



# Emergency Management Issues Special Interest Group Annual Meeting

## Use of HotSpot 2.07 to Estimate Site-Specific 95th Percentile Doses for EPHAs

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# Background

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1. DOE G151.1-2 specifies 95% met conditions for "conservative" EPHA cases
2. Default conditions (1 m/s & Class F) recommended if 95% conditions not known
3. Many (most?) planning basis analyses are done using default met conditions

# Hotspot 2.07

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1. Hotspot 2.07 offers EPHA analysts an easy and convenient method to determine 95% conditions.
2. Requires one or more years of hourly observation data in the MACCS2 file format

# MACCS2 Met Data Format

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- Text file
  - 8760 lines per year
  - One line per hour
  - 17 characters per line
  - Numerals represent
    - Julian day (1-365)
    - Hour (1-24)
    - Wind direction (1-16, to)
    - Wind speed (m/s x 10)
    - Stability class (1-7)
    - Precip (inches x 100)
- |                     |   |    |     |   |
|---------------------|---|----|-----|---|
| 1                   | 1 | 1  | 166 | 0 |
| 1                   | 2 | 11 | 176 | 0 |
| 1                   | 3 | 12 | 344 | 0 |
| 1                   | 4 | 13 | 206 | 0 |
| 1                   | 5 | 13 | 236 | 0 |
| 1                   | 6 | 12 | 364 | 0 |
| 1                   | 7 | 12 | 334 | 0 |
| .....               |   |    |     |   |
| .....               |   |    |     |   |
| etc, etc, etc,..... |   |    |     |   |

# Here's where we are.....

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1. Hotspot is in the DOE safety "toolbox" -- wide and increasing use
2. Safety basis calcs vs EPHA calcs: the divide is getting narrower
3. Site-specific 95% dose results can be significantly different from those obtained using default meteorology (1 m/s & F)

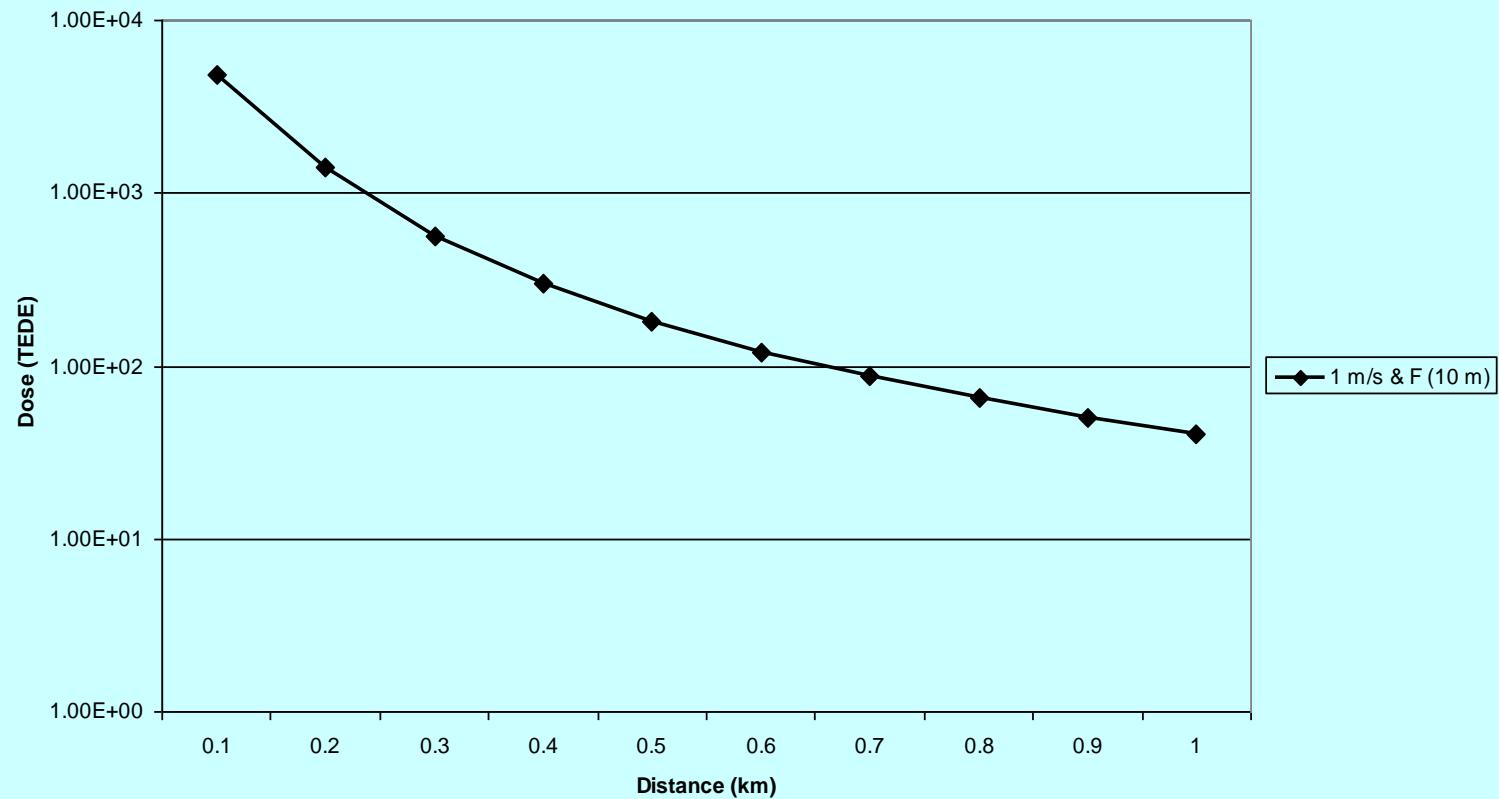
# How much different?

