EXTERNAL EVENTS

The WILDCARD of EMERGENCY MANAGEMENT

Going Beyond the DOE/EH Central Registry Toolbox – The SCAPA Consequence Assessment Modeling Toolbox

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Clifford Glantz (PNNL)
cliff.glantz@pnl.gov
509.375.2166

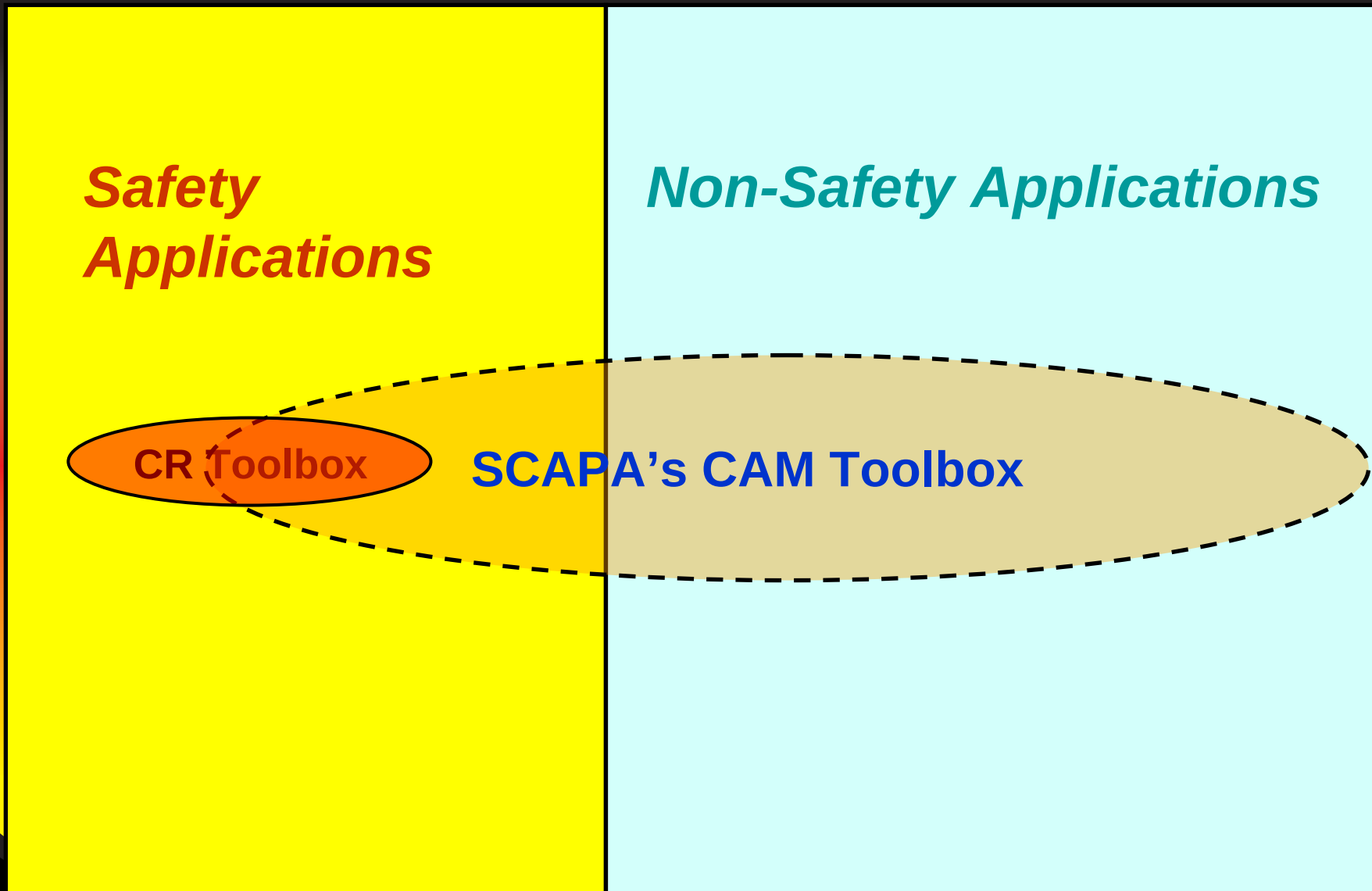
Key Questions to be Addressed

1. Why is SCAPA developing a Consequence Assessment Modeling (“CAM”) Toolbox?
2. How does this toolbox compliment DOE/EH’s Central Registry Toolbox?
3. What models are candidates for the CAM toolbox?
4. What are the appropriate levels of Software Quality Assurance (SQA) for consequence assessment models that do not fall into the *safety software* category?

