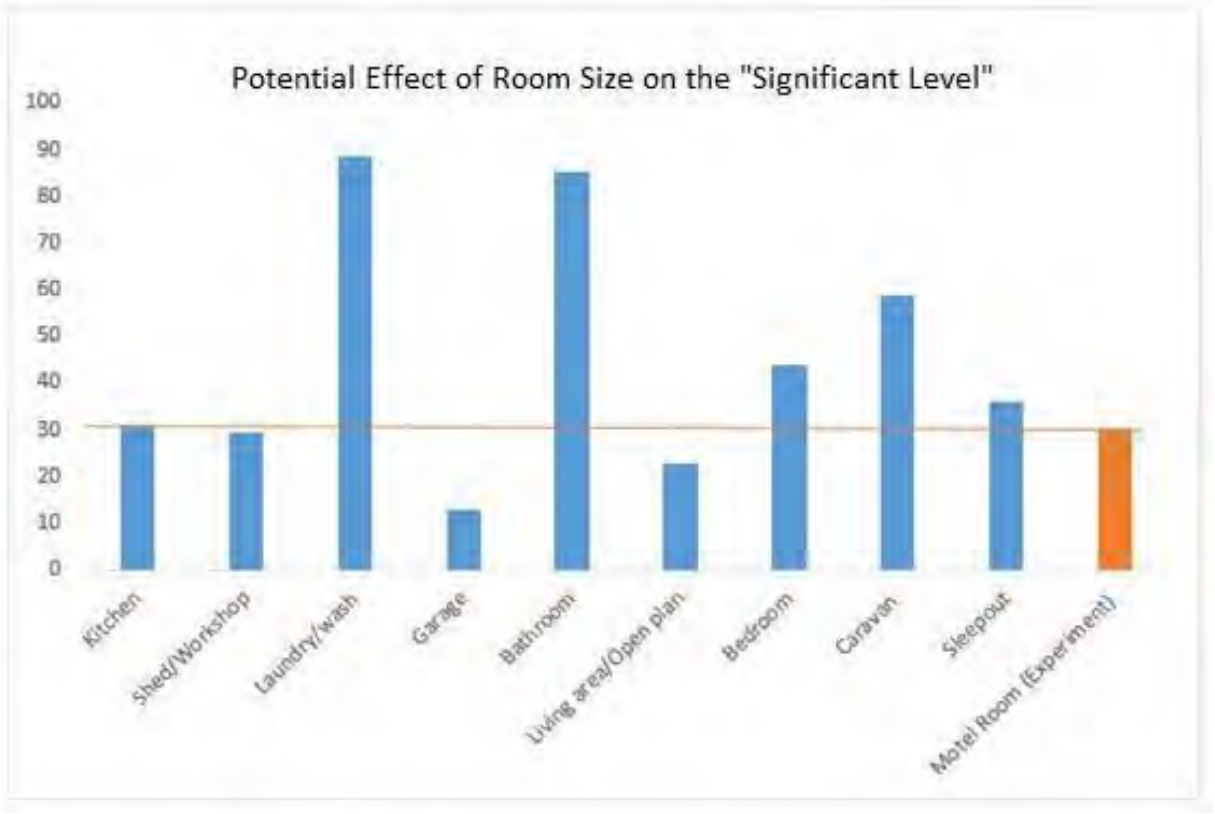


Figure 25: Effect of room size on the significant level.

The effect of room height and therefore room volume is more complex. Having carried out the experiments ourselves (see Section 9), methamphetamine smoke quite obviously rises and the “mist” that forms appears to increase in density towards the ceiling. Also, later analysis shows a tendency for contamination on the walls to increase with height and for the ceiling to be more contaminated than the walls (see Section 8). Therefore, the ceiling height, unless it is significantly higher, may not have a corresponding effect on the levels of contamination as room size does.

Interestingly, accounting for room size has little effect on the overall location deemed to be the most contaminated and therefore the place where clan-lab activity is most likely to have occurred. Having said that, the Figure 25 shows that unless this is taken into account, there is a reasonable proposition that higher levels of contamination would be observed in smaller rooms had any activity occurred in that area.

7.1.4 Surface Type

As discussed in Section 5.1, ESR scientists will generally choose surfaces that are likely to have only come into contact with aerosolised methamphetamine so as to limit the number of hypothesis on the origin of the contaminant (i.e. either smoking or manufacture). These will often be surfaces that would otherwise be unreachable. Such surfaces generally include ceilings and/or their light fittings, the upper surfaces of walls, doors and garage doors, and fixed, unopenable window glass.

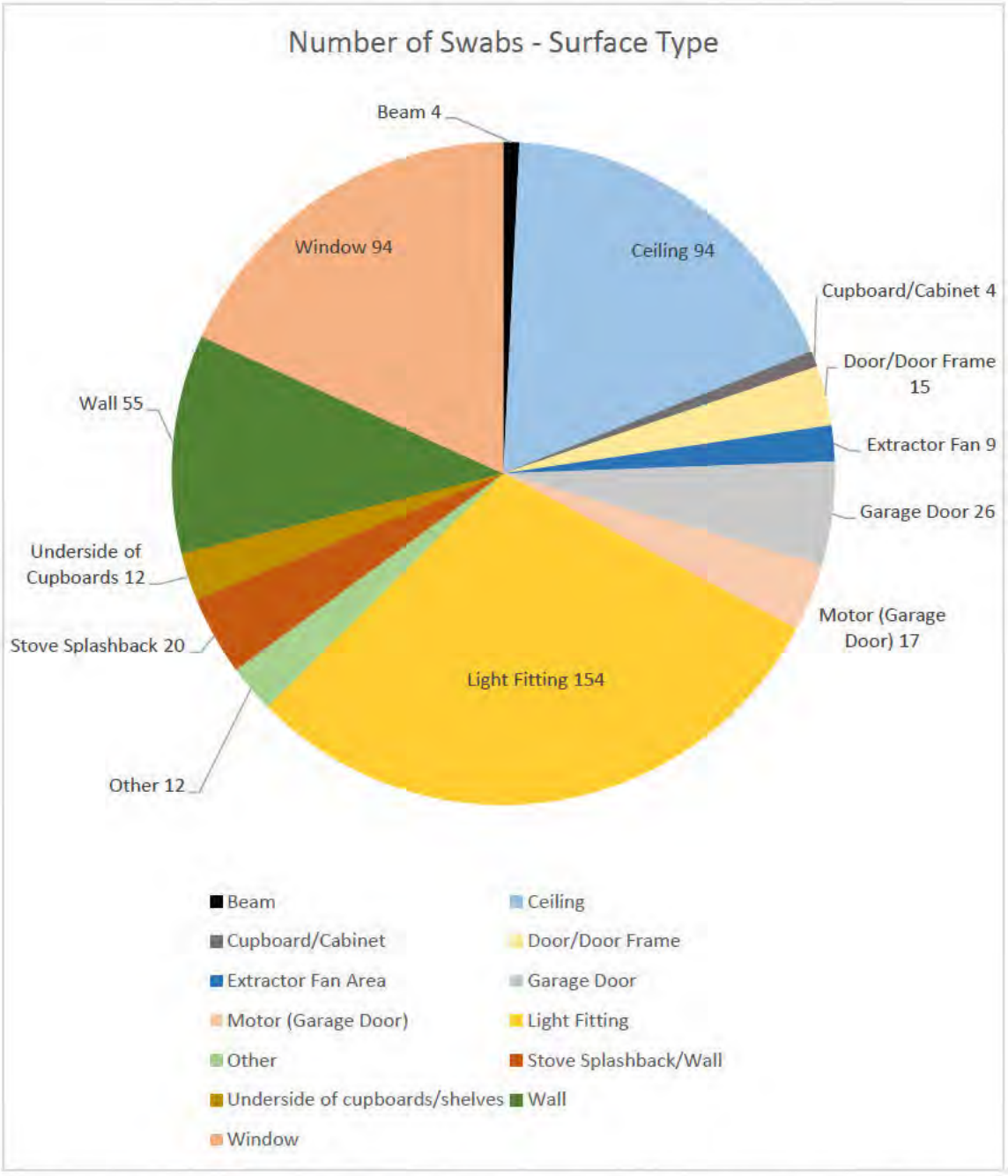


Figure 26: Pie chart showing the distribution of the different surface types from wipes taken within suspected clandestine laboratories (all wipes).

Figure 26 shows light fittings are by far the most swabbed surface whereas extractor fans are generally avoided since it is generally accepted that an extractor fan is likely to draw a disproportionate amount of contamination towards it, if it is switched on and this is corroborated by the graph in Figure 27. Extractor fans are generally swabbed to determine the presence of other compounds such as by-products and/or precursors which, if present, would provide additional evidence in relation to any activity taking place in that location.

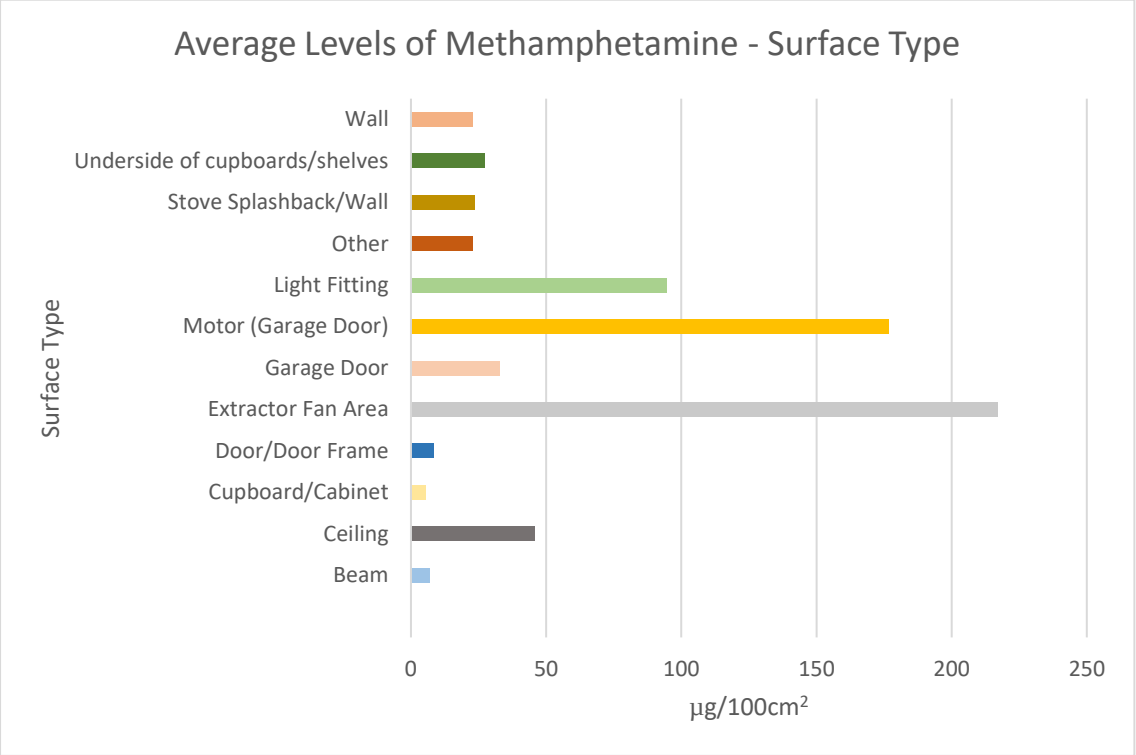


Figure 27: Average levels of methamphetamine with regard to surface type.

The choice of surface is likely to be further influenced now that the data has been collected. Extractor fans aside (for reasons already discussed), it would appear that light fittings and garage-door motors, perhaps because of their general construction from non-porous materials seem to provide a better surface for methamphetamine to adhere to. These surfaces may be "recording" a truer level of the contamination to which the room has been exposed. This is precisely why surface type and material need to be taken into account when making calculations and forming opinions in relation to the type and amount of activity that has taken place since levels on certain surfaces maybe more than twice that of others.

7.1.5 Surface Material

Surface material type was determined for almost half the surface swabs. The graph in Figure 28 shows the average level of methamphetamine based on the most commonly swabbed surface materials.

The data to emerge from this will inform those surface types that best "record" the level of contamination to which the room's surfaces were exposed; the hypothesis being that, as for the HNZ data, the surfaces showing higher levels of contamination are doing so because methamphetamine is easily removed from them. Indeed, the data suggests that plastic surfaces may provide higher experimental swab results to plasterboard (GIB) type surfaces when exposed to the same quantity of "smoked" methamphetamine. As such, this is a consideration when carrying out associated calculations.

Surface material testing forms a large part of the "smoking experiments" carried out as part of this project (see Section 9.2.2 for further interpretation)

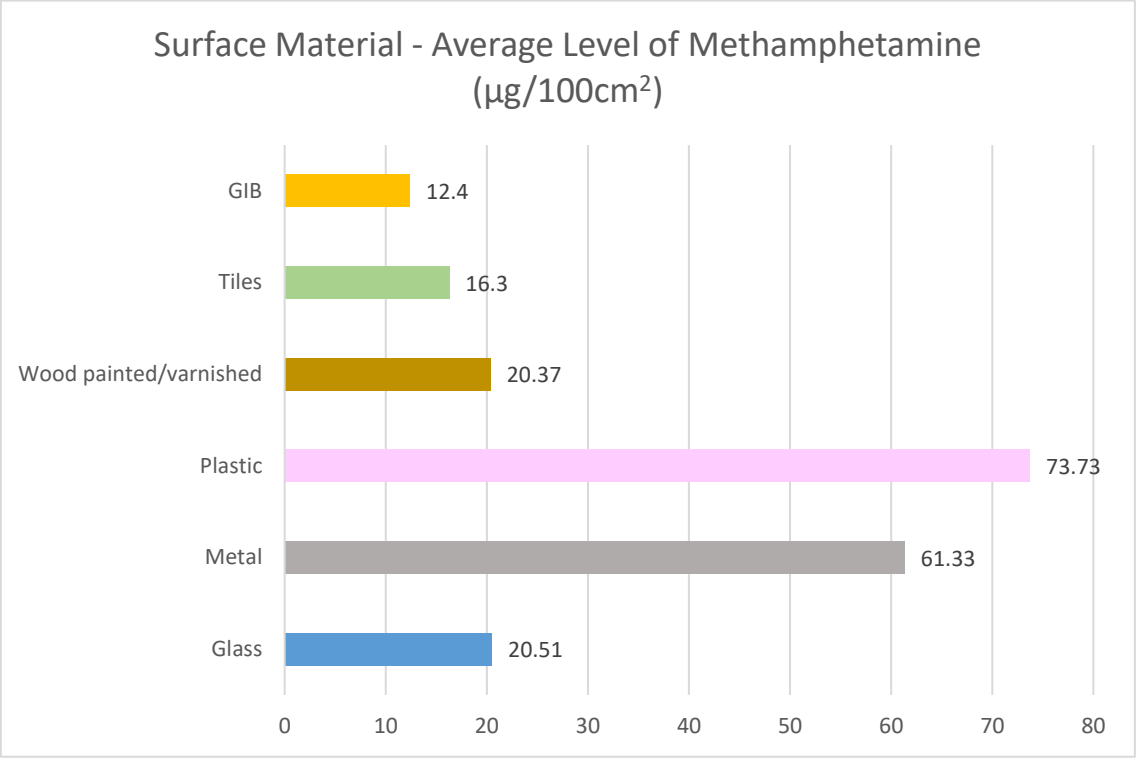


Figure 28: Average levels of methamphetamine with regard to surface material.

7.1.6 Detection of Manufacturing By-Products and Precursors and their Evidential Value

Current methods advise swabbing a large surface area in a suspected clandestine laboratory to properly assess the presence (or not) of by-products and the precursors ephedrine and/or pseudoephedrine. The average swabbed area on which by-products were detected was 1680cm^2. The default swab size for the ESR methods is 2500cm^2 or a 50cmx50cm area. The average area is less probably because the surface type is influential and as such is not always 2500cm^2. Such is the case for light fittings and out of the 15% of cases where by-products were detected over half were detected on the ceiling or light-fittings. Again, though this may be more down to the frequency that these surfaces are swabbed rather than the type of surface being influential. Interestingly, there is little correlation between the surface material and the frequency of detecting by-products. The chart in Figure 29 shows the frequency of by-product and/or precursor (including iodine) detection by location.

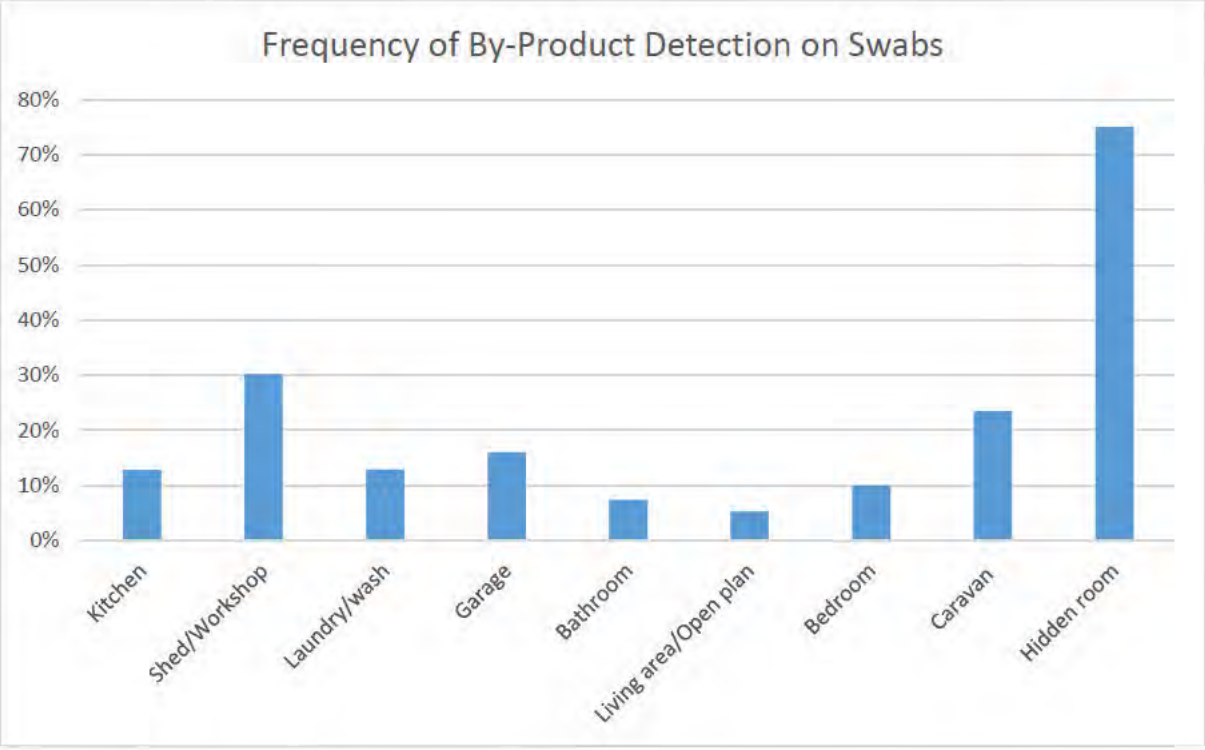


Figure 29: Frequency of by-product detection.

The evidential value of detecting the by-products or precursors may be opposed by the hypothesis that they too are present in methamphetamine powders and their presence could therefore be accounted for by smoking the drug itself.

The occurrence of by-products in methamphetamine powder is generally unseen during the routine analysis of methamphetamine powders and this is despite “the naphthalenes” (BMN and DMPN) being the last by-products to form during the synthesis of methamphetamine. The naphthalenes are formed as a result of condensation and dehydration reactions between molecules of the by-product P2P. Similarly, P2P is formed by the acid hydrolysis of DMPA which is formed early on in the reaction by ring closure of the theoretical intermediate, iodomethamphetamine. Therefore, it is reasonable to expect that by the time the reaction is worked-up and the product distilled and salted-out, the presence of by-products, if any, are more likely to be the naphthalenes. In fact, these compounds are commonly detected in the waste liquids and distillation apparatus with little or none making it through to the final stages.

As discussed previously in Section 4.4, methamphetamine in NZ has an average purity of 76% (approximately 96% of the hydrochloride salt). This particular profiling project did not mention the occurrence of any other compounds (including the precursors, pseudoephedrine or ephedrine) other than the cutting agents, dimethylsulphone (MSM) and creatine [21]. However, overseas methamphetamine profiling projects have shown their minute presence in powders [33, 34, 35]. This has helped to determine the method of manufacture and is useful for comparing imported and domestically produced methamphetamine. But, to detect these components, a relatively large quantity of powder (approximately 100mg) was required to produce a solution concentrated enough (100mg/mL) to detect even minute amounts of them. Although the concentrations of the by-products/precursors relative to the amount of methamphetamine is not reported in these references [33, 34, 35], by comparison, precursors and by-products are frequently observed alongside methamphetamine at the 100µg level as opposed to the 100mg level.

To put this in perspective the average amount of methamphetamine on a surface where by-products or precursors were also detected is the equivalent of 119.2µg/100cm^2. And although this equates to approximately 2mg of methamphetamine if the surface swabbed was 1680cm^2 (the average swabbed area for detecting by-products or precursors), the concentration is still 50-100 times less. Therefore, this would suggest that the source of the by-products/precursors, is unlikely to have been just from the powder itself and subsequently helps to form an opinion in relation to the contamination having originated from the synthesis.

7.2 CONCLUSIONS

From this data a number of conclusions can be made:

- With an average level of 54.23µg/100cm^2, average methamphetamine levels at suspected clandestine laboratories are far higher (approximately 20 times) than in the HNZ dataset.
- With an “average high” level of 135.9µg/100cm^2 methamphetamine levels at suspected clandestine laboratories are far higher (almost 20 times) than in the HNZ dataset.
- Methamphetamine manufacture produces far more methamphetamine contamination than smoking.

7.3 ACKNOWLEDGEMENTS

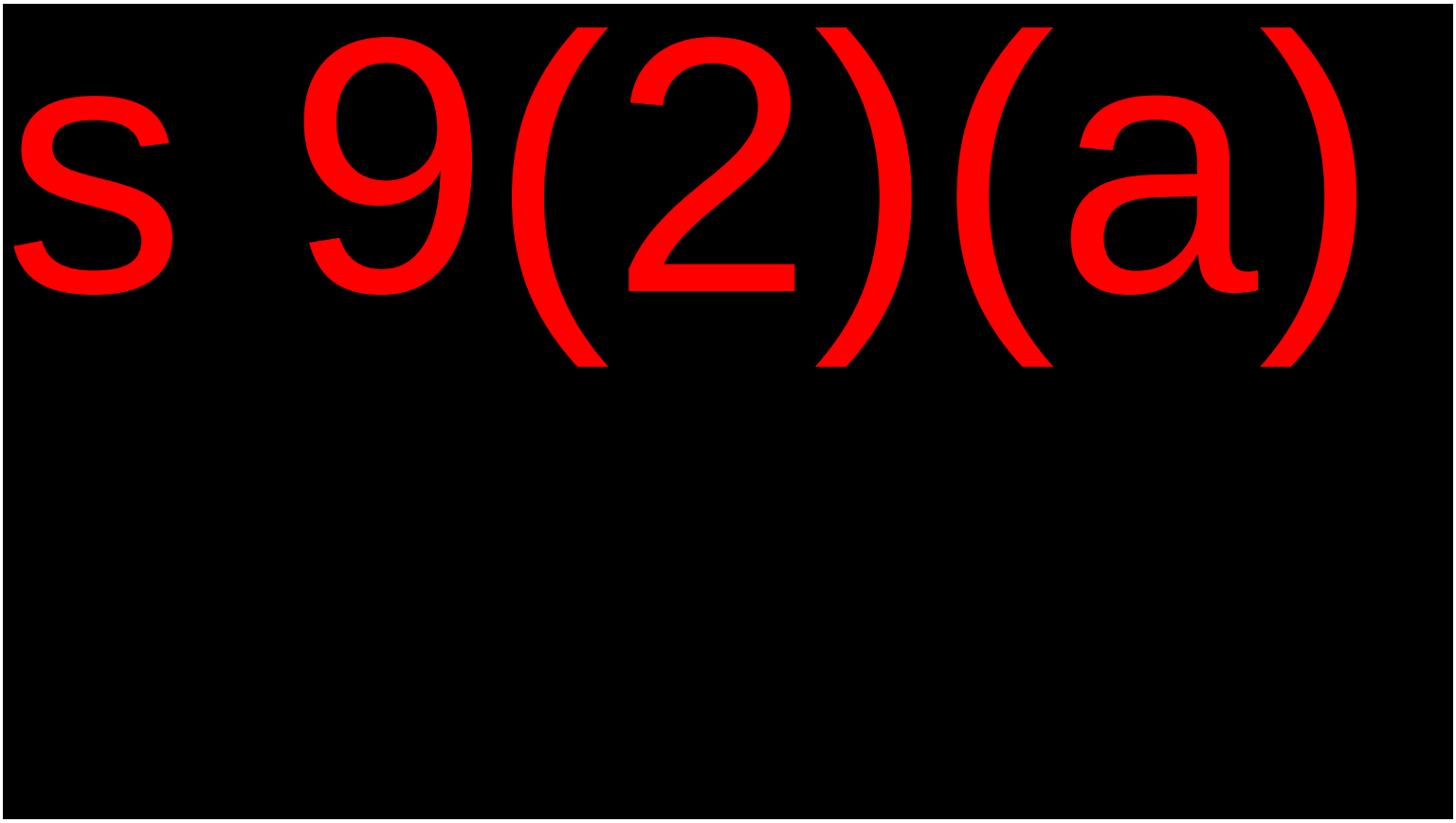
Acknowledgments to Andrew Jones, internship student from the United Kingdom who contributed in collating the clan-lab data in 2015, which has led to some of the analysis interpretations and discussion points above.

8. CONTAMINATION SPREAD

During the project, ESR considered it important to gauge the extent and spread of contamination in a property known to be contaminated with methamphetamine. Preferably the contamination in the property would be relatively high so that variables, such as those already discussed, could be assessed. However, it was important that the property was not known to be linked to any activity involving the manufacture of methamphetamine. This would allow discussion on contamination trends associated with smoking rather than both. As already discussed, it is highly unlikely that contamination from methamphetamine manufacture will be independent of methamphetamine smoking.

8.1 THE PROPERTY

The property at s 9(2)(a) was a two storey, semi-detached dwelling. There were two entrances to the property, one from the driveway at the front of the house and one from the back garden into the laundry. The bottom floor had a short hallway (referred to as the entry in other documentation) leading to the kitchen at the back of the house which had a laundry attached. To the right of the hallway was the lounge area. To the left of the front door was stairs leading to the second floor and the four remaining rooms - a bathroom and three bedrooms coming off a short hallway. Bedroom 1 was the master bedroom.



Every wall in the dwelling was covered in a textured wallpaper and the doors, doorframes and ceilings were all painted. There was carpet throughout the house except for the kitchen and bathroom/laundry which had lino flooring. The windows had thermal curtains.

Sample wipes collected by a representative from a methamphetamine testing company on 10 May 2017 and analysed by Hill Laboratories showed methamphetamine was present in all rooms of the dwelling, and apart from laundry and bathroom, was at levels exceeding the 1.5μg/100cm^2 decontamination level in NZS 8510. No methamphetamine was detected in the shed. The analysis results are summarised in Table 8.

Room	Area Tested	Methamphetamine (μg/100cm^2)
Kitchen	Wall	6.5
Kitchen	Ceiling	2.1
Lounge	Ceiling	5.1
Lounge	Door	15.6
Laundry	Ceiling	0.92
Bathroom	Wall	1.41
Hallway	Ceiling	2.5
Bedroom 1	Ceiling	14.1
Bedroom 1	Door	0.38
Bedroom 2	Ceiling	3.0
Bedroom 2	Cabinet	8.1
Bedroom 3	Ceiling	4.0
Bedroom 3	Cabinet	6.7
Entry	Ceiling	5.2
Shed	Wall	<0.02

Table 8: Original sampling results from the methamphetamine testing company.

Based on these analysis results, the lounge, bedroom 1 and the entry were chosen for more detailed sampling to determine the spread of methamphetamine throughout these rooms. The specific areas sampled by the methamphetamine testing company were not resampled by ESR. ESR attended the property on 31 May 2017 to carry out the additional sampling and the wipes were analysed by Hill Laboratories.

8.2 LOUNGE

The lounge was 19.9m^2 and the ceiling height was approximately 2.7m from the floor.

8.2.1 Ceiling

The ceiling in the lounge area was painted. The methamphetamine testing company sample wipe was documented to have been taken in the centre of the room, near the light fitting and a level of 5.1μg/100cm^2 was reported. Six further sample wipes were taken from the ceiling as shown in Photograph 2 and the analysis results are presented in Table 9.

Photograph 2: Sampling sites on the ceiling in the lounge.

Area Tested	Methamphetamine (µg/100cm^2)
1	5.2
2	5.7
3	4.1
4	4.9
5	2.5
6	4.0

Table 9: Sampling results from the ceiling in the lounge.

8.2.2 Door

The door in the lounge area was painted. The methamphetamine testing company wipe sample was documented to have been taken in the top corner of the door, above the handle and a level of 15.6µg/100cm^2 was reported. Three further samples were taken from the top, middle and bottom of the hinge side of the door as shown in Photograph 3 and the analysis results summarised in Table 10.

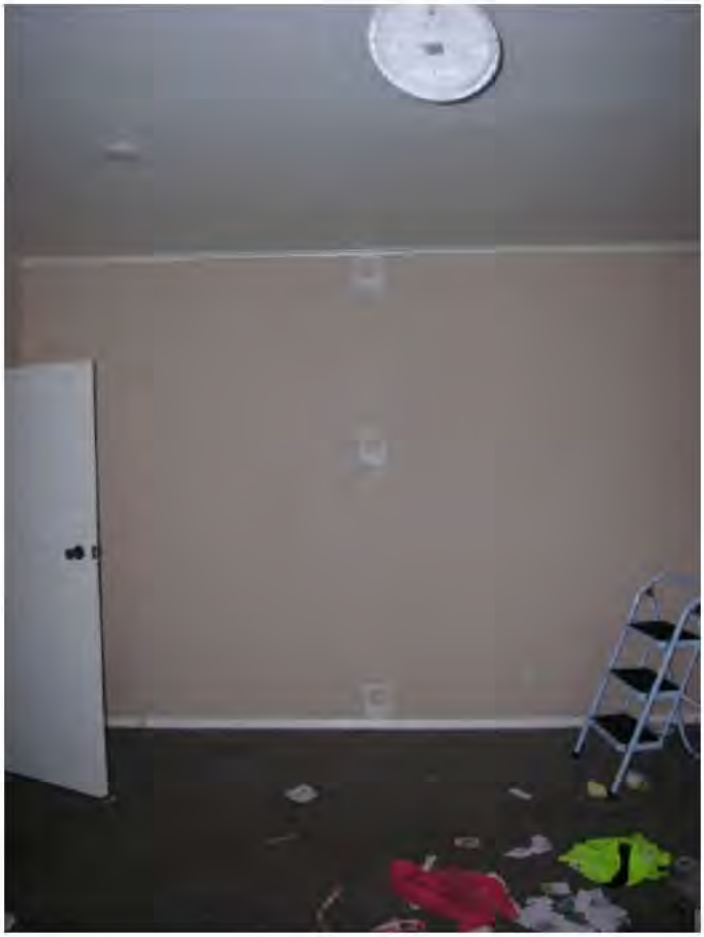
Photograph 3: Sampling sites on the door in the lounge.

Area Tested	Methamphetamine (µg/100cm^2)
Top	24
Middle	13.3
Bottom	4.1

Table 10: Sampling results from the door in the lounge.

