Risk Assessment and Consequence Analysis for Routes from H.B. Robinson NPP, SC to Eccles, NV

Additional Informative Viewgraphs

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Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company,
for the United States Department of Energy's National Nuclear Security Administration
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Analysis of Incident-Free Routine Transportation

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Exposure to Passing Rail Crews and Rail Yard Workers

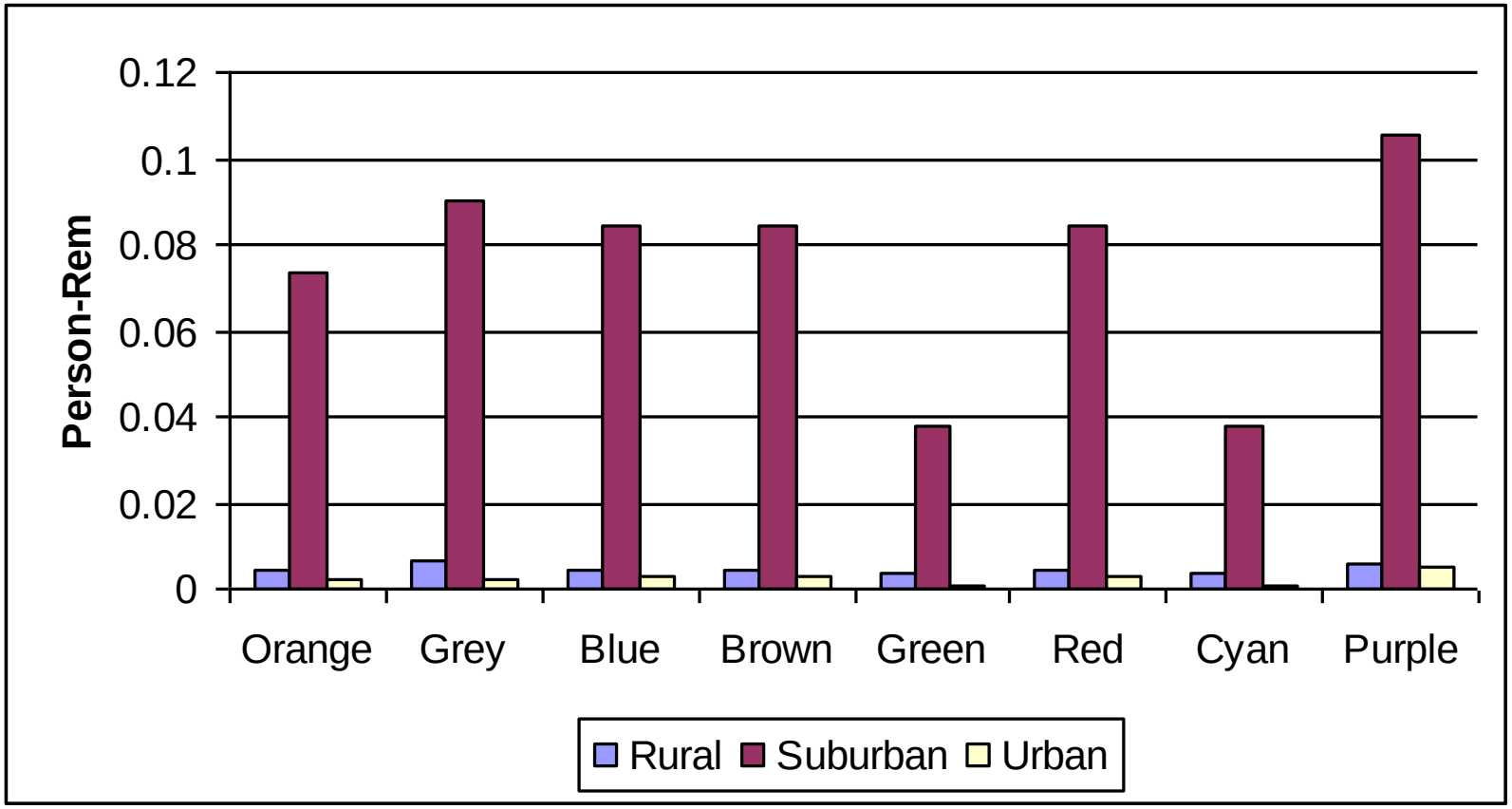
- Dose to all rail crews passing consist = 0.018 – 0.026 Person-Rem

Rail yard worker scenario:

- 4 spent fuel rail cars all at the regulatory limit.
- Stop in rail yard is for 10 hours.
- Rail yard has 20 people.
- All personnel are between 3 – 400 meters of cask.

