Message

From: Praskins, Wayne [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=4F47BC0A2C2E42A98347D59CD1A98B19-WPRASKIN]
Sent: 12/9/2020 1:04:53 AM
To: Stralka, Daniel [Stralka.Daniel@epa.gov]
Subject: RE: HPNS: Ingestion exposure assumptions
Attachments: BPRG_Users_Guide_092019.pdf

Dan –

Another Hunters Point question.

The Building PRG calculator for estimates radiological risk for two exposure scenarios: residential and indoor worker.

The indoor worker exposure assumptions are described in the last few pages of the user's guide (attached). Key values include:

Exposure Duration - 25 years

Exposure Frequency - 250 days per year

Air Exposure Time - 8 hours per day

Inhalation Rate – 60 m3 /day; based on a rate of 2.5m /hr for 24hr

How closely does the indoor worker scenario fit a commercial/industrial use scenario for the buildings?

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From: Stralka, Daniel <Stralka.Daniel@epa.gov>
Sent: Wednesday, May 13, 2020 12:35 PM
To: Praskins, Wayne <Praskins.Wayne@epa.gov>
Subject: RE: HPNS: Ingestion exposure assumptions

That's correct, their proposed surface area times 2 based on the supplied reference. However, Stuart is not looking at changing that input in the revisions.

From: Praskins, Wayne <Praskins.Wayne@epa.gov>
Sent: Wednesday, May 13, 2020 10:39 AM
To: Stralka, Daniel <Stralka.Daniel@epa.gov>
Subject: RE: HPNS: Ingestion exposure assumptions

Dan –

That's helpful. Thanks. (No, I hadn't received your email on Friday.). When I communicate our position to the Navy I'll let them know that none of the Navy's proposed changes are included in past changes to the EFH or are in planned changes to the BPRG, and are not adequately supported by the cited studies.

You note that they miscalculated the finger surface area. That's their proposed changes from 49 to 11.5 cm2 (adults) and 16 to 3.7 cm2 (children)? So their proposed change is really 49 to 23 cm2 (adults) and 16 to 7.4 cm2 (children)?

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From: Stralka, Daniel <Stralka.Daniel@epa.gov>
Sent: Wednesday, May 13, 2020 9:15 AM
To: Praskins, Wayne <Praskins.Wayne@epa.gov>
Subject: RE: HPNS: Ingestion exposure assumptions

Sorry, I just saw this in my draft folder. Did I send it last Friday?

How about this?

The applicable exposure factors for this pathway are appropriately taken for chapter 4 of the 2011 EFH and correctly incorporated into the PRG calculator. The proposed changes are not supported by the totality of the studies presented. The purpose of the PRG calculator is to present the RME, reasonable maximum exposure scenario to inform the project team of target levels of concern. This entails balancing all the inputs to achieve a reasonable maximum that is health protective while still being plausible. The proposed change to the adult hand-to-mouth frequency is not consistent with the conceptual site model and the RME evaluation. Further, carrying more than one significant digit suggest a level of precision that is not supported by the data. Therefore, changing from 3 event/hr to 2 events/hr is well within the uncertainty range ascribed to the overall result and is not significant. As for the proposed fingertip surface area, the values cited are for only one hand and should be doubled. Again, if included would only change the input by half and would not be significant. Therefore, the changes should not be made in the calculator inputs and the project team should include the uncertainties of the estimates into their risk management decisions.

I forgot to ask Stuart if there is any thought or effort to reconcile BPRG and RERAD BUILD.

As we discussed, we have been working with the Stuart and the Army Corps to evaluate the Hunters Point remediation goals (RGs) for radiological contaminants in buildings. The RGs were adopted back in 2006 and have been incorporated into multiple RODs at the site.

The Navy evaluated the RGs by running the numbers through EPA's Building PRG calculator (BPRG) and DOE's RESRAD BUILD calculator. The risks associated with the RGs are much higher using BPRG compared to RESRAD. As an example, for radium-226, the RG is 100 dpm/100cm2. The estimated risk is two orders of magnitude higher using BPRG compared to RESRAD BUILD (2.9 x 10-4 vs. 3 x 10-6).