8.2.3 Walls

The walls in the lounge area were covered in a slightly textured wallpaper. The methamphetamine testing company did not sample any wall surfaces in the lounge. Further samples were taken from the top, middle and bottom of two different walls within the lounge as shown in Photographs 4 and 5. The analysis results are shown in tables 11 and 12:



Photograph 4: Sampling sites on a wall in the lounge

Area Tested	Methamphetamine (µg/100cm^2)
Top	11.6
Middle	4.1
Bottom	1.02

Table 11: Sampling Results from a Wall in the Lounge

Photograph 5: Sampling sites on another wall in the lounge

Area Tested	Methamphetamine (µg/100cm^2)
Top	8.7
Middle	2.7
Bottom	2.5

Table 12: Sampling Results from another Wall in the Lounge

8.2.4 Other Surfaces

All the other surface types within the lounge were sampled to determine the variation in contamination levels within the room. A sample was taken from the painted bricks on the fireplace surround and the varnish mantel piece as shown in photograph 6), the painted window frame (Photograph 7) and the heat pump (Photograph 8). The analysis results for these surfaces are summarised in Table 12.

Photograph 4: Sampling sites on the fireplace and mantelpiece in the lounge.

Photograph 5: Sampling site on the window frame in the lounge.

Photograph 6: Sampling site on the heat pump in the lounge.

Area Tested	Methamphetamine (µg/100cm^2)
Painted bricks	12.5
Varnished mantelpiece	15.7
Window Frame	32
Heat Pump	4.6

Table 11: Sampling results from other surfaces in the lounge.

8.3 BEDROOM 1

Bedroom 1 was 16.5m^2 including a 2.2m^2 wardrobe. The ceiling height was approximately 2.4m from the floor.

8.3.1 Ceiling

The ceiling in bedroom 1 was painted. The methamphetamine testing company sample wipe was documented to have been taken from the ceiling on the left hand side of the room closest to the door and a level of 14.1µg/100cm^2 was reported. Five further samples were taken from the ceiling as shown in Photographs 9, 10 and 11 and the analysis results are summarised in Table 13.

Photograph 7: Sampling sites on the ceiling in bedroom 1.

Photograph 8: Sampling site on the ceiling by the door in bedroom 1.

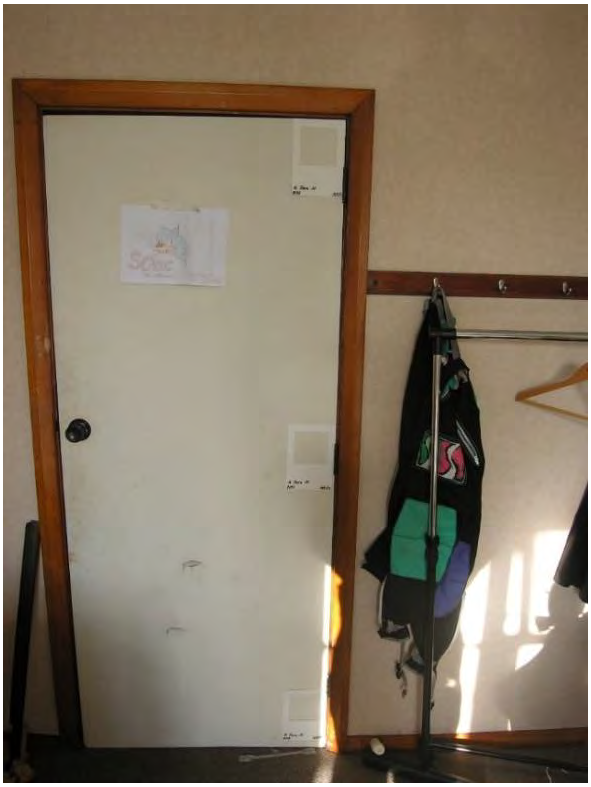
Photograph 9: Sampling site on the ceiling by the light fitting in bedroom 1.

Area Tested	Methamphetamine (µg/100cm^2)
1	7.0
2	6.0
3	4.5
4	5.2
5	4.9

Table 12: Sampling results from the ceiling in bedroom 1.

8.3.2 Doors

There were two doors in bedroom 1, the painted entry door and a varnished wardrobe door. The methamphetamine testing company wipe sample was documented to have been taken in the top corner of the painted entry door, above the handle and a level of 0.38µg/100cm^2 was reported. Further samples were taken from the top, middle and bottom of the hinge side of the painted door as shown in Photograph 12 and the top, middle and bottom of the hinge side of the varnished door as shown in Photograph 13. The analysis results are summarised in Table 14.



Photograph 10: Sampling sites on the painted door in bedroom 1.

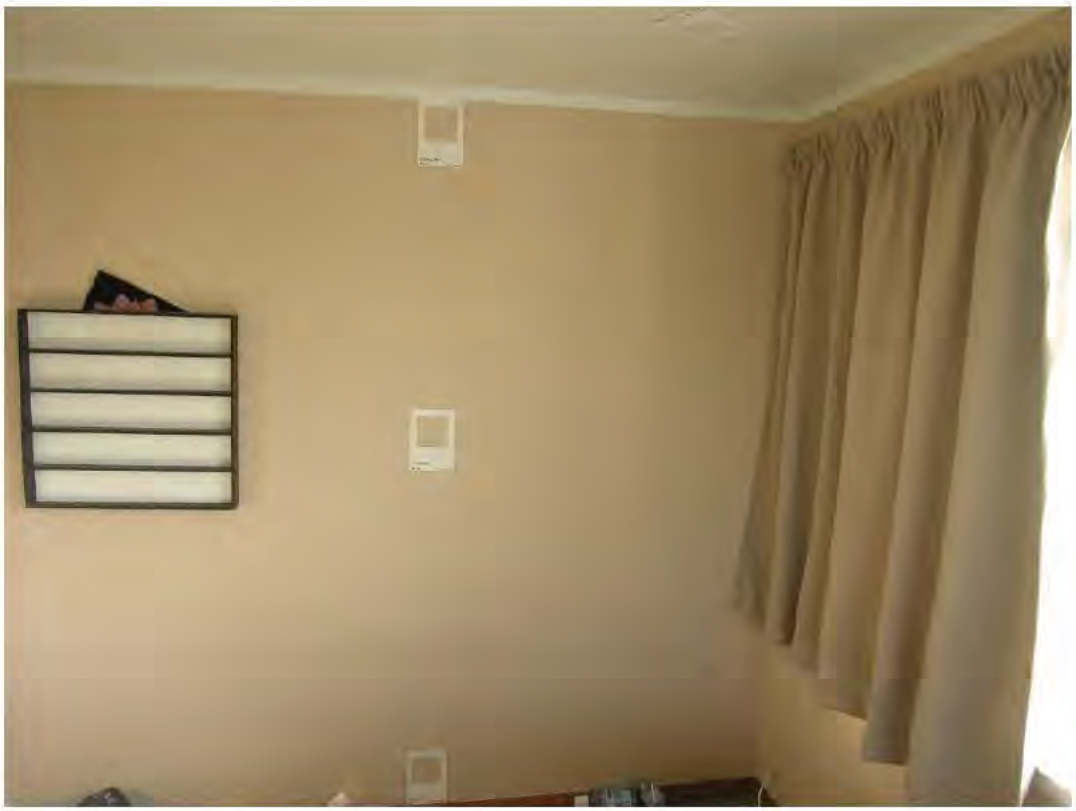
Photograph 11: Sampling sites on the varnished door in bedroom 1.

Area Tested	Methamphetamine (µg/100cm^2)
Top – painted door	0.91
Middle – painted door	0.31
Bottom – painted door	0.38
Top – varnished door	8.9
Middle - varnished door	5.4
Bottom - varnished door	5.0

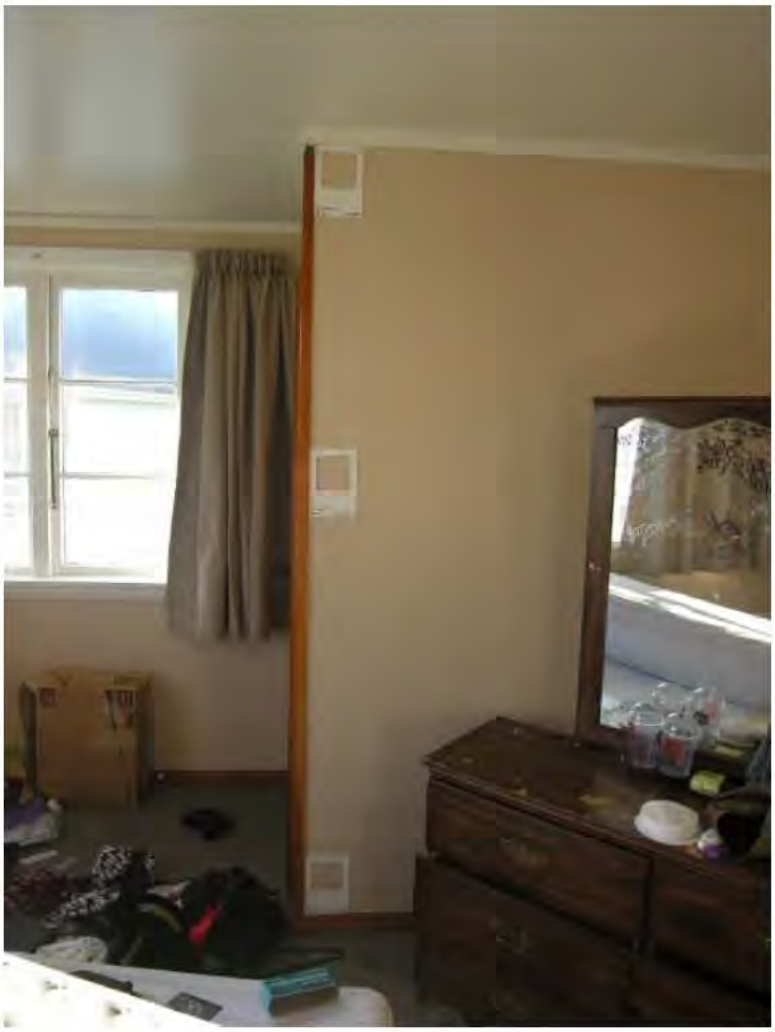
Table 13: Sampling results from the doors in bedroom 1.

8.3.3 Walls

The walls in bedroom 1 had the same slightly textured wallpaper as the lounge. The methamphetamine testing company did not sample any wall surfaces in bedroom 1. Further samples were taken from the top, middle and bottom of two different walls within bedroom 1 as shown in Photographs 14 and 15. The analysis results are summarised in Table 15.



Photograph 12: Sampling sites on a wall in bedroom 1 (wall 3).



Photograph 13: Sampling sites on another wall in bedroom 1 (wall 4).

Area Tested	Methamphetamine (µg/100cm^2)
Top – wall 3	9.1
Middle – wall 3	5.8
Bottom – wall 3	1.16
Top – wall 4	9.8
Middle – wall 4	5.8
Bottom – wall 4	3.5

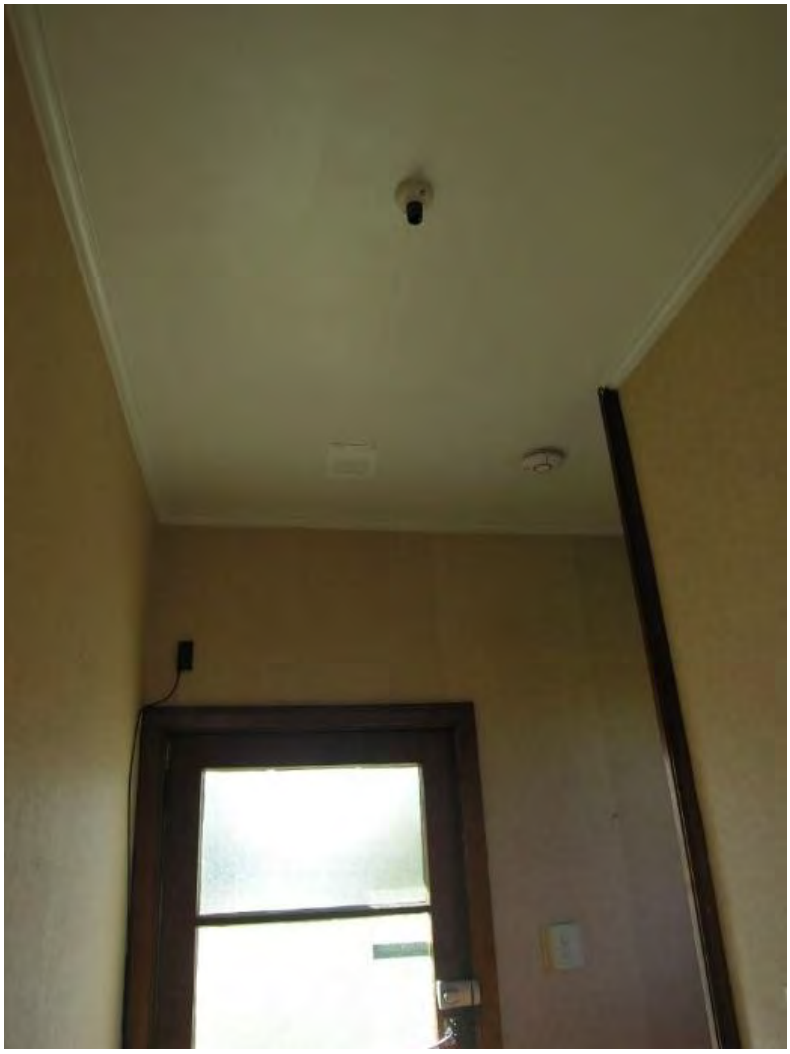
Table 14: Sampling results from the walls in bedroom 1.

8.4 ENTRY

The entry was 8.3m^2 including the stairwell. The ceiling height was approximately 2.7m from the floor which increased to 3.2m at the top of the stairs.

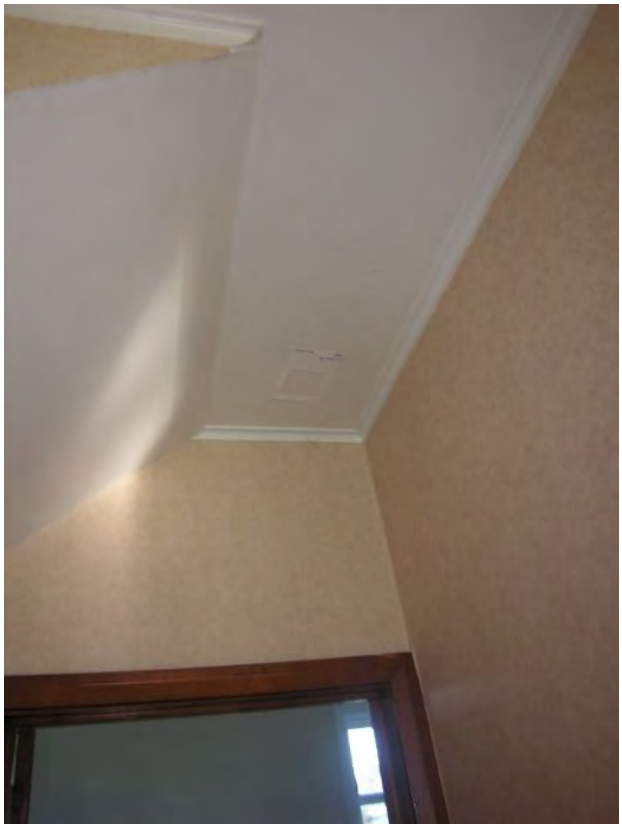
8.4.1 Ceiling

The ceiling in entry hallway was painted. The methamphetamine testing company wipe sample was documented to have been taken from near the centre of the hallway on the front door side and a level of 5.2μg/100cm^2 was reported. Three further samples were taken from the ceiling and one from the cover of the fuse box as shown in Photographs 16, 17 and 18. The analysis results are summarised in Table 16.



Photograph 14: Sampling site on the ceiling in the entry hallway close to the front door.

Photograph 15: Sampling sites in the centre of the ceiling in the entry hallway and the fuse box cover.



Photograph 16: Sampling site on the ceiling in the entry hallway close to the kitchen door.

Area Tested	Methamphetamine (µg/100cm^2)
1	2.1
2	4.2
3	2.4
Fuse Box Cover	15.3

Table 15: Sampling results from the entry hallway.

8.5 DISCUSSION

The results of the swabs taken by ESR and analysed at Hill Laboratories were either similar or lower than the results previously reported by the methamphetamine testing company for the same surface and location. The period of time between the swabs taken in this experiment and those originally taken by the methamphetamine testing company was approximately three weeks. The results are likely to be showing that, in the absence of any external factors, contamination will reduce over a period of time. However, it is not yet known whether the reduction being observed is due to the drug breaking down, absorption of the drug beneath or into the surface material or whether it is falling away from the surface. As later experiments will show, the speed and degree with which this reduction occurs needs further research and is likely to depend on a number of factors.

Variations in the results for swab samples taken in the same area were observed when a different surface material was swabbed. The wallpaper surface on the upper part of the walls, in particular, showed higher levels than the ceiling in the same room. Greater amounts of methamphetamine were also removed from varnished and painted surfaces with one swab from a painted window frame recording a level of 32µg/100cm^2. This result, among others recorded from swabs taken from smooth, glossy surfaces, shows that higher levels of methamphetamine are observed on these surfaces when compared with other surfaces in the same location. Such surfaces should be swabbed when attempting to determine the level of contamination the area has been exposed to.

The swabs taken from various heights on the walls, in the two rooms where these tests were carried out, are consistent in that they show much higher levels towards the ceiling. This goes hand in hand with the observation that methamphetamine vapour readily rises. Therefore, there is a greater potential for contamination on surfaces on or towards the ceiling. This observation however, can only be determined if the surface being swabbed is consistent

throughout the room since the results also show that the levels of methamphetamine on the wall are generally higher than the ceiling. As already discussed, this is not likely to be because the ceiling is less contaminated. It is far more likely, in this case, that the surface material on the ceiling is retaining more methamphetamine and/or the swab is less effective in removing the methamphetamine from that surface.

8.6 CONCLUSIONS

From this exercise a number of conclusions can be made:

- The methamphetamine testing company's method of testing and overall reporting were satisfactory.
- The levels of methamphetamine appear to reduce overtime. However, the initial contamination level will almost always be unknown, so the rate and consistency of reduction from the initial contamination is not (yet) known.
- Methamphetamine contamination increases with height, regardless of the surface.
- Swabs from different surface materials in the same area generally show different levels of contamination.
- Swabs from smoother surfaces show greater levels of contamination.

8.7 ACKNOWLEDGEMENTS

Acknowledgments go to Megan McKinnel and Janine Watson for travelling to Christchurch, carrying out the examination of the property, taking the swabs and collating the data.

9. PROJECT RESEARCH

The analysis of the data has shown there is some requirement for scientific interpretation when assessing methamphetamine contamination. Along with ESRs current expertise within the Clandestine Laboratory Team, there is now a large amount of data to support scientific opinion. However, the project has presented the group with an opportunity to carry out some further research to challenge the literature that informs the methods in the current SOPs. The intention is to place ESR at the forefront of this type of research, increasing our expertise to consult in this area and retain the confidence of our clients.

9.1 PROXIMITY TO SOURCE AND CONTAMINATION RETENTION

For the initial experiments it was important to establish if there would be any variation with which a surface retained “contamination” over a short period of time. Over time, or between exposures and in the absence of any external influence, it could reasonably be expected that the level of methamphetamine on a surface would decrease and that testing a surface directly after exposure would not necessarily be realistic in assessing prolonged contamination.

The results may also have connotations for further research (e.g. “when to swab?”) and therefore affect comparisons with previously published work. As such, the intention here was to simply show that a variation exists, or not, rather than determine exactly what the variation is. The latter may require numerous experiments using an inexhaustible variety of surfaces in different positions over countless time periods. Nevertheless, the results of this experiment suggest that examining this variable further might be worthwhile.

9.1.1 Retention Experiment – Method

An experiment was carried out in a converted shipping container. The larger (inner) room of the container was approximately 9.4m^2 and 2.4m high. A shelving unit was constructed with top shelf holding a variety of surfaces placed approximately 1m above a source of “smoking” methamphetamine. A glass surface was placed vertically alongside.

The methamphetamine used for this experiment was synthesised at ESR as the hydrochloride salt via the HI reduction of pseudoephedrine method using hypophosphorous acid and iodine. The purity of the final product was 76.1% (calculated as base). 6.57 grams

of the product (5.0 grams of methamphetamine base) was used for the experiment. This quantity is the equivalent of approximately 50-65 individual doses or “points” (0.1 gram of methamphetamine base/hydrochloride).

Relatively smooth surfaces were chosen for this experiment based on the observation that swabs from these surfaces generally record higher levels of methamphetamine. Rather than the implication that these that these surfaces are more contaminated, it is more likely to be because the methamphetamine is more easily removed. For this reason, such surfaces are also less likely to retain methamphetamine for longer periods of time and may therefore show a greater degree of variation over time.

As mentioned, a glass surface was placed vertically adjacent to the “smoking” source, and the other surfaces; acrylic, laminated chipboard, bare wood and varnished wood, were placed above. Control swabs were taken from the surfaces before the experiment began for the purposes of assessing any significant background contamination.

The methamphetamine was then heated in an aluminium foil tray over a gas burner and passed underneath the surfaces allowing the smoke to come into contact with all surfaces. The experiment produced a significant amount of smoke in the room and the room had to be left for approximately two hours to allow the smoke to dissipate. Although, even after this period of time, a haze was still visible.

The surfaces were then sampled and the wipe samples analysed using the NIOSH 9111 method (the kits were supplied by and the analysis undertaken by Hill Laboratories). Some of the surfaces were large enough to be sampled in duplicate and results for these surfaces were averaged. The container was entered six days later and a single sample wipe was taken from each surface and sent to Hill Laboratories for analysis.

9.1.2 Retention Experiment – Results and Discussion

Table 17 shows the results for swabs taken in the retention experiment. The background contamination prior to the experiments was either nil or considered insignificant.

Material	Result (duplicate)	Result (6 days)	% Reduction (average)
Glass	6.9*	0.09	98
Acrylic	19.1*	6.9	63
Laminated chip	38*	17	55
Wood (bare)	27	4.9	81
Wood (varnished)	24	5.5	77
Average	23	6.8	74.8

Table 16: Results of the swabs (methamphetamine levels in µg/100cm^2)) in the retention experiment. *Results are an average of duplicates.

It is clear that the contamination on all surfaces reduced after six days. Moreover, the contamination reduced by at least 50% for all surfaces and on average, by approximately 75%. The 98% reduction on the glass surface might suggest a quick fall-off in the level of methamphetamine over an even shorter time period.

The results are significant because assessing the amount of smoking activity to have caused the contamination may be impacted by how soon after the activity the swabs are taken. Based on this experiment, a lengthy period between smoking and sampling may result in an underestimate in the amount of activity. However, this does depend on how the experiments are set up in assessing the activity in the first place and the time between smoking and sampling is not indicated in the published reference.

One important earlier observation in the experiments concerned the "haziness" of the room in the container. It is possible that the activity of sampling may have been compromised by simply entering a methamphetamine-contaminated atmosphere. The extent and significance of this is unknown but it is rational to suggest that the more contaminated an area/atmosphere is, the greater the chances of (further) contaminating the sample before and/or after the wipe sample was taken. In hindsight, an additional control sample would have been useful to assess the significance of any contribution to the level of methamphetamine purely from the atmosphere in the room.

9.2 ASSESSING SMOKING ACTIVITY

ESR's Clandestine Laboratory Team are the only group among the international Clandestine Laboratory Investigating Chemists (CLIC) community who have adapted published literature into a tool that quantifies smoking activity. In turn, Professor John Martyny et al, the authors of the publication to which this work mainly relates [27], are the only group known to have carried out research in this area.

The main findings to which ESRs calculations are based upon are somewhat lost in the detail of these publications as they are generally written from an environmental science and safety point of view, rather than taking a forensic approach. As stated in Section 5.3, the surfaces swabbed in this research did not include ceilings and the overall interpretation did not include any discussion on surface type or material differences despite the range being used. As discussed in Section 9.1, the length of time between smoking and sampling is likely to be a significant factor and one that is not accounted for in the published experiment.

However, this particular research provided an extremely good platform for carrying out some preliminary experiments. Such work has not been carried out previously by the Clandestine Laboratory Team due to the lack of appropriate instrumentation at MASC to carry out accurate low-level quantitative measurements. Although LCMS/MS instruments are available at other sites it was not possible to use them for NIOSH 9111 analysis as part of this project due to the workflow demands already placed on these instruments and their operators. Instead, the project used Hill Laboratories and their sampling kits to carry out the quantitative work. One of the benefits of using this provider is the ability to compare results with the overall HNZ data for which Hill Laboratories are a significant contributor. Since the completion of the project, the NIOSH method 9111 has been approved and validated on LCMS/MS instrumentation in the ESR Christchurch laboratory for use in further projects relating to methamphetamine contaminated properties [36].

9.2.1 Smoking Experiment – Method

A smoking experiment, based on previously published work, was carried out in a converted shipping container. The larger room of the container was approximately 9.4m^2 and 2.4m high. A shelving unit was constructed with the "ceiling shelf" at a height of approximately 2.1m off the ground. The bottom "table shelf" was approximately 0.3m off the ground (approximately 1.8m beneath the ceiling) with a hotplate in the centre. The design was intended to roughly mimic the experimental conditions set up for "Smoke #4" in the published

reference [27] using a hotplate to heat methamphetamine, through its smoking point, in an aluminium foil tray.

The methamphetamine used for this experiment was synthesised at ESR as the hydrochloride salt via the HI reduction of pseudoephedrine method using hypophosphorous acid and iodine (the most common method currently observed in New Zealand). The purity of the final product was 76.1% (calculated as base). 6.57 grams of the product (5.0 grams of methamphetamine base) was used for the experiment. This quantity is the equivalent of approximately 50-65 individual doses or “points” (0.1 gram of methamphetamine base/hydrochloride) and was “consumed” during one experiment, similar to the method used for “Smoke #4” in the published reference.

Photograph 17: Container smoking experiment – Three light shades including one with a working bulb (1), painted plasterboard (2,3), metal-painted (4), metal-bare (5), panel heaters (6,7).

The surfaces used for the experiments were chosen as they were the most frequently swabbed surfaces by ESR at clandestine laboratories and/or for their comparability to the surfaces used in the reference. An initial investigation around the influence of heat/electricity was also included along with a comparison between ceiling and wall locations. The surfaces included painted plasterboard (wall and ceiling locations), plastic light shades (with and without working light bulbs), panel heaters (on and off), painted and bare metal surfaces.

Once installed inside the container, an area on each of the surfaces was swabbed prior to the experiment to assess background contamination. The light and one of the panel heaters were switched on before the “burn” and allowed sufficient time to heat up. The methamphetamine was placed in the foil tray and the hotplate was switched on. The power was then controlled from outside the container.

Photograph 18: Container smoking experiment – methamphetamine smoke rising from source.

After approximately 40 hours, the surfaces were swabbed in duplicate using sampling kits supplied by Hill Laboratories and sent to them for analysis.

During the experiment it was clear that the methamphetamine smoke rose rapidly towards the ceiling where it collected first before filling the room. The process did not take long; less than a minute before the crystals began to smoke prolifically, and complete within 5 minutes. The resulting “fog” appeared to be denser towards the ceiling and took a few hours to clear,

hence the reason for allowing almost two days to pass before re-entering the container to swab for this experiment. During heating, liquefying of the crystals was observed, turning off the heat resulted in recrystallization but discolouration was obvious. This observation corroborates the user descriptions outlined in Section 4.2.

9.2.2 Smoking Experiment – Results and Discussion

The first point to take into account when analysing the data above is that the smoker was not in the room to absorb the smoke. Therefore, calculations to determine whether our data is in agreement with previously published data, must not account for the smoker.

The background contamination prior to the experiments was either nil or considered insignificant. The data from this experiment is presented in Table 18.

Surface	Material	Texture/Finish	Position	Distance from Source (m)	Result (equivalent µg/100cm^2)
Light (off)	Plastic	Smooth/Glossy	DF	1.8	7.5 (1.53)
Light (off)	Plastic	Smooth/Glossy	DF	1.8	2.8 (0.57)
Light (on)	Plastic	Smooth/Glossy	DF	1.8	12.8 (2.61)
Ceiling	Plasterboard, painted	Chalky/Matt	DF	1.8	6.1
Ceiling	Plasterboard, painted	Chalky/Matt	DF	1.8	4.7
Panel Heater (on)	Plastic	Rough/Matt	V	1.1	0.03
Panel Heater (on)	Plastic	Rough/Matt	V	1.1	0.04
Panel Heater (off)	Plastic	Rough/Matt	V	1.1	0.08
Panel Heater (off)	Plastic	Rough/Matt	V	1.1	0.04
Wall	Metal (painted finish)	Smooth/Glossy	V	2.2	9.2
Wall	Metal (painted finish)	Smooth/Glossy	V	2.2	9.5
Wall	Metal (bare steel)	Smooth/ Scratched	V	1.5	1.72
Wall	Metal (bare steel)	Smooth/ Scratched	V	1.5	1.61
Wall	Plasterboard, painted	Chalky/Matt	V	2.1	4.4
Wall	Plasterboard, painted	Chalky/Matt	V	2.1	5.3

Table 17: Results of the swabs taken from surfaces in the container for the "smoking" experiments.

The data explicitly shows that the amount of contamination being reported in a room depends more upon the surface material rather than its position and distance from the source. Therefore, the effect of position and distance from the source can only be assessed using the same surface material. Smooth surfaces record higher levels of methamphetamine than rougher surfaces, indicating that the swabbing process is more effective on a smooth surface and/or methamphetamine is more likely to be retained on a rough surface. Interestingly though, the plastic light fitting swabs have recorded lower levels per 100cm^2 than the ceiling swabs taken adjacent to them, which somewhat contradicts the Clan-Lab data that recorded higher levels overall on plastic surfaces.

With regard to the lights, it appeared that an operating light bulb made a difference to the amount of contamination observed on the surface surrounding it. This is could be because this particular surface type is better at retaining methamphetamine when it's warm or the warmth/electricity from the light bulb itself has some influence on the methamphetamine being retained in this area. However, the light fittings overall showed the most variable results and this observation is not supported by the other electrically warmed surface which showed the lowest readings in the room.

The painted plasterboard on the ceiling showed higher levels of contamination than the same material positioned vertically on the wall. However, if the distance from the source is taken into account along with its position (vertical versus downward-facing), the difference is not so remarkable, in this experiment. This might go some way to show that although methamphetamine smoke rapidly rises to the surfaces above the source, it readily spreads to affect all upper surfaces in the room. However, more experiments would be required to show this trend and although it is expected that room size is influential, the only way to properly assess this is to use the same surface material in various locations in rooms of different sizes.

Table 19 compares the experimental data (accounting for swab area and room size) with the previously published data. The panel heater data has been omitted since that particular surface type recorded too low concentrations to extrapolate accurately.

Surface	Result (equivalent µg/100cm^2)	Result for 1 smoke equivalent (max)	Adjustment to a room 23m^2	Equivalent surface (literature) result (max)
Light (off)	7.5 (1.53)	0.031	0.012	
Light (off)	2.8 (0.57)	0.011	0.004	
Light (on)	12.8 (2.61)	0.052	0.021	
Ceiling	6.1	0.122	0.048	
Ceiling	4.7	0.094	0.038	
Wall	9.2	0.184	0.074	
Wall	9.5	0.190	0.076	
Wall	1.72	0.034	0.014	
Wall	1.61	0.032	0.013	
Wall	4.4	0.088	0.035	
Wall	5.3	0.106	0.042	
Average (approx.)	**4.3**	**0.1**	**0.04**	**0.22**

Table 18: Comparison of the experimental data (accounting for swab area and room size) with the previously published data.

The results indicate that the amount of methamphetamine expected to be deposited from burning 0.1 gram of methamphetamine would be approximately 0.1µg/100cm^2. If we proportionally adjust the results to account for room of 23m^2, the contamination levels observed in this experiment would be up to five times less than those reported in the published literature. Although, it is expected that proximity to the source is influential, particularly in these experiments where the methamphetamine being "smoked" is in a stationary position.