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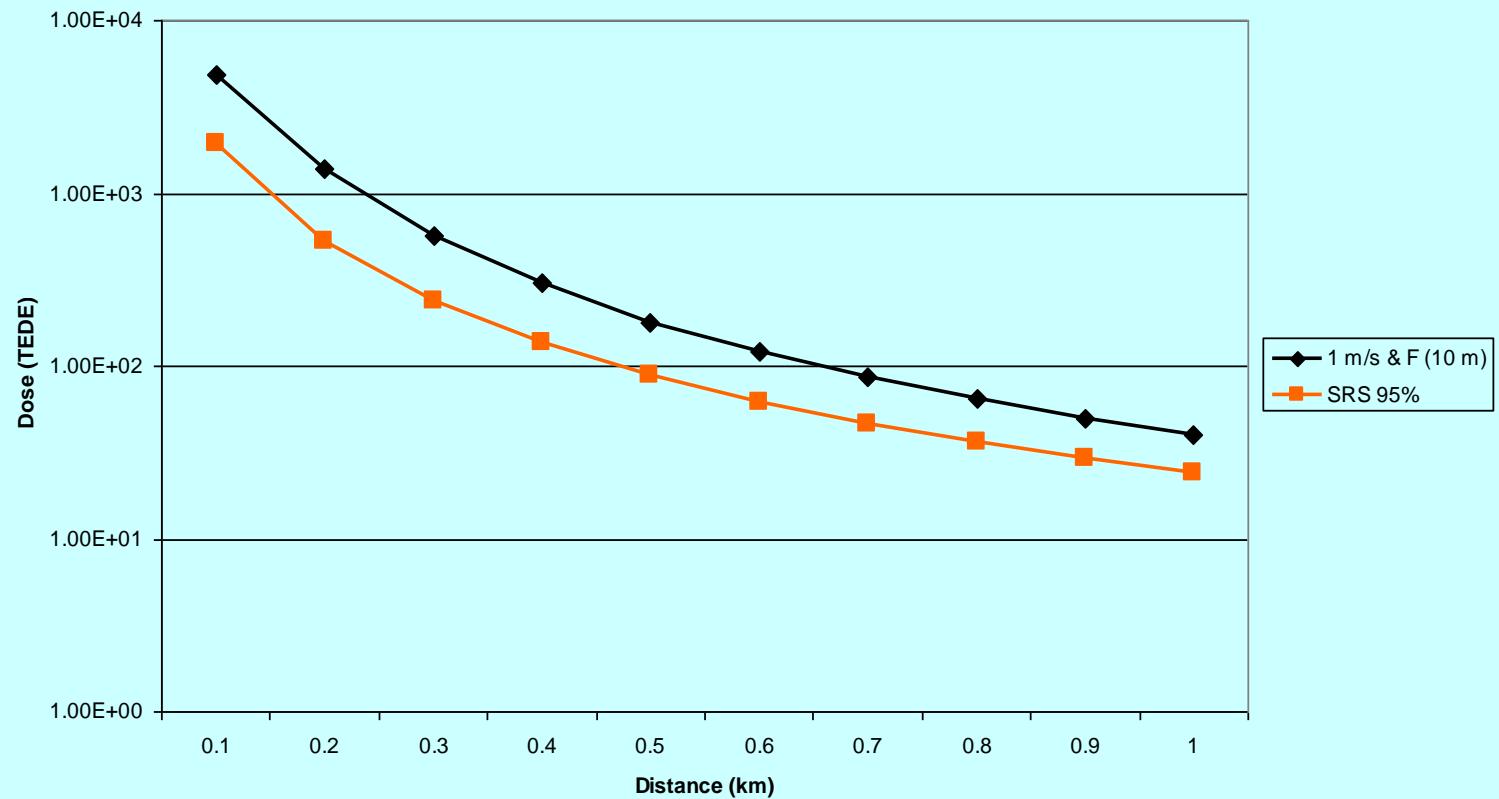
It depends.....

