New and Upcoming Features of HotSpot

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May 2007

UCRL-PRES
This work was performed under the auspices of the U.S. Department of Energy by University of California, Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.

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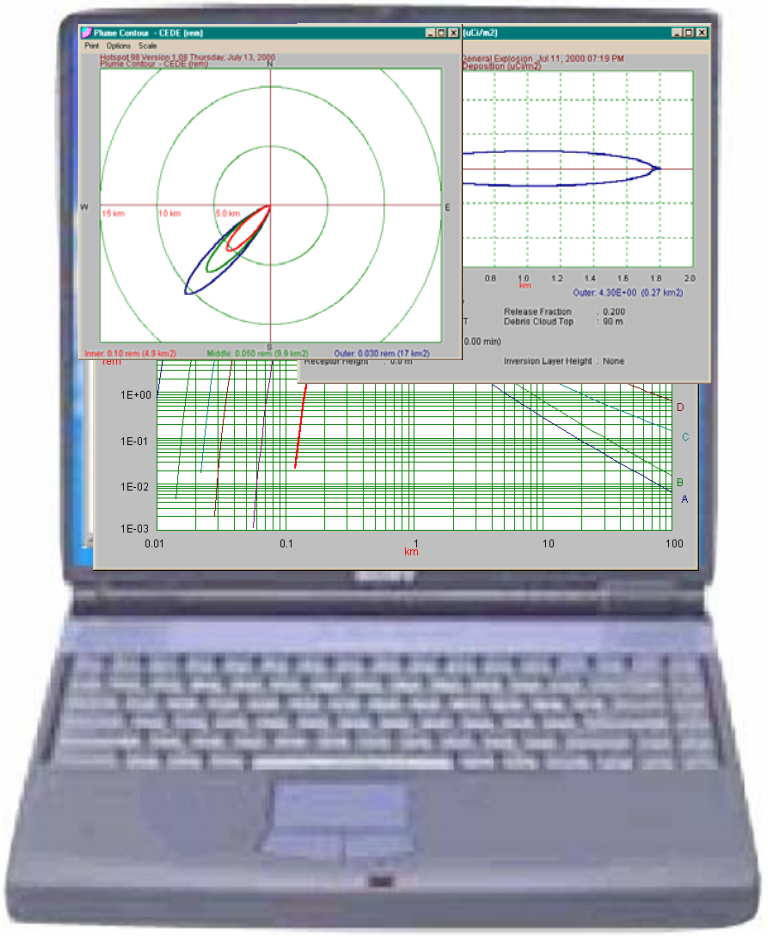
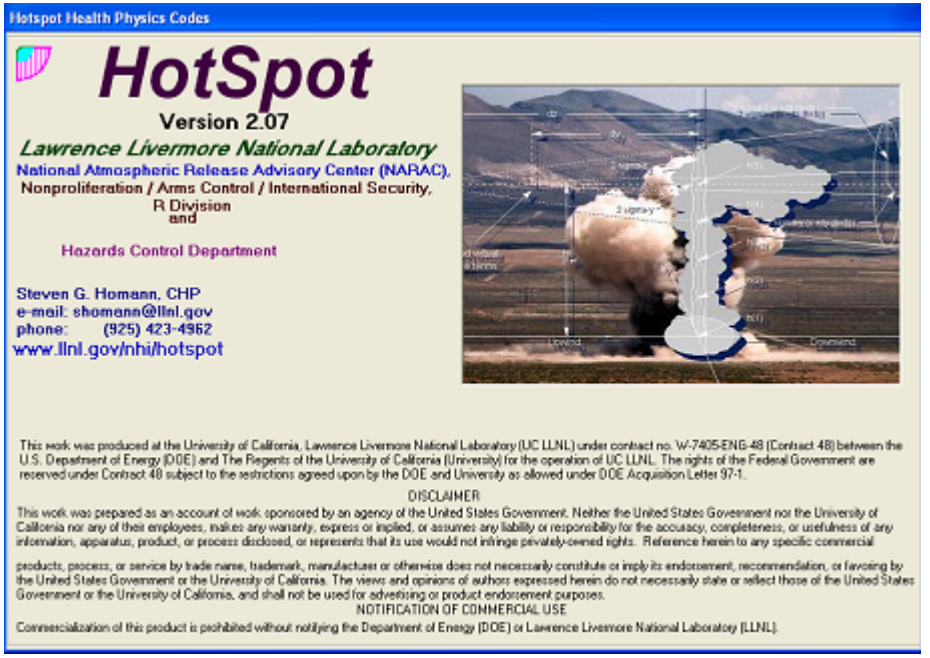
Hotspot Provides Quick Dose Estimates for Radiological and Nuclear Releases