9.2.3 Smoking Experiments – Comparison with Previously Published Work

In his experiments, Martyny did not examine ceilings or light fittings. Therefore, a more direct comparison can be made using the wall results. Previous experiments recorded levels of 4.8µg/100cm^2 on the wall after 2.45 grams of methamphetamine had been "smoked". Similar figures were observed in these experiments after "smoking" more than twice as much in a room less than half the size which may lead to conclusion that smoking methamphetamine

actually produces far less contamination than originally thought. If we were to use the results of this experiment, the estimate of smoking activity could increase by up to five times, making the use of Martyny's figures very conservative.

However, given the observation from the first experiment (Section 9.1), consideration needs to be given to the time between smoking and sampling which may be the reason for the "reduced" level of contamination observed in the above experiments. Although it remains unaccounted for, if Martyny had carried out his sampling soon after smoking (which is probable since he hasn't inferred otherwise) then higher results in this experiment could be expected if swabbing had been carried out sooner.

In the initial retention experiment, although different surfaces materials in different positions were used, the average result of the wipe samples taken six days later was 3.3 times lower than that taken soon after smoking (in the same experiment) (Table 17). Furthermore, the average result of the wipe samples taken soon after smoking (23µg/100cm^2) was approximately 5.3 times higher than the average result of the swabs taken after two days in this experiment.

The highest level observed for one "smoke" on a vertical surface in Martyny's experiment (again, recalling that the smoker was not present to absorb up to 90% of the vapour) was on a mirror approximately 60cm above the source; this level was 0.22µg/100cm^2. By comparison, the highest equivalent result (extrapolated for a single smoke) in the smoking experiment (Table 19) was 0.19µg/100cm^2 (9.5µg/100cm^2/50) from a smooth metal "wall".

In our initial retention experiment, the average level observed on a glass surface adjacent to the source, in a similar position and distance, was 6.9µg/100cm^2 (Table 17). Taking into account the amount of methamphetamine used this would equate to 0.14µg/100cm^2 for a single "smoke". Martyny's figures do suggest higher levels of contamination if the swab is taken in close proximity to the source from a smooth surface and the figures from our first experiment support this. The highest level observed in our experiment, 38µg/100cm^2 was on a laminated surface. Taking into account the amount of methamphetamine used this would equate to between 0.58 and 0.76µg/100cm^2 for a single "smoke". Martyny's highest level (after one "smoke") on a vertical smooth surface in close proximity to the source was 0.22µg/100cm^2. However, his second (smoke) sample from the same surface was 1.5µg/100cm^2 and the final sample was 12µg/100cm^2. Extrapolating these values back to a single sample results in a similar range to the one observed on our laminated surface. Therefore "proximity" to the source needs to be taken into account when taking a wipe

sample could be included in the calculations. It is proposed that room size will have little effect on proximity.

Considering a sharp reduction in contamination over time supports Martyny's observations if indeed he had swabbed soon after smoking. This would also support the conservativeness of using Martyny's data for assessing smoking activity because it uses the maximum amount of contamination recorded for a single smoking event (i.e. 0.22µg/100cm^2) as the baseline level (in a room 23m^2). Accounting for a smoker absorbing at least 67% of the vapour, this level could be expected to be approximately 0.07µg/100cm^2. Having extrapolated the results for a single smoke, this level (0.22µg/100cm^2) was not reproducible in the above smoking experiment, even in a smaller room.

9.3 CONTAMINATION PRODUCED BY RECRYSTALLISATION

The purpose of this study was in response to a defence hypothesis (R v SOWMAN, March 2016) that argued that methamphetamine contamination observed on the surfaces swabbed at the suspected clandestine laboratory in this case could be attributed to the recrystallization of methamphetamine from water and not the manufacturing process. This hypothesis was investigated [37].

9.3.1 Method

The experiments were carried out using methamphetamine hydrochloride powder with a purity of approximately 71.061625% methamphetamine. Each experiment involved dissolving 1 gram of the powder in 200mL of water and heating at approximately 70^{o}C within a Perspex box (395mm x 395mm x 400mm). Swabs were taken from the "ceiling" intermittently and with differing degrees of condensation, as observed. The level of contamination measured by semi-quantitation as for DRC/SOP/23 [31].

9.3.2 Results

Methamphetamine contamination was detected and, as expected, generally increased with increasing "weight" condensation, as observed (Figure 30).

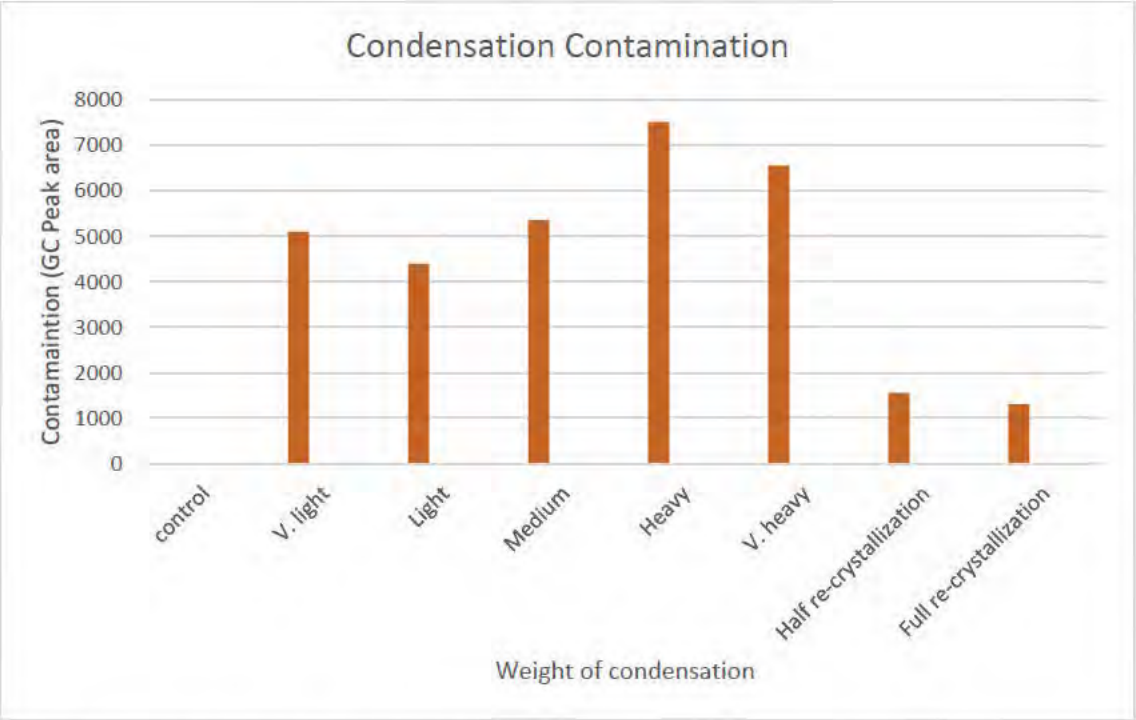


Figure 30: Level of contamination versus weight of condensation.

As expected the level of contamination varied over the course of the experiment but was relatively consistent during the evaporation phase (Figure 31).

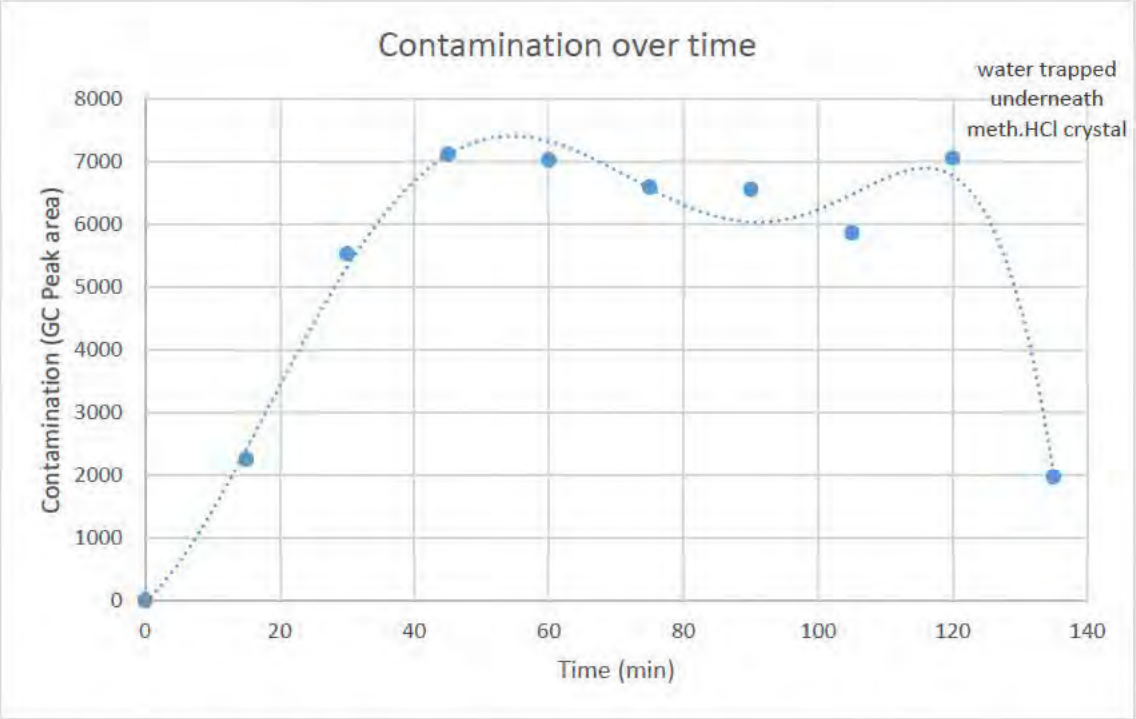


Figure 31: Level of contamination versus time.

The level of contamination observed during the recrystallization experiments averaged 1.55µg per experiment with a standard deviation of +/- 1.1µg. Although the results were variable very little contamination overall was being observed. The amount undergoing recrystallization was approximately 1 gram in a box approximately 400mm x 400mm x 400mm. Therefore, using this data, the equivalent level of contamination can be calculated in a room of a certain size for the same amount of methamphetamine.

9.3.3 Calculation of MVAP

It can already be seen from the amounts detected above that 1 gram of methamphetamine will produce far less contamination in a room many times larger than the experimental Perspex box. The formulas proposed for the calculation of the amount of methamphetamine that would have to be recrystallized to cause a certain level of contamination is given below:

RA / SA.SL = C

C = Entire room contamination g

RA = Surface area of room m^2

SA = Swab Area m^2

SL = Swab level (methamphetamine) g (from GC semi-quant)

MVAP = C / X

MVAP = Quantity of methamphetamine recrystallised by evaporation of water.

C = Entire room contamination g (derived above)

X = Constant from experiment g (approximately 1.5×10^{-6})

In the case of R v SOWMAN the value of MVAP was calculated to be in the region of 78 kilograms. SOWMAN either had recrystallized 78kg of methamphetamine hydrochloride or there is another hypothesis for the level of contamination observed on the surface swabs in that case.

9.4 CONCLUSIONS

From this research a number of conclusions can be made:

- Methamphetamine smoke rises rapidly spreading evenly across the upper surfaces of the room.
- Methamphetamine contamination on surfaces reduces sharply over a short period of time from the last contamination event. However, this is likely to vary with the amount of methamphetamine the surface was exposed during that event.
- The amount of contamination observed is dependent on the type of surface being swabbed.
- Smooth surfaces generally record higher levels of contamination and this is likely to be because the methamphetamine is more easily removed by swabbing rather than rougher surfaces being less contaminated.
- Using Martyny's figures for methamphetamine surface contamination in smoking activity calculations is conservative (regardless of the surface being swabbed) since his experiment recorded the highest level of contamination for a single smoking event, taken from a smooth surface.
- Calculation of smoking activity for evidential purposes is justifiable given the observation that contamination decreases over time.
- Recrystallization of methamphetamine from water would contribute little to the contamination observed on surface swabs taken in relation to suspected clandestine laboratories.

9.5 ACKNOWLEDGEMENTS

Acknowledgments to Andrew Cullen, internship student from Victoria who carried out the experimental work and determined an algorithm for calculating the contamination caused by recrystallisation:

10. CONTAMINATION CALCULATOR

The research presented in Section 9 show that the figures from previous research are in fact conservative when applying them to calculating the amount of smoking that would have caused the observed contamination. This confidence has led to the development of a web-based application of the calculator used in DRC/SOP/023 as a concept for a product that could potentially be active on the ESR website and and/or used by subscribers to an "app". The calculator calculates a range of smoking, that is the number of single smoking "events" or "doses" to have caused the contamination within that space. The calculator has two versions; a "general" version and an "advanced" version. The general version is simple and calculates the range without explaining the detail behind the figures and is intended to be adapted for public use. The advanced version is more detailed and explains the algorithms behind the calculations which are also displayed if required. This version is intended for research and evidential casework.

10.1 GUEST VERSION

The original concept of the ESR Clan-Lab "Swab Calculator" was considered a useful tool for companies and agencies concerned with methamphetamine contamination testing and decontamination. The calculator puts the level of contamination into perspective in terms of the amount of smoking activity that might have taken place to cause the contamination. In addition, the Housing New Zealand (HNZ) data (refer Section 6) is used to provide a second perspective in the form of a percentile rating as to how contaminated a property/room is relative to its large dataset. From this point of view, the information might be useful to the discerning homebuyer or landlord having requested the testing themselves.

With the "Swab Calculator" as a draft, and support from the IMSG team at ESR, we were able to develop a web based program that might appeal to an external market to be used as an additional tool that might help to inform a decontamination strategy.

The example in Figure 32 shows a result of 1.4µg/100cm^2 being inputted into the calculator's fields along with the room size. The size of the room is factored into the calculation which provides the user with range of smoking activity that may have caused the measured level of contamination. The range is the number of single smoking "events" or "doses" proposed to have caused the contamination within that space. With the indication that contamination decreases over time, the original amount may be much higher. However, the detail is not

necessary in the general version and ESR's intellectual property regarding the calculations is hidden from the viewer and embedded within the program.

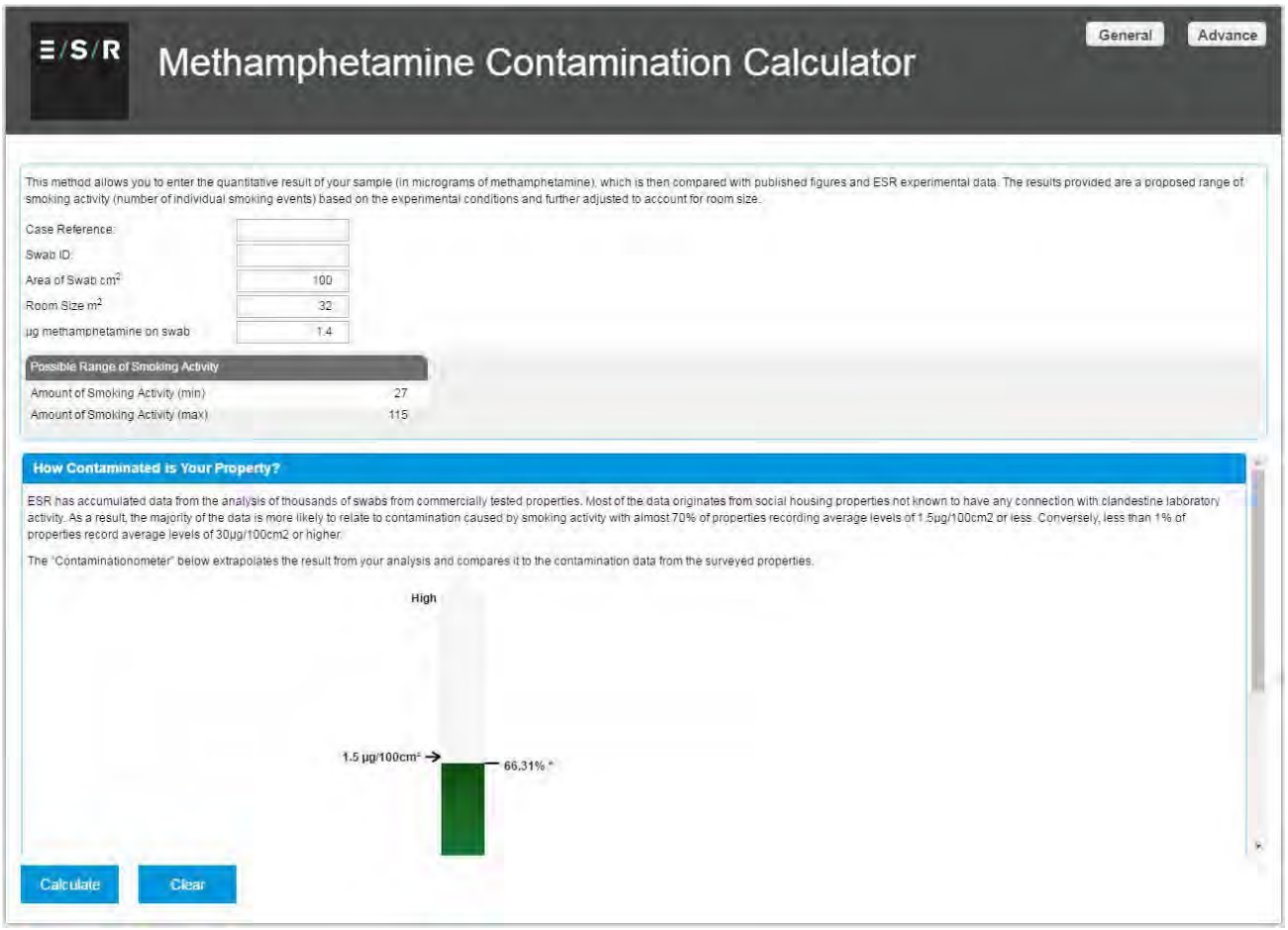


Figure 32: A working example of the "Guest" version of the "Methamphetamine Contamination Calculator" which calculates the amount of smoking activity to have caused the measured level of contamination.

The user is also shown a "contaminationometer" (scrolling down on the app will reveal the full picture) which extrapolates the users result and compares it to the contamination data from the surveyed properties. The meter result is displayed in a "low" to "high" field with the 1.5µg/100cm^2 threshold depicted as a marker. In this example, 66.3% of the surveyed properties had contamination levels lower than 1.4µg/100cm^2. This part of the calculator has yet to receive approval from HNZ to use the data.

10.2 ADVANCED VERSION

Again, the original concept of the ESR Clan-Lab "Swab Calculator" was considered a useful tool for other forensic agencies to apply to casework. This calculator is more aligned to the

original version. In this version, the calculations are based upon adjustments to Martyny's experiments [27]. For example, Martyny swabbed an area of 100cm^2 but field swabs may be required to be taken from an object or larger surface area. Adjusting the swab area and room size would change Martyny's results respectively. This full calculation can be accessed upon pressing "Calculate" and expanding the "Expected Experimental Results" field which show the original values from Martyny's experiments and the expected results once a parameter, such as swab area "χ" and room size "γ" are changed in the fields above (Figure 33). A working example of the "Advanced" version of the "Methamphetamine Contamination Calculator" which calculates the amount of expected contamination resulting from a single smoking event along with an explanation of the algorithms within the program is shown in Figure 33.

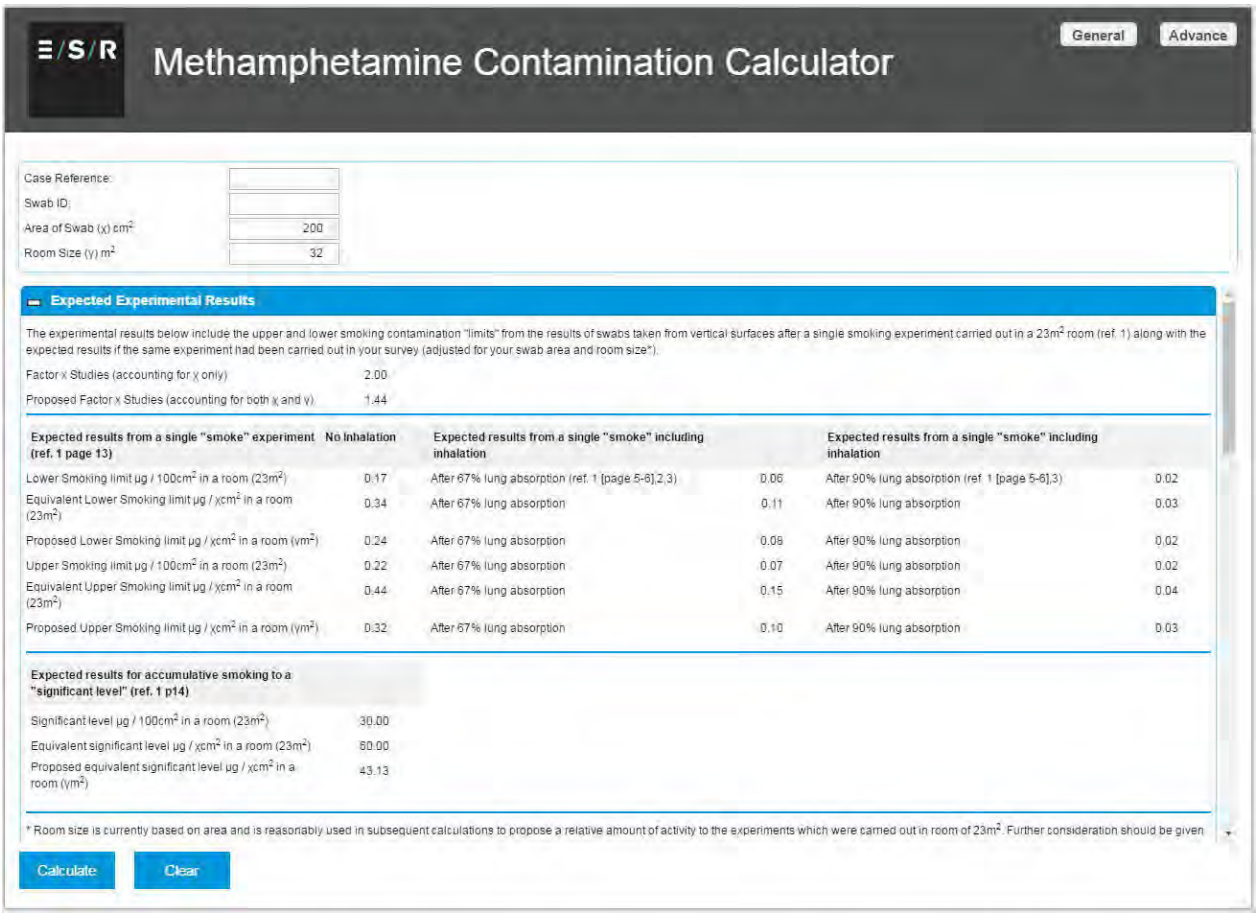


Figure 33: A working example of the "Advanced" version of the "Methamphetamine Contamination Calculator".

Now the values are ready to be inputted into further algorithms once the methamphetamine level is established. If the user already has a value, they can expand the "Full Quantitative Method Calculation" field below (Figure 34). The area of the swab and the room size values are carried through from the initial entry fields and pressing "Calculate" again will provide a

range of smoking based on the figures generated previously. A working example of the “Full Quantitative Method Calculation” of the “Advanced” version of the “Methamphetamine Contamination Calculator” is shown in Figure 34.

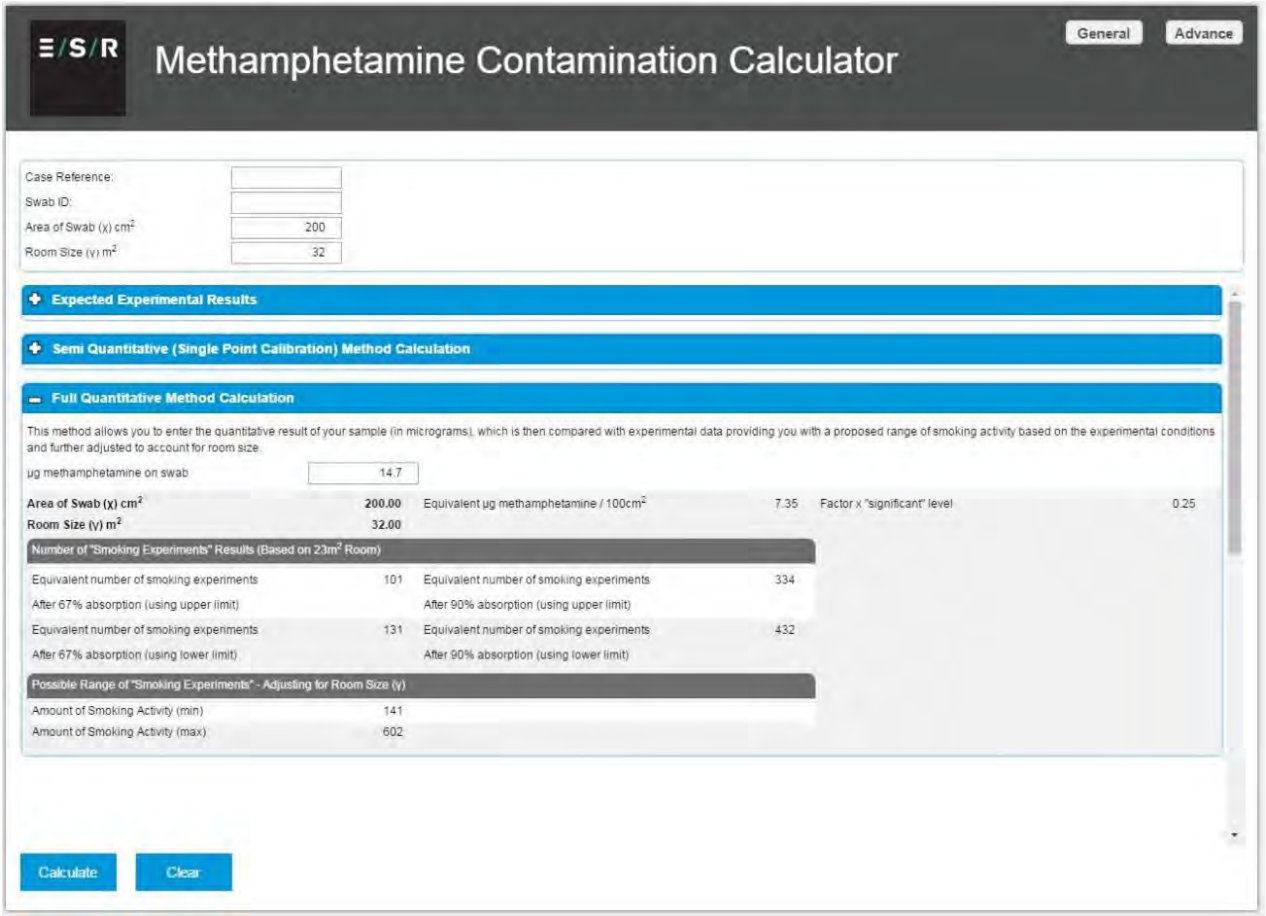


Figure 34: A working example of the ”Full Quantitative Method Calculation” of the “Advanced” version of the “Methamphetamine Contamination Calculator”.

Alternatively, the user can carry-out a semi-quantitative method and input the values from the gas chromatography results and instrument parameters (Figure 35). This is achieved by expanding the associated section and completing the fields before pressing “Calculate”. This single point calibration is useful for swabs taken from suspected clandestine laboratories where the levels are extremely high. An accurate quantitative value for the amount of methamphetamine is expensive and unnecessary if the purpose is simply to show that the “significant level” has been breached or not. As discussed previously, the “significant level” represents a value generally thought to be an excessive level of contamination had it been caused by smoking alone. The “factor” the significant level would need to be multiplied by to equal the swab result is also provided in the calculation. This factor is helpful in gauging the relative level of contamination. With a factor above “1”, this swab would be in the top 0.3% of

swab values had it originated from the HNZ data. A working example of the “Semi Quantitative Method Calculation” of the “Advanced” version of the “Methamphetamine Contamination Calculator” along with an explanation of the algorithms within the program is shown in Figure 35.

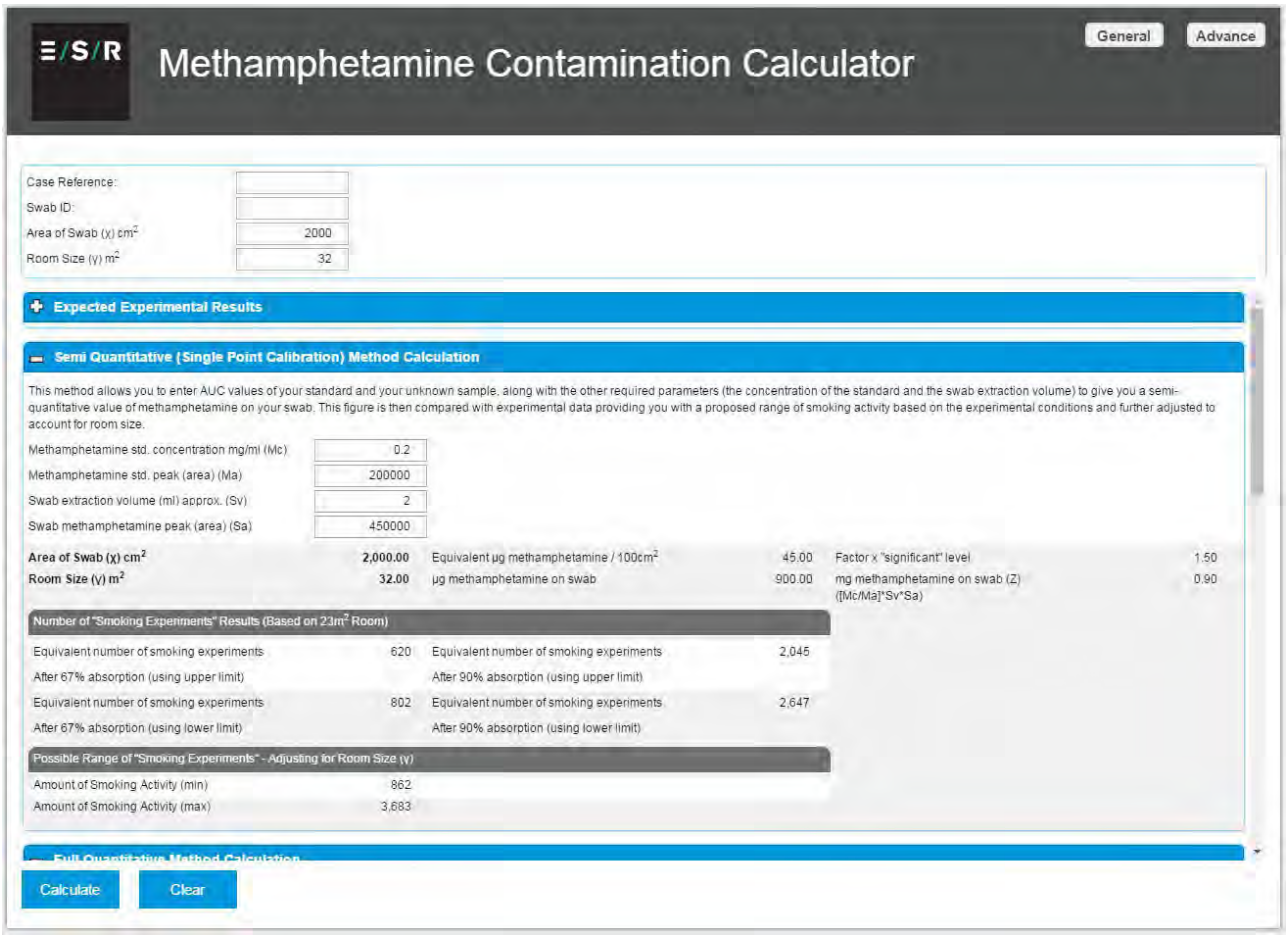


Figure 35: A working example of the ”Semi Quantitative Method Calculation” of the “Advanced” version of the “Methamphetamine Contamination Calculator”.