- Site meteorology
- Release scenario (height)
- Wind speed reference height
- Deposition velocity
- Distance
- Averaging time

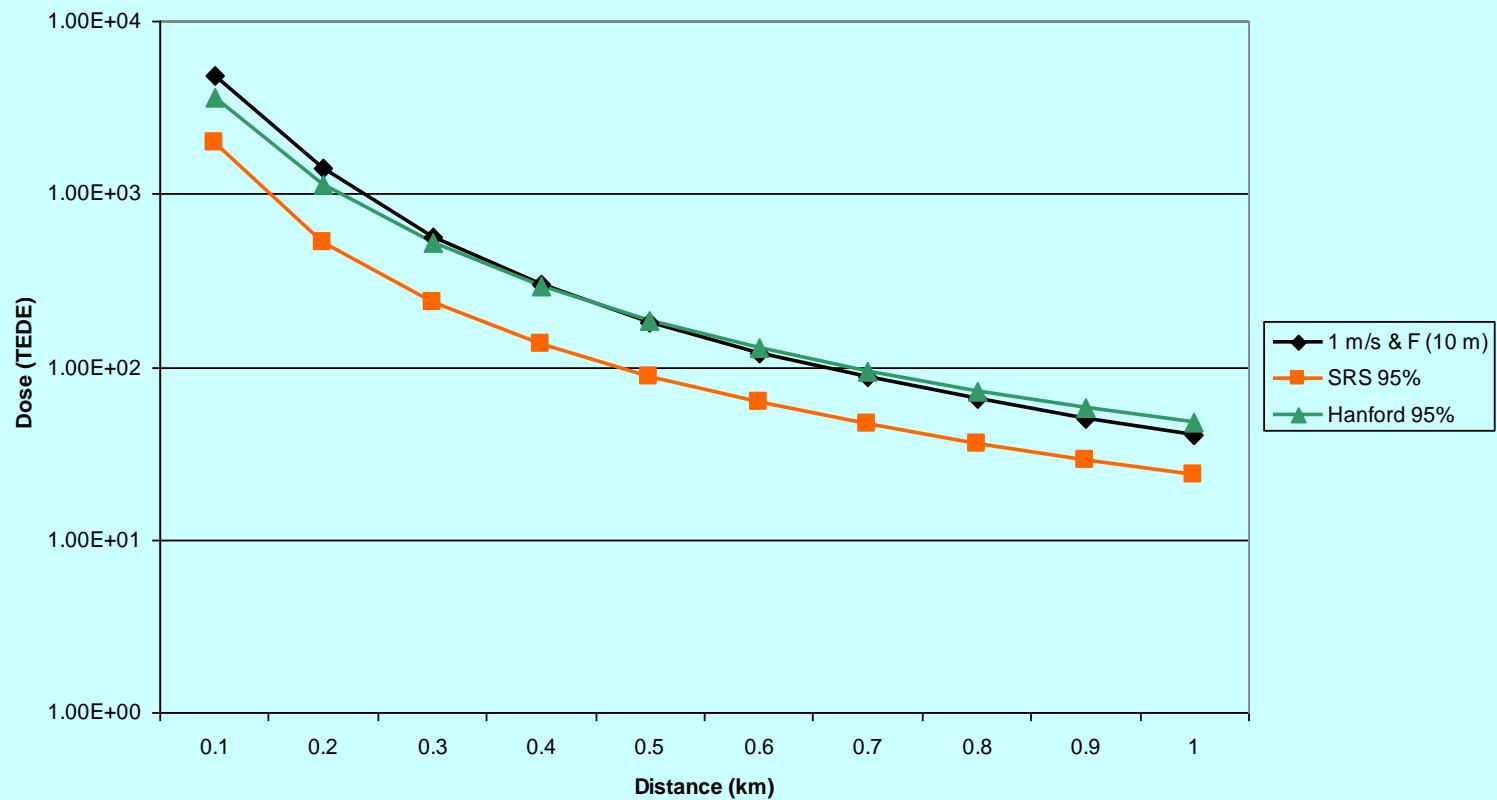
# Site Comparison, 95% vs default conditions (1 m/s at 10 m)