The BPRG calculates ingestion dose as the product of four factors: (surface concentration) x (hand-to-mouth frequency) x (fingertip surface area) x (saliva extraction factor)

The Navy has proposed changing some of the default inputs into the BPRG, including the following:

BPRG Input	BPRG default	Navy proposed change	Navy rationale for proposed change
Hand to mouth frequency	3 hr^{-1} (adult)	1.64 hr^{-1} (adult)	*"Average for Age 7-26 from EPA 2000 page D-4). The BPRG default values for FQ (17 events/hr child and 3 events/hr adult) are based on the 2011 Exposure Factors Handbook Table 4-1. However, there is no data for adults older than 11 years and*

		(No change proposed for child.)	*the BPRG default values are based on those for 6-11 years. The 2017 update to Chapter 5 of the EFH uses 1 event/hr for adults (Pages 5-37, 5-65). From the 2003 World Trade Center report page D-5, the time-weighted average for adults age 7-26 is a minimum of 1.35/hr, maximum of 1.92/hr and an average of 1.64/hr."*
Fingertip surface area	49 cm^2 (adult) 16 cm^2 (child)	11.5 cm^2 (adult) 3.7 cm^2 (child)	*"Area of three fingertips from Sahmel et al.,2014 rather than full area of three fingers). The EPA default for saliva extraction factor is 50% based on pesticide studies in 1994. A 2014 study (Sahmel et al.) of transfer of lead to three fingers found the factor is 24% and is more applicable to the Navy contaminants. The authors note similar in 3rd para of their introduction. See https://academic.oup.com/annweh/article/59/2/210/2740608. In the same paper, they measure the area of three fingertips. The BPRG assumes that dust is transferred from an area equivalent to three fingers, not just the tips. The paper is more accurate and their value of 11.5 cm2 for the area of three adult fingertips is used. The EPA hand areas for adults (980 cm2) and children (317 cm2) are used to get the area of three child fingertips, or 11.5*317/980 = 3.7 cm2."* (Although they comment on the saliva extraction factor, the Navy is not, as far as I can tell, proposing to reduce the default value of 50%)

The BPRG Users Guide says the following about the sources of the default values:

- **Frequency of Hand to Mouth (FQ)**

The exposure factors handbook (EPA 2011, Table 4-1) and the World Trade Center report (EPA 2003) provide hand to mouth contact rates for many age groups. For the child FQ, all age groups for mean indoor contact from birth to 6 years old were time-weight averaged from the exposure factor handbook. Missing data points were substituted with data from the nearest age group. The FQ for children was determined to be 17 times/hr.
For the adult FQ, all age groups for mean indoor contact from 6 to 26 years old were time-weight averaged from the exposure factor handbook and World Trade Center report. The FQ for adults was determined to be 3 times/hr.

- **Surface Area (SA)**

In general, this is the skin area contacted during the mouthing event. The OPP recommended default was based on the surface area of the 3 fingers that a child will most likely use for hand to mouth transfer. It was assumed that 3 fingers of one hand represents about 5% of the total area of both hands (EPA 2003). The exposure factor handbook (EPA 2011, Table 7.2) presents hand surface areas for adults and children. For children, the surface areas were time-weight averaged across all age groups from birth to 6 years (317 cm), and the 5% assumption was applied to derive the child hand surface area of 16 cm .

The hand surface area for the adult was also derived from data presented in the exposure factor handbook (EPA 2011, Table 7.2). The exposure factor handbook presents hand surface areas for adult males and females of 1070 and 890 cm , respectively. These numbers were averaged to 980 cm , and the 5% assumption was applied to derive the adult hand surface area of 49 cm .

<u>Can you evaluate and let me know if you think there is a valid basis for the Navy's proposed changes (or other changes from the default values)?</u>

That would be great if you could get to it this week (by 5/1/20). Thanks.

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