Again, the comparison with the HNZ data can be viewed on the contaminationometer by scrolling down on the app. In this particular case, along with the proposed smoking range, this information is also useful in evidence as it shows that the vast majority of the properties in the survey showed levels far lower than the contamination level shown by this swab. The two meters shown in Figure 36 represent the values from the full quantitative method (right) and the semi-quantitative method (left).

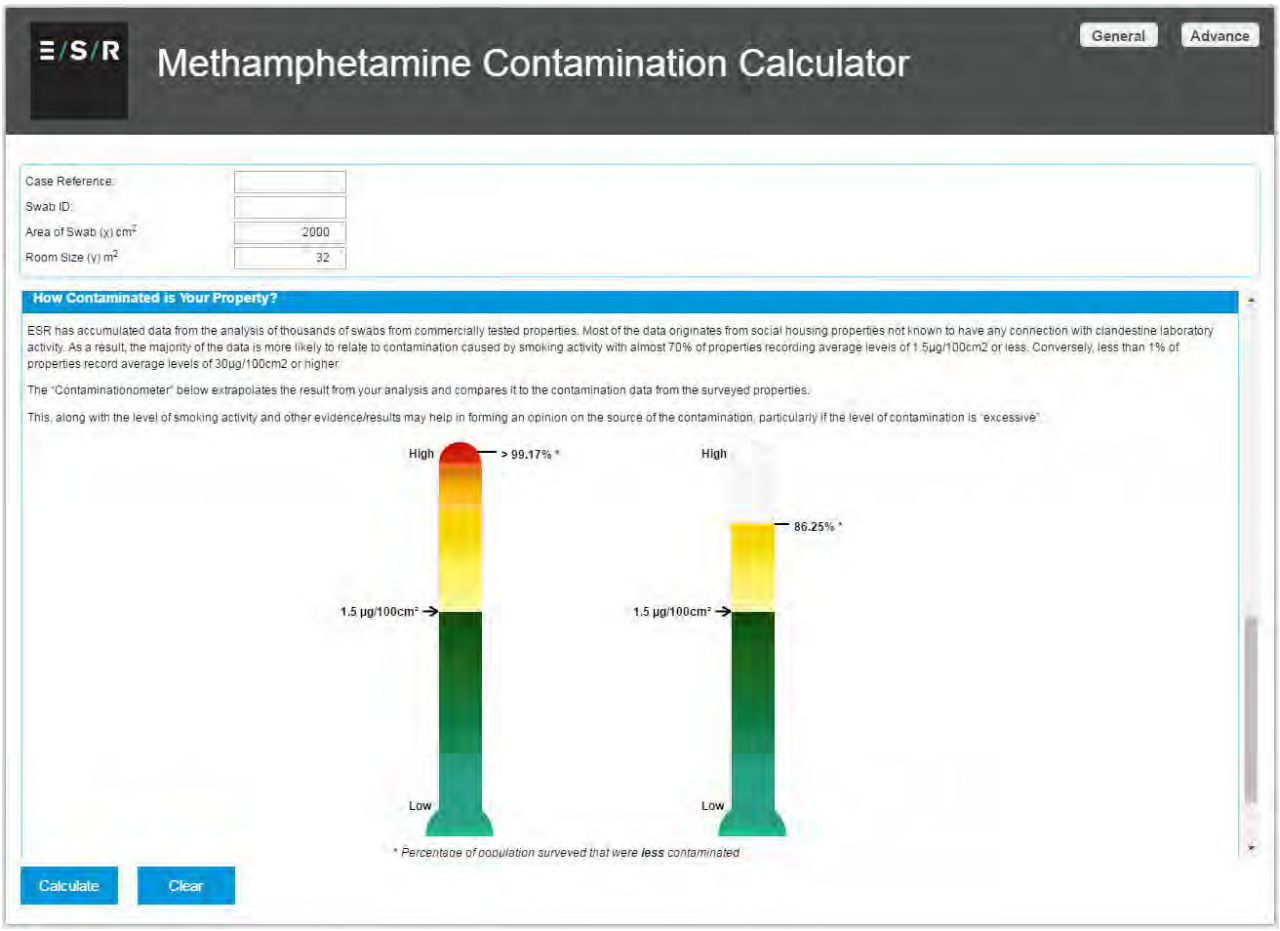


Figure 36: A working example of the "Advanced" version of the "Methamphetamine Contamination Calculator" which also calculates the degree of contamination relative to the data obtained from HNZ.

10.3 WEB VERSION

In January 2018, a web version of the calculator, developed by ESR IMSG and Catalyst IT, was launched for public use. The algorithms are based on the original calculation but provides an "up to" value for the number of "smoked doses" that could have caused the observed contamination. This figure is obtained from the highest achievable value in the "range" extrapolated from the original calculation. This figure was chosen for user simplicity rather than having to explain the reasons for a range of values.

A screen shot of the "Meth Calculator" is provided in Figure 37. Otherwise the "Meth Calculator" can be found here:
https://www.esr.cri.nz/our-services/products-and-tools/meth-calculator/

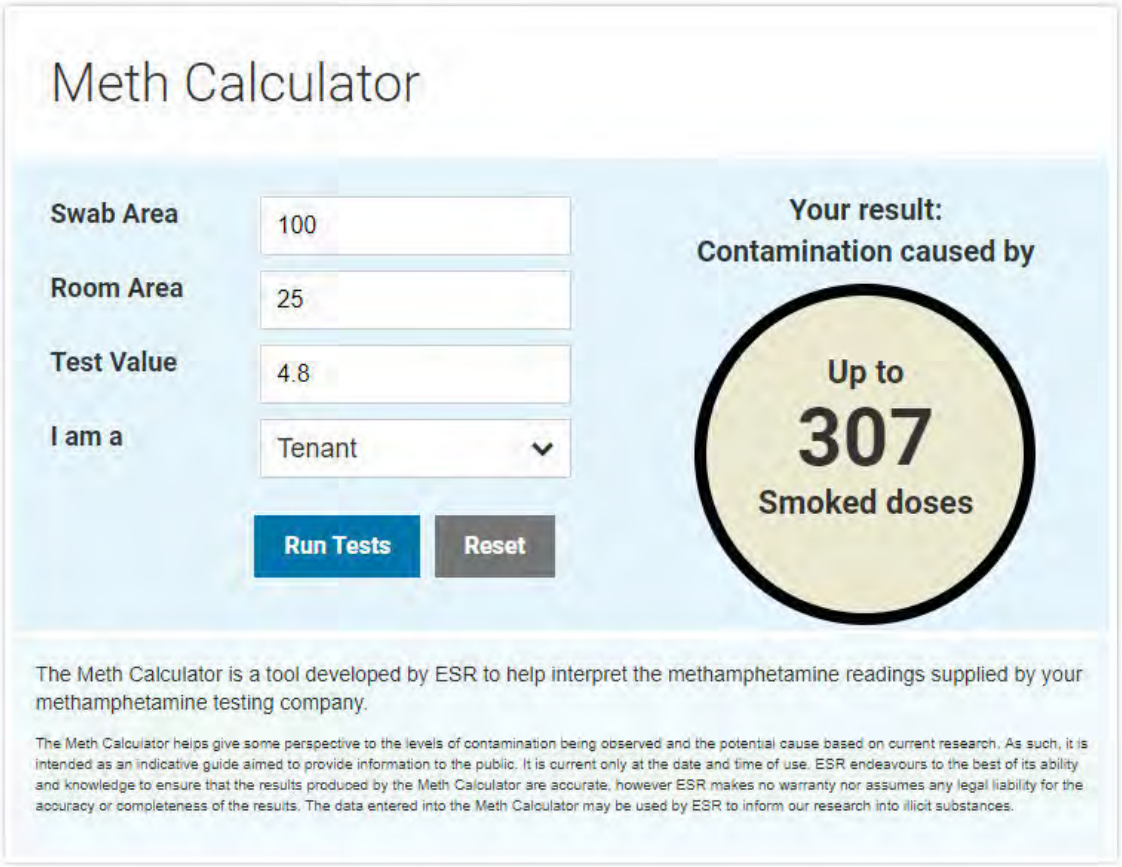


Figure 37: A working example of the Web version of the "Meth Calculator" which calculates an "up to" value for the number of "smoked doses" that potentially caused the observed contamination.

10.4 ACKNOWLEDGEMENTS

Significant input from ESR's IMSG team has led to the successful development of various version of the "Meth Calculator" with special acknowledgements to Dushyanthi Jayasekera, Deidre McMahon and Gavin Jolly.

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Liam Collins

From: Lucy Saunders
Sent: Tuesday, 17 May 2022 4:56 pm
To: Erina Mayo
Cc: Liam Collins
Subject: Few further questions on meth for tomorrow

Kia ora Erina

Thank you again for making time to chat again tomorrow about the meth proposals. I have been thinking about a few questions which I'd like to discuss, and I thought I'd send them through now to give you a heads up.

Here we go!

1. The s 9(2)(f)(iv) you sent through was really helpful in lots of ways, but it raised a few further questions for me. Specifically:
    - s 9(2)(f)(iv) [redacted]
    - [redacted]
    - [redacted]
    - Can we reference this report, as needed, in our discussion paper and Cab paper or not? If we can, is it OK to reference specific pages/ sections?
2. s 9(2)(f)(iv) [redacted]

[redacted]

[redacted]

s 9(2)(f)(iv) [redacted]

[redacted]

OK, I may have thought of a few more things by tomorrow but hopefully not. Take care and I look forward to our discussion.

Ngā mihi,

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He kāinga ora, he hapori ora - our purpose is thriving communities where everyone has a place to call home.

[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 11 May 2022 4:15 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth regulations: topics to discuss

Hi Lucy
Playing catch-up after being away delivering Police training in Wellington.

What you have described is almost spot on, but I just have the following comments.

[redacted]

s 9(2)(f)(iv) [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

I can't find reference to this in the current ESR report, but I may have just misunderstood some key aspects. Can you let me know if this statement is from the report, and if so, where? Or alternatively if you know what other scientific source this is based on? (I'll also look through our previous files to see if I can find the source).

s 9(2)(f)(iv) [redacted] I think we may have supplied it to Vanessa previously.
I just saw your other email, and yes that publication is the correct one…I will see if I can find it to email through. We have done further work since then though and may be able to word things a bit differently.

s 9(2)(f)(iv) [redacted]

I suspect the science answer is in the report, ie:

s 9(2)(f)(iv) [redacted]

Correct, I (ESR) can't comment on that. However, you may be able to speak to Peter Cressey for further info. He was the toxicologist that authored the report you have.

I think that has covered most things. Sorry if it is still confusing, I was confusing myself!

Happy to catch up over Teams, Wednesday next week is looking free for me!

Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Monday, 9 May 2022 11:44 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Meth regulations: topics to discuss

Kia ora ano Erina

Apologies – another couple of science questions for you, s 9(2)(f)(iv) [redacted]

1. Our current paper states:

s 9(2)(f)(iv) [redacted]

I can't find reference to this in the current ESR report, but I may have just misunderstood some key aspects. Can you let me know if this statement is from the report, and if so where? Or alternatively if you know what other scientific source this is based on? (I'll also look through our previous files to see if I can find the source).

s 9(2)(f)(iv) [redacted]

I suspect the science answer is in the report, ie:

s 9(2)(f)(iv) [redacted]

[redacted]

I look forward to hearing from you. Happy to chat by phone if that's easier.

Lucy

[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Friday, 6 May 2022 8:56 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth regulations: topics to discuss

Kia ora Erina

Sorry to pester – but are you able to let me know if my understanding below is right, or not? I'm hoping to send the doc to various people today for another look, but I want to make sure I'm clear on the testing proposals. If it's not possible for you to look at this today, no worries - I'll just put a placeholder in that bit saying I'm still checking.

In thinking about it further, I'm wondering if, s 9(2)(f)(iv) [redacted]

Fine to call me if that's easier/ quicker – either on teams or +64 4-832 2490

Ngā mihi,

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[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Wednesday, 4 May 2022 5:03 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth regulations: topics to discuss

Thank you. It was so helpful speaking to you, and your comments are great.

I have tried to summarise the s 9(2)(f)(iv) in my own words to double check that I understand it all. So, I think we're proposing that:

s 9(2)(f)(iv) [redacted]

s 9(2)(f)(iv) [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Let me know about all this when you get a chance. Thanks again.

Ngā mihi,

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[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 4 May 2022 3:20 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth regulations: topics to discuss

Hi Lucy
It was lovely speaking with you today.

I have made some further comments on the attached document for you to choose to address or ignore!
If you have any additional questions, then please don't hesitate to contact me.
Cheers
Erina

Erina Mayo BSc, MSc (Hons)
Team Leader, Clandestine Drug Laboratory
Forensic Drug Chemistry
Mt Albert Science Centre, 120 Mt Albert Road, Auckland 1025
DDI: +64 9 815 3963
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E: erina.mayo@esr.cri.nz
W: www.esr.cri.nz

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Thursday, 28 April 2022 3:21 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth regulations: topics to discuss

Thank you! This sounds great. s 9(2)(a) [redacted]

Next week should be OK – I'll send through an appointment for Wednesday - the Tuesday times are tricky for me.

Looking forward to the discussion.

Ngā mihi,

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Lucy

[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Thursday, 28 April 2022 3:02 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth regulations: topics to discuss

Hi Lucy

Thank you for sending that through and I have no problem helping you get up to speed with all of this. If we find that after our meeting more time is required then I might look at a new contract for the time, however happy to get this first meeting completed first and see how we go.

s 9(2)(a) I could do Tuesday anytime from 11am – 2pm, or Wednesday from 1pm onwards. Wednesday is better for me but I can also make Tuesday work.

Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Wednesday, 27 April 2022 3:20 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: Meth regulations: topics to discuss

Kia ora ano Erina

In preparation for our possible meeting on Friday, I attach a version of the current discussion document with a number of questions/ comments marked up to discuss with you, s 9(2)(f)(iv) My questions may be a bit more complicated than I anticipated when I emailed this morning, sorry! This document was 95% written by my predecessors, so I'm still coming up to speed with lots of the detail. You may not have seen this document before – apologies if so. I welcome your comments on any aspects, not only those I have asked above.

I'm aware that all this may take reasonable amounts of your time. If you'd like me to investigate a new contract for you to cover your time on all this, please let me know: as I think I said earlier, Claire has confirmed that we can do this if needed. Also, if you need a bit more time to consider the issues, then we could meet early next week instead – let me know. We now have slightly more time to get these things resolved, which is a relief.

I look forward to hearing from you.

Ngā mihi,

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[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Wednesday, 27 April 2022 9:24 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

Kia ora Erina

Does sometime this Friday suit you to chat?

I'm free between 10-12 or otherwise after 3.30: an hour should be plenty. I have various technical questions for you, s 9(2)(f)(iv) [redacted] I'll compile a list and send it through so you have a bit of warning. (It won't be that complex I don't think, I'm just still getting up to speed).

Can you let me know what time might suit, and I'll send through a teams invite.

Many thanks in advance.

Ngā mihi,

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[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 20 April 2022 3:12 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

No problem!
Look forward to catching up next week, my calendar is fairly free so just let me know when suits.
Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Wednesday, 13 April 2022 4:57 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

Hi Erina

No problem at all – sorry that I've been chasing 😊.

I'm away next week, actually, so maybe we can catch up in the week of 26 April? IN the meantime, I will be sending the draft proposals out to agencies but I think they're clear enough for that purpose, and you and I can iron out any minor details.

Many thanks for getting back to me.

Ngā mihi,

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[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 13 April 2022 10:33 am
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

Hi Lucy
Sorry for the delayed response, I have been out of the office at scenes and then sick leave.

I am just catching up on emails now but am happy to have a chat about this. Unfortunately, the rest of my week is full up with meetings etc so it will have to be sometime next week if that suits you? Asides from being on call my calendar is looking pretty clear so happy to work with a time that suits you.
Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Tuesday, 12 April 2022 3:14 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Meth contamination work at HUD has restarted: quick question

Kia ora ano Erina

I have now looked further through the files, and found your thorough comments from the middle of last year sent to Vanessa James, where you cover your thoughts on a level a property should test to following cleaning: thank you!

I have a couple of further questions about the s 9(2)(f)(iv) in the current paper, mainly to clarify whether:

- s 9(2)(f)(iv) [redacted]

Would you be available for a chat at some point? Claire, the manager on this work (cc'd), has said that if needed, there may be an opportunity to enter a short further contract with you to cover your time on this work: let me know if you'd like me to look into that further.

I look forward to hearing from you.

Ngā mihi,

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[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Wednesday, 6 April 2022 4:11 pm
To: Erina.Mayo@esr.cri.nz
Subject: Meth contamination work at HUD has restarted: quick question

Kia ora Erina

I have recently started at HUD, and have picked up the paused meth regs work, which I know ESR has extensively advised on. Are you still the best person to ask about this? Please let me know if there's someone else I should contact.

The previous person working on this left at the end of last year, so I am trying to get to the bottom of a few outstanding issues. s 9(2)(f)(iv) I have a copy of an email from Vanessa James to you asking about your views on this, but I'm not sure I have a copy of your reply.

s 9(2)(f)(iv)

Please let me know. Very happy to chat if that's easier.

Ngā mihi,

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Liam Collins

From: Lucy Saunders
Sent: Monday, 13 June 2022 12:25 pm
To: Erina Mayo
Cc: Claire Leadbetter; Liam Collins
Subject: RE: Follow up on possible further meth advice needed

Kia ora Erina

s 9(2)(a) [redacted]

I'll put the meeting in for Wednesday, but if you need to postpone again no worries.

Alternatively, is there anyone else we could consult with at ESR, s 9(2)(f)(iv) [redacted] so ideally we'd need it **before the end of June** if that's at all feasible. We are seeking further policy decisions from the Minister in early-mid July in order to inform the Ministerial/caucus consultation on the Cabinet paper in August so it would be great to be able to include this decision in that briefing.

Let's discuss on Wednesday anyway, health permitting.

Ngā mihi,

Lucy Saunders (she/her)
Principal Policy Advisor | Policy and Legislation Design
Solutions Design and Implementation
lucy.saunders@hud.govt.nz | +64 4-832 2490
www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

[IN-CONFIDENCE:RELEASE EXTERNAL]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Monday, 13 June 2022 11:49 am
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Follow up on possible further meth advice needed

Hi Lucy
s 9(2)(a) [redacted]
Is there a chance we can reschedule to Wednesday? My calendar is completely free Wednesday and Friday.
Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Wednesday, 8 June 2022 11:59 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Follow up on possible further meth advice needed

No worries! I hope you feel better soon. I'll reschedule – probably next Monday I think.

Take care, Lucy

[IN-CONFIDENCE:RELEASE EXTERNAL]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 8 June 2022 11:00 am
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Follow up on possible further meth advice needed

Hi Lucy

s 9(2)(a) [redacted]

I have time in my calendar this Friday and next Mon, Wed, Fri – we could try for tomorrow but not sure I will be well enough yet.

Sorry for the inconvenience.
Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Friday, 3 June 2022 3:38 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Follow up on possible further meth advice needed

Hi again Erina

Hopefully the possible teams meeting time has come through to you OK. The time is to fit in with Claire's diary, but let me know if it won't work and I'll try for something different.

I'll come back to you early next week about the extra data: it won't be much at this stage I don't think, but will be good to make contact with Matt in any case.

Have a good weekend.

Cheers, Lucy

[IN-CONFIDENCE:RELEASE EXTERNAL]

From: Lucy Saunders
Sent: Wednesday, 1 June 2022 3:52 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>
Subject: FW: Follow up on possible further meth advice needed

Hi Erina

The email below bounced for some reason, but IT now tell me the issue is sorted, so hopefully this one gets to you.

s 9(2)(f)(iv) [redacted]

Let's discuss further next week.

Lucy

[IN-CONFIDENCE:RELEASE EXTERNAL]

From: Lucy Saunders
Sent: Wednesday, 1 June 2022 2:45 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Subject: RE: Follow up on possible further meth advice needed

Hi Erina

Many thanks for your reply.

Data
That's great about the data question: I'll think about what we need and send the questions through. Next week will be fine – we have had to delay things slightly while we iron out the various loose ends but we are still hoping to get things sorted for the Minister soon.

s 9(2)(f)(iv) [redacted] Yes, we would welcome any of your other colleagues' thoughts on this as well: potentially also at a meeting next Tues or Wed to confirm what's possible? I'm hoping Claire, our manager, will also be able to attend.

s 9(2)(f)(iv) [redacted]

[redacted]

[redacted]

If OK with you, I'll send a meeting appointment through for Tuesday or Wednesday once I've checked whether Claire will be attending or not – her diary is a lot trickier than mine. Absolutely fine for Matt, Peter, or any of your other colleagues to attend as you decide.

Thanks again,

Lucy

[IN-CONFIDENCE:RELEASE EXTERNAL]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 1 June 2022 11:54 am
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Follow up on possible further meth advice needed

Hi Lucy

s 9(2)(f)(iv)

s 9(2)(f)(iv) [redacted]

A catch up over teams would be good to discuss further. Early next week (Tuesday or Wednesday preferably) might work well, it will give me a chance to run some of this past a couple of my colleagues. I might invite Matt Russell to the meeting also as he was involved in the initial MHUD discussions and would be the one providing the data you require. Just let me know if those days suit you.

Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Tuesday, 31 May 2022 9:59 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>; Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>
Subject: RE: Follow up on possible further meth advice needed

Hi again Erina

I hope your week of field work last week went well.

Just checking in on this: have you had a chance to look into any of the topics below? Let me know. Following discussions with Claire, s 9(2)(f)(iv) [redacted] really welcome a chat with you about this area as well. Following our informal conversations, s 9(2)(f)(iv) [redacted]

We have a template contract (based on last year's one) which we can adjust as needed for any further work, so that step shouldn't take too long to sort out.

I look forward to hearing from you. Fine to chat by phone if that's easier – I'm generally around.

Ngā mihi,

Lucy Saunders (she/her)
Principal Policy Advisor | Policy and Legislation Design
Solutions Design and Implementation
lucy.saunders@hud.govt.nz | +64 4-832 2490
www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

From: Lucy Saunders
Sent: Monday, 23 May 2022 3:32 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>; Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>
Subject: Follow up on possible further meth advice needed

Kia ora Erina

Thanks again for the extremely helpful conversation last week working through further meth science questions.

I've now discussed the possible extra advice we need from ESR with Claire. Our initial thoughts are:

(s 9(2)(f)(iv) [redacted]

I'm conscious you're away this week, so no worries if you don't get back to me until next week. I look forward to hearing from you: feel free to call if it's easier.

Ngā mihi,

Lucy Saunders (she/her)
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Liam Collins

Subject: ESR/HUD discussion: further meth work commissioning
Location: Microsoft Teams Meeting

Start: Wed 15/06/2022 4:00 pm
End: Wed 15/06/2022 5:00 pm
Show Time As: Tentative

Recurrence: (none)

Meeting Status: Not yet responded

Organizer: Lucy Saunders
Required Attendees: Claire Leadbetter; Erina Mayo; Liam Collins

s 9(2)(a) [redacted]

Kia ora Erina

Thank you again for your email earlier in the week relating to my meth questions, including the possibility of further detailed work being commissioned from ESR. We would be keen to discuss the issues with you: will this time suit? Feel free to invite any of your colleagues as needed.

I've attached the last email in our email chain by way of context.

Ngā mihi,

Lucy Saunders (she/her)
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Solutions Design and Implementation
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Microsoft Teams meeting

Join on your computer or mobile app
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Join with a video conferencing device
847795097@t.plcm.vc

Video Conference ID: 138 288 260 2
Alternate VTC instructions

Or call in (audio only)

+64 4-280 7338,,607194195# New Zealand, Wellington

Phone Conference ID: 607 194 195#
Find a local number | Reset PIN

Learn More | Meeting options

Liam Collins

From: Liam Collins
Sent: Friday, 17 June 2022 9:56 am
To: Erina Mayo
Cc: Claire Leadbetter; Lucy Saunders
Subject: RE: Discussion this afternoon

Hi Erina,

Yes that'd be good to have Peter there, so we can delay till next week. Do you think you'll both be available Monday afternoon, about 3pm?

Thanks,
Liam

[IN-CONFIDENCE:RELEASE EXTERNAL]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Friday, 17 June 2022 9:35 am
To: Liam Collins <Liam.Collins@hud.govt.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>; Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Discussion this afternoon

Hi all

I have been speaking with Peter Cressey, our toxicologist, s 9(2)(f)(iv) [redacted] and who was hoping to come along to this afternoon's meeting. Unfortunately, he is busy at the EPA all day today so was hoping to be able to meet/discuss next week instead. I have not yet had a chance to get a handle on his thoughts on this matter, so am wondering if you still wanted to go ahead with our meeting today, or whether you would prefer to wait to include Peter next week?

Cheers
Erina

From: Liam Collins <Liam.Collins@hud.govt.nz>
Sent: Wednesday, 15 June 2022 9:55 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Discussion this afternoon

After lunch sounds good, say 1pm? Or a little later?

[IN-CONFIDENCE:RELEASE EXTERNAL]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 15 June 2022 9:48 am
To: Liam Collins <Liam.Collins@hud.govt.nz>
Cc: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Discussion this afternoon

Hi Liam

s 9(2)(a) I have a couple of meetings late morning (from 10.30am), but at this stage I have time either before that or after lunch. I am on call from Friday, so there is a chance I may have postpone again short notice but we can deal with that if it happens!

s 9(2)(a)

Cheers
Erina

From: Liam Collins <Liam.Collins@hud.govt.nz>
Sent: Wednesday, 15 June 2022 9:44 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: Discussion this afternoon

Hi Erina,

s 9(2)(a)

Thanks,

Liam Collins
Policy Advisor | Policy and Legislation Design Team 1
Solutions Design and Implementation
Phone: +64 4-832 2437
Liam.Collins@hud.govt.nz
www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

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Liam Collins

From: Lucy Saunders
Sent: Wednesday, 13 July 2022 3:36 pm
To: Erina Mayo
Cc: Liam Collins
Subject: RE: Meth regulations work for HUD: further commission relating to "remediation level"

Perfect, thank you! I will get things as final as possible at this end, and (assuming the ESR contract people are happy – I think Peter was checking) get a version through for signing.

I'll be in touch.

Take care, Lucy

[IN-CONFIDENCE:RELEASE EXTERNAL]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Wednesday, 13 July 2022 3:28 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Meth regulations work for HUD: further commission relating to "remediation level"

Hi Lucy

I realised I had looked at the most recent contract sent by Peter, so can confirm that I am happy with it as it stands.

s 9(2)(b)(ii) [redacted]

[redacted]

Cheers

Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Wednesday, 13 July 2022 12:39 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>
Subject: FW: Meth regulations work for HUD: further commission relating to "remediation level"

Kia ora Erina

Sorry to chase – have you been able to look at this at all? It would just be good to ensure the new contract covers as much as possible of what we might want to do rather than have to go through all the hoops again. s 9(2)(f)(iv) [redacted] Peter has started on that even before the contract is finalised, but it would be good to get the contract sorted ASAP.

I'm on leave next week so if we can get it sorted this week that would be great, or otherwise ASAP in the week I'm back.

Let me know – cheers.

Ngā mihi,

Lucy Saunders (she/her)
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Solutions Design and Implementation
lucy.saunders@hud.govt.nz | +64 4-832 2490
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[IN-CONFIDENCE:RELEASE EXTERNAL]

From: Lucy Saunders
Sent: Friday, 8 July 2022 3:58 pm
To: Peter Cressey <Peter.Cressey@esr.cri.nz>; Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>; Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Meth regulations work for HUD: further commission relating to "remediation level"

Many thanks, Peter.

Erina – I look forward to hearing from you. If you won't have time to focus on this for a bit, we may be able to finalise Peter's bit first so that we can keep that work moving? But I welcome thoughts.

Ngā mihi,

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www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

[IN-CONFIDENCE:RELEASE EXTERNAL]

From: Peter Cressey <Peter.Cressey@esr.cri.nz>
Sent: Thursday, 7 July 2022 2:15 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>; Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>; Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Meth regulations work for HUD: further commission relating to "remediation level"

Hi Lucy

I've added some more details into the attached. With respect to your questions:

1. Yes, as long as we can get through the contracting quickly
2. **Erina**, for you
3. I have added the people most likely to be involved under 'Approved personnel'. **Erina**, if this is unlikely to be you or Matt, please amend. s 9(2)(b)(ii) [redacted] I'll keep you posted.

Kind regards

Peter

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Monday, 4 July 2022 1:48 p.m.
To: Erina Mayo <Erina.Mayo@esr.cri.nz>; Peter Cressey <Peter.Cressey@esr.cri.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>; Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Meth regulations work for HUD: further commission relating to "remediation level"

Kia ora ano Erina and Peter

I've filled in a few more of the contract details in the attached, and this has been reviewed by our procurement team.

We've included one minor change to the standard AoG conditions which was also included in the 2020 contract relating to Clause 8. We're not sure the other change which was agreed then to clause 12.1(e) is needed? That's not included at this stage.

Can you confirm:

1. If you're happy with the indicative dates I have inserted for the s 9(2)(f)(iv) [redacted] or whether you need more time: I've proposed a discussion about your initial conclusions by the end of next week, final report by end July.
2. If you're happy with the flexible wording in Part B and C (ie that we can agree work under these areas as we go)
3. s 9(2)(b)(ii) [redacted]
4. If there's anything else you'd like to add or amend.

Once we're both happy with the details, I'll arrange for final review and sign off at our end and can send a scanned copy back through to you.

I look forward to hearing from you.

Ngā mihi,

Lucy Saunders (she/her)
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He kāinga ora, he hapori ora - our purpose is thriving communities where everyone has a place to call home.

[IN-CONFIDENCE:RELEASE EXTERNAL]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Friday, 1 July 2022 6:11 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>; Peter Cressey <Peter.Cressey@esr.cri.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>; Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Meth regulations work for HUD: further commission relating to "remediation level"

Thank you for sorting Peter, sorry for my absence these past few days!

I am happy with that Lucy, leaving it open for some additional work if needed. Any suggested wording?

Have a good weekend.
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Friday, 1 July 2022 9:03 am
To: Peter Cressey <Peter.Cressey@esr.cri.nz>; Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>; Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Meth regulations work for HUD: further commission relating to "remediation level"

Many thanks, Peter – this sounds good: we're comfortable with your indicative budget and timeframe.

That would be great if you could complete some more of the contract details early next week: similarly, I'll get in touch with our contract people to confirm what else we need to do at our end. I don't think we'll need to change any of the standard AoG Ts and C's so that should make things fairly quick.

s 9(2)(b)(ii) [redacted] **Erina**, if we can agree on some suitably flexible language (which still requires specific agreement to a task from both parties) are you OK if we leave the door open to this type of thing? It just saves us having to do another contract if we do agree to something else.

Ngā mihi,

Lucy Saunders (she/her)
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www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

He kāinga ora, he hapori ora - our purpose is thriving communities where everyone has a place to call home.

From: Peter Cressey <Peter.Cressey@esr.cri.nz>
Sent: Thursday, 30 June 2022 2:30 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>; Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>; Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Meth regulations work for HUD: further commission relating to "remediation level"

Hi Lucy

I think the risk management questions are fine – they provide a sufficient framework to address the issues we discussed.

Depending on contracting, we should be able to complete something by about 15-22 July.

s 9(2)(b)(ii) [redacted]

From my perspective, s 9(2)(b)(ii) [redacted] If so, Erina will need to respond separately.

If there are no alterations to the AoG T&Cs this will probably speed the process – I didn't notice any, but I'm not the world's most contract savvy person!

If this sounds as though we are on the same page, I can start populating the contract on Monday (I'm on leave Friday).