Why is SCAPA Developing the CAM Toolbox?

- The DOE/EH's Central Registry Toolbox is intended to cover *safety* software "used to establish the safety basis for DOE facilities and operations", it contains a small number of codes that are in widespread use, and it takes a lot of work to get new models into the toolbox.
- There is a need for a toolbox to support the wide variety of consequence assessment models used in the DOE community. This includes both *safety* and "*non-safety*" software.

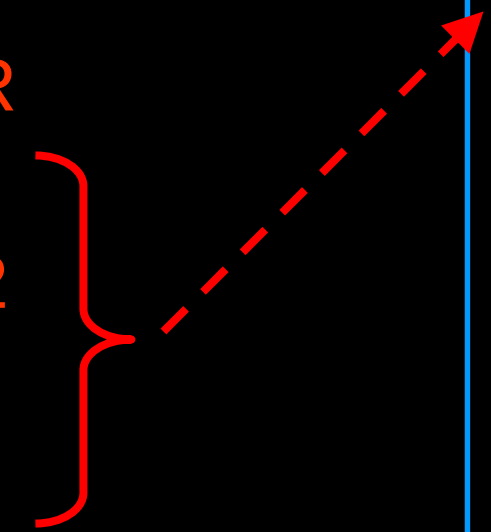
Scope of SCAPA CAM Toolbox



Contents of the Toolboxes

Central Reg. Toolbox

- CFAST
- MELCOR
- GENII
- MACCS2
- ALOHA
- EPI
- IMBA *(coming)*
- HOTSPOT *(nominated)*



CAM Toolbox

- Central Reg. **C.A.** models
- HOTSPOT
- NARAC
- APGEMS
- 2DPUFF
- AlphaTrac
- RASCAL
- ARCON96
- CAP88
- HPAC/SCIPUFF…

The CAM Toolbox Will Provide:

- General information on the consequence assessment models that are available for various applications
- Instructions on how to access the models
- Guidance on when & how to use these models
- Links to technical documentation
- Description of the SQA that has been applied to the models
- Indication of whether the models meet SQA requirements for various applications

Why Not Apply DOE O 414.1C to all Consequence Assessment Models?

- The average cost to bring the relatively simple Central Registry codes (e.g., GENII, EPICODE, ALOHA) into compliance with DOE O 414.1C is over $300K per model.
- For more sophisticated models, this level of SQA would cost much more.

Finding the Right Balance

- *Safety* software must comply with DOE O 414.1C
- For "non-safety" software, we need to adopt an effective approach to SQA. This should be based on (1) site- or contractor-specific requirements and (2) key elements of the graded approach presented in the DOE SQA Order and Guide.
- Key SQA focus areas will be technical documentation, code documentation and change control, and verification & validation testing
- We want to encourage an improvement in SQA and the continued development of better models.

Setting Boundaries for SQA…

SCAPA is working with DOE/EH and others to:

- determine which consequence assessment models are operating as *safety software* and which are not
- determine appropriate SQA levels for *safety software* using the “graded approach”
- establish appropriate SQA guidelines for “non-safety” software. Note that this type of software is not formally covered by the DOE SQA Order.

The Evolving Picture of SQA Boundaries

Consequence assessment models used for:

- hazards assessment/safety planning purposes are clearly covered by the SQA Order and Guide
- emergency response purposes that provide a direct *hazard control function* are also covered. These are the models that are used to make initial protective action recommendations (e.g., EPI, ALOHA, HOTSPOT).

The Evolving Picture (cont)

Consequence assessment models used for:

- emergency response exercises/training **are not covered** by the SQA Order.
- emergency response purposes and clearly do **not** provide a direct "*hazard control function*" **are also not covered**.

