Subject: Re: My comments etc
Date: Friday, 13 April 2018 at 12:26:02 PM New Zealand Standard Time
From: Leo Schep
To: Anne Bardsley
Attachments: image001.png

Hi Anne

By all means cite my work

Regards

Leo

From: Anne Bardsley <a.bardsley@auckland.ac.nz>
Sent: Friday, April 13, 2018 12:20 PM
To: Leo Schep
Cc: Felicia Low
Subject: Re: My comments etc

Hi Leo,
Thanks for your timely comments and edits. I have gone through and made the necessary changes (though I note that in the last point, a change from 'exceedance' to 'excess' would not be technically correct in that instance).

My colleague Felicia has gone over your calculations to check how they align with what we have already done in the appendices. She was the one who analysed both Nick Kim's and your calculations, as well as those from Hammon and Griffin and others. Her comments are below:
We are very much aware of the possibility of recalculating the Colorado data to derive alternative thresholds, based on Nick Kim's 2016 report HNZ, and your peer review comments on it (which you'd kindly shared with us on 20 Feb). The alternative calculations – both where the health-based reference value is derived using Hammon's variables, and where more realistic values for the ABSO and ABSD are used – are already shown in Appendix 8.4. You will note that our calculated value for using Hammon's variables is 13 µg/100 cm^2; the slight discrepancy with your/Dr Kim's value of 12.5/12 is because we've used the unrounded exposure value of 0.018 µg/kg-bw/d for extrapolation, rather than 0.02 µg/kg-bw/d.

Your input has been very helpful, and while your comments are currently cited in a footnote, we can also formally cite your peer review report if you so wish.

Thanks again for your help.
Regards,
Anne (and Felicia)

From: Leo Schep
Date: Friday, 13 April 2018 at 9:47 AM
To: Anne Bardsley <a.bardsley@auckland.ac.nz>
Subject: My comments etc

Hi Anne

Here are my review comments, predominantly grammatical changes.

Re our discussion yesterday on the 15 and 30 µg/100 cm^2 standards, I have put together a 2 page document summarising Hammond & Griffin's model with changes to 2 of his assumptions and deriving a value of 25 µg/100 cm^2 where the reference value for methamphetamine human toxicity (ie a value that suggests a daily dose causing no adverse effect for the duration of a lifetime exposure) at 0.005 mg/day. See attachment. Get back to me with queries/comments

Cheers

Leo

Page 3 paragraph 2: change 'rate, attention, and wakefulness' to 'rate, attention, wakefulness'
Page 9 paragraph 2: '(as do most chemicals if the exposure is high enough)' – is this necessary?
Page 12 paragraph 6: 'additional risk of additional contaminants' could possibly be changed to 'additional risk of other contaminants'
Page 17 paragraph 4: risk is typically defined as the probability of adverse effect occurring under specific exposure conditions associated with toxicity and duration of exposure
Page 19 paragraph 1: the sentence 'Nonetheless, the methamphetamine testing and decontamination industry has promoted the idea that all properties are potentially in danger from methamphetamine contamination' could do with an appropriate reference such as a newspaper editorial
Page 19 paragraph 5: regarding the use of 30 ug/100 cm2 and our discussion on this, I have put together a 2 page document summarising Hammon and Griffin's model and deriving a possible appropriate level (see attachement) – it could be included in appendix 8.4
Page 19 paragraph 6: the statement 'remediation down the 1.5 µg/100 cm^2' is not clear
Page 20 paragraph 6: change 'targeted to areas' to 'targeted areas'
Page 20 paragraph 4: (ref 25, cited in [6]) is not correct. Give this reference its own citation number and refer to it in the reference section 'Property Test Reports from Public Sector Agencies 2014 – 2017 in Russell M, McKinnel M, Ivory B. Methamphetamine contamination. Forensic internal report 2018/02. Auckland: Institute of Environmental Science and Research (ESR); 2018'.
Page 23 paragraph 4: change 'Further, the results' to 'Furthermore, the results'
Page 24 paragraph 1: change 'data being input' to 'input data'
Page 25 paragraph 6: 'led to an exceedance' to ; led to a excess'