- Dose to rail yard workers during stop = 0.0002 Person-Rem

Collective Dose to Public within SSEB 2,500 meter buffer zone



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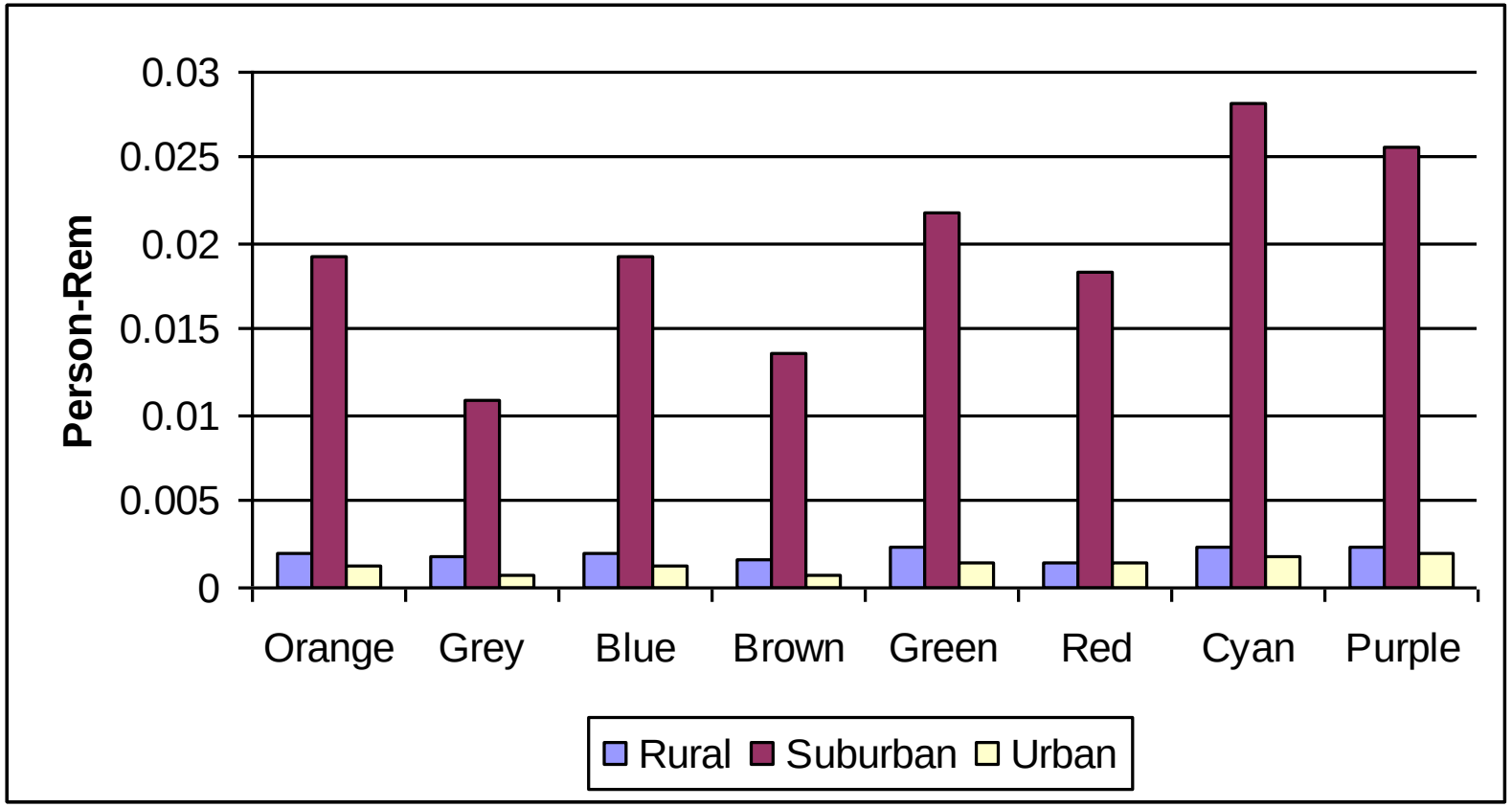
Collective Dose to Public within WIEB 2,500 meter buffer zone