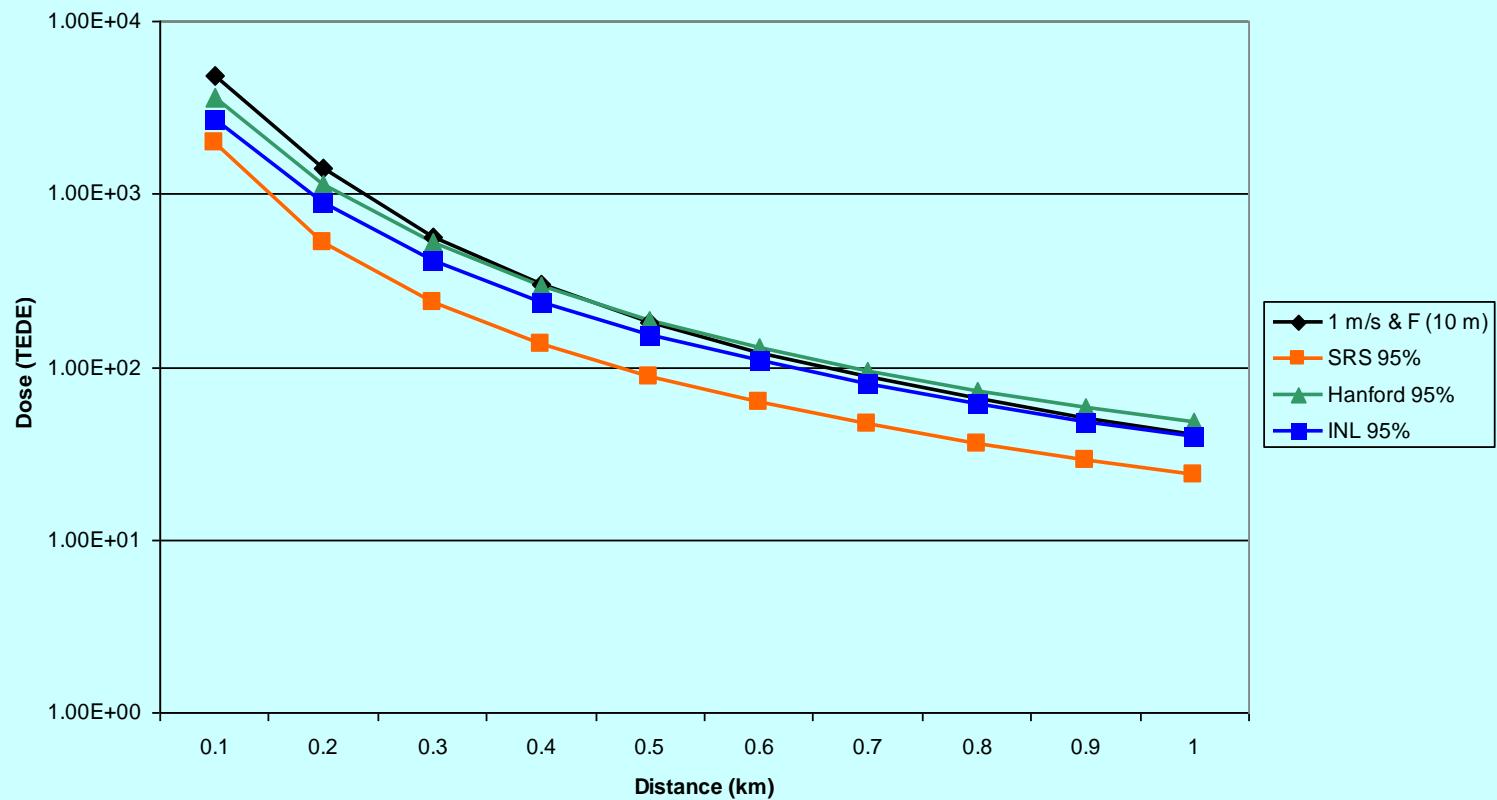
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