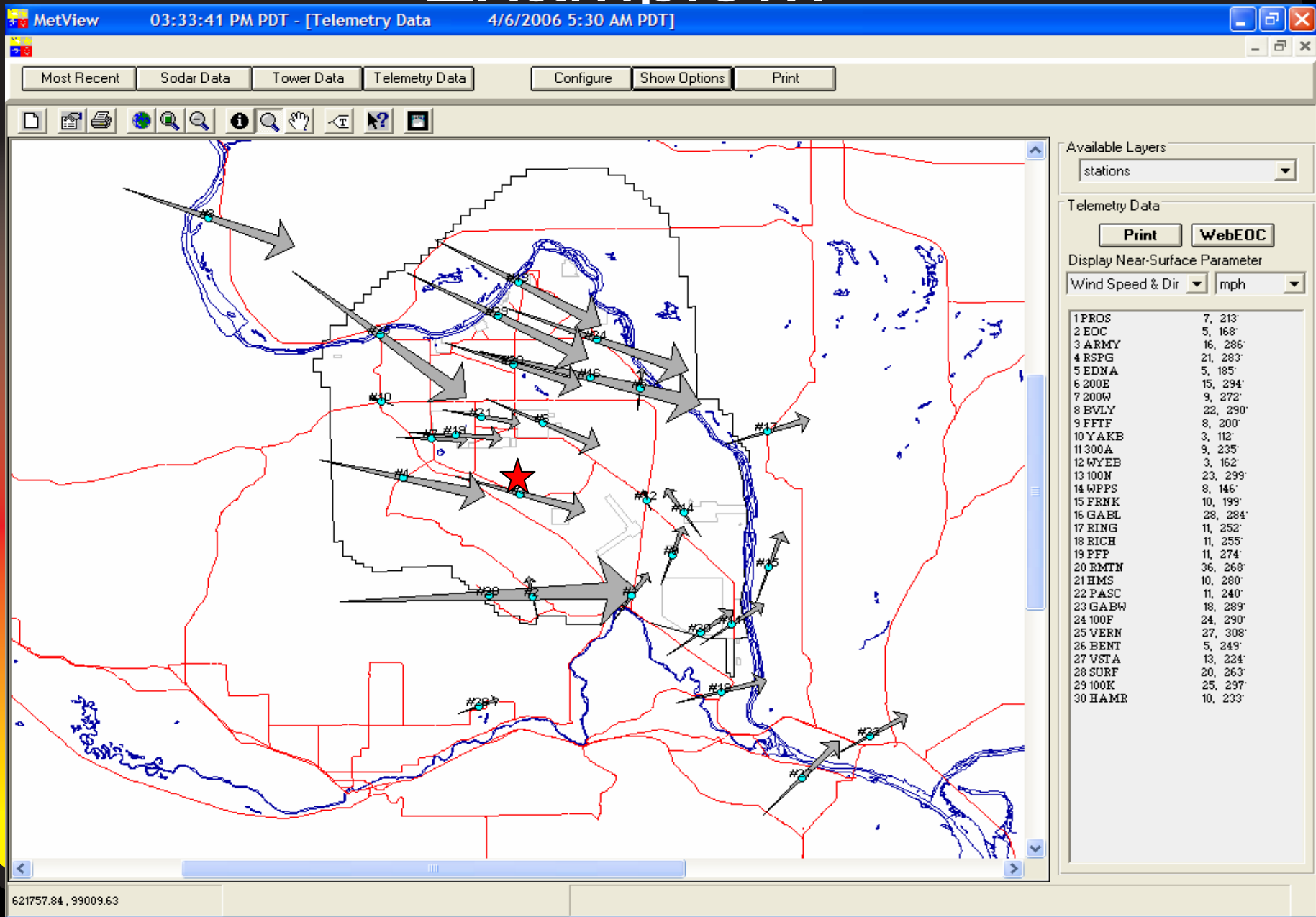
Examples of applications not covered by DOE O 414.1C :

- estimates of exposures at downwind distances where the radiological impacts would not be hazardous
- estimates plume position or deposition locations for purpose of deploying field measurement teams (their radiological monitoring will be used to make safety decisions for themselves and others)
- sophisticated modeling of plume movement or impacts that do not serve as the basis for protective action decisions.

