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Protecting People and the Environment

RASCAL 4.0

Radiological Assessment System for Consequence Analysis

National Radiological Emergency Preparedness Conference

March 30, 2010

Part 1 - George Athey, Athey Consulting

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Lou Brandon, Nuclear Regulatory Commission

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RASCAL 4

- Released beta version March 1st
- Presentation goals:
  - Highlight the big changes
  - Demonstrate new capabilities
  - Discuss the future

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A presentation in 4 parts:

1. Data and user interface changes
2. Transport & diffusion, decay, and mixture methods
3. Dose differences & future plans
4. New interface for utilities

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Data and User Interface Changes

- What has changed?
- Why was it changed?
- How does the change impact results?

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Updated Core Inventory

- Old core inventory – RASCAL 3
  - Taken from NUREG-1228 / WASH-1400
  - Selected for early health effects + likely noble gases
- New core inventory – RASCAL 4
  - Based on normalizes SCALE/ORIGEN run
  - Increased number of nuclides from 33 to 58
  - No longer select for early health effects
- Impact – small changes to source term

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Updated Coolant Inventory

- From ANSI/ANS 18.1-1999
- Old inventory (RASCAL 3) excluded:
  - nuclides with half-life < 50 minutes, and
  - noble gases for BWRs
- New inventory (RASCAL 4) includes all
- A more complete set; nuclide number increased from 36 to 63
- Impact – small changes to source term

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Improvements to Source Term and Release Path methods

- BWR release pathways
- PWR Steam Generator Tube Ruptures
- Spent Fuel Pool drained

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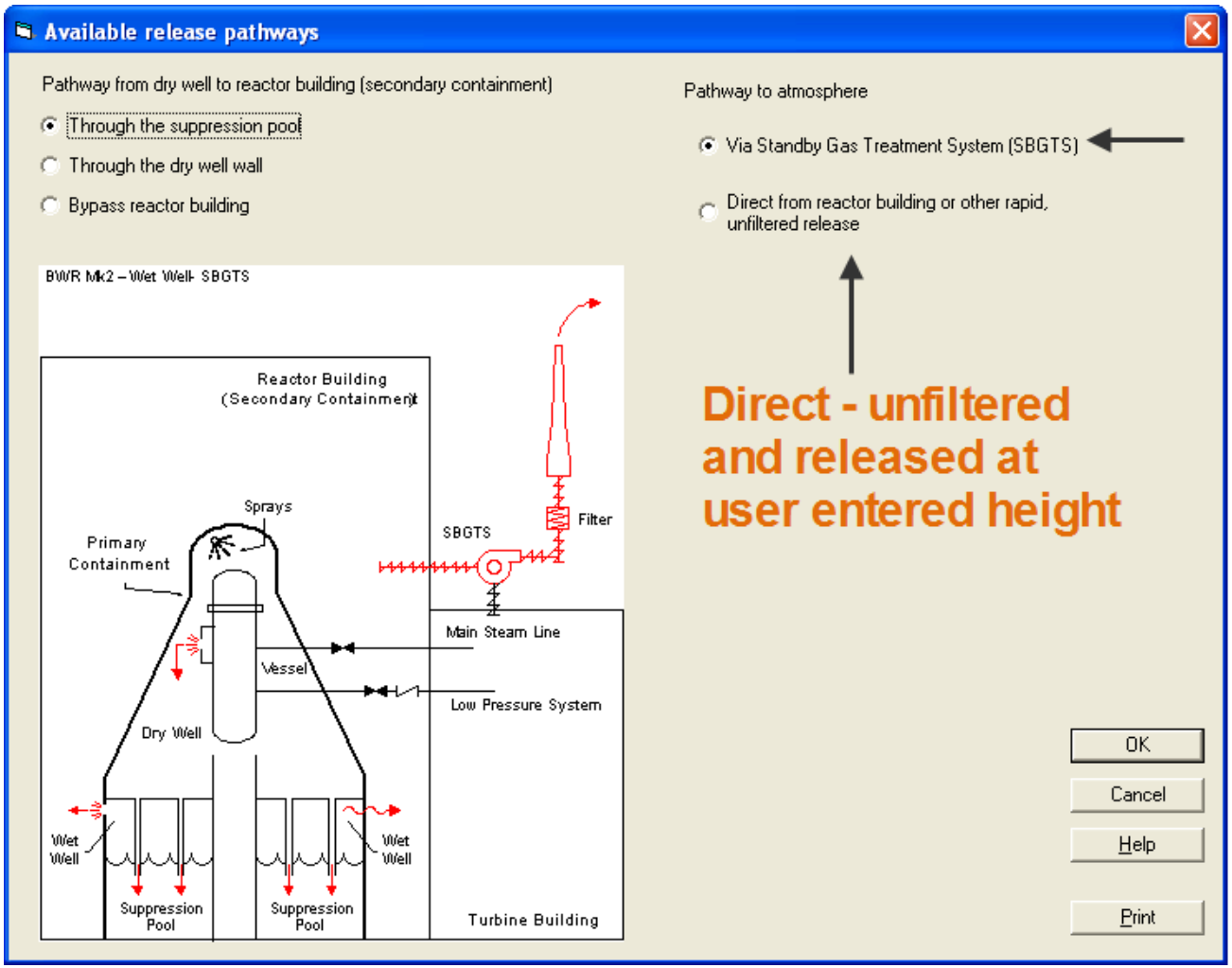
BWR release options