- **Multiple release scenarios (explosive, fire, general plume)**
- **Fully-integrated FGR11 (ICRP26, 30), and 13 (ICRP 60+) internal and FGR 12 external dose factors**
- **Straight-line Gaussian plume model**
- **Standalone version available via Web download: http://www.llnl.gov/nhi/hotspot/**
- **Also can run in *NARAC Web* and *iClient* user interface and maps**



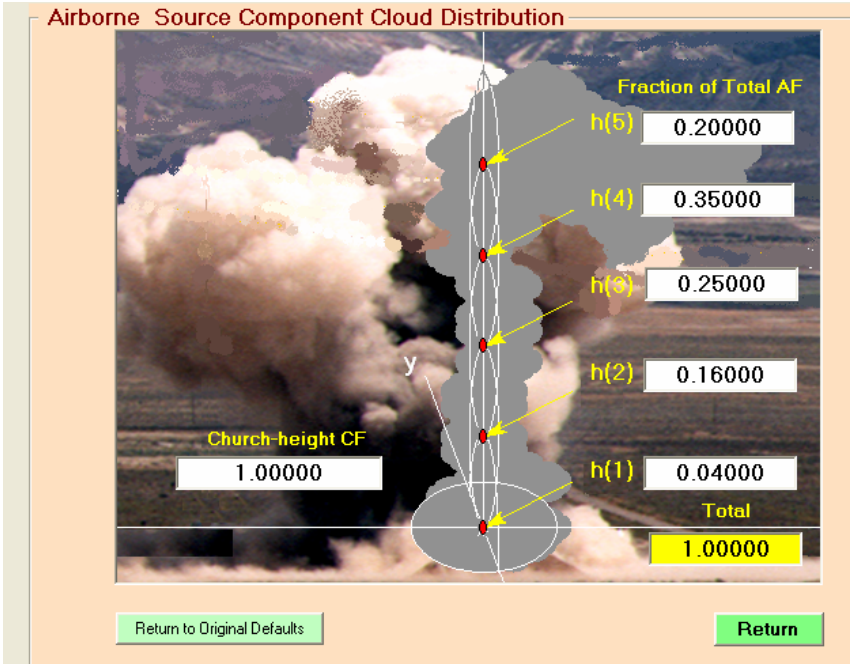
HotSpot Version 2.07

- New Features have been added to HotSpot
- Target release date for Version 2.07 is Summer 2007



New HotSpot Explosion Model

- Improved deposition and ground shine estimates in proximity (within a few 100 m) of the detonation point
- Users can customize cloud parameters
  - Vertical source distribution
  - Scale cloud height calculated using Church formula