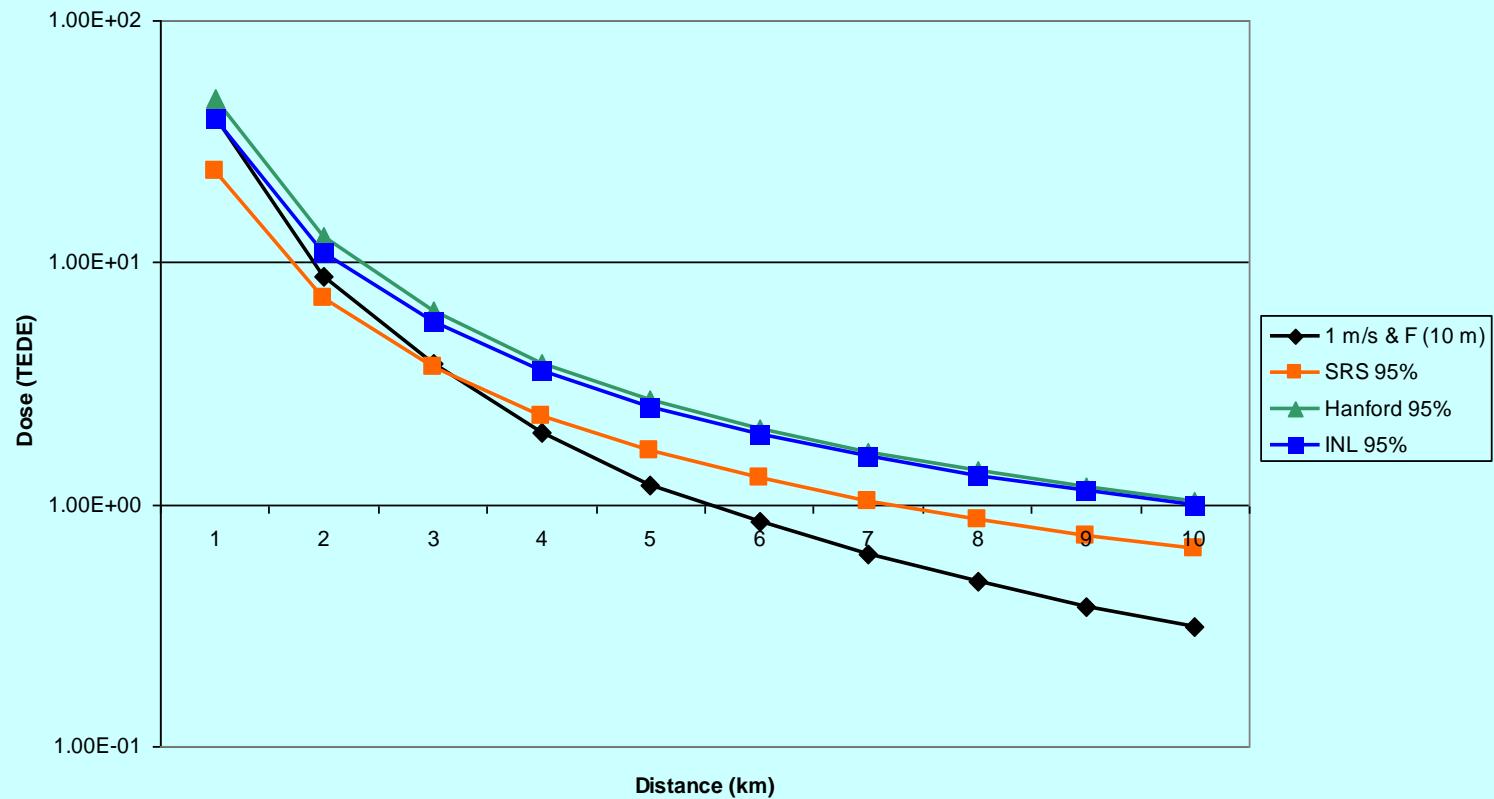