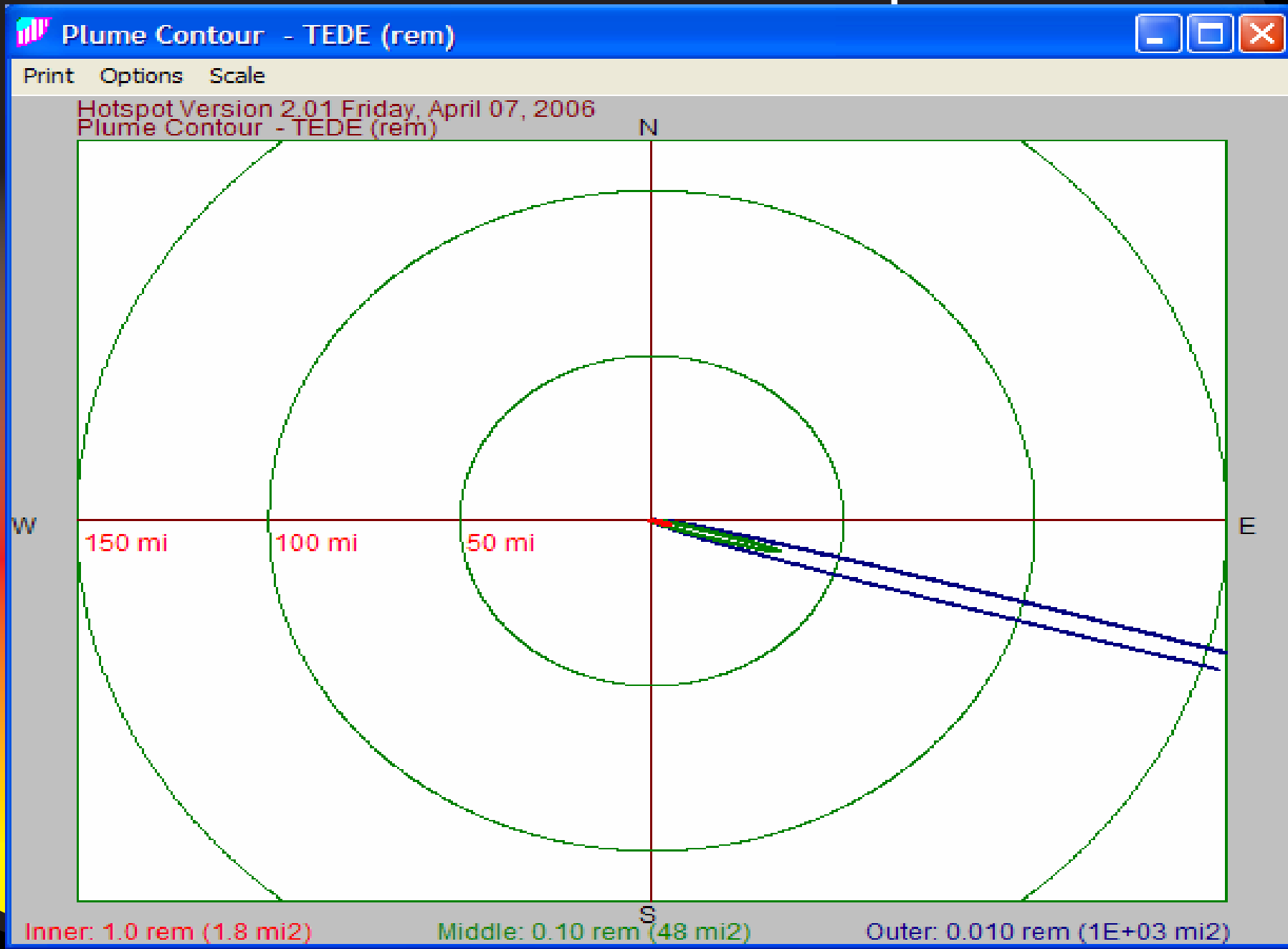
The SQA Balancing Act

- Use the **right tool** for the job
- We need to find an effective balance between requirements for SQA documentation/validation and technical sophistication.
- If we have to use models that lack technical sophistication, we won't be able to effectively do our job.