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Nonradiological Accident Risk Analysis

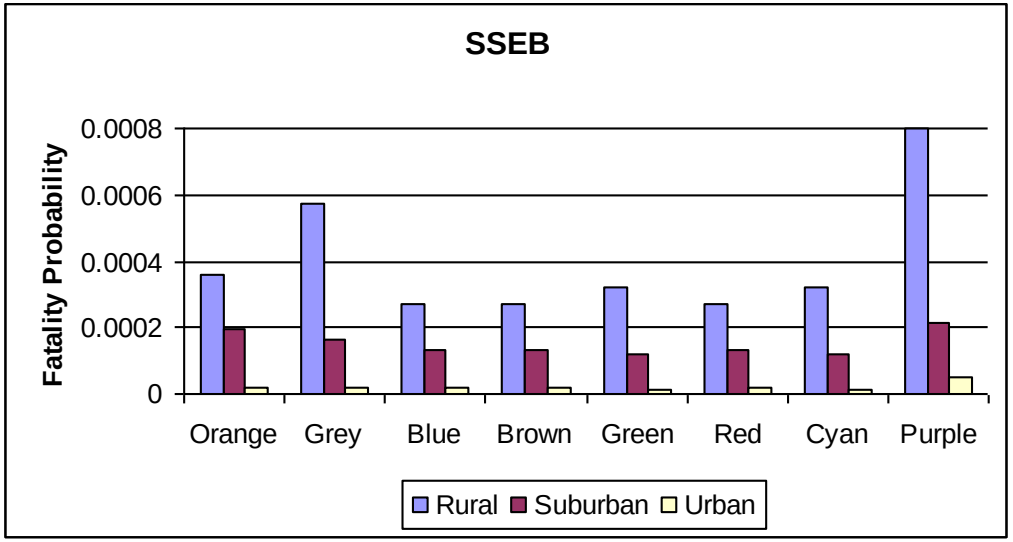
Non-Radiological Fatality Probability

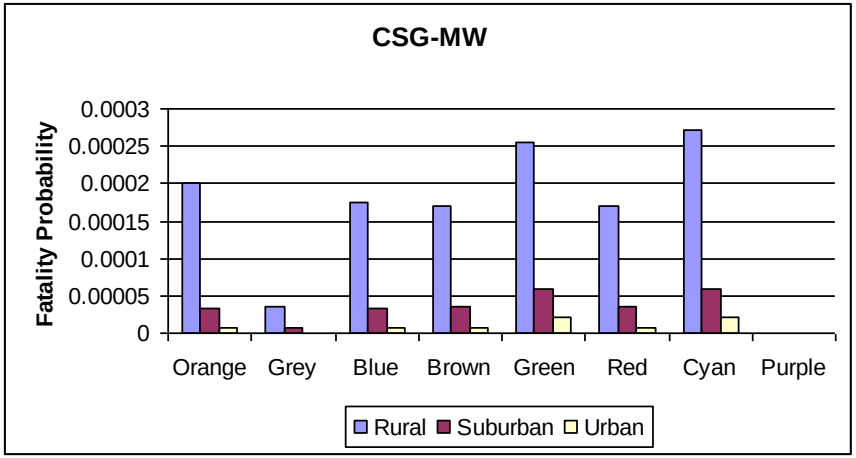
Fatality rates are taken from Saricks & Tompkins (ANL-1999).