## At distances of 1 km or less...

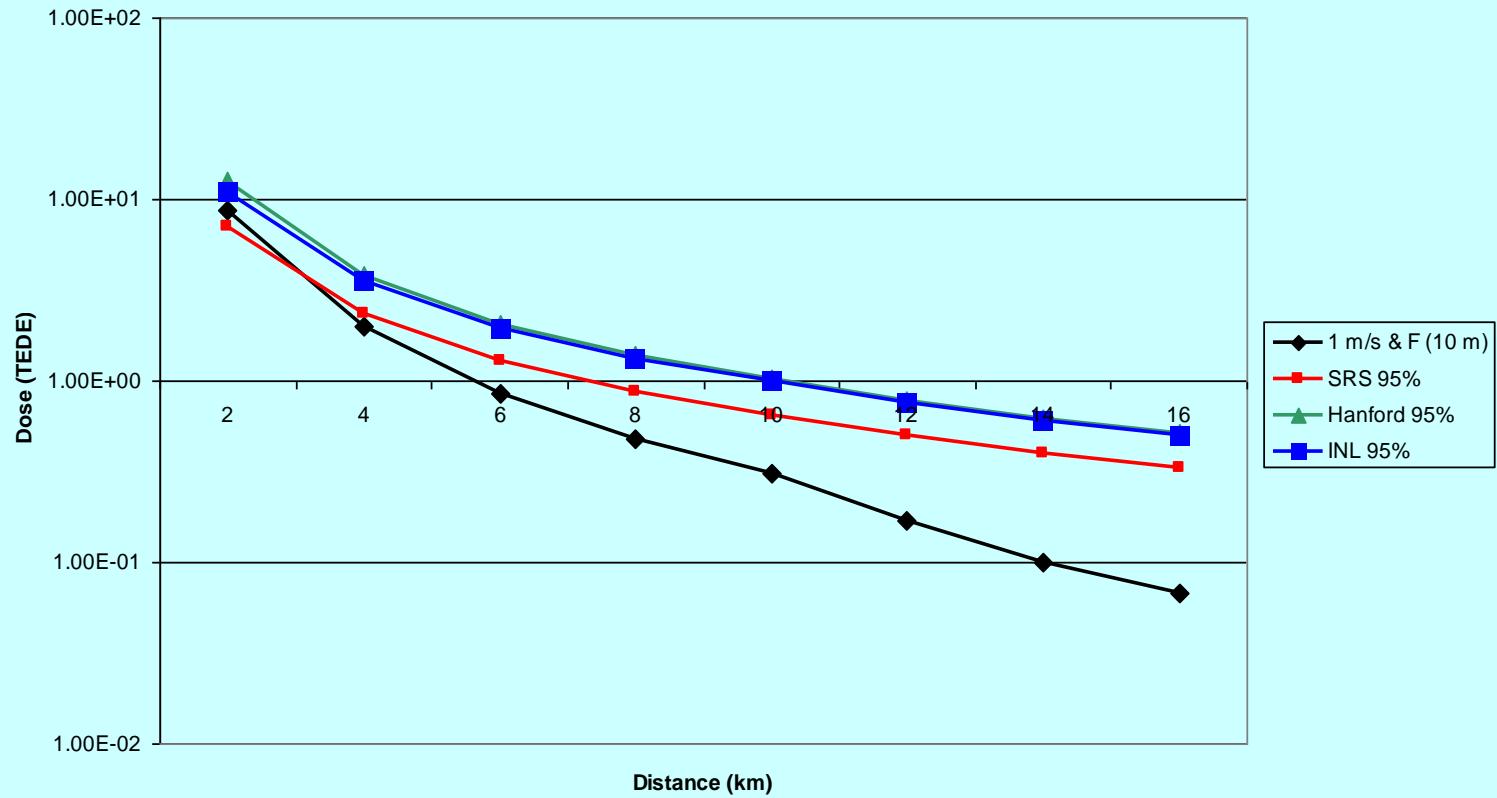
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- Hanford & INL: default met conditions of Class F & 1 m/s (measured at 10 m) is **very good** approximation of the 95% condition.
- SRS: default conditions are fairly conservative and produce doses that correspond to about the 99th percentile.