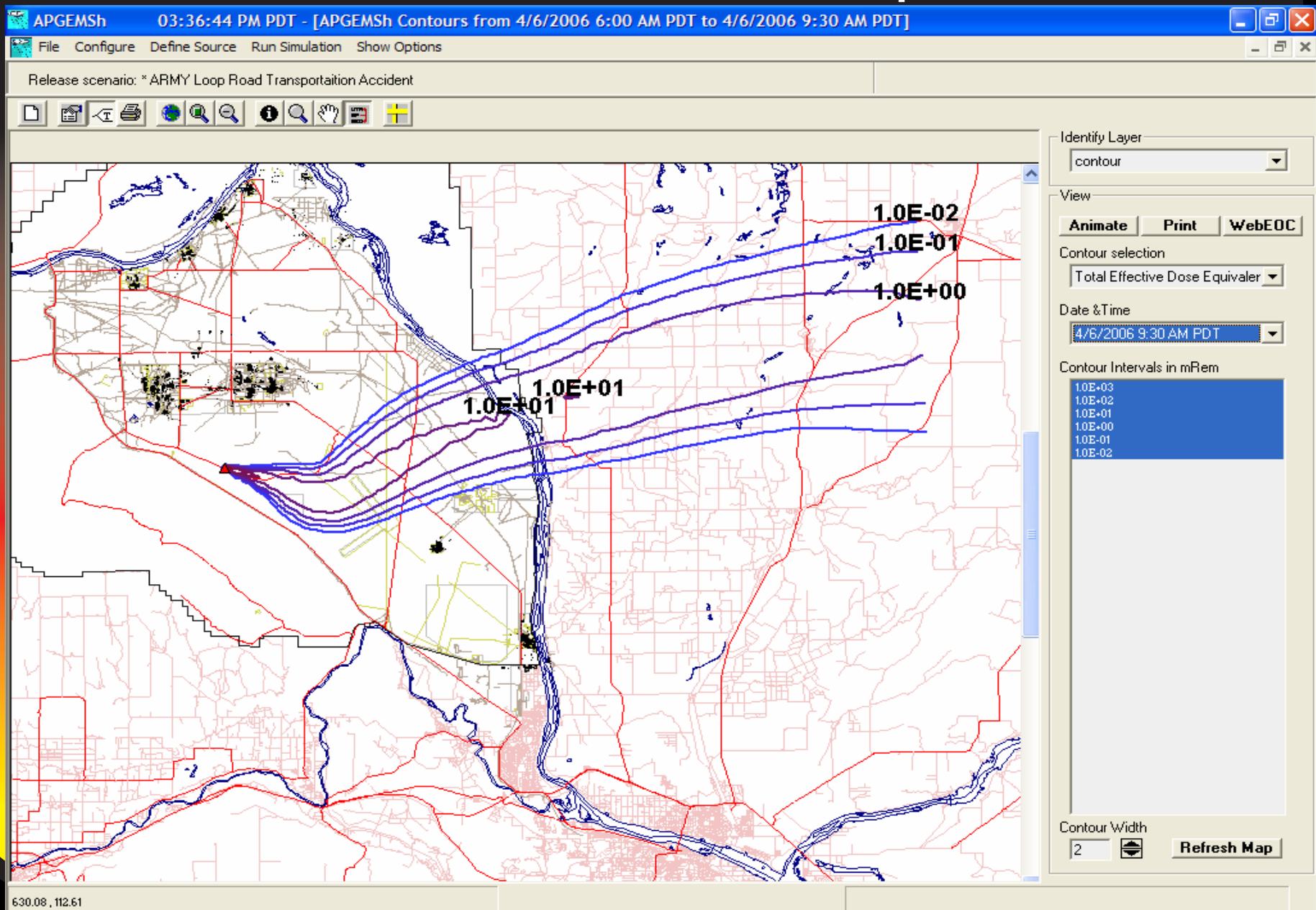
Example…


MetView
03:33:41 PM PDT - [Telemetry Data
4/6/2006 5:30 AM PDT]
Most Recent
Sodar Data
Tower Data
Telemetry Data
Configure
Show Options
Print
Available Layers
stations
Telemetry Data
Print
WebEOC
Display Near-Surface Parameter
Wind Speed & Dir
mph
1 PROS 7, 213
2 EOC 5, 168
3 ARMY 16, 286
4 RSPG 21, 283
5 EDNA 5, 185
6 200E 15, 294
7 200W 9, 272
8 BVLY 22, 290
9 FFTF 8, 200
10 YAKB 3, 112
11 300A 9, 235
12 WYEB 3, 162
13 100N 23, 299
14 WPPS 8, 146
15 FRNK 10, 199
16 GABL 28, 284
17 RING 11, 252
18 RICH 11, 255
19 PFP 11, 274
20 RMTN 36, 268
21 HMS 10, 280
22 PASC 11, 240
23 GABW 18, 289
24 100F 24, 290
25 VERN 27, 308
26 BENT 5, 249
27 VSTA 13, 224
28 SURF 20, 263
29 100K 25, 297
30 HAMR 10, 233
621757.84 , 99009.63