Kind regards

Peter

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Thursday, 23 June 2022 9:44 a.m.
To: Peter Cressey <Peter.Cressey@esr.cri.nz>; Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>; Liam Collins <Liam.Collins@hud.govt.nz>
Subject: Meth regulations work for HUD: further commission relating to "remediation level"

Kia ora Peter and Erina

Many thanks for the discussion on Tuesday afternoon about possible further work to support HUD develop proposals for the methamphetamine regulations.

As discussed, s 9(2)(f)(iv) [redacted]

We are now keen to hear, in the next few days:

- s 9(2)(b)(ii) [redacted]
- your thoughts on timeframe for this work (ideally not too long – 2-3 weeks for final advice??)
- s 9(2)(b)(ii) [redacted]
- any other thoughts you have on the revised contract (although fine if this bit takes a few more days than the points above).

For reference, I have attached a **marked up version of the previous contract** (still to be fully checked at our end, but it should be largely fine), and the **earlier ESR advice we have saved as the 'final'** (dated Dec 2020 in the text, but 17 Feb 21 in the file name – not quite sure why there is a difference).

My initial go at a possible question for the further work is :

s 9(2)(f)(iv) [redacted]

Can you let me know your thoughts on this? For brevity, I haven't included all the words from your conclusion in the Dec 2020 report, however if you'd like more of the original words to be included then all good: please advise. We would want to be able to publish your advice, alongside the Dec 2020 report, to illustrate the scientific basis for our regulatory settings in this area.

You'll that I've marked up the attached contract to include this question, and deleted much of the earlier text. You may, however, think that some of the previous text, or something similar is still needed in terms of parameters/ other context for this work: again, please advise. s 9(2)(f)(iv) [redacted]

We look forward to hearing from you ASAP. Feel free to give me a call to discuss if that's helpful.

Ngā mihi,

Lucy Saunders (she/her)
Principal Policy Advisor | Policy and Legislation Design
Solutions Design and Implementation
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www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

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[1] Specific Ref the Dec 2020 advice

[IN-CONFIDENCE:RELEASE EXTERNAL]

Science for Communities

METHAMPHETAMINE CONTAMINATION IN RESIDENTIAL ENVIRONMENTS: ANALYSIS OF EVIDENCE RELATED TO HUMAN HEALTH EFFECTS

DECEMBER 2020

Document withheld in full under section 9(2)(f)(iv)

PREPARED FOR:	**Ministry of Housing and Urban Development**
CLIENT REPORT No:	**FW20045**
PREPARED BY:	**Peter Cressey, Risk Assessment and Social Systems Group**
	Jeff Fowles, Tox-Logic
REVIEWED BY:	**Andrew Chappell, Risk Assessment and Social Systems Group**

Contract for Services

Contract Details

Methamphetamine contamination in rental housing **Contract ref: TBC**

The Parties

The Buyer:

Te Tūāpapa Kura Kāinga - Ministry Housing Urban and Development
NZBN 9429047143937
PO Box 82, Wellington 6140

and

The Supplier:

The Institute of Environmental Science and Research Ltd (ESR)
NZBN 9429038774096
Kenepuru Science Centre, Kenepuru Drive, Porirua

The Contract

Agreement

The Buyer appoints the Supplier to deliver the Services described in this Contract and the Supplier accepts that appointment. This Contract sets out the Parties' rights and obligations.

Parts of this Contract

The documents forming this Contract are:

1. **Contract Details**: This section
2. **Schedule 1**: Description of Services
3. **Schedule 2**: Standard Terms and Conditions GMC Form 1 SERVICES | Schedule 2 (3rd Edition) available at: www.procurement.govt.nz
4. Any other attachments described at Schedule 1.

How to read this Contract

- Together the above documents form the whole Contract
- Any Supplier terms and conditions do not apply
- Clause numbers refer to clauses in Schedule 2
- Words starting with capital letters have a special meaning. The special meaning is stated in the Definitions section at clause 17 (Schedule 2).

Acceptance

In signing this Contract each Party acknowledges that it has read and agrees to be bound by it.

Signed for and on behalf of the Buyer:		**Signed for and on behalf of the Supplier:**	
_____		_____	
(signature)		(signature)	
Name:	Claire Leadbetter	**Name:**	Dr Rob Lake
Position:	Manager, Policy and Legislation Design	**Position:**	Manager, Risk Assessment and Social Systems Group, ESR
Date:	1/07/2022	**Date**	Select date

Schedule 1
Description of Services

Contract Management and Personnel

Start Date	1/07/2022	*Reference Schedule 2 clause 1*
End Date	1/07/2023	*Reference Schedule 2 clause 1*
Renewal	Not applicable.	*Reference Schedule 2 clause 1*

Contract Managers

Reference Schedule 2 clause 4

	Buyer's Contract Manager	**Supplier's Contract Manager**
Name:	Insert name	Michelle Williamson
Title / position:	Insert position	Contracts Co-ordinator
Address:	Insert address	Christchurch Science Centre, P. O Box 29-181, Christchurch 8540
Phone:	Insert phone number	s 9(2)(a)
Email:	Insert email address	michelle.williamson@esr.cri.nz

Addresses for Notices

Reference Schedule 2 clause 14

	Buyer's address	**Supplier's address**
For the attention of:	As above	As above
c.c. Contract Manager	N/A	N/A
Delivery address:	N/A	N/A
Postal address:	N/A	N/A
Email:	N/A	N/A

Supplier's Approved Personnel

Reference Schedule 2 clause 2.4

[OPTIONAL]	**Approved Personnel**
Name:	Peter Cressey
Position:	Science Leader
Specialisation:	Risk assessment
Name:	Abhishek Gautam
Position:	Risk assessor

[OPTIONAL]	**Approved Personnel**
Specialisation:	Risk assessment, toxicology
Name:	Erina Mayo
Position:	Team Leader Clan Lab
Specialisation:	Clandestine drug laboratories, drug residues
Name:	Matthew Russell
Position:	Science Leader
Specialisation:	Clandestine drug laboratories, drug residues

Copy set of three rows and paste to add more Approved Personnel. Approved Personnel should only be listed where the specific personnel are required to perform the Services.

s 9(2)(f)(iv)

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]	
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[1] Specific Ref to the Dec 2020 advice

s 9(2)(b)(ii) [redacted]

[redacted]

[redacted]

[redacted]

Specific code of conduct / policies / health & safety / protective security / legislative requirement

None

Supplier's Reporting Requirements

Reference Schedule 2 clause 5.2

Report to:	Description of report	Due date
Contract Manager	Interim progress meeting	15/07/2022
	Final report for Part A	29/07/2022
	Final advice on Parts B and C	As specifically agreed

s 9(2)(b)(ii) [redacted]

[redacted]

s 9(2)(b)(ii) [redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
		[redacted]	
		[redacted]	

[redacted]

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[redacted]

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
	[redacted]	

Delete unwanted rows. Copy and paste to add rows.

Address for invoices

Reference Schedule 2 clause 3

	Buyer's address
For the attention of:	***HUD to confirm***
Address:	hud.invoices@hud.govt.nz

Other instructions about invoices

Include HUD contract number on invoice to enable payment.

Insurance

Reference Schedule 2 Clause 8.1

The Buyer does not require any specific insurance under this Contract other than the requirements under clause 8.1 of Schedule 2.

Changes to Schedule 2 and attachments

Schedule 2 of this Contract is amended as follows:

Set out any changes to clauses in Schedule 2 and/or any new clauses that are in addition to Schedule 2

Clause 8 Clause 8 is renamed 'Insurance and Liability' and a new clause 8.2 is included as follows:

Liability:

Neither party will be liable to the other for any indirect, consequential or incidental loss or damage or loss of profit or opportunity arising out of or in connection with this Contract.

Each party's liability to the other party under or in connection with this Contract is limited to a sum equivalent in aggregate to the total fees that the Buyer has paid to the Supplier under this Contract.

Attachments

None

Liam Collins

From: Lucy Saunders
Sent: Tuesday, 2 August 2022 12:45 pm
To: Peter Cressey
Cc: Claire Leadbetter; Liam Collins
Subject: RE: Contract: final details

Kia ora ano Peter

I've now read the conclusion page properly and have seen how you've referred to the residual issue – all good, I think that's clear and we will note this in our advice to the Minister.

In terms of remaining steps to finalise the report, Claire is keen to read it before I send through our minor thoughts: she hopes to get to it on Friday. So, all going well, I'll send through any minor proposed edits or queries early next week, and after that it should be able to be finalised.

In the meantime, we are happy to sign the contract once we can open the ESR signed version. If you think it's a tech problem at our end I can speak to IT here, but if you could send it again just in case, that would be great.

Ngā mihi,

Lucy Saunders (she/her)
Principal Policy Advisor | Policy and Legislation Design
Solutions Design and Implementation
lucy.saunders@hud.govt.nz | +64 4-832 2490
www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Friday, 29 July 2022 11:04 am
To: Peter Cressey <Peter.Cressey@esr.cri.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>; Michelle Williamson <Michelle.Williamson@esr.cri.nz>; Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Contract: final details

Kia ora Peter

Thank you again for this. Overall, it's easy to follow, with clear advice: much appreciated.

I have a few minor wording tweaks to suggest, s 9(2)(f)(iv) [redacted] or minor style suggestions. I'll forward these through either later today or on Monday, once Liam has had a chance to read this as well.

In terms of the residual issue you've mentioned below, is this also mentioned in your report? I didn't see it, but I may have missed it: let me know. My current thinking is that we can work through this, but how I tackle it in the

advice to the Minister will depend a bit on how you've framed it. Alternatively, it may be a back pocket observation (and not reflected in the report itself) which is also OK.

Skiing was great, thank you: the snow was excellent. The weather was a bit patchy at the start of the week, but by the end it was good, and the kids were speeding down the mountain. My husband and I were somewhat slower!!

Ngā mihi,

Lucy Saunders (she/her)
Principal Policy Advisor | Policy and Legislation Design
Solutions Design and Implementation
lucy.saunders@hud.govt.nz | +64 4-832 2490
www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

[IN-CONFIDENCE]

From: Peter Cressey <Peter.Cressey@esr.cri.nz>
Sent: Thursday, 28 July 2022 2:30 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>; Michelle Williamson <Michelle.Williamson@esr.cri.nz>
Subject: RE: Contract: final details

Hi Lucy

I'm taking a leap of faith here, so don't let me down!

s 9(2)(f)(iv) [redacted]

Anyway, have a look at the report and let me know if there are aspects of it that you want to discuss further.

Kind regards

Peter

PS. Hope the skiing went well – should have been no shortage of snow.

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Wednesday, 27 July 2022 1:43 p.m.
To: Peter Cressey <Peter.Cressey@esr.cri.nz>

Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>
Subject: RE: Contract: final details

Kia ora Peter

Just a quick note to say I haven't forgotten about this contract. Claire and I are agreed on the details now, but unfortunately our Ministry contracts adviser seems to be uncontactable so far this week (she hasn't replied to emails or teams messages) and we need a final tick from her. Apologies - I'm hoping this won't be far away!

s 9(2)(b)(ii) [redacted]

I'll be in touch with the version of the contract to sign as soon as I can.

Ngā mihi,

Lucy Saunders (she/her)
Principal Policy Advisor | Policy and Legislation Design
Solutions Design and Implementation
lucy.saunders@hud.govt.nz | +64 4-832 2490
www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Friday, 15 July 2022 8:22 am
To: Peter Cressey <Peter.Cressey@esr.cri.nz>
Subject: RE: Contract: final details

Thanks Peter. I'm sure the revised rate is fine.

However, I'm just waiting on my manager to confirm minor details eg who the contract manager should be and a couple of similar minor matters. I'm on leave next week so keen to confirm this today if we can.

Will keep you posted (and in any case we'll be chatting at 1).

Cheers, Lucy Saunders

[IN-CONFIDENCE]

From: Peter Cressey <Peter.Cressey@esr.cri.nz>
Sent: Thursday, 14 July 2022 9:34 am
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Cc: Erina Mayo <Erina.Mayo@esr.cri.nz>; Liam Collins <Liam.Collins@hud.govt.nz>; Michelle Williamson <Michelle.Williamson@esr.cri.nz>
Subject: RE: Contract: final details

Hi Lucy

Like the idea of extending the term. The less often we have to do contracting the better!

s 9(2)(b)(ii) [redacted]

Legal are happy with the contract and my manager is poised to sign. If you can return an email indicating your acceptance of my rate I will make the change and get the contract signed.

Thanks

Peter

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Wednesday, 13 July 2022 4:50 p.m.
To: Peter Cressey <Peter.Cressey@esr.cri.nz>
Cc: Erina Mayo <Erina.Mayo@esr.cri.nz>; Liam Collins <Liam.Collins@hud.govt.nz>
Subject: Contract: final details

Kia ora ano Peter

Erina has confirmed today that she's happy with th s 9(2)(b)(ii) [redacted]

The only other things for you to check/ advise in relation to the attached are:

- [redacted]
- Did you hear back from your contract people about any other changes they need?

At our end, I'm just following up who should be the contract manager listed and whether it's OK to leave the Part B and C work with no overall cap – we'd have to get budget approval anyway for any specific task so I'm hoping we can leave the contract itself flexible but we'll see.

I'm hoping to be able to finalise this for signature this week, all going well.

I look forward to hearing from you.

Ngā mihi,

Lucy Saunders (she/her)
Principal Policy Advisor | Policy and Legislation Design
Solutions Design and Implementation
lucy.saunders@hud.govt.nz | +64 4-832 2490
www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

He kāinga ora, he hapori ora - our purpose is thriving communities where everyone has a place to call home.

[IN-CONFIDENCE]

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Contract for Services

Contract Details

Methamphetamine contamination in rental housing **Contract ref: TBC**

The Parties

The Buyer:

Te Tūāpapa Kura Kāinga - Ministry Housing Urban and Development
NZBN 9429047143937
PO Box 82, Wellington 6140

and

The Supplier:

The Institute of Environmental Science and Research Ltd (ESR)
NZBN 9429038774096
Kenepuru Science Centre, Kenepuru Drive, Porirua

The Contract

Agreement

The Buyer appoints the Supplier to deliver the Services described in this Contract and the Supplier accepts that appointment. This Contract sets out the Parties' rights and obligations.

Parts of this Contract

The documents forming this Contract are:

1. **Contract Details**: This section
2. **Schedule 1**: Description of Services
3. **Schedule 2**: Standard Terms and Conditions GMC Form 1 SERVICES | Schedule 2 (3rd Edition) available at: www.procurement.govt.nz
4. Any other attachments described at Schedule 1.

How to read this Contract

- Together the above documents form the whole Contract
- Any Supplier terms and conditions do not apply
- Clause numbers refer to clauses in Schedule 2
- Words starting with capital letters have a special meaning. The special meaning is stated in the Definitions section at clause 17 (Schedule 2).

Acceptance

In signing this Contract each Party acknowledges that it has read and agrees to be bound by it.

Signed for and on behalf of the Buyer:		**Signed for and on behalf of the Supplier:**	
_____		_____	
(signature)		(signature)	
Name:	Claire Leadbetter	**Name:**	Dr Rob Lake
Position:	Manager, Policy and Legislation Design	**Position:**	Manager, Risk Assessment and Social Systems Group, ESR
Date:	1/07/2022	**Date**	Select date

Schedule 1
Description of Services

Contract Management and Personnel

Start Date	1/07/2022	*Reference Schedule 2 clause 1*
End Date	1/07/2024	*Reference Schedule 2 clause 1*
Renewal	Not applicable.	*Reference Schedule 2 clause 1*

Contract Managers

Reference Schedule 2 clause 4

	Buyer's Contract Manager	**Supplier's Contract Manager**
Name:	Insert name	Michelle Williamson
Title / position:	Insert position	Contracts Co-ordinator
Address:	Insert address	Christchurch Science Centre, P. O Box 29-181, Christchurch 8540
Phone:	Insert phone number	s 9(2)(a)
Email:	Insert email address	michelle.williamson@esr.cri.nz

Addresses for Notices

Reference Schedule 2 clause 14

	Buyer's address	**Supplier's address**
For the attention of:	As above	As above
c.c. Contract Manager	N/A	N/A
Delivery address:	N/A	N/A
Postal address:	N/A	N/A
Email:	N/A	N/A

Supplier's Approved Personnel

Reference Schedule 2 clause 2.4

[OPTIONAL]	**Approved Personnel**
Name:	Peter Cressey
Position:	Science Leader
Specialisation:	Risk assessment
Name:	Abhishek Gautam
Position:	Risk assessor

[OPTIONAL]	**Approved Personnel**
Specialisation:	Risk assessment, toxicology
Name:	Erina Mayo
Position:	Team Leader Clan Lab
Specialisation:	Clandestine drug laboratories, drug residues
Name:	Matthew Russell
Position:	Science Leader
Specialisation:	Clandestine drug laboratories, drug residues

Copy set of three rows and paste to add more Approved Personnel. Approved Personnel should only be listed where the specific personnel are required to perform the Services.

Description of Services

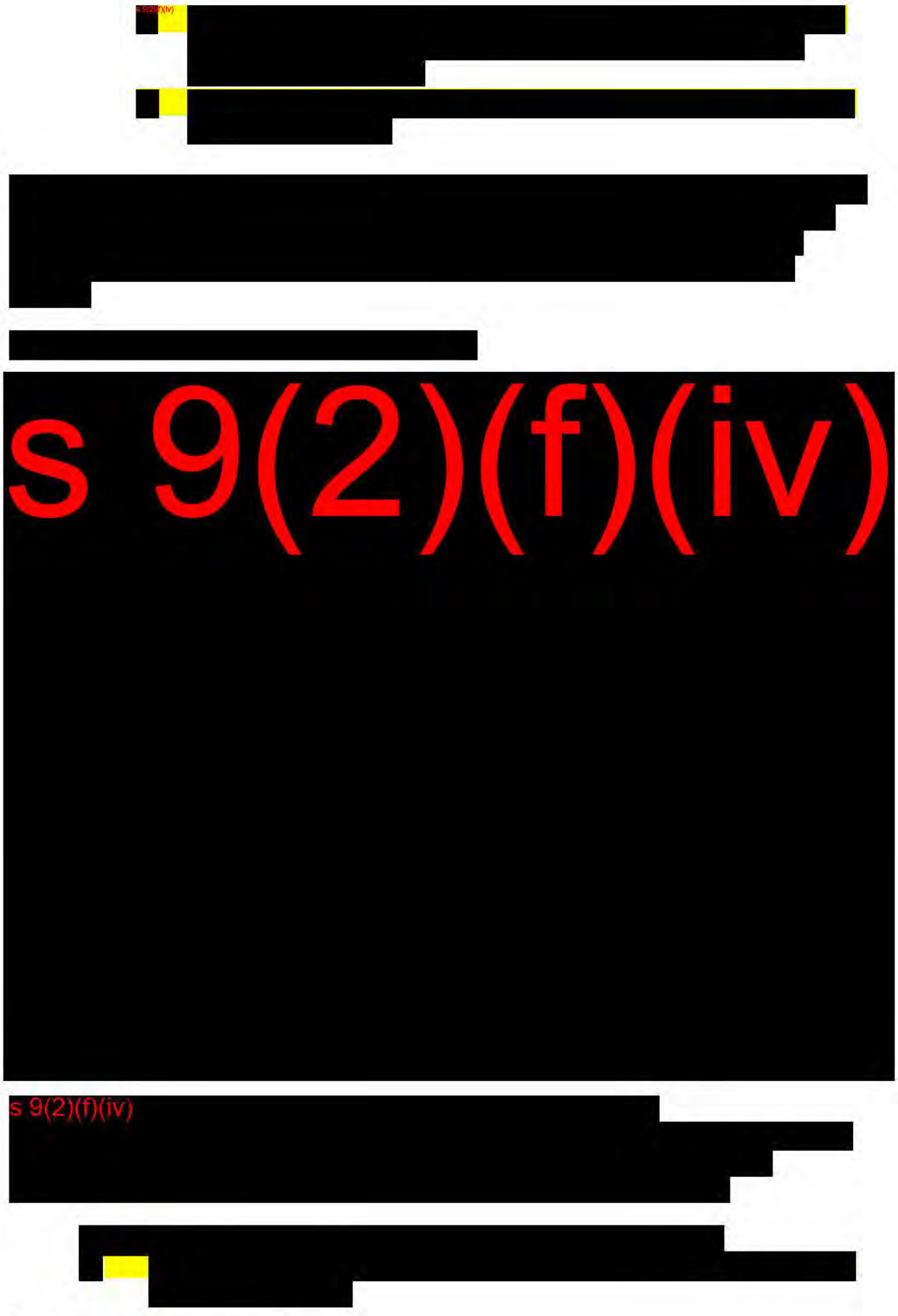
Context

The Ministry of Housing and Urban Development (HUD) (as Buyer) is engaging the Institute of Environmental Science and Research Limited (ESR) (as Supplier) to provide advice to support regulations HUD is developing under section 138C of the Residential Tenancies Act 1986.
The regulations seek to:

- minimise the health impacts of methamphetamine contamination
- provide certainty to tenants and landlords about their rights and responsibilities around methamphetamine contamination
- provide clear rules and processes for testing for methamphetamine contamination, and decontamination
- support professional behaviours and standards in the testing and decontamination industries
- manage costs of testing and decontamination.

Description of Services

s 9(2)(f)(iv) [redacted]



[1] Specific Ref to the Dec 2020 advice

s 9(2)(b)(ii) [redacted]

[redacted]

[redacted]

[redacted]

Specific code of conduct / policies / health & safety / protective security / legislative requirement

None

Supplier's Reporting Requirements

Reference Schedule 2 clause 5.2

Report to:	Description of report	Due date
Contract Manager	Interim progress meeting	15/07/2022
	Final report for Part A	29/07/2022
	Final advice on Parts B and C	As specifically agreed

s 9(2)(b)(ii) [redacted]

[redacted]

Address for invoices

Reference Schedule 2 clause 3

	Buyer's address
For the attention of:	*HUD to confirm*
Address:	hud.invoices@hud.govt.nz

Other instructions about invoices

Include HUD contract number on invoice to enable payment.

Insurance

Reference Schedule 2 Clause 8.1

The Buyer does not require any specific insurance under this Contract other than the requirements under clause 8.1 of Schedule 2.

Changes to Schedule 2 and attachments

Schedule 2 of this Contract is amended as follows:

Set out any changes to clauses in Schedule 2 and/or any new clauses that are in addition to Schedule 2

Clause 8 Clause 8 is renamed 'Insurance and Liability' and a new clause 8.2 is included as follows:

Liability:

Neither party will be liable to the other for any indirect, consequential or incidental loss or damage or loss of profit or opportunity arising out of or in connection with this Contract.

Each party's liability to the other party under or in connection with this Contract is limited to a sum equivalent in aggregate to the total fees that the Buyer has paid to the Supplier under this Contract.

Attachments

None

Science for Communities

METHAMPHETAMINE CONTAMINATION IN RESIDENTIAL ENVIRONMENTS: LIMITS FOR CONTAMINATION

JULY 2022

Document withheld in full under section 9(2)(f)(iv)

PREPARED FOR:	**Ministry of Housing and Urban Development**
CLIENT REPORT No:	**FW22024**
PREPARED BY:	**Peter Cressey, Risk Assessment and Social Systems Group**
REVIEWED BY:	**Jeff Fowles, Tox-Logic**

Liam Collins

From: Lucy Saunders
Sent: Tuesday, 2 August 2022 2:19 pm
To: Peter Cressey
Cc: Claire Leadbetter
Subject: RE: Final ESR contract

Perfect! This one works fine. I'll ask Claire to sign it and get it back through to you.

[IN-CONFIDENCE:RELEASE EXTERNAL]

From: Peter Cressey <Peter.Cressey@esr.cri.nz>
Sent: Tuesday, 2 August 2022 2:12 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>
Subject: RE: Final ESR contract

Hi Lucy

Should just be a pdf, but I will send again.

Peter

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Tuesday, 2 August 2022 9:16 a.m.
To: Peter Cressey <Peter.Cressey@esr.cri.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>
Subject: RE: Final ESR contract

Many thanks Peter.

Unfortunately, we can't properly open the doc you attached: Claire can open it on her phone but she can't print from that, and it won't open on our computers. Is it possible for you to scan it through again?

Many thanks.

Lucy

[IN-CONFIDENCE:RELEASE EXTERNAL]

From: Peter Cressey <Peter.Cressey@esr.cri.nz>
Sent: Tuesday, 2 August 2022 8:22 am
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>
Subject: FW: Final ESR contract

Hi Lucy

ESR signed contract attached.

Regards

Peter

From: Michelle Williamson <Michelle.Williamson@esr.cri.nz>
Sent: Tuesday, 2 August 2022 7:41 a.m.
To: Peter Cressey <Peter.Cressey@esr.cri.nz>
Subject: RE: Final ESR contract

:)

Michelle Williamson MSc
Contracts Co-ordinator
Institute of Environmental Science and Research Limited (ESR)
Christchurch Science Centre: 27 Creyke Road, Ilam, Christchurch 8041
PO Box 29181, Christchurch 8540, New Zealand
DDI: +64 3 351 0129 / **T:** +64 3 351 6019 / **EXTN:** 8129
E: michelle.williamson@esr.cri.nz
www.esr.cri.nz

From: Peter Cressey <Peter.Cressey@esr.cri.nz>
Sent: Friday, 29 July 2022 8:14 am
To: Michelle Williamson <Michelle.Williamson@esr.cri.nz>
Subject: FW: Final ESR contract

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Thursday, 28 July 2022 8:36 p.m.
To: Peter Cressey <Peter.Cressey@esr.cri.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>
Subject: FW: Final ESR contract

Kia ora Peter

See finalised contract, attached. My apologies that it only came through today! I haven't read your report yet but will do so when I'm back in the office tomorrow. Thank you so much for getting that to us before the deadline.

As you can see from the email below, this version is ready for signing. Happy for ESR to sign first and then Claire can sign a scanned version from you, or I can arrange for Claire to sign first and scan that over – whichever you prefer.

Apologies again for the unexpected delay with the contract.

Ngā mihi,

Lucy Saunders (she/her)
Principal Policy Advisor | Policy and Legislation Design
Solutions Design and Implementation
lucy.saunders@hud.govt.nz | +64 4-832 2490
www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

Te Tūāpapa Kura Kāinga
Ministry of Housing and Urban Development

He kāinga ora, he hapori ora - our purpose is thriving communities where everyone has a place to call home.

[IN-CONFIDENCE:RELEASE EXTERNAL]

From: Natalie Selby <Natalie.Selby@hud.govt.nz>
Sent: Thursday, 28 July 2022 1:00 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>; Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>
Cc: Contracts <Contracts@hud.govt.nz>
Subject: RE: Final ESR contract

Hi Lucy and Claire,

My sincere apologies for the delay. I've been sick this week and am finally somewhat back online today.

I've reviewed the contract and all looks good for signing. I've added the contract number too so please use the attached version.

Ngā mihi,

Natalie Selby
Procurement Advisor | System Delivery and Performance
natalie.selby@hud.govt.nz | +64 4 830 6967

www.hud.govt.nz | Level 7, 7 Waterloo Quay, Wellington

[IN-CONFIDENCE]

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Contract for Services

Contract Details

Methamphetamine contamination in rental housing **Contract ref: 001379**

The Parties

The Buyer:

Te Tūāpapa Kura Kāinga - Ministry Housing Urban and Development
NZBN 9429047143937
PO Box 82, Wellington 6140

and

The Supplier:

The Institute of Environmental Science and Research Limited (ESR)
NZBN 9429038774096
Kenepuru Science Centre, Kenepuru Drive, Porirua

The Contract

Agreement

The Buyer appoints the Supplier to deliver the Services described in this Contract and the Supplier accepts that appointment. This Contract sets out the Parties' rights and obligations.

Parts of this Contract

The documents forming this Contract are:

1. **Contract Details**: This section
2. **Schedule 1**: Description of Services
3. **Schedule 2**: Standard Terms and Conditions GMC Form 1 SERVICES | Schedule 2 (3rd Edition) available at: www.procurement.govt.nz
4. Any other attachments described at Schedule 1.

How to read this Contract

- Together the above documents form the whole Contract
- Any Supplier terms and conditions do not apply
- Clause numbers refer to clauses in Schedule 2
- Words starting with capital letters have a special meaning. The special meaning is stated in the Definitions section at clause 17 (Schedule 2).

Acceptance

In signing this Contract each Party acknowledges that it has read and agrees to be bound by it.

Signed for and on behalf of the Buyer:		**Signed for and on behalf of the Supplier:**	
			
_____		_____	
(signature)		(signature)	
Name:	Claire Leadbetter	**Name:**	Dr Rob Lake
Position:	Manager, Policy and Legislation Design	**Position:**	Manager, Risk Assessment and Social Systems Group, ESR
Date:	1/07/2022	**Date**	2/08/2022

Schedule 1
Description of Services

Contract Management and Personnel

Start Date	1/07/2022	*Reference Schedule 2 clause 1*
End Date	1/07/2024	*Reference Schedule 2 clause 1*
Renewal	Not applicable.	*Reference Schedule 2 clause 1*

Contract Managers

Reference Schedule 2 clause 4

	Buyer's Contract Manager	**Supplier's Contract Manager**
Name:	Claire Leadbetter	Michelle Williamson
Title / position:	Manager, Policy and Legislation Design	Contracts Co-ordinator
Address:	Te Tūāpapa Kura Kāinga - Ministry Housing Urban and Development PO Box 82, Wellington 6140	Christchurch Science Centre, P. O Box 29-181, Christchurch 8540
Phone:	s 9(2)(a)	s 9(2)(a)
Email:	claire.leadbetter@hud.govt.nz	michelle.williamson@esr.cri.nz

Addresses for Notices

Reference Schedule 2 clause 14

	Buyer's address	**Supplier's address**
For the attention of:	As above	As above
c.c. Contract Manager	N/A	N/A
Delivery address:	N/A	N/A
Postal address:	N/A	N/A
Email:	N/A	N/A

Supplier's Approved Personnel

Reference Schedule 2 clause 2.4

Name: Peter Cressey	Position: Science Leader	Specialisation: Risk assessment
Name: Abhishek Gautam	Position: Risk Assessor	Specialisation: Risk assessment, toxicology
Name: Erina Mayo	Position: Team Leader Clan Lab	Specialisation: Clandestine drug laboratories, drug residues
Name: Matthew Russell	Position: Science Leader	Specialisation: Clandestine drug laboratories, drug residues

Description of Services

s 9(2)(f)(iv)

[redacted]

s 9(2)(f)(iv) [redacted]

[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

[redacted]

[1] Specific Ref to the Dec 2020 advice

s 9(2)(f)(iv) [redacted]

[redacted]

[redacted]

- [redacted]
  - [redacted]
  - [redacted]
  - [redacted]
  - [redacted]
  - [redacted]
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[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
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			[redacted]	[redacted]

s 9(2)(f)(iv)	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Specific code of conduct / policies / health & safety / protective security / legislative requirement

None

Supplier's Reporting Requirements

Reference Schedule 2 clause 5.2

Report to:	Description of report	Due date
Contract Manager	Interim progress meeting	15/07/2022
	Final report for Part A	29/07/2022
	Final advice on Parts B and C	As specifically agreed

s 9(2)(b)(ii)

[redacted]

No expenses are foreseen.

s 9(2)(b)(ii)

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

Address for invoices

Reference Schedule 2 clause 3

	Buyer's address
For the attention of:	Claire Leadbetter
Address:	hud.invoices@hud.govt.nz

Other instructions about invoices

Include HUD contract number on invoice to enable payment.

Insurance

Reference Schedule 2 Clause 8.1

The Buyer does not require any specific insurance under this Contract other than the requirements under clause 8.1 of Schedule 2.

Changes to Schedule 2 and attachments

Schedule 2 of this Contract is amended as follows:

Clause 8 Clause 8 is renamed 'Insurance and Liability' and a new clause 8.2 is included as follows:

Liability:

Neither party will be liable to the other for any indirect, consequential or incidental loss or damage or loss of profit or opportunity arising out of or in connection with this Contract.