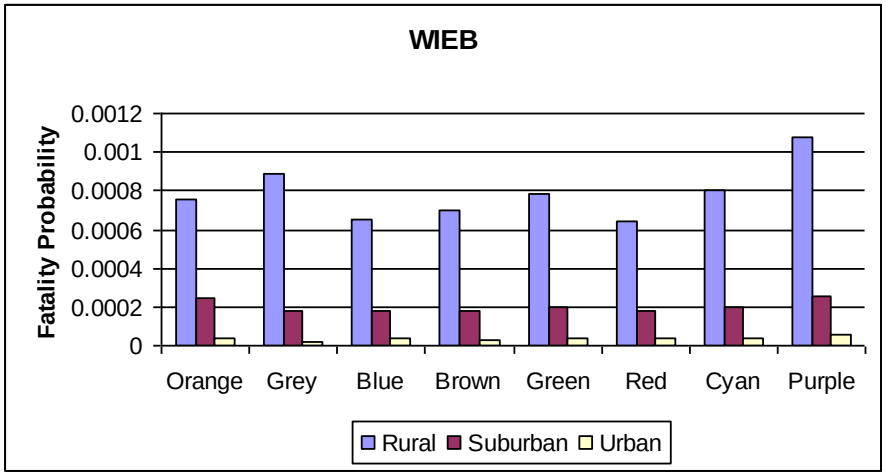
Fatality probabilities are on a per trip basis for this analysis.

All trespassing and nontrespassing fatalities were analyzed.

Non-Rad Fatality Probability for each Region







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Sensitivity Analysis

Distributions

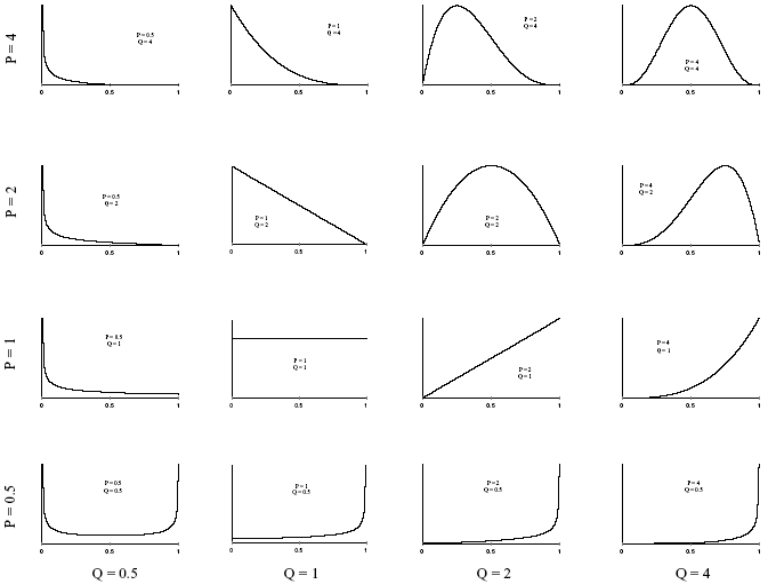
The primary manifest (blue) route was analyzed using a distribution of curies for selected radionuclides. The radionuclides selected have been analyzed in ORIGEN to determine the curie distribution. A beta distribution was selected.

PDF Equation:

$$f(x) = \frac{(x-a)^{p-1}(b-x)^{q-1}}{B(p,q)(b-a)^{p+q-1}} \qquad a \le x \le b; p,q > 0$$

CDF Equation:

$$F(x) = I_x(p,q) = \frac{\int_0^x t^{p-1}(1-t)^{q-1}dt}{B(p,q)} \qquad 0 \le x \le 1; p,q > 0$$



