RE: Exposure Calculation for Marysville Cohort

Bob Benson to: Bill Brattin 11/05/2008 08:04 AM

From: Bob Benson/R8/USEPA/US
To: "Bill Brattin" <brattin@syrres.com>

I guess I didn't explain my point very well. I will try again later as I have some other things I need to finish before the end of the week.

"Bill Brattin" <brattin@syrres.com>

"Bill Brattin" <brattin@syrres.com>
11/05/2008 07:21 AM

To Bob Benson/R8/USEPA/US@EPA
cc
Subject RE: Exposure Calculation for Marysville Cohort

I am not sure I understand your point.

IRIS did use a factor of 2.8 to extrapolate the cancer potency factor based on workers to a value based on residents, and that seems fine to me.

By analogy, you would do the same thing for the cumulative RfC, except that your factor would be somewhat smaller because the workers were exposed more than 8 hrs/day for 5 days/week.

****
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-----Original Message-----
From: Benson.Bob@epamail.epa.gov [mailto:Benson.Bob@epamail.epa.gov]
Sent: Wednesday, November 05, 2008 7:14 AM
To: Bill Brattin
Subject: RE: Exposure Calculation for Marysville Cohort

If what you say is true, then IRIS should never adjust an occupational study to a 7 day week. The asbestos IUR was adjusted by 140/50 (ie, 20/10 x 7/5)

If we used the average fibers/cc across the work areas for each worker, then we would adjust by 5/7 x 10/20 to normalize to continuous exposure as the

first step in deriving the RfC. The process should not be different if we are using cumulative exposure.

"Bill Brattin"
<brattin@syrres.
com>

11/04/2008 11:02
AM

To
Bob Benson/R8/USEPA/US@EPA

cc

Subject
RE: Exposure Calculation for
Marysville Cohort

I believe that the cumulative exposure values assigned in the Lockey study (and every other eidemiological study of asbestos-exposed workers) are calculated by summing the average exposure concentration for each year of work across all years of work:

CE (f/cc-yrs) = SUM of all C(i) values, where C(i) = concentration the worker was exposed to in year i.

Note that the value of C(i) is the average concentration in the workplace area where the worker was employed in year i.
It is NOT adjusted to account for how many hrs/day or days/year the worker was present.

For example, assume a person worked in Location A for 5 years and in Location B for 3 years.
The concentration in Location A is 0.7 f/cc and the concentration in Location B is 2.0 f/cc In this case, the cumulative exposure of that worker is 5*0.7 + 3*2.0 =
9.5
f/cc-yrs.

If this is correct, the exprapolation of the RfC based on the data in workers to a value in residents is done in one of two ways:

Option 1: Adjust by the ratio of air breathed per year

Resident: 20 m3/day * 350 days/year = 7000 m3/year
Worker: 10 m3/workday * 250 workdays/year = 2500 m3/year
Ratio: 7300/2500 = 2.8
RfC(resident) = RfC (worker) / 2.8

= RfC (worker) * 0.36

This is the approach used by IRIS to extrapolate cancer potency factors from workers to residents.

In your case, because your workers worked longer days and more days, you would make the conversion using your best estimates of hrs/day and days/year. For example, you might calcuate the adjustment as follows:

Worker = 1.25 m3/hr * 10 hrs/day * 300 days/yr = 3750 m3/hr

Ratio = 7000/3750 = 1.87
RfC(resident) = RfC (worker) / 1.87
= RfC (worker) * 0.54

Option 2: same as above, except that breathing rate is not used

Resident: 24 hrs/day * 350 days/year = 8400 hrs/year
Worker: 8 hrs/workday * 250 workdays/year = 2000 hrs/year
Ratio: 8400/2000 = 4.2
RfC(resident) = RfC (worker) / 4.2
= RfC (worker) * 0.24

This is how USEPA 1986 did the cancer extrapolation originally, but IRIS changed the approach to Option 1.

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-----Original Message-----
From: Benson.Bob@epamail.epa.gov [mailto:Benson.Bob@epamail.epa.gov]
Sent: Tuesday, November 04, 2008 10:26 AM
To: brattin@syrres.com
Subject: Exposure Calculation for Marysville Cohort

Here is the original speadsheet I got from the UC Research Group.

(See attached file: epa07082007.xls)

Duration of exposure is in Column AT (duration_verm_total 1980_1963).
The units are years.

Cumulative exposure is in Column BS (verm_fiber 1980_1963). The units are (fibers-yr)/cc..

The UC team assumed that the individual was exposure 365.25 days per year. Hence the calculation of cumulative exposure by UC includes time when the individual was not working. We have to account for that calculation of overexposure in the RfC derivation. I am open to suggestions on how best to do this.

I used 5/7 to adjust the calcuated cumulative exposure back to a 40 hour work week (5 days/7 days) and then used the exposure scenarios listed in the appendix to adjust to 24 hrs/day, 7 days/week.

How would you do the calculation?