Each party's liability to the other party under or in connection with this Contract is limited to a sum equivalent in aggregate to the total fees that the Buyer has paid to the Supplier under this Contract.

Attachments

None

Liam Collins

From: Lucy Saunders
Sent: Tuesday, 2 August 2022 3:38 pm
To: Peter Cressey
Cc: Claire Leadbetter; Liam Collins; Natalie Selby
Subject: Final signed ESR/ HUD contract: July 2022
Attachments: 20220802153550893.pdf

Kia ora Peter

I now attach the final contract, signed by both parties.

Please let me know if you have any queries about this.

Ngā mihi,

Lucy Saunders (she/her)
Principal Policy Advisor | Policy and Legislation Design Solutions Design and Implementation
lucy.saunders@hud.govt.nz | +64 4-832 2490 www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

[IN-CONFIDENCE:RELEASE EXTERNAL]

Te Tūāpapa Kura Kāinga
Ministry of Housing and Urban Development

Contract for Services

Contract Details

Methamphetamine contamination in rental housing **Contract ref: 001379**

The Parties

The Buyer:

Te Tūāpapa Kura Kāinga - Ministry Housing Urban and Development
NZBN 9429047143937
PO Box 82, Wellington 6140

and

The Supplier:

The Institute of Environmental Science and Research Limited (ESR)
NZBN 9429038774096
Kenepuru Science Centre, Kenepuru Drive, Porirua

The Contract

Agreement

The Buyer appoints the Supplier to deliver the Services described in this Contract and the Supplier accepts that appointment. This Contract sets out the Parties' rights and obligations.

Parts of this Contract

The documents forming this Contract are:

1. **Contract Details:** This section
2. **Schedule 1**: Description of Services
3. **Schedule 2**: Standard Terms and Conditions GMC Form 1 SERVICES | Schedule 2 (3rd Edition) available at: www.procurement.govt.nz
4. Any other attachments described at Schedule 1.

How to read this Contract

- Together the above documents form the whole Contract
- Any Supplier terms and conditions do not apply
- Clause numbers refer to clauses in Schedule 2
- Words starting with capital letters have a special meaning. The special meaning is stated in the Definitions section at clause 17 (Schedule 2).

Acceptance

In signing this Contract each Party acknowledges that it has read and agrees to be bound by it.

Signed for and on behalf of the Buyer:		**Signed for and on behalf of the Supplier:**	
(signature)		(signature)	
Name:	Claire Leadbetter	**Name:**	Dr Rob Lake
Position:	Manager, Policy and Legislation Design	**Position:**	Manager, Risk Assessment and Social Systems Group, ESR
Date:	1/07/2022	**Date**	2/08/2022

Schedule 1
Description of Services

Contract Management and Personnel

Start Date	1/07/2022	*Reference Schedule 2 clause 1*
End Date	1/07/2024	*Reference Schedule 2 clause 1*
Renewal	Not applicable.	*Reference Schedule 2 clause 1*

Contract Managers

Reference Schedule 2 clause 4

	Buyer's Contract Manager	**Supplier's Contract Manager**
Name:	Claire Leadbetter	Michelle Williamson
Title / position:	Manager, Policy and Legislation Design	Contracts Co-ordinator
Address:	Te Tūāpapa Kura Kāinga - Ministry Housing Urban and Development PO Box 82, Wellington 6140	Christchurch Science Centre, P. O Box 29-181, Christchurch 8540
Phone:	s 9(2)(a)	
Email:	claire.leadbetter@hud.govt.nz	michelle.williamson@esr.cri.nz

Addresses for Notices

Reference Schedule 2 clause 14

	Buyer's address	**Supplier's address**
For the attention of:	As above	As above
c.c. Contract Manager	N/A	N/A
Delivery address:	N/A	N/A
Postal address:	N/A	N/A
Email:	N/A	N/A

Supplier's Approved Personnel

Reference Schedule 2 clause 2.4

Name: Peter Cressey	Position: Science Leader	Specialisation: Risk assessment
Name: Abhishek Gautam	Position: Risk Assessor	Specialisation: Risk assessment, toxicology
Name: Erina Mayo	Position: Team Leader Clan Lab	Specialisation: Clandestine drug laboratories, drug residues
Name: Matthew Russell	Position: Science Leader	Specialisation: Clandestine drug laboratories, drug residues

Description of Services

Context

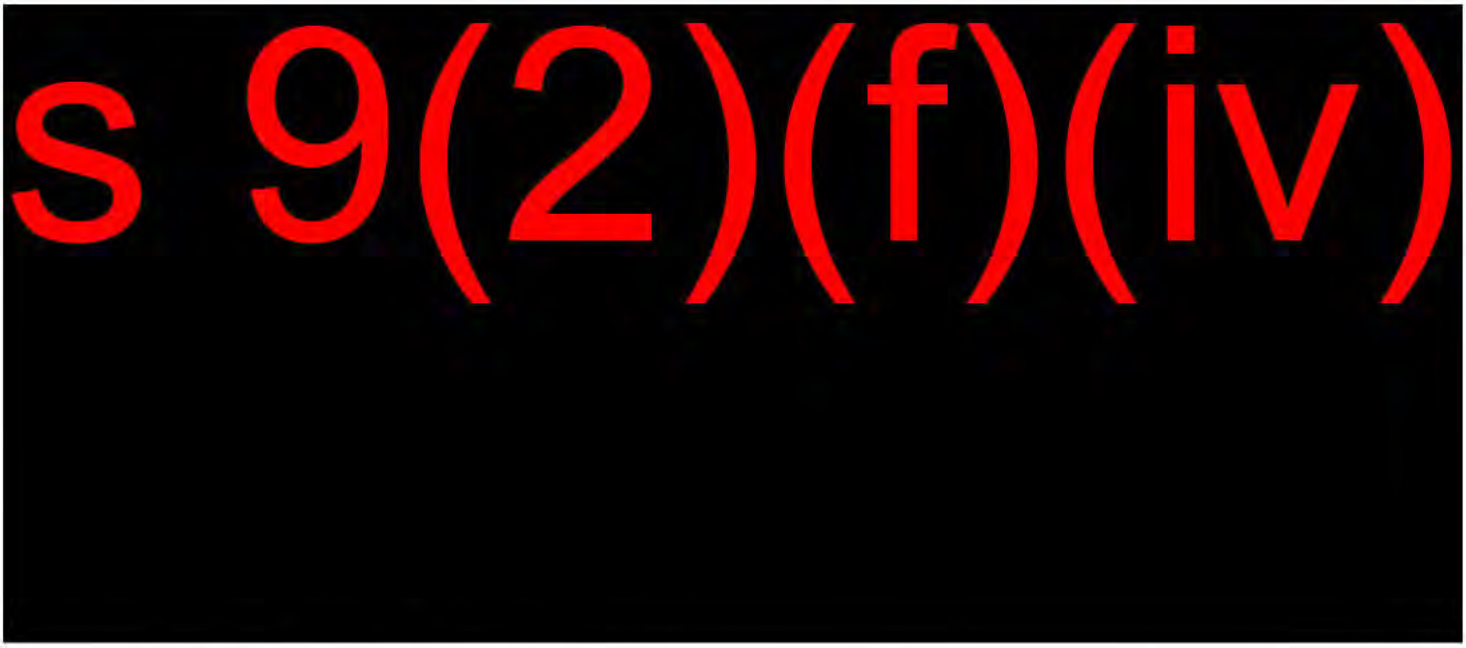
The Ministry of Housing and Urban Development (HUD) (as Buyer) is engaging the Institute of Environmental Science and Research Limited (ESR) (as Supplier) to provide advice to support regulations HUD is developing under section 138C of the Residential Tenancies Act 1986.
The regulations seek to:

- minimise the health impacts of methamphetamine contamination
- provide certainty to tenants and landlords about their rights and responsibilities around methamphetamine contamination
- provide clear rules and processes for testing for methamphetamine contamination, and decontamination
- support professional behaviours and standards in the testing and decontamination industries
- manage costs of testing and decontamination.

s 9(2)(f)(iv)

s 9(2)(f)(iv)

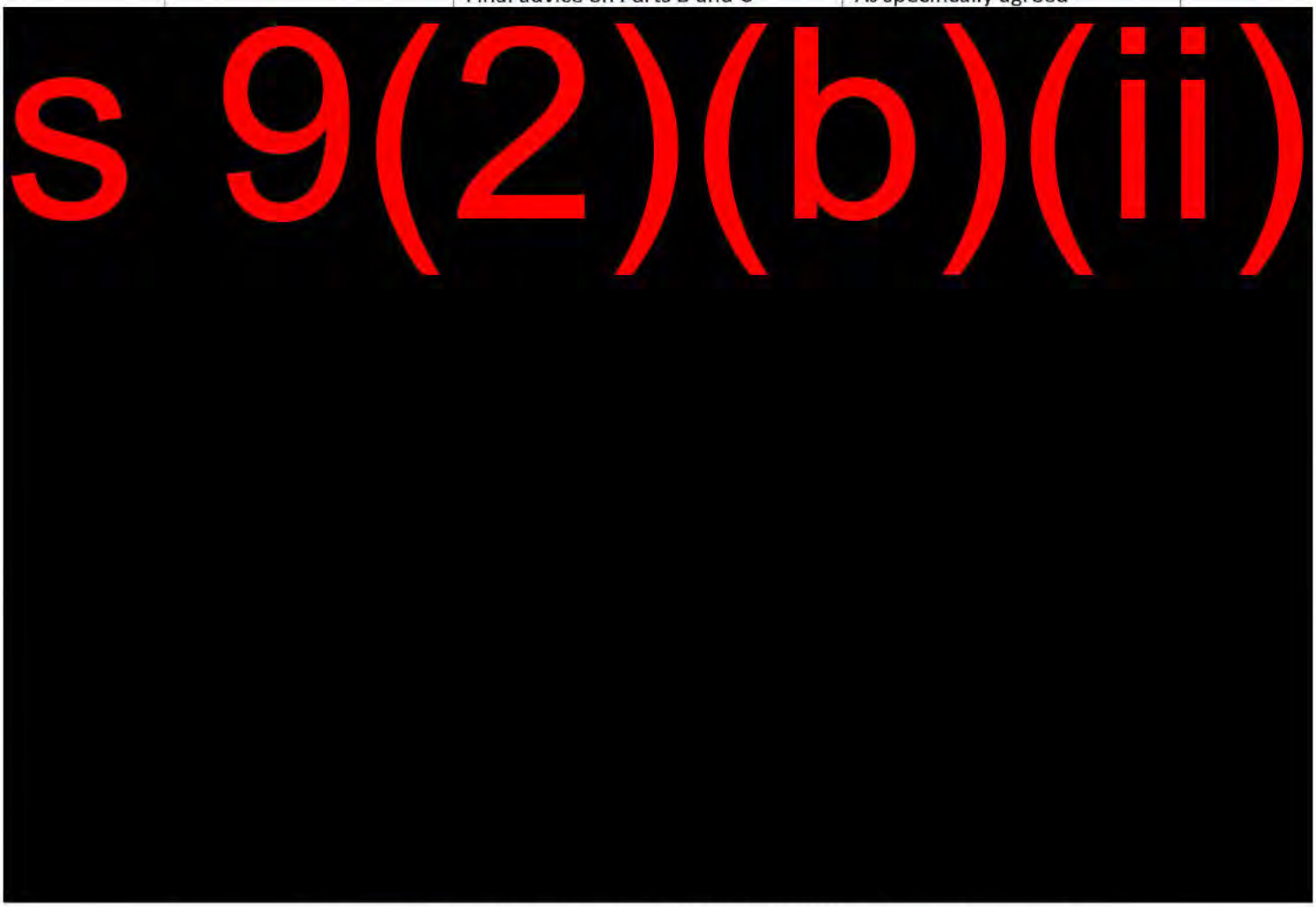
s 9(2)(f)(iv)

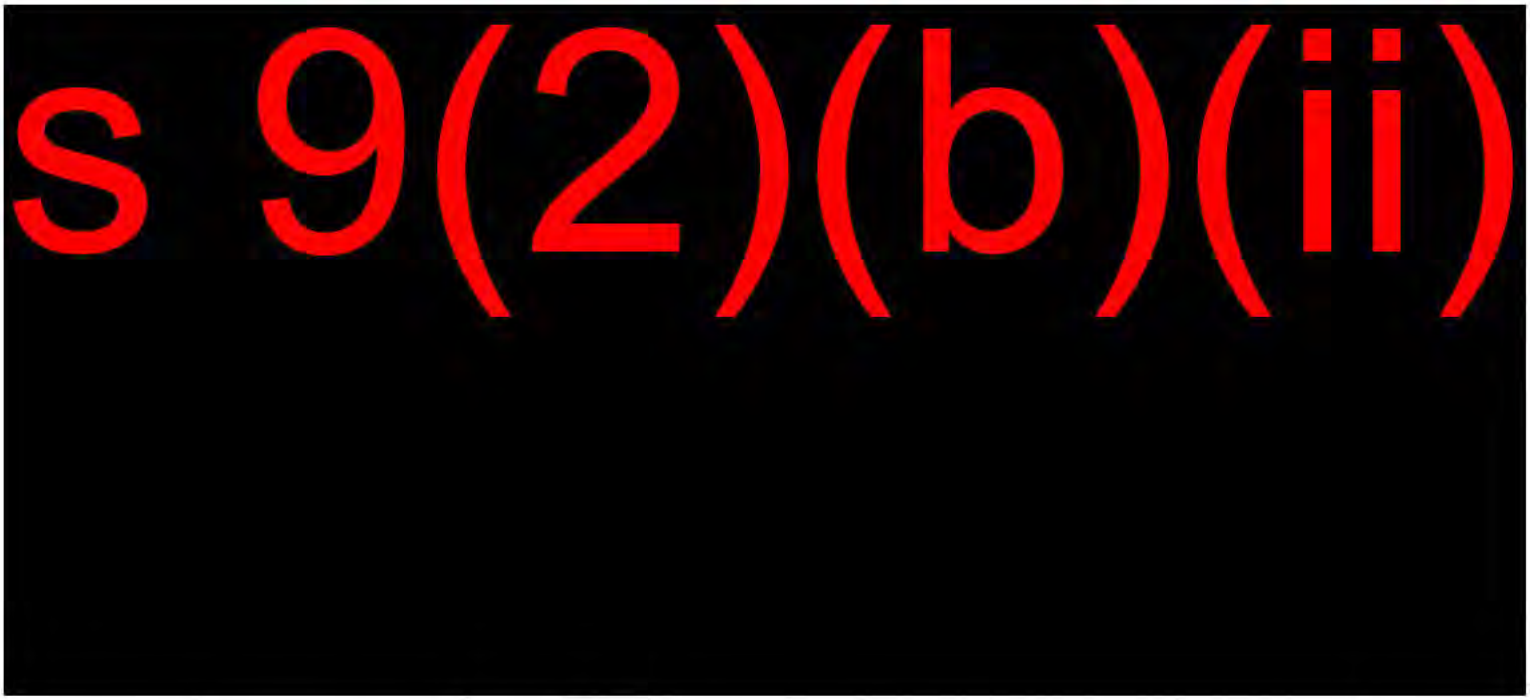


Supplier's Reporting Requirements

Reference Schedule 2 clause 5.2

Report to:	Description of report	Due date
Contract Manager	Interim progress meeting	15/07/2022
	Final report for Part A	29/07/2022
	Final advice on Parts B and C	As specifically agreed





	Buyer's address
For the attention of:	Claire Leadbetter
Address:	hud.invoices@hud.govt.nz

Other instructions about invoices

Include HUD contract number on invoice to enable payment.

Insurance

Reference Schedule 2 Clause 8.1

The Buyer does not require any specific insurance under this Contract other than the requirements under clause 8.1 of Schedule 2.

Changes to Schedule 2 and attachments

Schedule 2 of this Contract is amended as follows:

Clause 8 Clause 8 is renamed 'Insurance and Liability' and a new clause 8.2 is included as follows:

Liability:

Neither party will be liable to the other for any indirect, consequential or incidental loss or damage or loss of profit or opportunity arising out of or in connection with this Contract.

Each party's liability to the other party under or in connection with this Contract is limited to a sum equivalent in aggregate to the total fees that the Buyer has paid to the Supplier under this Contract.

Attachments

None

Liam Collins

From: Lucy Saunders
Sent: Monday, 22 August 2022 10:58 am
To: Erina Mayo
Cc: Liam Collins
Subject: RE: Meth regulations: would you have a chance to review briefing text? It

Many thanks! s 9(2)(f)(iv) [redacted]

I'll be in touch in the next week or two if s 9(2)(b)(ii) [redacted]

Ngā mihi,

Lucy Saunders (she/her)
Principal Policy Advisor | Policy and Legislation Design
Solutions Design and Implementation
lucy.saunders@hud.govt.nz | +64 4-832 2490
www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

Te Tūāpapa Kura Kāinga
Ministry of Housing and Urban Development

He kāinga ora, he hapori ora - our purpose is thriving communities where everyone has a place to call home.

[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Friday, 19 August 2022 11:45 am
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Meth regulations: would you have a chance to review briefing text? It

Hi Lucy
That looks good to me!
Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Tuesday, 16 August 2022 10:22 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>; Peter Cressey <Peter.Cressey@esr.cri.nz>
Subject: RE: Meth regulations: would you have a chance to review briefing text? It

Thank you again, Erina.

I have incorporated all your suggested changes and they make sense. I'll get back in touch if anything else arises.

Just one final quick thing to check - s 9(2)(f)(iv) [redacted]

[redacted]

Let me know if any further tweaks needed.

Lucy

-----Original Message-----
From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Monday, 15 August 2022 12:39 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>; Peter Cressey <Peter.Cressey@esr.cri.nz>; Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>
Subject: RE: Meth regulations: would you have a chance to review briefing text? It

Hi Lucy
I have completed the review and have attached the document with a few track changes. The suggestions and comments I have made are only minor and I think you have covered off the science well!

If you have any questions about any of my comments then just flick me an email, or I am happy to have a chat if you prefer. I am in meetings most of the rest of today, but I have the odd 15 minute window!

Cheers
Erina

-----Original Message-----
From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Monday, 15 August 2022 9:58 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>; Peter Cressey <Peter.Cressey@esr.cri.nz>; Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>
Subject: RE: Meth regulations: would you have a chance to review briefing text? It

Thank you!! Really appreciated.

[IN-CONFIDENCE]

-----Original Message-----
From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Monday, 15 August 2022 9:52 am
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>; Peter Cressey <Peter.Cressey@esr.cri.nz>; Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>
Subject: Re: Meth regulations: would you have a chance to review briefing text? It

Morning,
I'm close to finishing the review and will have it back to you today. The science is looking good from my perspective with only minor comments/edits so far.

Cheers

Erina

On 15/08/2022, at 8:51 AM, Lucy Saunders <Lucy.Saunders@hud.govt.nz> wrote:

Mōrena ano Erina

Will you get a chance to look at this, ideally today? Alternatively, can anyone else advise?

The key bits I'm keen for you to read/ comment on are:

s 9(2)(f)(iv) [redacted]

Time is tight now as Claire is signing the briefing out tomorrow and then we're discussing it with Claire's manager, Jeremy on Wednesday.

I'm really sorry to chase because I know this isn't your first priority! I just don't want to give advice to the Minister that's not right from a scientific perspective.

Let me know – cheers.

Ngā mihi,

Lucy Saunders
(she/her)<https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.publicservice.govt.nz%2Four-work%2Fdiversity-and-inclusion%2Fpronoun-use-in-email-signatures%2F&data=05%7C01%7CLucy.Saunders%40hud.govt.nz%7Ca081e0f6ce5d4a1e1b8008da7e5767e1%7C9e9b30203d3848a69064373bc7b156dc%7C0%7C0%7C637961211145219282%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=1FIXzTBT%2BZGK%2B6lieh%2Bf872xa1WIhtsOLr%2FpnPxPIDs%3D&reserved=0>
Principal Policy Advisor | Policy and Legislation Design Solutions Design and Implementation
lucy.saunders@hud.govt.nz<mailto:lucy.saunders@hud.govt.nz> | +64 4-832 2490
<https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.linkedin.com%2Fcompany%2Fministry-of-housing-and-urban-development%2F&data=05%7C01%7CLucy.Saunders%40hud.govt.nz%7Ca081e0f6ce5d4a1e1b8008da7e5767e1%7C9e9b30203d3848a69064373bc7b156dc%7C0%7C0%7C637961211145219282%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=w8UtU746LCj9BWdHI4xZvis%2B7D1tgiDfxCRM1O91liM%3D&reserved=0>
<https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.linkedin.com%2Fcompany%2Fministry-of-housing-and-urban-development%2F&data=05%7C01%7CLucy.Saunders%40hud.govt.nz%7Ca081e0f6ce5d4a1e1b8008da7e5767e1%7C9e9b30203d3848a69064373bc7b156dc%7C0%7C0%7C637961211145219282%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=w8UtU746LCj9BWdHI4xZvis%2B7D1tgiDfxCRM1O91liM%3D&reserved=0><https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Ftwitter.com%2FHUDgovtnz&data=05%7C01%7CLucy.Saunders%40hud.govt.nz%7Ca081e0f6ce5d4a1e1b8008da7e5767e1%7C9e9b30203d3848a69064373bc7b156dc%7C0%7C0%7C637961211145219282%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=TBxrgPrc4fZPEGreTZrSaagfZJ3w1xxjRHNUoZVMV40%3D&reserved=0>
<https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Ftwitter.com%2FHUDgovtnz&data=05%7C01%7CLucy.Saunders%40hud.govt.nz%7Ca081e0f6ce5d4a1e1b8008da7e5767e1%7C9e9b30203d3848a69064373bc7b156dc%7C0%7C0%7C637961211145219282%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoi

V2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=TBxrgPrc4fZPEGreTZrSaagfZJ3w1xxjRHNUoZVMV40%3D&reserved=0><https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.facebook.com%2FHUDgovtnz%2F&data=05%7C01%7CLucy.Saunders%40hud.govt.nz%7Ca081e0f6ce5d4a1e1b8008da7e5767e1%7C9e9b30203d3848a69064373bc7b156dc%7C0%7C0%7C637961211145219282%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=1GeiXJ9WtcqCSGHjzN6qQGNC0s7CtDhGIvB0skjFdYs%3D&reserved=0>
<https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.facebook.com%2FHUDgovtnz%2F&data=05%7C01%7CLucy.Saunders%40hud.govt.nz%7Ca081e0f6ce5d4a1e1b8008da7e5767e1%7C9e9b30203d3848a69064373bc7b156dc%7C0%7C0%7C637961211145219282%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=1GeiXJ9WtcqCSGHjzN6qQGNC0s7CtDhGIvB0skjFdYs%3D&reserved=0>https://aus01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.hud.govt.nz%2F&data=05%7C01%7CLucy.Saunders%40hud.govt.nz%7Ca081e0f6ce5d4a1e1b8008da7e5767e1%7C9e9b30203d3848a69064373bc7b156dc%7C0%7C0%7C637961211145219282%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=4FcVekTfedaaqufr7N5O2WNqFsWI7jMzamGix7s5cbU%3D&reserved=0<https://aus01.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.hud.govt.nz%2F&data=05%7C01%7CLucy.Saunders%40hud.govt.nz%7Ca081e0f6ce5d4a1e1b8008da7e5767e1%7C9e9b30203d3848a69064373bc7b156dc%7C0%7C0%7C637961211145219282%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=4FcVekTfedaaqufr7N5O2WNqFsWI7jMzamGix7s5cbU%3D&reserved=0> | Level 8, 7 Waterloo Quay, Wellington 6011

<https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.hud.govt.nz%2F&data=05%7C01%7CLucy.Saunders%40hud.govt.nz%7Ca081e0f6ce5d4a1e1b8008da7e5767e1%7C9e9b30203d3848a69064373bc7b156dc%7C0%7C0%7C637961211145219282%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=btfjIDzWwTc55utM2zcjKYokwkfbv0BMH8PCXV68Mow%3D&reserved=0>
<https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.hud.govt.nz%2F&data=05%7C01%7CLucy.Saunders%40hud.govt.nz%7Ca081e0f6ce5d4a1e1b8008da7e5767e1%7C9e9b30203d3848a69064373bc7b156dc%7C0%7C0%7C637961211145219282%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=btfjIDzWwTc55utM2zcjKYokwkfbv0BMH8PCXV68Mow%3D&reserved=0>

[IN-CONFIDENCE:RELEASE EXTERNAL]
From: Lucy Saunders
Sent: Wednesday, 10 August 2022 2:25 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>; Peter Cressey <Peter.Cressey@esr.cri.nz>; Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>
Subject: RE: Meth regulations: would you have a chance to review briefing text?

Thanks for your reply – much appreciated. Hope the training goes well!

Keep me posted on any thoughts you have on the doc.

Cheers, Lucy

[IN-CONFIDENCE:RELEASE EXTERNAL]

From: Erina Mayo <Erina.Mayo@esr.cri.nz<mailto:Erina.Mayo@esr.cri.nz>>
Sent: Wednesday, 10 August 2022 2:16 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz<mailto:Lucy.Saunders@hud.govt.nz>>
Cc: Liam Collins <Liam.Collins@hud.govt.nz<mailto:Liam.Collins@hud.govt.nz>>; Peter Cressey <Peter.Cressey@esr.cri.nz<mailto:Peter.Cressey@esr.cri.nz>>; Claire Leadbetter <Claire.Leadbetter@hud.govt.nz<mailto:Claire.Leadbetter@hud.govt.nz>>
Subject: RE: Meth regulations: would you have a chance to review briefing text?

Hi Lucy

I am in training for a new piece of instrumentation which is taking me away from my desk for the week (funnily enough it is instrumentation for all of our meth contamination work!), but I will try my best to finish my review of the document and get back to you by the end of this week.
Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz<mailto:Lucy.Saunders@hud.govt.nz>>
Sent: Tuesday, 9 August 2022 3:18 pm
To: Erina Mayo <Erina.Mayo@esr.cri.nz<mailto:Erina.Mayo@esr.cri.nz>>
Cc: Liam Collins <Liam.Collins@hud.govt.nz<mailto:Liam.Collins@hud.govt.nz>>; Peter Cressey <Peter.Cressey@esr.cri.nz<mailto:Peter.Cressey@esr.cri.nz>>; Claire Leadbetter <Claire.Leadbetter@hud.govt.nz<mailto:Claire.Leadbetter@hud.govt.nz>>
Subject: RE: Meth regulations: would you have a chance to review briefing text?

Kia ora Erina

Are you likely to be able to look at the meth doc anytime soon? s 9(2)(f)(iv) [redacted] It would be great to hear from you by the end of this week if that's at all possible. Very happy to discuss if that's easier.

Slightly revised version attached: have a look at this one if you haven't looked at the earlier one. I've inserted a couple of Peter's comments and accepted all your other suggestions, Peter, plus changed a few other unrelated things.

Peter – I'm conscious we still need to come back to you with any feedback on your recent report. Claire has promised to read it ASAP so I hope we can reply by the end of the week so you can finalise it.

Ngā mihi,

Lucy Saunders
(she/her)<https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.publicservice.govt.nz%2Four-work%2Fdiversity-and-inclusion%2Fpronoun-use-in-email-signatures%2F&data=05%7C01%7CLucy.Saunders%40hud.govt.nz%7Ca081e0f6ce5d4a1e1b8008da7e5767e1%7C9e9b30203d3848a69064373bc7b156dc%7C0%7C0%7C637961211145219282%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=1FIXzTBT%2BZGK%2B6lieh%2Bf872xa1WIhtsOLr%2FpnPxPIDs%3D&reserved=0>
Principal Policy Advisor | Policy and Legislation Design Solutions Design and Implementation
lucy.saunders@hud.govt.nz<mailto:lucy.saunders@hud.govt.nz> | +64 4-832 2490
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From: Lucy Saunders
Sent: Friday, 5 August 2022 3:13 pm

To: Peter Cressey <Peter.Cressey@esr.cri.nz<mailto:Peter.Cressey@esr.cri.nz>>; Erina Mayo <Erina.Mayo@esr.cri.nz<mailto:Erina.Mayo@esr.cri.nz>>
Cc: Liam Collins <Liam.Collins@hud.govt.nz<mailto:Liam.Collins@hud.govt.nz>>
Subject: RE: Meth regulations: would you have a chance to review briefing text?

Many thanks – that all makes sense, s 9(2)(f)(iv) [redacted]

Erina, there are a couple of questions in here on which Peter has deferred to you – are you OK to have a look and ideally get back to me early next week? Let me know.

Thanks heaps, getting there I think!

Lucy

[IN-CONFIDENCE:RELEASE EXTERNAL]
From: Peter Cressey <Peter.Cressey@esr.cri.nz<mailto:Peter.Cressey@esr.cri.nz>>
Sent: Friday, 5 August 2022 2:53 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz<mailto:Lucy.Saunders@hud.govt.nz>>; Erina Mayo <Erina.Mayo@esr.cri.nz<mailto:Erina.Mayo@esr.cri.nz>>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz<mailto:Claire.Leadbetter@hud.govt.nz>>; Liam Collins <Liam.Collins@hud.govt.nz<mailto:Liam.Collins@hud.govt.nz>>
Subject: RE: Meth regulations: would you have a chance to review briefing text?

Hi Lucy

I have addressed your additional comments where I can. I have ducked a couple of them as they are outside my area of expertise.

Hope this is helpful

Regards

Peter

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz<mailto:Lucy.Saunders@hud.govt.nz>>
Sent: Friday, 5 August 2022 10:03 a.m.
To: Peter Cressey <Peter.Cressey@esr.cri.nz<mailto:Peter.Cressey@esr.cri.nz>>; Erina Mayo <Erina.Mayo@esr.cri.nz<mailto:Erina.Mayo@esr.cri.nz>>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz<mailto:Claire.Leadbetter@hud.govt.nz>>; Liam Collins <Liam.Collins@hud.govt.nz<mailto:Liam.Collins@hud.govt.nz>>
Subject: RE: Meth regulations: would you have a chance to review briefing text?

Many thanks Peter – very much appreciated.

I have added a few further questions/ comments in the attached just for clarification – would you be able to have a quick look at those, and advise? Again, happy to chat if that's easier – let me know.

Erina, not sure of your availability, but I also welcome any thoughts you have if you have time.

Ngā mihi,

Lucy Saunders
(she/her)<https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.publicservice.govt.nz%2Four-work%2Fdiversity-and-inclusion%2Fpronoun-use-in-email-signatures%2F&data=05%7C01%7CLucy.Saunders%40hud.govt.nz%7Ca081e0f6ce5d4a1e1b8008da7e5767e1%7C9e9b30203d3848a69064373bc7b156dc%7C0%7C0%7C637961211145375502%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=RaTz0VXvRgu%2BE93ikCrI3EfYql3AqBdL5xVNFCdlW%2FI%3D&reserved=0>
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Sent: Thursday, 4 August 2022 1:15 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz<mailto:Lucy.Saunders@hud.govt.nz>>; Erina Mayo <Erina.Mayo@esr.cri.nz<mailto:Erina.Mayo@esr.cri.nz>>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz<mailto:Claire.Leadbetter@hud.govt.nz>>; Liam Collins <Liam.Collins@hud.govt.nz<mailto:Liam.Collins@hud.govt.nz>>
Subject: RE: Meth regulations: would you have a chance to review briefing text?

Hi Lucy

I have suggested a couple of changes and embedded some comments. While I've mainly confined myself to matter associated with risks, s 9(2)(f)(iv) [redacted] Section 7 of the attached IANZ guide probably explains it better.

Let me know if I have missed anything that you wanted me to comment on.