Estimating the risks of human toxicity following exposures to residues of surface coated methamphetamine

There is very limited information on determining the risks of toxicity following exposure to methamphetamine-coated surfaces. In a recent paper, published by Hammon and Griffin,[1] a model was presented to estimate dermal contact with methamphetamine, derived from residues and contaminated dust on indoor surfaces (figure 1), comparing them with toxicity reference values, which ranged from 0.005 to 0.07 mg/kg/day. Assuming a reference value of 0.005 mg/kg/day, they determined that surface methamphetamine concentrations of 0.05, 0.1 and 0.5 µg/100 cm^2 were still well below this toxicity reference value, suggesting such amounts do not pose a threat to human health. Indeed, to achieve the 0.005 mg/kg/day reference value, based on their model and associated assumptions, would require a surface loading of 12.5 µg/100 cm^2.

Figure 1 Hammon and Griffin's equation to estimate dermal contact with household residues, where PDR = potential dose rate (mg/kg/day), ISR is the indoor surface transferable residue (mg/cm^2), TC is the transfer coefficient (cm^2/h), ET is the exposure time (h/day), ABSD is the dermal absorption fraction (unitless) and BW is the body weight (kg).

PDR = (ISR * TC * ET * ABSDÞ)/BW

The authors made several conservative assumptions to estimate their potential dose rates which unfortunately do not reflect the true value for such parameters involved in dermal contact.

They estimated the exposure time (ET) for a child would be 8 hours and 4 hours on carpets and hard surfaces respectively during the course of the day and during those 12 hours they will be continually exposed

They assumed a child, for example, less than 12 months will have 80% of skin exposed to surfaces (transfer coefficient - TC), based on the assumption that they will only be in nappies and will have continual exposure to these surfaces

The fraction transferred from the surfaces were based on pesticides with the assumption the solute was wet

They assumed, based on DDT and lindane, the skin absorption (ABSD)would be 10%

They assumed that the transfer from the hand to the mouth (ABSO), would result in 100% absorption into systemic circulation

We can, for example, address two of these variables with more realistic values and thereby estimate the surface loading dose necessary to achieve the reference value of 0.005 mg/kg/day.

The oral bioavailability of methamphetamine (ABSO) is approximately 0.67 rather than 1.0[2]; hence any values derived from their calculations could possibly be reduced to ~67% of the value they concluded.

Limited information on methamphetamine skin absorption (ABSD) approximates ~3% dermal absorption for the free base[3] (the HCl salt will have an even lower percentage skin absorption). Calculated values could be further reduced to another ~30% of the values the authors calculated.

Essentially, employing all of Hammond's variables, the derived health reference value would be achieved at 12.5 µg/100 cm^2. Modifying the ABSD to 0.03 and the ABSO to 0.67, the threshold for an infant would increase to 25 µg/100 cm^2.

These calculations are still very conservative as a child, for example, will not have continual contact with contaminated surface for 12 hours per day and such contact would most likely only be with hands and possible face, and not the majority of their torso. Based on this model, with appropriately derived assumptions, the risks of human toxicity to household surfaces, derived from recreational smoking of methamphetamine, remains low.

References

1. Hammon TL, Griffin S. Support for selection of a methamphetamine cleanup standard in Colorado. Regulatory toxicology and pharmacology. 2007;48:102-14.
2. Cook CE, Jeffcoat AR, Sadler BM, et al. Pharmacokinetics of oral methamphetamine and effects of repeated daily dosing in humans. Drug metabolism and disposition. 1992 Nov-Dec;20(6):856-62.
3. Vree TB. Pharmacokinetics and metabolism of amphetamines. Available from:<http://repository.ubn.ru.nl/handle/2066/147775> (last accessed July 12 2016): Katholieke Universiteit in Nijmegen, The Netherlands; 1973.