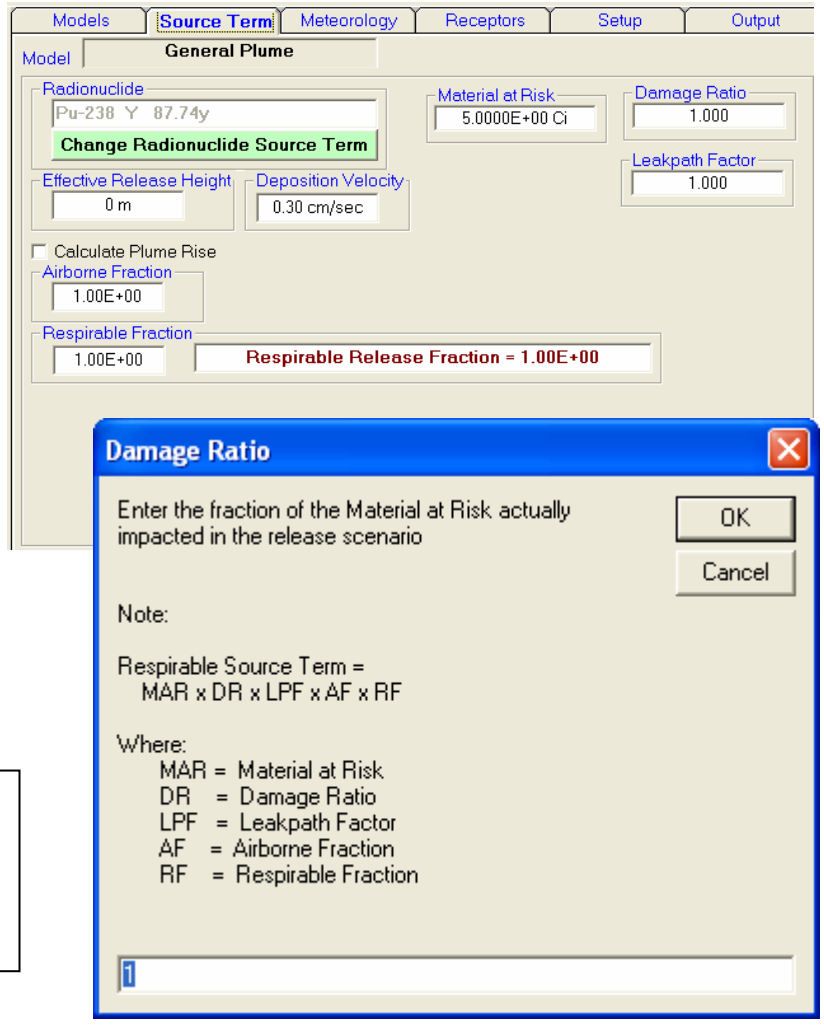


Hotspot Expanded Source Term Description

Controllable parameters:

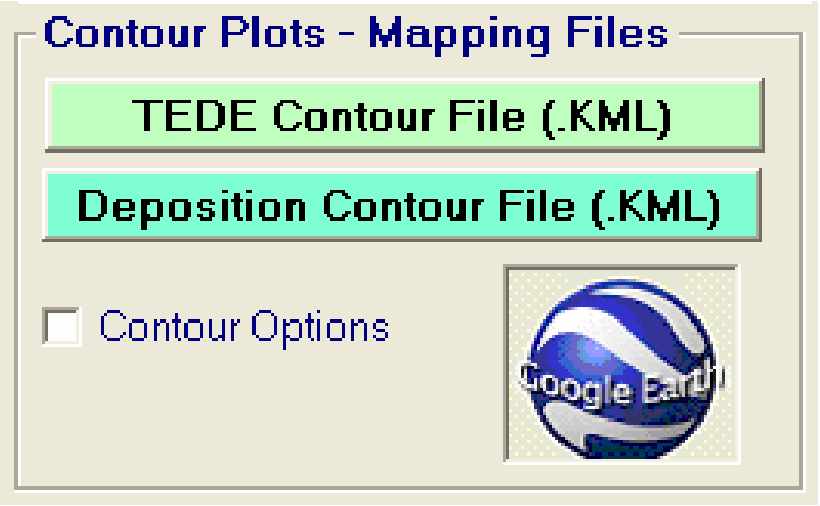
- Material at Risk (MAR)
- Damage Ratio (DR)
- Leakpath Factor (LP)
- Airborne Fraction (AF)
- Respirable Fraction (RF)

Respirable source term =
MAR x DR x LPF x AF x RF



Mapping HotSpot Plumes in Google Earth

- HotSpot plume files can be displayed on Google Earth global maps
- HotSpot plume files (.KML), automatically invoke Google Earth and zoom to the user-input Lat/Long and display select contours
- Contour options include
  - General and Explosive release models
    - Dose
    - Deposition
  - Nuclear explosion
    - Fallout dose and dose rate
    - Prompt nuclear effects
      - Blast
      - Thermal
      - Ionizing



HotSpot and NARAC Dose Conversion Factors Being Updated with DCFPAK 1.6 Values

- Using new ORNL dose conversion factor data base: DCFPAK 1.6:
  - Age dependent: Infant, 1-yr, 5-yr, 10-yr, 15-yr, adult (adult is used by HotSpot)
  - Particle size dependent: AMAD 0.001, 0.003, 0.01, 0.03, 0.1, 0.3, 1, 3, 5, 10 micron (1 micron only is used by HotSpot)
  - ICRP26 or ICRP60 tissue weighting factors
  - FGR11/ICRP30 or FGR13/ICRP66 biokinetic models
  - 30-day acute committed inhalation or ingestion dose
  - 50/70-year committed inhalation or ingestion dose (50 yr only is used by HotSpot)
  - External air immersion or ground exposure (FGR12)
- HotSpot allows option for FGR11 or FGR13. Options for NARAC model runs are currently available only by LLNL/NARAC staff, not yet by external users.