HOTSPOT TEDE Output



APGEMS TEDE Output

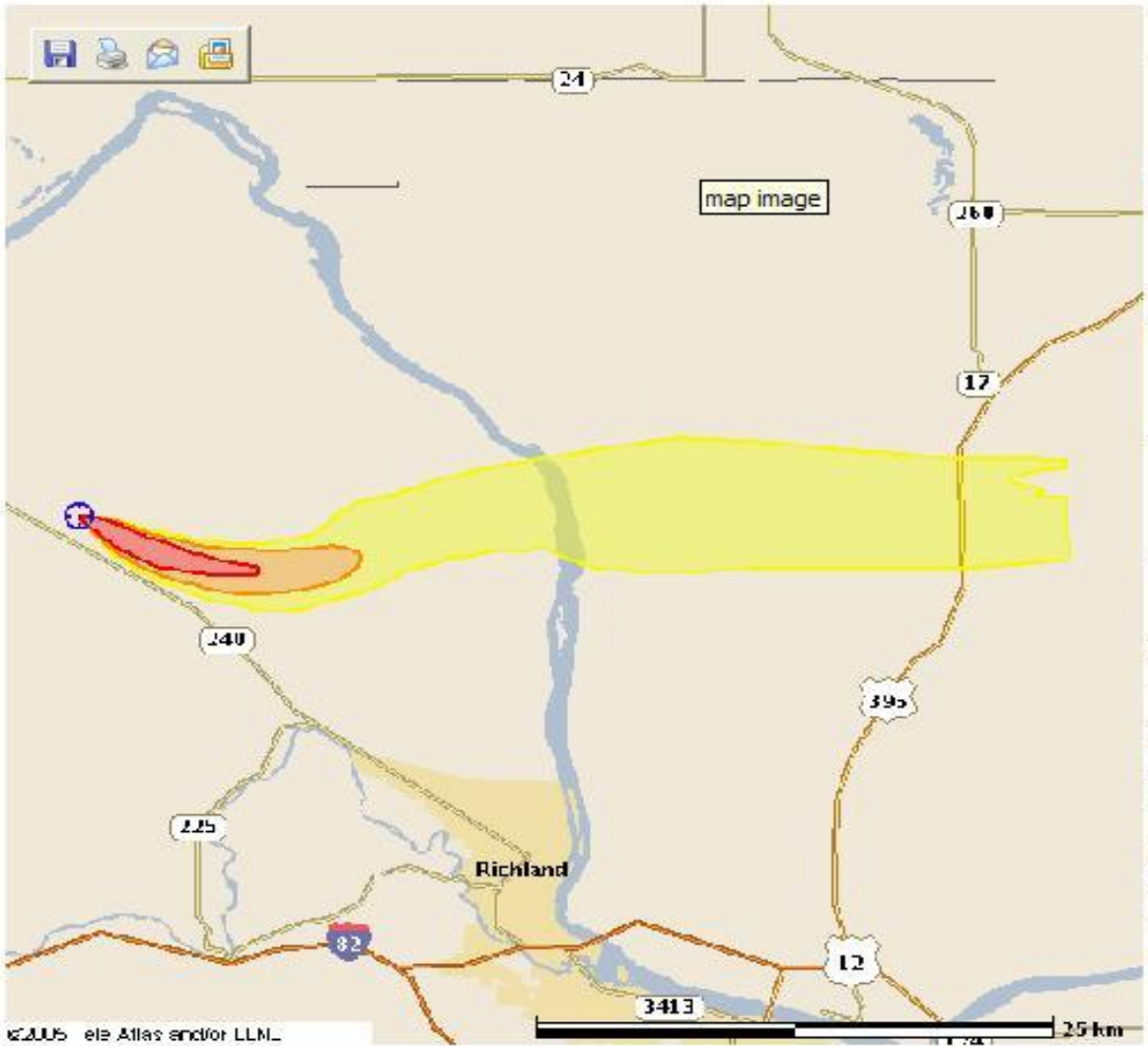


NARAC TEDE Output

NARAC

Total Effective Dose Equivalent

Army Loop Run Test 2
Automated Report - Testing



Actions and Long-Term Effects

mrem Extent Area	Population	
>25 9.2km 9.7km2	0	
>5 13.7km 29.7km2	0	
>1 47.7km 272km2	1,045	

Note: Areas and counts in the table are cumulative.

Effects or contamination from April 06, 2006 12:30 UTC to
April 06, 2006 16:30 UTC at 10.0 m.
Release Location: 46.496510 N, 119.568280 W
Material: SR-90 (Pure)
Generated On: April 07, 2006 23:02 UTC
Comments: Hypothetical release 04/06/2006 12:30:00 UTC for 15 min met obs

Summary

- The CAM Toolbox will compliment the Central Registry Toolbox
- The CAM Toolbox will provide guidance in selecting the right consequence assessment model tool for the job at hand
- Consequence assessment modeling for *safety* applications must comply with the DOE SQA Order, for *non-safety* applications we can borrow from the graded approach outlined in the DOE SQA Order and Guide.