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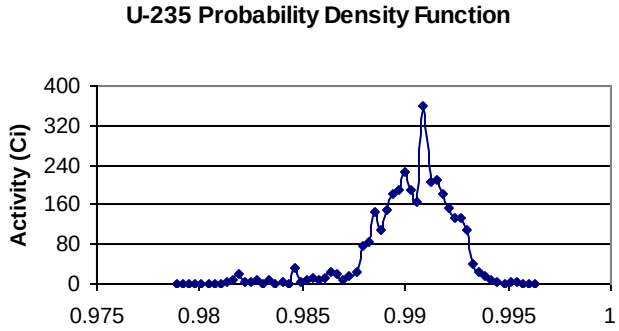
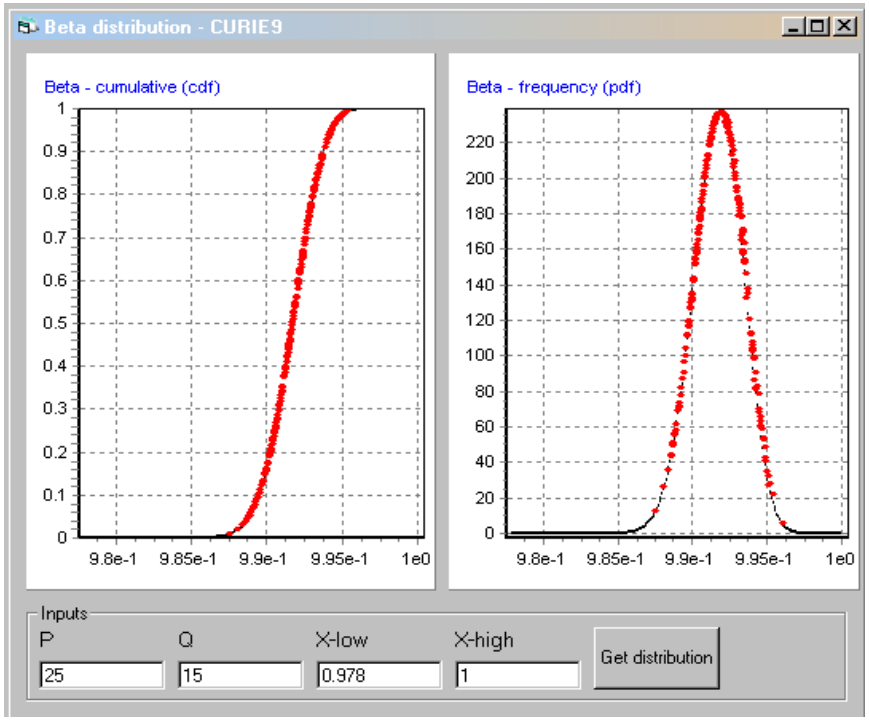
Distribution Example: Curie Content





Parameters of Default Beta Distribution

$p = 25$
$q = 15$ ← **Shaping Parameters**

A = 0.978 ← **Minimum**

B = 1.00 ← **Maximum**

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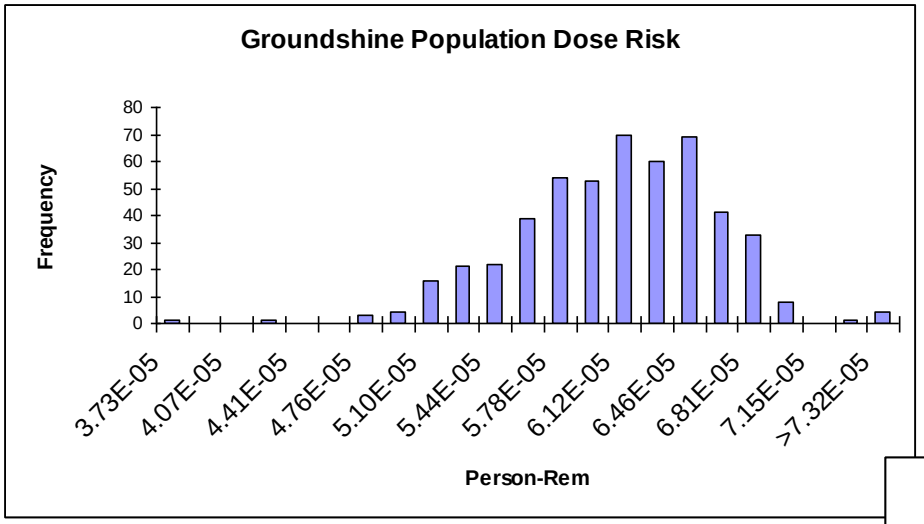
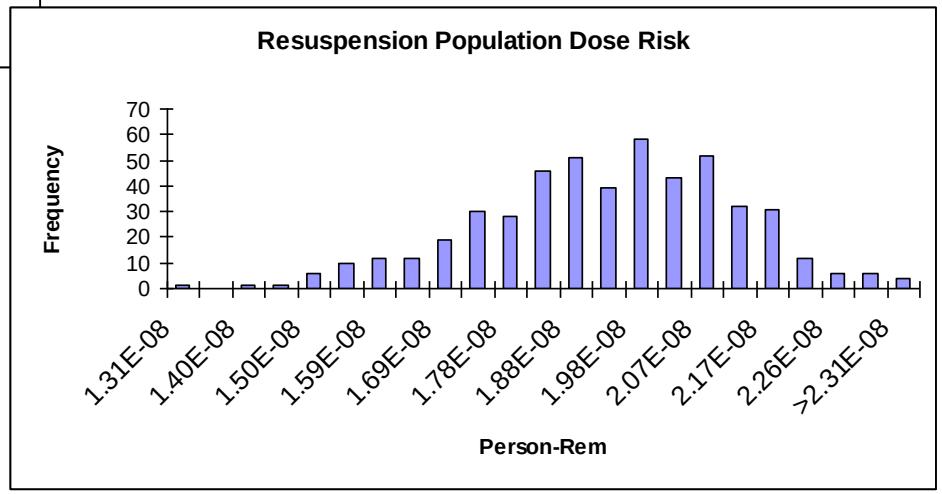
Expected Values of Population Dose Risks