Kind regards

Peter

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz<mailto:Lucy.Saunders@hud.govt.nz>>
Sent: Wednesday, 3 August 2022 11:00 a.m.
To: Peter Cressey <Peter.Cressey@esr.cri.nz<mailto:Peter.Cressey@esr.cri.nz>>; Erina Mayo <Erina.Mayo@esr.cri.nz<mailto:Erina.Mayo@esr.cri.nz>>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz<mailto:Claire.Leadbetter@hud.govt.nz>>; Liam Collins <Liam.Collins@hud.govt.nz<mailto:Liam.Collins@hud.govt.nz>>
Subject: Meth regulations: would you have a chance to review briefing text?

Mōrena Peter and Erina

Following receipt of Peter's draft report last week, we are now finalising advice to our Minister seeking her decisions on all the key parts of the proposed methamphetamine regulations to publicly consult on: current word doc of the draft advice attached. We would very much appreciate your review of key scientific aspects of this advice, ideally by early next week if that's possible. It's fine if you invoice your time for this as a 'Part C' service under the recent contract (final signed version attached).

Background

Even though you have previously commented on the Cab paper and discussion doc (which come after the Minister's decisions) we need to go back to seek Minister Woods' decisions because she has recently taken over from Minister Williams, and a number of the proposals have changed since we sought Minister Williams' decisions in late 2020.

In the attached doc, I have highlighted in yellow the key parts where I welcome your thoughts. Feel free to comment on anything else you spot, though. At a high level, the key areas are:

s 9(2)(f)(iv) [redacted]

* How I've referenced the 2018 ESR report which Erina forwarded me a while ago

s 9(2)(f)(iv) [redacted]

You'll see there are also a few comments/ square brackets still in the doc for me/ Claire/legal to resolve – don't worry about those.

Next steps

Please let me know if this is OK or not, and if the timeline is going to be challenging. I'm very happy to chat by phone if needed to discuss any aspects, but it would be great if any comments you have are also sent by email (comments on the doc are fine) so that I can keep track.

Many thanks in advance.

Ngā mihi,

Lucy Saunders
(she/her)<https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.publicservice.govt.nz%2Four-work%2Fdiversity-and-inclusion%2Fpronoun-use-in-email-signatures%2F&data=05%7C01%7CLucy.Saunders%40hud.govt.nz%7Ca081e0f6ce5d4a1e1b8008da7e5767e1%7C9e9b30203d3848a69064373bc7b156dc%7C0%7C0%7C637961211145375502%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=RaTz0VXvRgu%2BE93ikCrI3EfYql3AqBdL5xVNFCdlW%2FI%3D&reserved=0>
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lucy.saunders@hud.govt.nz<mailto:lucy.saunders@hud.govt.nz> | +64 4-832 2490
<https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.linkedin.com%2Fcompany%2Fministry-of-housing-and-urban-development%2F&data=05%7C01%7CLucy.Saunders%40hud.govt.nz%7Ca081e0f6ce5d4a1e1b8008da7e5767e1%7C9e9b30203d3848a69064373bc7b156dc%7C0%7C0%7C637961211145375502%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=i3G6JlvbQuGOdX8c7iFyGCZfp%2Fi11YkiF%2B%2BC3lreGBc%3D&reserved=0>
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[IN-CONFIDENCE:RELEASE EXTERNAL]

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Liam Collins

From: Lucy Saunders
Sent: Monday, 22 August 2022 1:26 pm
To: Peter Cressey
Cc: Liam Collins
Subject: RE: Minor comments on remediation level report and request to finalise

FYI – this is our proposed response to the relevant WPQ:

Reply 29147 (2022) has been released
Portfolio: *Housing (Hon Dr Megan Woods)*
Due: *26 Aug 2022*
Question: *Has the Ministry of Housing and Urban Development commissioned or seen any research into meth contamination of residential properties since 13 September 2018; if so, what is that research, listed by title and date?*
29147 (2022)

Answer*: the Ministry of Housing and Urban Development has commissioned two pieces of research into meth contamination of residential properties since 13 September 2018:*

- *Methamphetamine Contamination in Residential Environments: Analysis of Evidence related to Human Health Effects, December 2020, ESR*
- *Methamphetamine Contamination in Residential Environments: Limits for Contamination: July 2022, ESR*

We've also noted to the Minister's office that we suggest these reports be released in full to support the public consultation (currently scheduled for late November) so she may also mention that in her response.

Chat at 2.

Cheers, Lucy

[IN-CONFIDENCE]

From: Lucy Saunders
Sent: Monday, 22 August 2022 1:04 pm
To: Peter Cressey <Peter.Cressey@esr.cri.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Minor comments on remediation level report and request to finalise

Hi Peter – thanks for this. Yes, we've also received similar WPQs although not an OIA that I'm aware of.

Let's discuss – you can call me on 04-832 2490, or I could pop a teams meeting in our diaries? Or I can call you direct – let me know the best number for you.

Ngā mihi,

Lucy Saunders (she/her)
Principal Policy Advisor | Policy and Legislation Design
Solutions Design and Implementation
lucy.saunders@hud.govt.nz | +64 -4-832 2490
www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

[IN-CONFIDENCE]

From: Peter Cressey <Peter.Cressey@esr.cri.nz>
Sent: Monday, 22 August 2022 11:29 am
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Minor comments on remediation level report and request to finalise

Hi Lucy

Thanks for this. Please find attached the de-in confidence copies.

On a related matter, we have received a couple of PQs (parliamentary questions?) about meth. The one of relevance to our consultation is:

22158 (2018). Simon O'Connor to the **Minister of Research, Science and Innovation** (13 Sep 2018): Does the ESR stand by their report, "Review of Remediation Standards for Clandestine Methamphetamine Laboratories" (07 October 2016) recommending that an acceptable level be 1.5ug/100cm2 for methamphetamine use, or do they agree with a level of 15ug/100cm2 as adopted by the Prime Minister's Chief Science Advisor report?

Hon Dr Megan Woods (Minister of Research, Science and Innovation) replied: I am advised that ESR stands by its report.

AND
29378 (2022): Further to the answer to QWA 22158 (2018), does the ESR still stand by their report, "Review of Remediation Standards for Clandestine Methamphetamine Laboratories" (07 October 2016) recommending that an acceptable level be 1.5ug/100cm2 for methamphetamine use, or do they agree with a level of 15ug/100cm2 as adopted by the Prime Minister's Chief Science Advisor report?

Obviously, the answer to this question is tied to the work we have done for HUD, which is not yet in the public domain. Our management seem okay with pushing back on this due to the circumstances but this would be easier if we could indicate something about the timeline for the public consultation around your proposed regulations. Any guidance would be appreciated. May be worth having a quick call to discuss. It would be great to have some feedback by mid-afternoon today.

We have also received an OIA from Mr Christopher Bishop concerning "*copies of correspondence since 1 January 2020 between ESR and the Min of Housing and Urban Development over the development of a*

regulation under the Residential Tenancies Act around the maximum acceptable level for meth contamination, processes for testing, and decontamination of rental properties."

Our initial thinking is that it may be appropriate to transfer this to HUD but wanted to give you a heads-up.

Kind regards

Peter

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Monday, 22 August 2022 10:02 a.m.
To: Peter Cressey <Peter.Cressey@esr.cri.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Minor comments on remediation level report and request to finalise

Thanks so much, Peter.

Apologies for the delay in responding – last week turned pretty busy with getting the briefing out, but we got there.

We've sent the 'in confidence' version to the Minister, but could you send a version through without 'in confidence' so we have it ready for the public consultation? That's still a while away - late November earliest - but it would be good to sort it now while we think of it.

We'll be in touch over the next couple of weeks if we have any further queries, or have any feedback from the Minister which we need to check with you. s 9(2)(f)(iv) [redacted]

And yes, in the meantime, feel free to invoice us for the work you and Erina have done to date.

Ngā mihi,

Lucy Saunders (she/her)
Principal Policy Advisor | Policy and Legislation Design
Solutions Design and Implementation
lucy.saunders@hud.govt.nz | +64 4-832 2490
www.hud.govt.nz | Level 8, 7 Waterloo Quay, Wellington 6011

[IN-CONFIDENCE]

From: Peter Cressey <Peter.Cressey@esr.cri.nz>
Sent: Tuesday, 16 August 2022 3:06 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>; Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Minor comments on remediation level report and request to finalise

Hi Lucy

Thanks for this. You have done all the hard work on revising the document!

I checked the Colorado regulations and they definitely refer to 'peace officers'. Maybe that says something about Colorado.

Please find attached the finalised report (Word and pdf). I have assumed you wish the 'in confidence' footer to be left. Let me know if not and I will send a version without.

I will work out with Erina what the part B/C costs are and get our invoice to you soonish.

Kind regards

Peter

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Monday, 15 August 2022 4:33 p.m.
To: Peter Cressey <Peter.Cressey@esr.cri.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>; Liam Collins <Liam.Collins@hud.govt.nz>
Subject: Minor comments on remediation level report and request to finalise

Kia ora Peter

Thanks again for your timely and clear report.

I have marked up a few minor suggested changes in the attached. These are primarily areas where our framing has changed slightly since the last report (eg the objectives are worded slightly differently now) and a couple of typos. Let me know if anything doesn't make sense. I think the way you've worded the 'residual issue' about potential other contaminants at manufacturing sites is fine, and clear: thank you.

Otherwise, no substantive comments from our end. Are you OK to finalise, ideally by the **end of Wednesday this week**? I'm presuming from the first couple of pages that it's already been reviewed at your end. I apologise that this timeframe is so tight: we're aiming to get the advice to the Minster finally signed out by our GM on Thursday, and we're keen to attach your report.

I look forward to hearing from you about any of this. Happy to discuss.

Ngā mihi,

Lucy Saunders (she/her)
Principal Policy Advisor | Policy and Legislation Design
Solutions Design and Implementation
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Science for Communities

METHAMPHETAMINE CONTAMINATION IN RESIDENTIAL ENVIRONMENTS: LIMITS FOR CONTAMINATION

JULY 2022

Document withheld in full under section 9(2)(f)(iv)

PREPARED FOR:	**Ministry of Housing and Urban Development**
CLIENT REPORT No:	**FW22024**
PREPARED BY:	**Peter Cressey, Risk Assessment and Social Systems Group**
REVIEWED BY:	**Jeff Fowles, Tox-Logic**

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PREPARED BY:	**Peter Cressey, Risk Assessment and Social Systems Group**
REVIEWED BY:	**Jeff Fowles, Tox-Logic**

[IN-CONFIDENCE]

Liam Collins

From: Lucy Saunders
Sent: Monday, 19 September 2022 8:22 am
To: Erina Mayo
Cc: Claire Leadbetter; Liam Collins
Subject: RE: Scope of possible further ESR work relating to meth regulations

Thanks, sounds good.

We may not need a separate contract because it should come within the scope of Part B of the recent contract? But let me know if you think otherwise. We would both need to be happy that the task is sufficiently specific - no problem if you want to set it out in a separate doc or with additional detail, if you think useful.

Lucy

[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Friday, 16 September 2022 4:45 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Scope of possible further ESR work relating to meth regulations

Hi Lucy

No issues at all.

Work (1) sounds fine to me and I am confident we can complete this by the end of October as required. It will be myself and Matthew Russell who will write/technically review the report.
I will put together a draft contract on Monday and send it through to you so we can get the work underway ASAP.

Have a good weekend.
Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Friday, 16 September 2022 9:27 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>; Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Scope of possible further ESR work relating to meth regulations

Kia ora Erina

My apologies for the delay in replying to you substantively.

We are keen to go ahead with commission (1), as follows (this is the same as in the email trail below, with the addition of the yellow highlighted text):

s 9(2)(f)(iv) [redacted]

[redacted]

s 9(2)(f)(iv) [redacted]

[redacted]

s 9(2)(f)(iv) [redacted]

[redacted]

[redacted]

Ngā mihi,

[IN-CONFIDENCE]

From: Erina Mayo <Erina.Mayo@esr.cri.nz>
Sent: Tuesday, 6 September 2022 3:11 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Subject: RE: Scope of possible further ESR work relating to meth regulations

Hi Lucy

Happy for you to touch base with Matt directly (sorry for the delay, I see you have already which is great!).

In relation to (1)

(A) The description of the work makes sense. s 9(2)(b)(ii) [redacted]

(B) End September would be difficult given we are party the way through already and we have an increased on call load now due to staff maternity leave. Mid October would be more achievable, however that includes the school holidays where we have further staff absences. End of October would be more suitable.

(C) s 9(2)(b)(ii) [redacted]

In relation to (2)

(A) The description of the work makes sense.

(B) s 9(2)(b)(ii) [redacted]

[redacted]

I hope that is of some help.

s 9(2)(a) [redacted] I will be monitoring my emails but there may be some delay in my response.

Cheers
Erina

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Tuesday, 23 August 2022 10:59 am
To: Erina Mayo <Erina.Mayo@esr.cri.nz>
Cc: Liam Collins <Liam.Collins@hud.govt.nz>; Peter Cressey <Peter.Cressey@esr.cri.nz>; Claire Leadbetter <Claire.Leadbetter@hud.govt.nz>
Subject: Scope of possible further ESR work relating to meth regulations

Kia ora Erina

As discussed previously, we are interested in possibly commissioning two further pieces of work from ESR relating to the meth regulations, as set out below. Depending on your responses and final sign off from Claire, we are fairly sure we would like to commission (1), but are still thinking through (2): we may need to discuss that one further by phone.

We welcome your thoughts on these proposals, as set out below.

s 9(2)(f)(iv) [redacted]

[redacted]

[redacted]

s 9(2)(f)(iv) [redacted]

[redacted]

s 9(2)(f)(iv) [redacted]

s 9(2)(f)(iv)

[redacted]

s 9(2)(f)(iv)

[redacted]

s 9(2)(b)(ii)

I look forward to hearing from you.

Ngā mihi,

Te Tūāpapa Kura Kāinga
Ministry of Housing and Urban Development

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Liam Collins

From: Matthew Russell <Matthew.Russell@esr.cri.nz>
Sent: Thursday, 8 September 2022 8:13 pm
To: Lucy Saunders
Cc: Erina Mayo; Liam Collins
Subject: RE: Quick data question from HUD

Hi Lucy,

Your conclusion sounds correct. s 9(2)(f)(iv) [redacted]

The reports surveyed were dated between Jun 2014 – Oct 2017. So, yes 'late 2017" is fine.

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Wednesday, 7 September 2022 2:21 pm
To: Matthew Russell <Matthew.Russell@esr.cri.nz>
Cc: Erina Mayo <Erina.Mayo@esr.cri.nz>; Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Quick data question from HUD

Thank you Matthew – very much appreciated.

Just to confirm on my second question: can you confirm when the data ended? Is 'late 2017' suitably accurate?

And one final question (which is probably answered in either the report itself or the article you've just provided, but I want to be sure):

- s 9(2)(f)(iv) [redacted]

By way of context, we are also referring to other data from around the same time from page 53 of this Kainga Ora report Methamphetamine-Contamination-Housing-New-Zealands-Response-September-2018.pdf (kaingaora.govt.nz) which shows that 9% of the premises which tested positive over 0.5ug had readings over 30ug. I'm thinking the big difference between these two studies is based on:

- Numbers of premises under 0.5ug not being included in their report
- Known clan labs being excluded from your report but included in theirs

Do you agree?

Thanks again.

Ngā mihi,

Lucy Saunders (she/her)
Principal Policy Advisor | Policy and Legislation Design
Solutions Design and Implementation
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[IN-CONFIDENCE:RELEASE EXTERNAL]

From: Matthew Russell <Matthew.Russell@esr.cri.nz>
Sent: Wednesday, 7 September 2022 1:28 pm
To: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Cc: Erina Mayo <Erina.Mayo@esr.cri.nz>; Liam Collins <Liam.Collins@hud.govt.nz>
Subject: RE: Quick data question from HUD

Hi Lucy,

Thank you for your email and apologies for the delayed response.

s 9(2)(f)(iv) [redacted]

[redacted]

[redacted]

[redacted]

I hope I have answered your questions?

Regards,

Matthew Russell BSc (Hons), MSc
Science Leader – Forensic Chemistry (Clandestine Laboratories)
Institute of Environmental Science and Research Limited (ESR)
Mt Albert Science Centre: 120 Mt Albert Road, Sandringham, Auckland 1025
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E: matthew.russell@esr.cri.nz
www.esr.cri.nz

From: Lucy Saunders <Lucy.Saunders@hud.govt.nz>
Sent: Tuesday, 6 September 2022 10:15 am

To: Matthew Russell <Matthew.Russell@esr.cri.nz>
Cc: Erina Mayo <Erina.Mayo@esr.cri.nz>; Liam Collins <Liam.Collins@hud.govt.nz>
Subject: Quick data question from HUD

Mōrena Matthew

I hope it's OK to contact you directly – Erina said a while ago that if we had data questions about the attached 2018 report that it would be OK to ask you about those.

I have two, hopefully easy, questions. It would be great to hear from you in the next few days if at all possible.

(1) s 9(2)(f)(iv) [redacted]

(2) When does the data on this end? My best guess from a skim of the document is 'late2017' (so, the data captured is between July 2014 and late 2017) but if you could confirm, and if we could be slightly more specific that would be good.

s 9(2)(f)(iv) [redacted]

Many thanks in advance.

Ngā mihi,

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He kāinga ora, he hapori ora - our purpose is thriving communities where everyone has a place to call home.

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Assessment of contamination levels in methamphetamine-tested properties in New Zealand

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ABSTRACT

In November 2016, whilst in draft, the New Zealand Standard (NZS8510:2017) for the "Testing and Decontamination of Methamphetamine Contaminated Properties" considered two acceptable post decontamination re occupancy methamphetamine levels; 1.5 μg/100 cm^2 if the contamination was caused by smoking methamphetamine and 0.5 μg/100 cm^2 if the contamination was caused by the manufacture of methamphetamine. In response to this, research carried out at this laboratory included the analysis of data obtained from over a thousand pre decontamination property test reports with the aim of understanding the variation in the levels of contamination, that could be expected, among the wider New Zealand (contaminated) housing stock. The vast majority of the reports originated from public sector agency properties where methamphetamine was suspected to have been used. Although it could not be ruled out, none of the properties had been associated with any suspicion of drug production. Thus, a further intention of the study was to assess and portray the levels of contamination that would be expected to be produced through methamphetamine use, commonly smoking. As such, it is expected that the data might be useful from an environmental exposure perspective and inform further research in this area. The assessment also discusses its potential as evidence in criminal cases where there may be discrepancies concerning the source of the methamphetamine contamination in relation to "Use of premises" and associated charges under Section 12 of the Misuse of Drugs Act (New Zealand) 1975. Regardless, the final New Zealand standard, released in June 2017, set a single decontamination level for 'high use areas' of 1.5 μg/100 cm^2 and a less stringent decontamination level for 'limited use areas' of 3.8 μg/100 cm^2, with no requirement to determine the origin of the contamination.

1. Introduction

The Ministry of Health (MOH, New Zealand) guidelines [2] previously recommended that residual methamphetamine measured using surface wipes should not exceed 0.5 μg/100 cm^2 as the acceptable post decontamination re occupancy metham phetamine level for a dwelling that has been used as a "clan meth lab". Although there is no reference made to any contamination caused by smoking, other than scientific opinion, there is currently no method that can distinguish one source of methamphetamine contamination from another. As well as creating a point of argument for private homeowners and their insurance companies, this "unknown" has been the subject of debate when assessing contamination levels at suspected clandestine laboratories.

Initially, insurance companies in New Zealand were treating any damage thought to be caused by methamphetamine smoking as "gradual damage" and were declining claims unless policy holders could prove that the damage was "sudden and unforeseen", for example, caused by a one off event where methamphetamine was smoked by a large number of people, or was manufactured. Attempts to address this issue in the commercial testing field were relatively unscientific and/or based on assumptions rather than robust scientific evidence. Due to the difficulties associated with proving or disproving if methamphetamine contamination was "sudden and unforeseen" or "gradual damage", insurers have gradually moved towards an approach whereby most policies now cover contamination caused by the use/consumption, storage or manufacture of methamphetamine in tenanted properties up to certain limit (usually NZ$30 50,000) as long as landlords have met various obligations, e.g. regular inspections. Overall, however, the testing and decontamination process has been costly to New Zealand and was a driving force behind the development of the NZS8510 standard.

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0379-0738/

The final standard, released in June 2017 [1], set a single decontamination methamphetamine level for 'high use areas' of 1.5 μg/100 cm^2 and a less stringent decontamination level for 'limited use areas', such as crawl spaces, of 3.8 μg/100 cm^2. It was acknowledged that a post decontamination methamphetamine level of 1.5 μg/100 cm^2 was very conservative, with a number of in built safety factors, to ensure it is health protective and that dwellings are safe to occupy. Therefore, future occupiers of properties that have been decontaminated (or have low levels of residual methamphetamine present) can be confident that adverse effects are highly unlikely, even for young children.

During the development of the standard, as independent research, in excess of one thousand reports from methamphetamine tested properties were examined. The majority of these properties had tests commissioned for pre tenancy checks and/or where the agency had reasonable cause to believe the drug was being "used". Although it could not be ruled out, none of the addresses were known to be associated with recent clandestine laboratory cases. In consideration of this, along with the size of the dataset, there was confidence this study would provide a sound assessment of the levels of contamination among the overall New Zealand housing stock where drug use, commonly smoking, is likely to be the cause of contamination.

2. Methamphetamine use (smoking) as a source of contamination

Methamphetamine hydrochloride can be insufflated (snorted) as a powder, dissolved in an aqueous solution and injected or, more commonly in New Zealand, smoked from a glass pipe. Some publications reference the use of aluminium foil [3], commonly known as "chasing the dragon" [4,5], however, this is not commonly observed in New Zealand.

The bowl of the pipe (Fig. 1) is heated underneath using a butane gas (cigarette) lighter or a small butane torch. Upon heating, vapours are released and inhaled through the mouthpiece. Drug use forums [4,5] describe the crystals melting and "advisers" suggest withdrawing the heat at this point, covering the "carb" (hole) and allowing the liquid to cool or recrystallize, to avoid excessive burning. The intention of the user here is also not to lose vapours, either through the carb or by exhalation having inhaled too much. Some forums suggest "holding in the hit". Others warn against this as causing recrystallization in the lungs. This seems to be in despite of its solubility in water. Most conversations tend to agree that most of what is inhaled is absorbed (up to 90%) which agrees with scientific research [7,8].

The dose is variable and will largely depend on the user's habit. Again, the internet is the best source of information on what subjectively comprises a "hit", with one website regarding anything above 50 mg to be "strong" [9]. The dose is also likely to depend on the "purity" of the powder containing the methamphetamine.

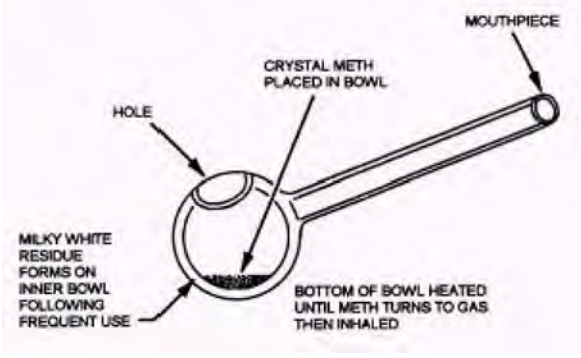

Fig. 1. A "P pipe" – A glass pipe used to smoke methamphetamine hydrochloride, "P". [6].

The production of crystalline methamphetamine hydrochloride in New Zealand yields a relatively pure product. A methamphetamine profiling project undertaken by this laboratory showed that pure (uncut) "P" methamphetamine in New Zealand has an average purity of 76% [10], the equivalent potency of a product at this purity is approximately 96% of the hydrochloride salt.

In the instances where the methamphetamine was "cut", on nine out of ten occasions, the material used was dimethylsulphone (MSM). Creatine was the only other component encountered in this project [10]. It could be inferred, therefore, that the majority of the methamphetamine smoked in New Zealand is relatively pure and even in the cases where it is not, it is likely that the primary contaminants produced through smoking are methamphetamine and its associated demethylated/methylated pyrolysis products, amphetamine and *N,N* dimethylamphetamine, respectively, which readily form above 315 °C [3].

3. Analysis and discussion

Data was collected from the results of over 13,000 surface wipes obtained from more than 1000 property test reports [11]. Although all the reports were obtained from public sector agencies, the analysis results originate from various analytical companies carrying out analysis on behalf of a number of commercial "methamphetamine testing" companies who attend the premises to carry out the sampling process.

However, as required by the New Zealand Standard, the accredited wipe sampling process and the subsequent analytical stream followed NIOSH methods 9106, 9109 or 9111 with analysis carried out by quantitative LCMS/MS or GCMS. It is acknowledged that, due to the methods being carried out, analysed and reported by different providers, there will be an additional degree of uncertainty for any given result (if the method had been carried through by another provider). However, the robustness of the NIOSH procedures, backed by ISO17025 accreditation, gives some reliability in portraying a large dataset such as this but should be born in mind when drawing any conclusions.

3.1. "Positive" results

Approximately 78% of surface wipes were "positive", i.e. methamphetamine was detected. The ranges chosen and presented in Fig. 2 have some relevance. The original MOH guidelines [2] referred to 0.5 μg/100 cm^2 as the acceptable post decontamination re occupancy methamphetamine level for a dwelling that has been used as a "clan meth lab", and remediation involved decontaminating to this level before the introduction of the NZS8510 standard [1], which increased this level to 1.5 μg/100 cm^2. Although 38% of the surface wipe results were above 0.5 μg/100 cm^2, almost half of those (14.9%) were at or below 1.5 μg/100 cm^2, the revised decontamination level as outlined in New Zealand Standard (NZS8510) for the "Testing and Decontamination of Methamphetamine Contaminated Properties".

23.1% of surface wipes were above 1.5 μg/100 cm^2 (Fig. 3), and less than one percent was over 30 μg/100 cm^2 (as shown in Fig. 2). 30 μg/100 cm^2 was considered a "high level" in research carried out by J. Martyny et al. [12] who discussed that it would take a "significant number of methamphetamine smokes" before such levels were reached. The relative infrequency that such high levels were detected (in this dataset) supports this theory.

The average concentration of the positive surface wipes (those that detected any level of methamphetamine) was 2.73 μg/100 cm^2. Although the majority of surface wipes taken from these

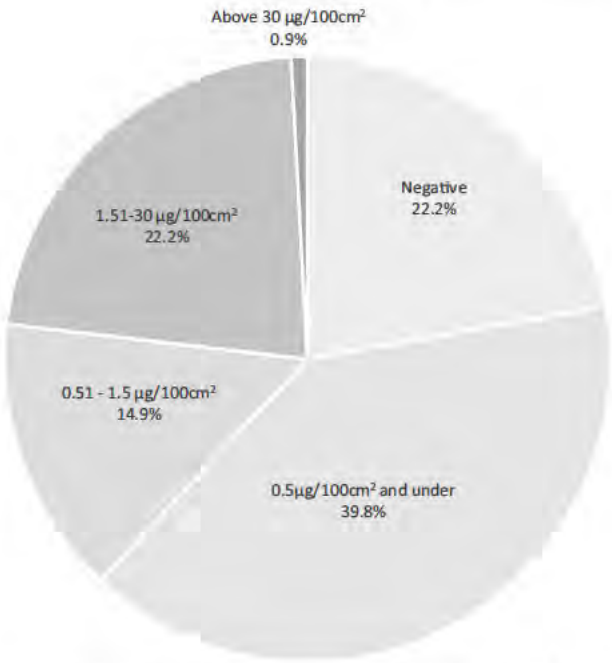

Fig. 2. Ranges of methamphetamine contamination levels (µg/100 cm^2) on wipes taken from methamphetamine-tested properties.

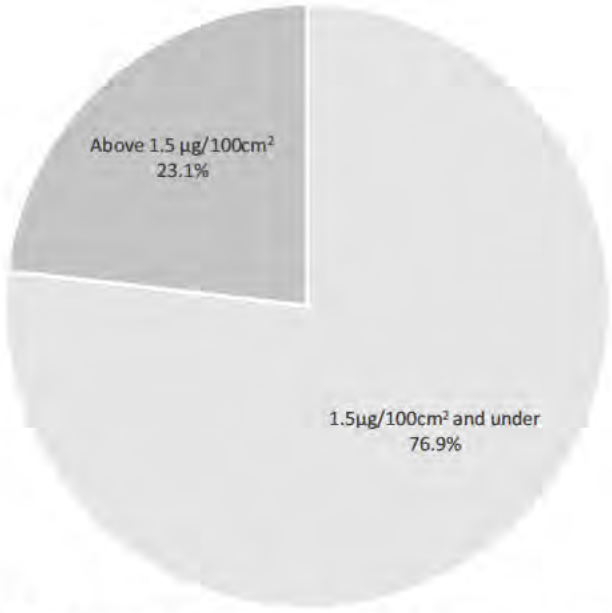

Fig. 3. The breakdown of surface wipes above or below 1.5 µg/100 cm^2, the decontamination level for "high-use areas" set in NZS8510.

properties show methamphetamine contamination levels below 1.5 µg/100 cm^2 (Fig. 3), the "average highest level" (i.e. the mean of the highest level reported in each property report) was 8.14 µg/100 cm^2. This figure is probably more representative of a value that could be expected to be observed in areas where methamphetamine use is more common.

The highest observed methamphetamine levels, for properties where a "positive" result was recorded, were plotted in a chart to depict the frequency at which these levels were observed (Fig. 4). In showing that 100% of "positive" results recorded a level of 0.01 µg/100 cm^2 or above, the purpose of the chart is to show that high levels of contamination in properties are observed less frequently, to a point where less than 10% of properties returned a level of contamination higher than 20 µg/100 cm^2. It is worth reiterating here that the properties surveyed are not representative of the New Zealand housing stock as a whole but are generally properties that have been tested on suspicion of use (commonly smoking) and are tenanted rather than owner occupied.

Fig. 5 also relates to the highest readings observed in each property. The box plot represents the range of the readings relative to one another and has calculated values above 20 µg/100 cm^2 as outliers when compared with the rest of the data.

Although the ten or so properties that recorded levels above 100 µg/100 cm^2 were included in the calculations, they have not been included in Fig. 5 so that the data could be better illustrated. The mean (8.14 µg/100 cm^2) actually sits between the third and fourth quartile and shows that the extreme outliers have affected the average. The bulk of the readings are below 10 µg/100 cm^2 with the median and the lower two quartiles below 5 µg/100 cm^2.

3.2. Room types

A variety of room types were tested, the most common including bedrooms, lounges, kitchens, hallways, bathrooms and laundries. Fig. 6 shows the number of wipe samples taken from the most common room types. Bedrooms show a significantly higher wipe count due to there being more than one bedroom within most of the properties. Although not included in this chart, a further 300 or so wipes came from areas less frequently swabbed such as entrances, basements and attics.

The average levels of contamination (for "positive" wipes only) for the common room types are shown in Fig. 7. Kitchens and entrances show the highest average methamphetamine surface wipe concentrations, followed by lounges, hallways, dining areas and basements.

If it is speculated that the majority of the data accumulated from these properties can be attributed to smoking, this information shows where this activity is most likely to occur. As expected, the common living areas, such as the kitchen, lounge and dining areas, show higher levels of methamphetamine contamination. However, the results show that the access ways, such as the entrance and hallways are also comparatively high. This could indicate that contamination readily spreads to connecting rooms from the area of origin, rather than these areas being the location of the activity. The data also indicates a trend in 'private' areas being utilised, such as bedrooms, bathrooms and toilets. However, the size of the room is not accounted for in the test reports. This is an important consideration as it is conceivable a smaller surface area, in a room such as a toilet, is likely to record a higher level of methamphetamine contamination relative to a larger room for a given amount of 'activity' and would account for any disproportionately higher levels of contamination observed in smaller rooms.

The median and mode values are compared in Table 1 alongside the mean (average) values for the most common room types. This provides a more realistic "range of contamination" which, in most cases, is likely to extend to levels much less than the average. For all room types, the most common result (the mode) is much lower still.