Hotspot and NARAC Model Resuspension and Weathering Has Been Updated

- Weathering correction factors for nuclear fallout and deposition of radionuclides. Two options:
  - WASH 1400 (NUREG-75/014),
  - Anspaugh (Health Physics, March 2002, Vol 82) – newer, default option

- Resuspension options:
  - WASH-1400 (NUREG-75/014)
  - NCRP Report 129 (Used by FRMAC) – newer, default option

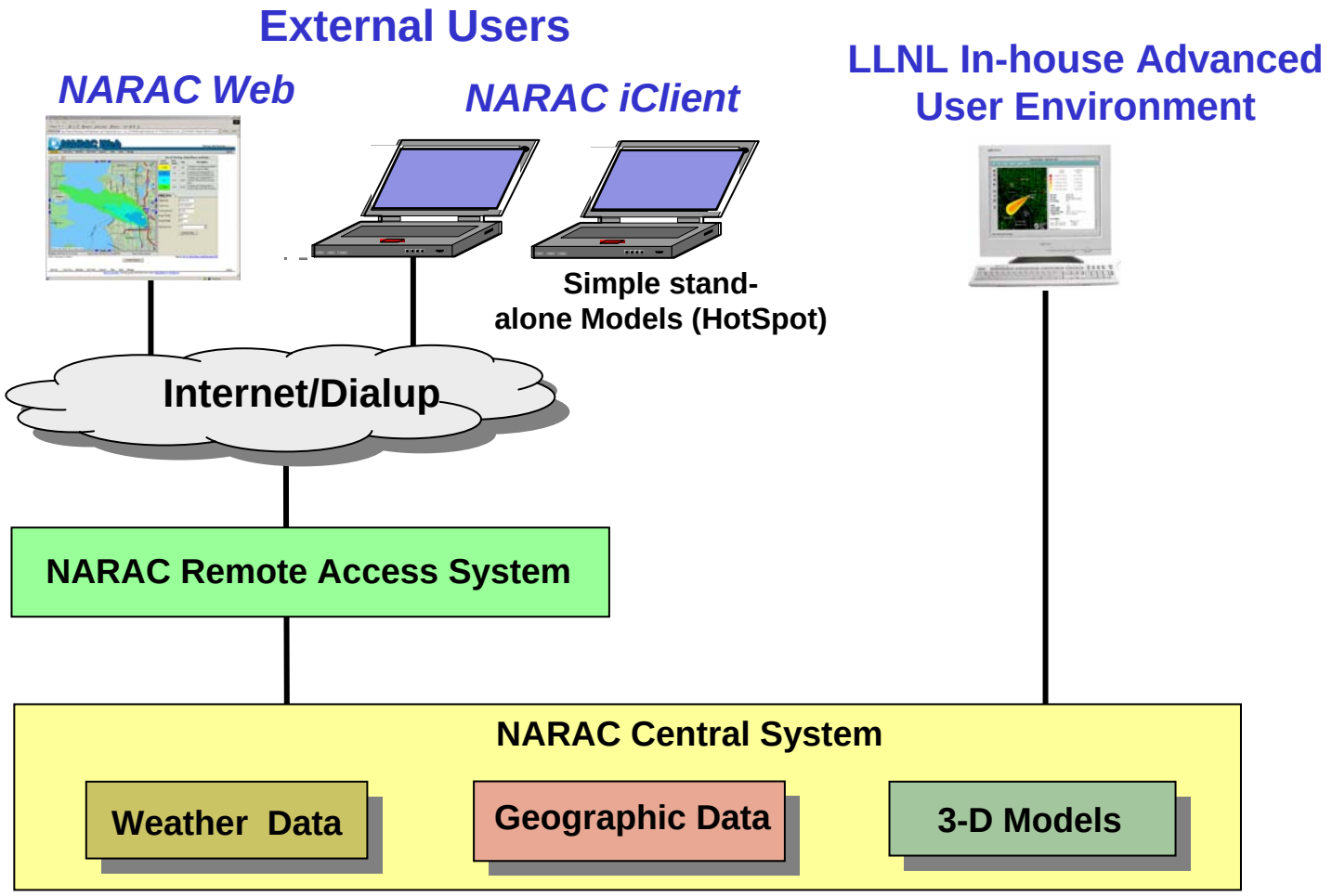
- Resuspension included with General model TEDE calculations
  - Plume passage
    - Submersion
    - Inhalation
  - Ground shine + weathering
  - Resuspension

HotSpot Becoming a DOE "Toolbox" Code

- DOE has approved (pending 5 "critical" recommendations) inclusion of the HotSpot Health Physics codes into the DOE Safety Software Central Registry