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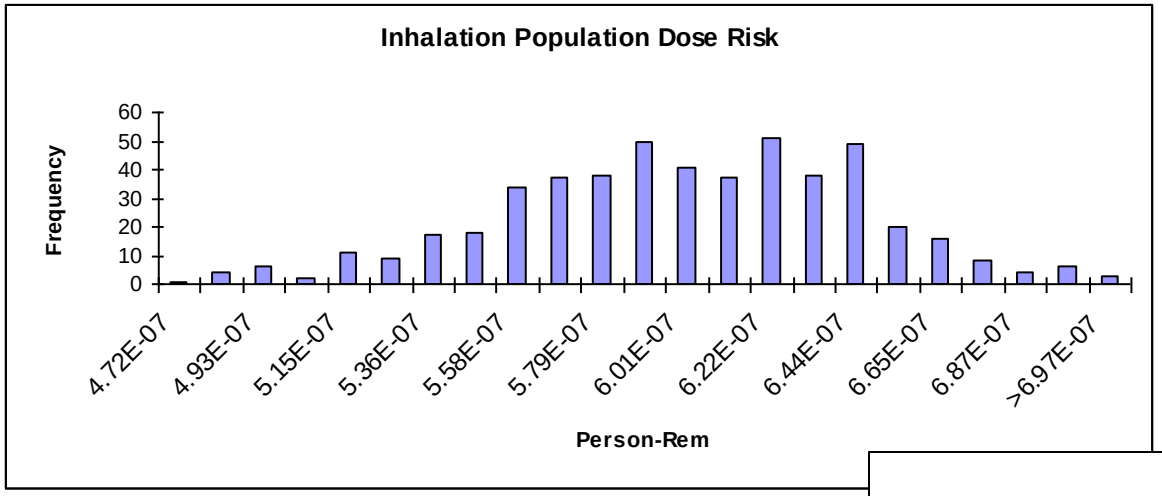
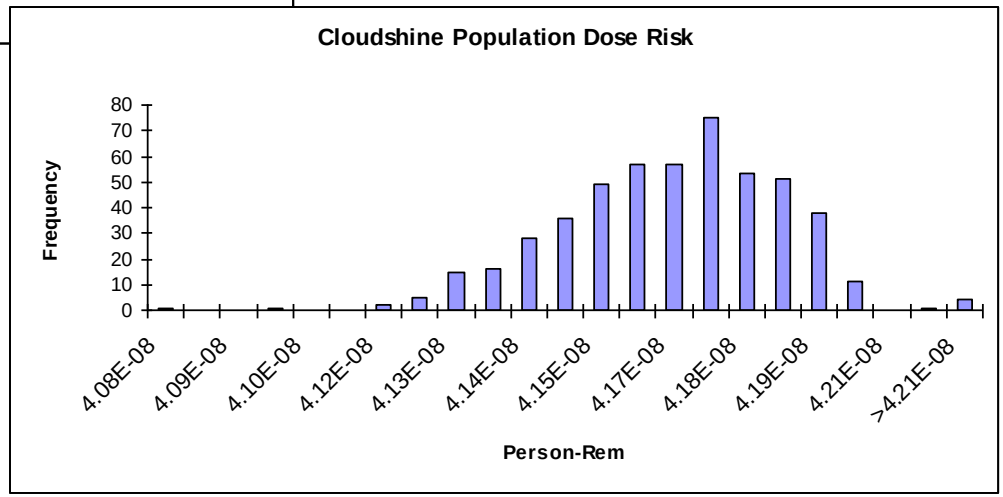
Expected Values of Population Dose Risks cont.





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