# Site Comparison, 0-10 km



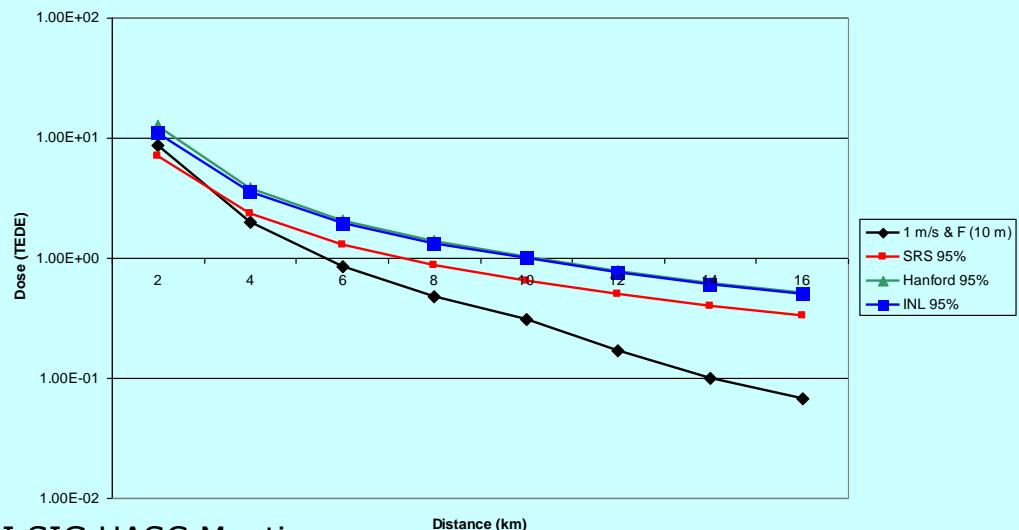
# Site Comparison, 0-16 km



## At 16 km, default met doses correspond to:

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- ~64th percentile for SRS
- ~ 50th percentile for INL & Hanford



# Observations for distances > 1km

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- Beyond 1 km, default met dose becomes significantly lower than 95% doses for all three sites.
- At 16 km, default met dose corresponds to occurrence frequency much closer to the median dose than to the advertised 95th percentile.

# Implications for EPHAs

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- Customize the default conditions for the site, scenario and receptor?
  - adjust HotSpot met conditions to yield doses that more closely approximate the 95th percentile
- What about chemical release calculations & assumptions?
- Easy determination of 95th percentile for elevated release calculations

# Implications for planning

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- What do offsite planning partners understand about your planning basis?
  - Changes in event classifications?
  - GEs where there were none before?
  - Overhaul of protective action plans/zones?
  - Reassess EPZ size & shape?

# Summary (1)

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- A few quirks, but basically straightforward
- Very useful for comparing different sites
- Can be used to generate Joint Frequency Distributions to compare met data sets

# Summary (2)

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- Policy issues

- Should use of site-specific met be encouraged (or not) for established programs?
- Is more detailed guidance needed regarding the "default" conditions (deposition velocity, wind speed reference height, limits on distance, etc.)

# Conclusion

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- A very useful tool, but should be adopted for EPHA use only after careful consideration of possible impacts on established emergency management programs.