The average levels can be misleading when taking into consideration the median and mode values of the results within the different room types. Consider that 76.9% of surface wipes in this dataset were 1.5 µg/100 cm^2 or lower. The median and mode values were much lower than the calculated averages, indicating that there were a minority of surface wipes with methamphetamine concentrations above 1.5 µg/100 cm^2, affecting the averages.

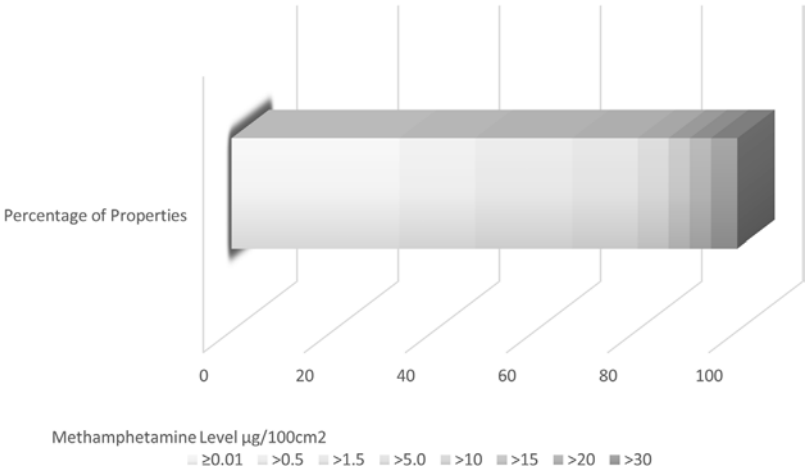

Fig. 4. The percentage distribution of the highest methamphetamine contamination level within the surveyed properties where methamphetamine was detected (µg/100 cm^2).

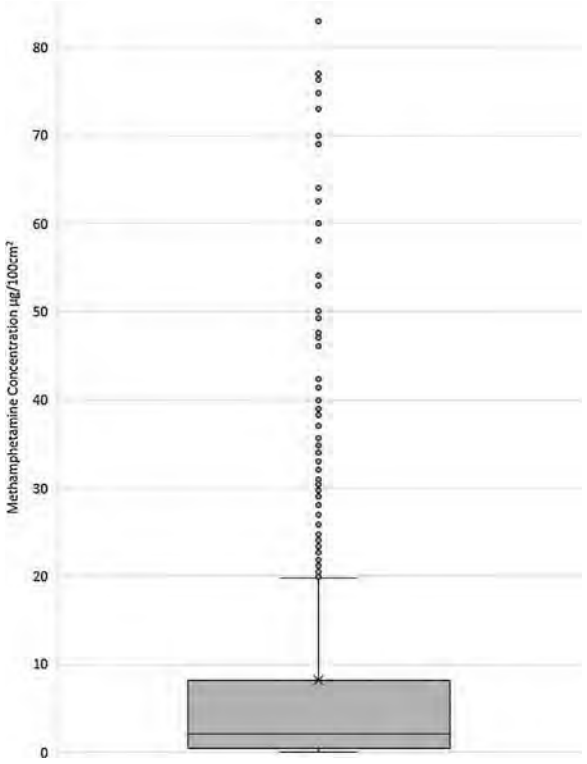

Fig. 5. Box & whisker plot showing quartile, mean (X), median and outlier distribution of the highest methamphetamine contamination levels (µg/100 cm^2) within each of the surveyed properties.

The box plot in Fig. 8 represents the data by using the logarithm to the base 10 values of the methamphetamine concentration for each room type. Even though the data is limited to only those wipes that recorded positive results (approximately 75%), most of the data is still centred around zero, accounting for the low median and mode values. The mean (X) is also low but generally positioned in the third quartile.

Having most of the wipes record below average levels may suggest that contamination has spread from areas where methamphetamine use was common to areas where it was not, or, perhaps more rooms were sampled where methamphetamine was not used compared to rooms where it was.

3.3. Surface type

The number of surface wipes (both positive and negative) collected from different surface types are shown in Fig. 9.

Walls and ceilings were the most frequently sampled surface types, with almost half of all wipes being taken from these surfaces. Other commonly sampled areas included various surfaces on or around internal doors, window frames and sills as well as fixed appliances such as range hoods, heat pumps etc. “Other” surfaces included power boards/meters (presumably the casing), shelving and other uncommon locations. “Composite” surface wipes are those taken from multiple surfaces, combined and analysed as one sample. Such wipes are generally sampled during initial/preliminary screening tests.

Methamphetamine sampling companies in New Zealand do not have a strict regime on where to test within a room. These agencies are attempting to assess the general level of contamination within a property, which is used to determine if the property is safe for human habitation. The location and type of surface being tested is not restricted, allowing for more data to be collected in this category. It should be considered that any interpretation of the results could be affected if a surface had been cleaned prior to sampling. However, given the intentions of the testing process and the areas sampled (i.e. it might be for this reason windows and floors were not often sampled), it is expected that this frequency would be relatively low. This frequency is expected to be lower still for areas such as walls and ceilings where most of the samples were taken. Nevertheless, this has been a reason for excluding certain surfaces in some of the following datasets and discussing associated trends.

The average methamphetamine concentration by surface type, for positive wipes only, is shown in Fig. 10.

The surface type showing the highest average methamphet amine concentration was “furniture”. However, the sample count was low (74) and furniture was usually only sampled if preliminary screening had shown relatively high methamphetamine contamination levels in the property. In these instances, the furniture was probably being tested in order to assess if it could be kept by the owners.

Door surfaces, fixed appliances and rafters/beams showed the next highest average methamphetamine contamination levels. The

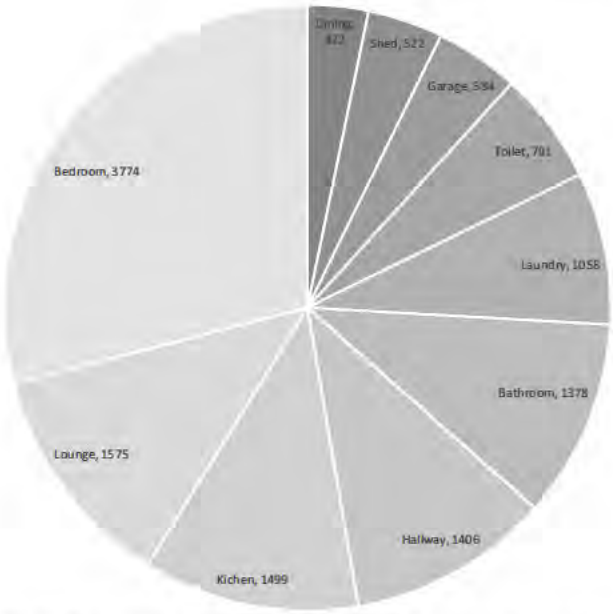

Fig. 6. The number of wipe samples taken in each (common) room type.

high levels exhibited by doors and door frames could be explained by the surface material of this surface type e.g. often are smooth plastic or painted surfaces which allow easier removal of residual methamphetamine. Also, the comparatively higher level of contamination on door frames compared with doors may be due to door frames offering an upward facing surface around the architrave where particulates may settle and accumulate. Particularly for an open door, this part of the door frame may also be more susceptible to the general flow of smoke rising and spreading as would be observed in a house fire, for example.

The median and mode values are compared in Table 2 alongside the mean (average) values for the most common surface types.

As observed in the data for "room type" presented in Section 3.2, the median and mode values for the methamphetamine concentrations for "surface type" also suggest a similar minority of high values contributing to a disproportionately high average value of methamphetamine contamination. Again, the median and mode values (Table 2) provide a more realistic "range of contamination" that includes levels much lower than the average.

Further, when fixed appliances and other upward facing surfaces (e.g. floors, window sills and the upper reaches of door frames, which could be subject to residue accumulation and/or regular cleaning) are excluded, higher average levels of methamphetamine contamination are observed on ceiling and rafters

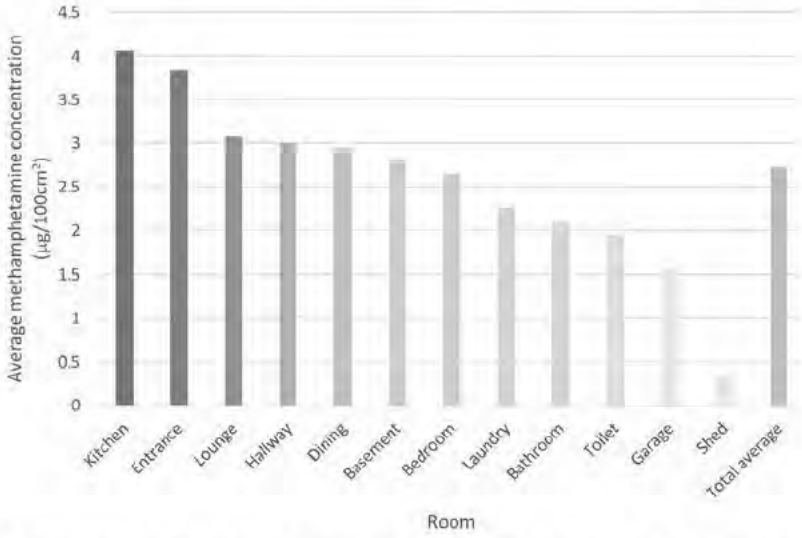

Fig. 7. The average methamphetamine concentration on surface wipes by room type (for positive surface wipes only). The average level of contamination on "positive" wipes was 2.73 µg/100 cm².

Table 1
Mean, median and mode of the methamphetamine levels from the common room types (positive surface wipes only). The average level of contamination on "positive" wipes was 2.73 µg/100 cm².

Room Type	No. of Positive Wipes	Mean (µg/100 cm²)	Median (µg/100 cm²)	Mode (µg/100 cm²)
Kitchen	1270	4.06	0.76	0.03
Entrance	134	3.83	0.54	0.03
Lounge	1260	3.08	0.49	0.03
Hallway	1168	3.00	0.59	0.03
Dining	339	2.95	0.58	0.03
Basement	14	2.81	0.19	0.06
Bedroom	3021	2.65	0.47	0.03
Laundry	818	2.26	0.37	0.03
Bathroom	1096	2.11	0.46	0.03
Toilet	629	1.95	0.42	0.03
Garage	394	1.55	0.25	0.03
Shed	154	0.35	0.06	0.03
All positive wipes	10,355	2.73	0.48	0.03

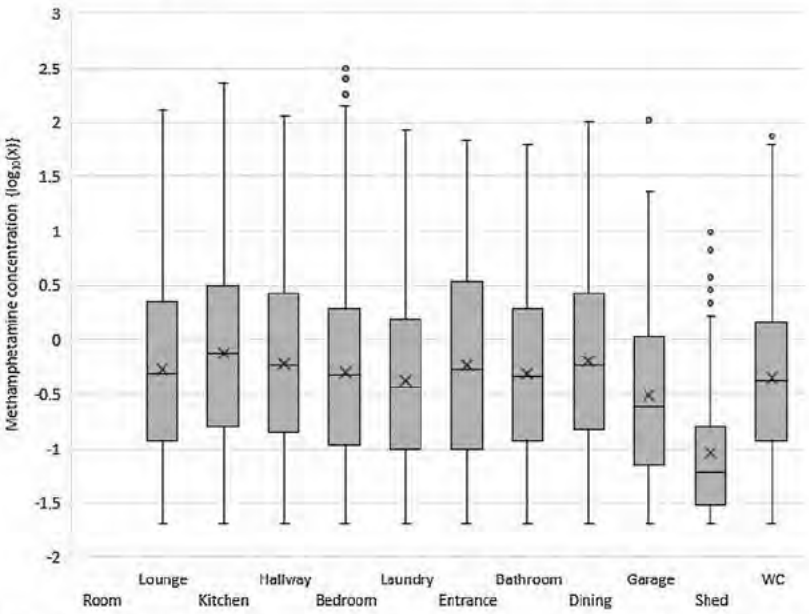

Fig. 8. Box plot using log to the base 10 values of the methamphetamine concentration on surface wipes against room type (for positive surface wipes only; x = methamphetamine concentration μg/100 cm^2).

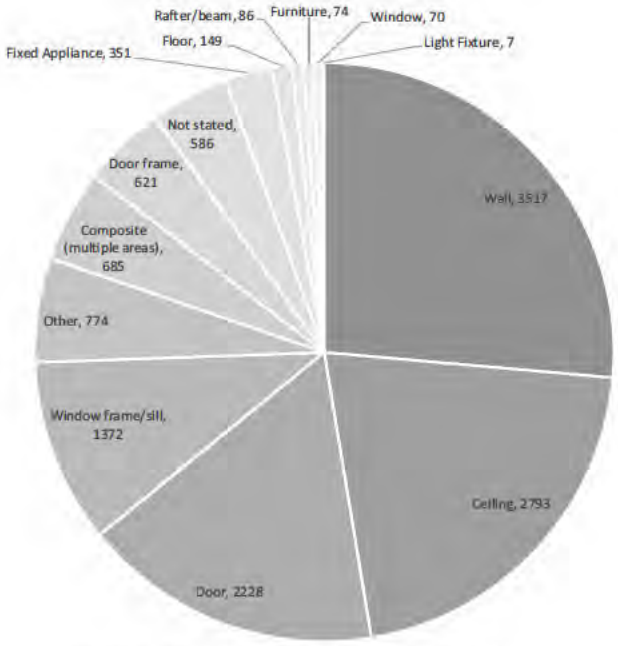

Fig. 9. The distribution of surface wipes by surface type.

rather than walls and windows. Thus, methamphetamine surface contamination is generally more concentrated towards the ceiling.

The box plot in Fig. 11 represents the data by using the logarithm to the base 10 values of the methamphetamine concentration for the most common surface types. Again, it can be seen that most of the data is centred around zero, accounting for the low median and mode values. The data for those surfaces likely to vary in position, height and surface material (such as fixed appliances, walls and door frames), show a wider spread of values with mean values much further away from the median. This suggests a greater need for care and consistency when using these surface types to compare and assess contamination levels.

3.4. Surface material

The data presented in Fig. 12 includes the number of wipes taken from different surface materials within the assessed properties. Those wipes that did not state a surface material were excluded.

Using surface material as a primary filter in relation to the levels of methamphetamine provided some interesting results; perhaps going as far as to suggest how well methamphetamine adheres to a certain material and/or whether it is being absorbed by that material. Alternatively, the data may relate to the efficiency of the wipe itself in removing the methamphetamine from different surface materials.

Almost a third of the data had no associated surface material information due to many reports not stating the surface material and focussing on the methamphetamine contamination level relative to the location. This data has therefore not been included. Otherwise, the surface materials that were most often sampled included painted wood and painted plasterboard, which make up roughly two thirds of the total number of wipes taken (Fig. 12). Other significant types include varnished wood, metal and plastic.

The "multiple materials" category relates to the composite wipes taken during initial/preliminary screening tests, where different surface materials were sampled and the wipes combined for analysis. Due to the difficulty in interpretation, this category was excluded from any further discussion. Similarly, floor coverings were sampled, but given the variable circumstances by which these surfaces could be contaminated (or decontaminated), including the immeasurable number of different contact transfer possibilities, data from these surface materials would not be useful in determining overall contamination trends associated with methamphetamine use or manufacture.

The average methamphetamine concentrations measured in the positive wipes from common surface materials are shown in Fig. 13. The surface material that showed the highest average methamphetamine concentration was tiled surfaces, however this surface type was rarely sampled. Therefore, these high readings are most likely influenced by a few relatively high results. Apart from "tiled surfaces" which have been included in Fig. 13 for comparison,

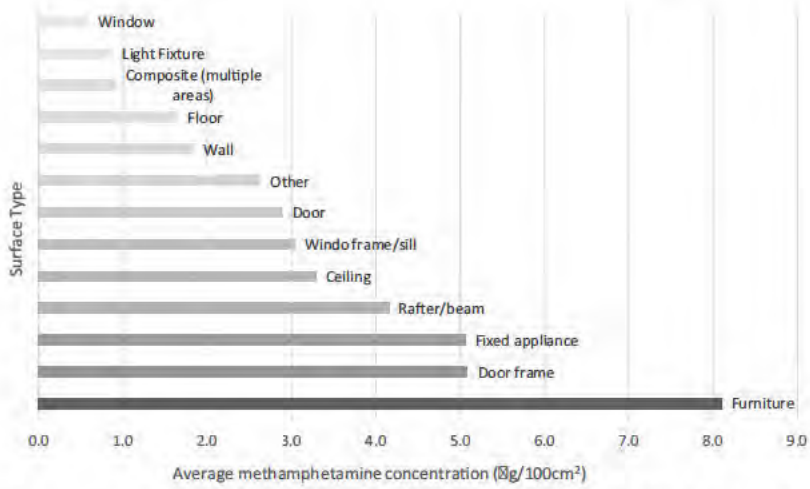

Fig. 10. The average methamphetamine concentration (positive surface wipes only) of each of the surface types.

Table 2
Average, median and mode for the methamphetamine concentration values per surface type (positive surface wipes on common surfaces only; negative surface wipes excluded; total includes all positive wipes).

Surface Type	No. of Positive Wipes	Average (μg/100 cm²)	Median (μg/100 cm²)	Mode (μg/100 cm²)
Door frame	589	5.08	1.10	0.05
Fixed Appliance	243	5.05	0.40	0.06
Ceiling	2295	3.28	0.67	0.03
Window frame/sill	1140	3.03	0.67	0.03
Door	1822	2.88	0.67	0.03
Wall	2564	1.83	0.30	0.03
Composite (multiple types)	586	0.91	0.24	0.02
All positive wipes	10,355	2.73	0.48	0.03

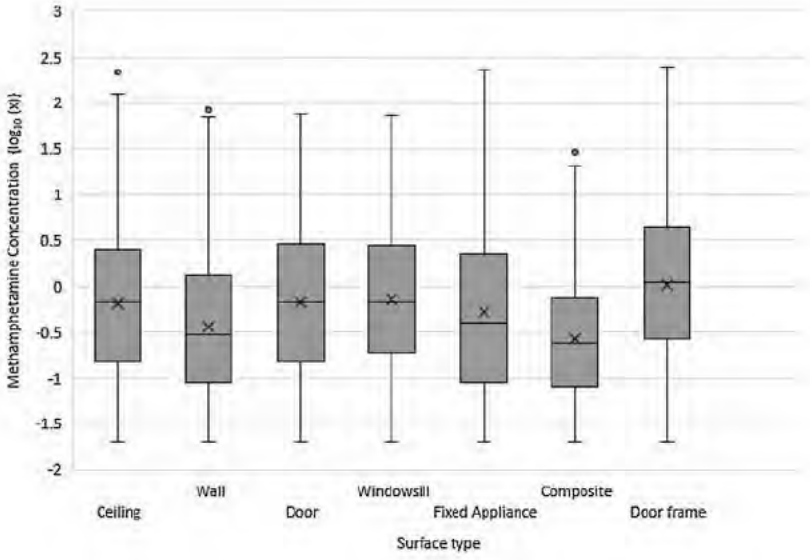

Fig. 11. Box plot using log to the base 10 values of the methamphetamine concentration against common surface types (for positive surface wipes only; x = methamphetamine concentration μg/100 cm²).

this surface material, along with other low number sample sets, such as brick and concrete, have not been discussed in further detail.

The two surface materials that stand out are the varnished/stained wood and metal. A large number of wipes were taken from these surface materials and the data shows high average methamphetamine concentrations. The smooth nature of these surfaces suggest that they are not only favourable surfaces for methamphetamine to adhere to, but also allow methamphetamine to be easily removed from them by the action of a wipe.

However, this observation doesn't seem to apply to glass and there appeared to be a general avoidance of sampling this surface material by the industry. Only 29 wipes contributed to the dataset for this surface material, of which the majority were from

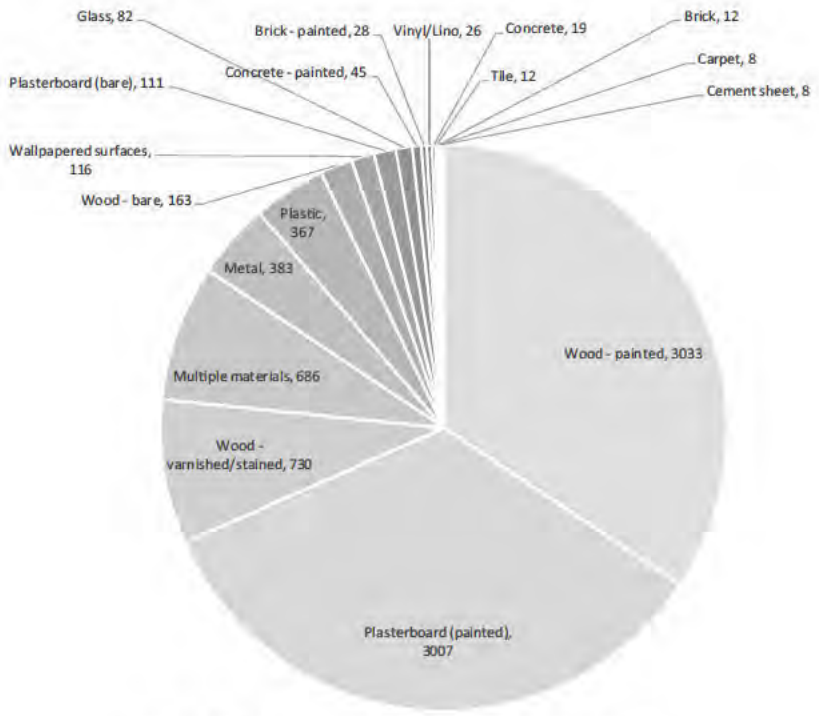

Fig. 12. The distribution of surface wipes by surface material.

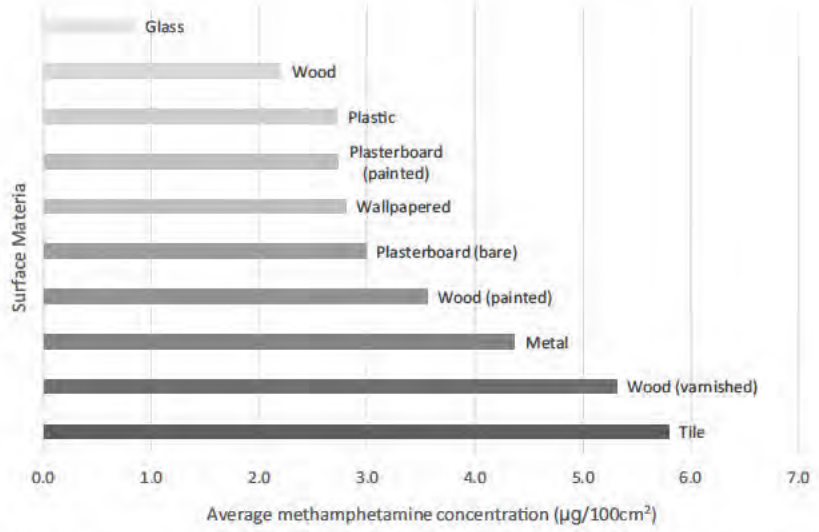

Fig. 13. The average methamphetamine concentrations measured on the common surface materials (positive wipes only; negative wipes excluded).

windows. Window coverings, cleaning frequency and condensation are valid explanations as to why glass, or at least windows, present relatively low readings in a room where higher reading(s) were observed elsewhere. The average level of methamphetamine contamination for windows was 0.59 µg/100 cm^2.

The median and mode values are compared in Table 3 alongside the mean (average) values for the most common surface materials. Once again, the median and mode values show that a more commonly encountered level of methamphetamine contamination was actually much lower than that suggested by the average methamphetamine concentrations for each common surface material.

The box plot in Fig. 14 represents the data by using the logarithm to the base 10 values of the methamphetamine concentration for the most common surface materials. Once more, the data is generally centred around zero, accounting for the low median and mode values. However, the plot shows that certain surface types will invariably show lower values compared to others. As perhaps would be expected, unpainted surfaces and glass show lower contamination values overall. As discussed window glass maybe covered, cleaned and susceptible to condensation, all of which would reduce the observed contamination level compared with other smooth surfaces. The data for the unpainted surfaces is perhaps showing that methamphetamine is retained and difficult to remove by the action of a wipe.

3.5. Surface position

Table 4 compares the most common surface materials on ceilings and walls (i.e. painted or bare plasterboard, and plastic)

Table 3
Average, median and mode values for the methamphetamine concentration values for the common surface materials sampled (positive wipes only).

Surface Material	No. of Positive Wipes	Average (μg/100 cm^2)	Median (μg/100 cm^2)	Mode (μg/100 cm^2)
Tile	6	5.79	5.50	NA
Wood – varnished/stained	697	5.31	1.40	0.05
Metal	247	4.36	0.45	0.03
Wood – painted	2687	3.55	0.96	0.03
Plasterboard – bare	96	2.98	0.65	0.04
Wallpapered surfaces	98	2.80	0.62	0.19
Plasterboard – painted	2592	2.73	0.56	0.03
Plastic	285	2.72	0.62	0.03
Wood – bare	95	2.20	0.32	0.03
Glass	29	0.84	0.13	0.03
All positive wipes	10,355	2.73	0.48	0.03

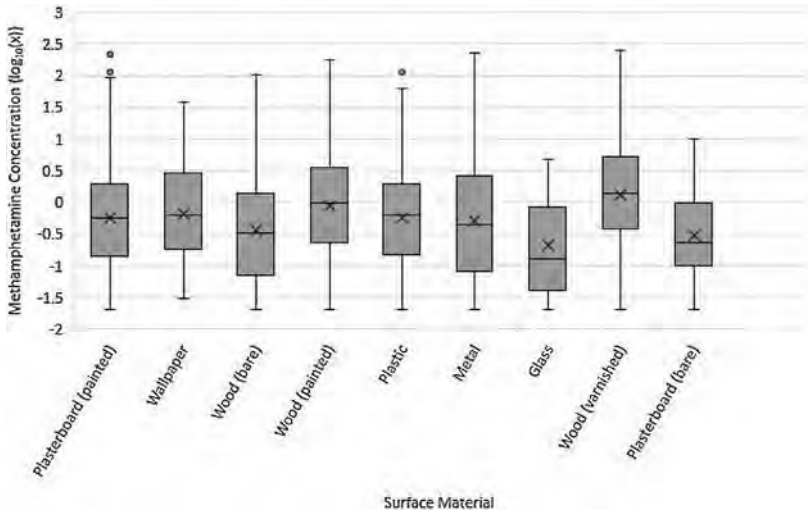

Fig. 14. Box plot using log to the base 10 values of the methamphetamine concentration against common surface materials (for positive surface wipes only; x = methamphetamine concentration μg/100 cm^2).

Table 4
Relationship between average methamphetamine concentrations on the common surface types/materials relative to their position (DF = downward facing, V = vertical).

Surface Type	Position	Surface Material	Number of Positive Wipes	Average (μg/100 cm^2)
Ceiling	DF	Plasterboard – painted	1069	3.68
	DF	Plasterboard – bare	76	3.52
	DF	Plastic	84	2.55
Wall	V	Plasterboard – painted	1516	2.07
	V	Plasterboard – bare	20	0.96
	V	Plastic	98	1.43
Door	V	Wood – painted	805	3.08
	V	Wood – varnished/stained	447	4.25
Door frame	V	Wood – painted	393	4.74
	V	Wood – varnished/stained	101	10.16
Rafter/beam	DF	Wood – painted	3	1.26
	DF	Wood – varnished/stained	10	8.48
	DF	Wood – bare	33	4.20

relative to their position (i.e. downward facing surfaces versus vertical surfaces), respectively, with the average methamphet amine concentrations for positive wipes in those groups.

All surface materials showed higher average methamphet amine concentrations on ceilings when compared to walls, leading to the observation that a downward facing surface was more susceptible to contamination than a vertical surface and/or methamphetamine vapour may be more concentrated towards the ceiling. Regardless of the material, this indicates that ceilings are a more appropriate surface location to sample to measure the methamphetamine contamination in a room, compared to walls.

Furthermore, of common wooden surfaces (i.e. doors, door frames and rafters/beams), those that were varnished/stained showed higher average methamphetamine concentrations

Table 5
Distribution by room of the "valid" wipes that showed a methamphetamine concentration over 30 μg/100 cm^2.

Room	Number of Wipes >30 μg/100 cm^2	Average (μg/100 cm^2)
Garage	1	104
Kitchen	10	72.51
Dining	3	61.33
Hallway	7	60.60
Bedroom	11	59.09
Lounge	12	57.5
Laundry	2	51.55
Toilet	4	41.29
Entrance	1	40.8

compared to those that were painted. This observation supports the general observation that smoother surfaces produce higher methamphetamine contamination results from surface wipes. The data suggests that this has more to do with the effectiveness of recovering residual methamphetamine using wipes from these surfaces rather than the surface itself being more contaminated. It could also suggest that these surfaces would be relatively easy to clean and/or prevent methamphetamine being absorbed into the material beneath.

3.6. Heavily contaminated properties

Within this dataset, there were a few properties that recorded methamphetamine concentrations above 30 μg/100 cm^2 (on one or more wipes). This figure is being discussed as it is a value considered significantly high in the literature if produced through smoking [12]. This group of wipes represented only 0.86% of the total number of wipes analysed and therefore justifies this observation. The distribution of these wipes is presented in Table 5 and only wipes that were considered "valid" (i.e. those that were taken from high vertical/downward facing horizontal surfaces) are included.

Isolating the results from those surfaces that are believed to only have come into contact with the vapour would be relevant for comparing levels of contamination produced by methamphetamine smoking and manufacture. The intention being to minimise the possibility of a result being the outcome of secondary/contact transfer of methamphetamine. Thus, the values are more likely to be portraying levels of contamination only from vapours produced through smoking and/or manufacturing methamphetamine.

Although the dataset was small (51 wipes from 34 properties), there was a tentative relationship between the level of methamphetamine contamination and the expected room size. For example, kitchens, because of their relatively smaller size, might be a reason why they show a higher average level of contamination than a lounge, rather than it being a more popular location for methamphetamine use. For the "valid" surface wipes, 37 of the 51 taken were from a ceiling. Therefore, it was difficult to compare between surface types or surface materials in this dataset.

The number of properties (34 out of 1142) recording a level greater than 30 μg/100 cm^2 (on one or more "valid" surfaces) provides a good indication that this level of contamination would not generally be expected to be achieved through methamphetamine use (i.e. smoking). The data further shows that only 13 of these properties recorded levels of greater than 30 μg/100 cm^2 on two or more wipes. This could infer that activities other than common "use" may have occurred at these properties.

3.7. Potential limitations for interpreting contamination "source"

Although methamphetamine concentrations above 30 μg/100 cm^2 could indicate the manufacture of methamphetamine as an additional source of contamination, the size of the room, which is likely to be relative to the level of contamination and the associated amount of activity taking place, has not been recorded. This parameter would be important if comparing levels to previous research [12] and evaluating levels of contamination in relation to this argument.

In addition, the location and type of surface was variable and many would not be "valid" for this type of interpretation due to the increased likelihood that the surface may have come into contact with the drug itself, rather than solely the vapours produced through the smoking or manufacture of the drug. Again, if to compare values with published research [12], it would be appropriate to compare values from similar smooth surfaces in similar locations.

Nevertheless, the infrequency with which levels of contamination exceeded 30 μg/100 cm^2, on "valid" surfaces, supports its attribution to levels considered excessive if caused by smoking alone and, should rouse consideration into the activities taking place at these properties. Measuring the levels of contamination at properties and comparing them to the data as assessed in this manuscript may inform associated environmental health policies and/or provide some evidence in relation to whether or not the property may have been the site of a clandestine laboratory.

CRediT authorship contribution statement

M. Russell: Conceptualization, Methodology, Investigation, Data curation, Visualization, Supervision, Writing original draft. **Bradley Ivory:** Methodology, Data curation, Formal analysis. **Megan McKinnel:** Investigation, Writing review & editing, Supervision.

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