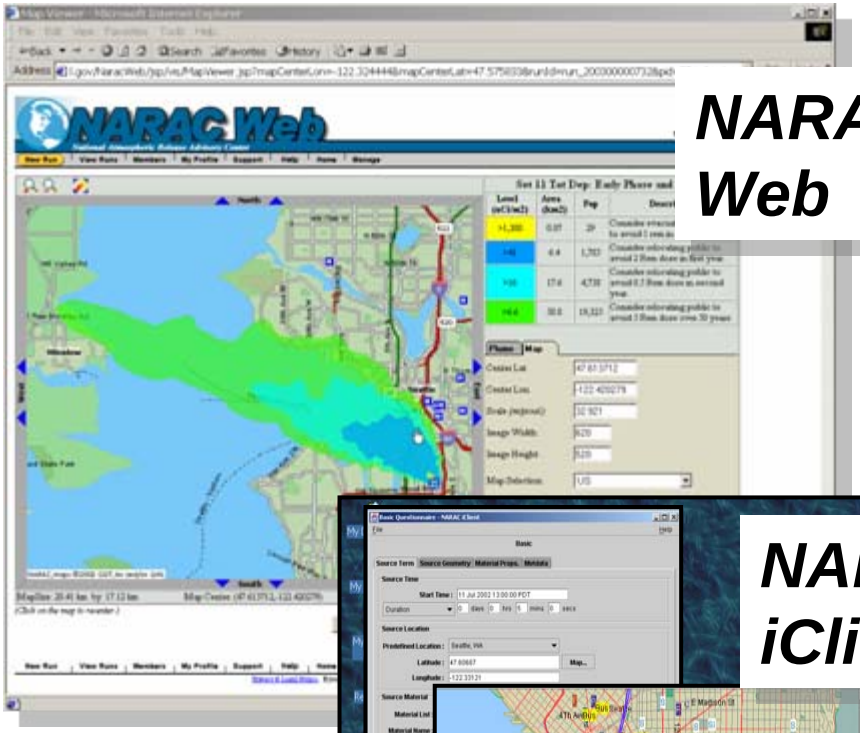
- Five Critical recommendations
  - 95th-percentile dose from historical weather data -- requirement of DOE-STD-3009-94 Change Notice 3 Appendix A, subsection A.3.3 *Dose Estimation / Atmospheric Dispersion* – Not in version 2.07
  - HotSpot User manual/documentation (.PDF) and online help module
  - Formal internal configuration management plan
  - Formal V&V test process
  - Problem reporting, evaluation and notification plan per *DOE G 414.1-4 level B custom software*

Component-based LLNL NARAC Computer Systems Support External and In-house Users, Simple and Advanced Models

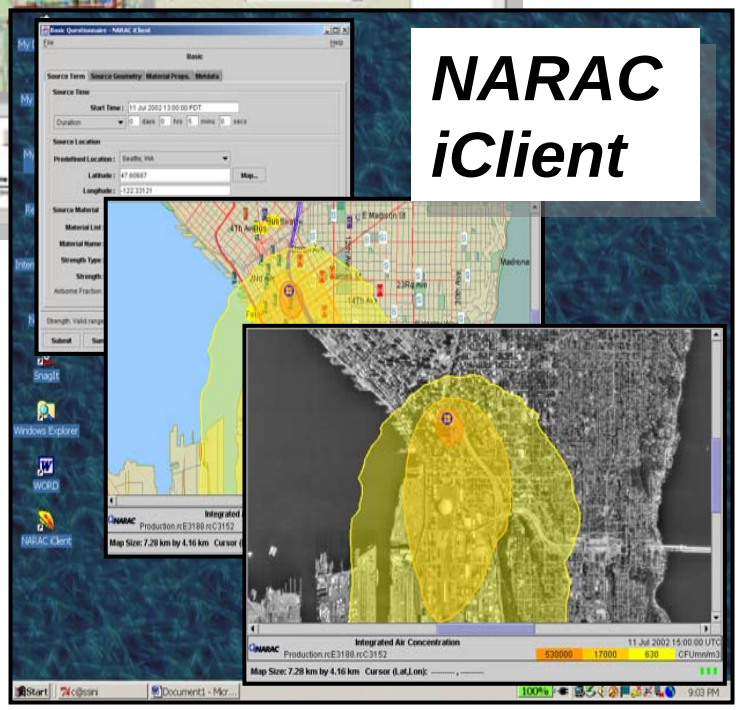


NARAC Web and *iClient* Software Tools Provide Remote Users with Access to NARAC Predictions

- Automated reach-back to plume modeling with real-time weather data
- Sharing of predictions with other users or groups of users through *IMAAC/NARAC Web*
- Output formats
  - GIS Shape files
  - PDF
  - HTML/XML
  - PowerPoint
  - JPG/PNG graphics
  - Consequence reports
- *iClient*: Stand-alone capabilities: Simple Models and geographical information displays



NARAC Web



NARAC iClient

For more information

Web: http://narac.llnl.gov

Email: narac@llnl.gov

NARAC will host a DOE User Training Course at LLNL, August 15-16, 2007, and User's Group Meeting to be held at the NARAC facility on August 17, 2007