SBGTS - filtered and released at stack height

Direct - unfiltered and released at user entered height

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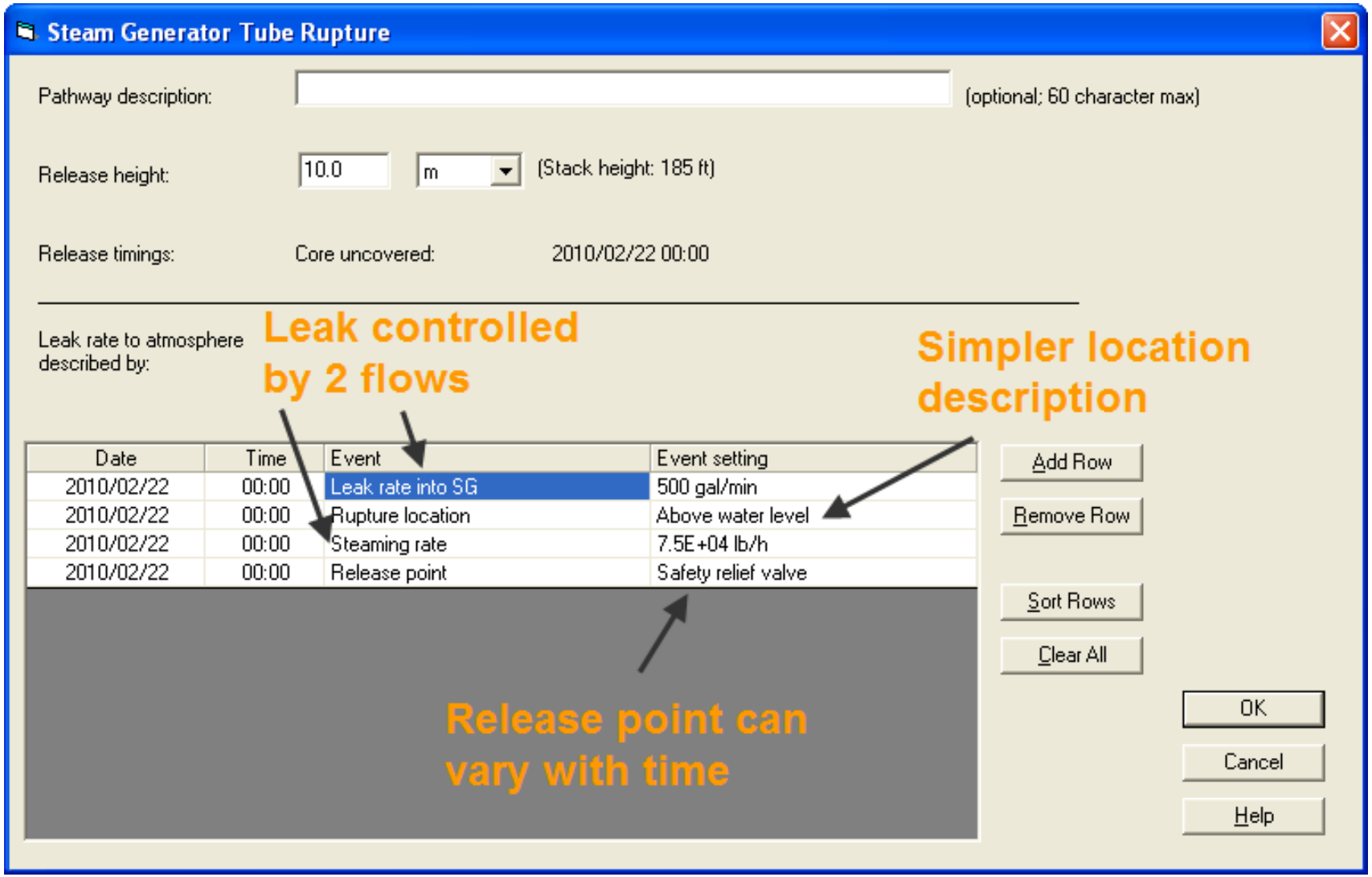
SGTR Changes



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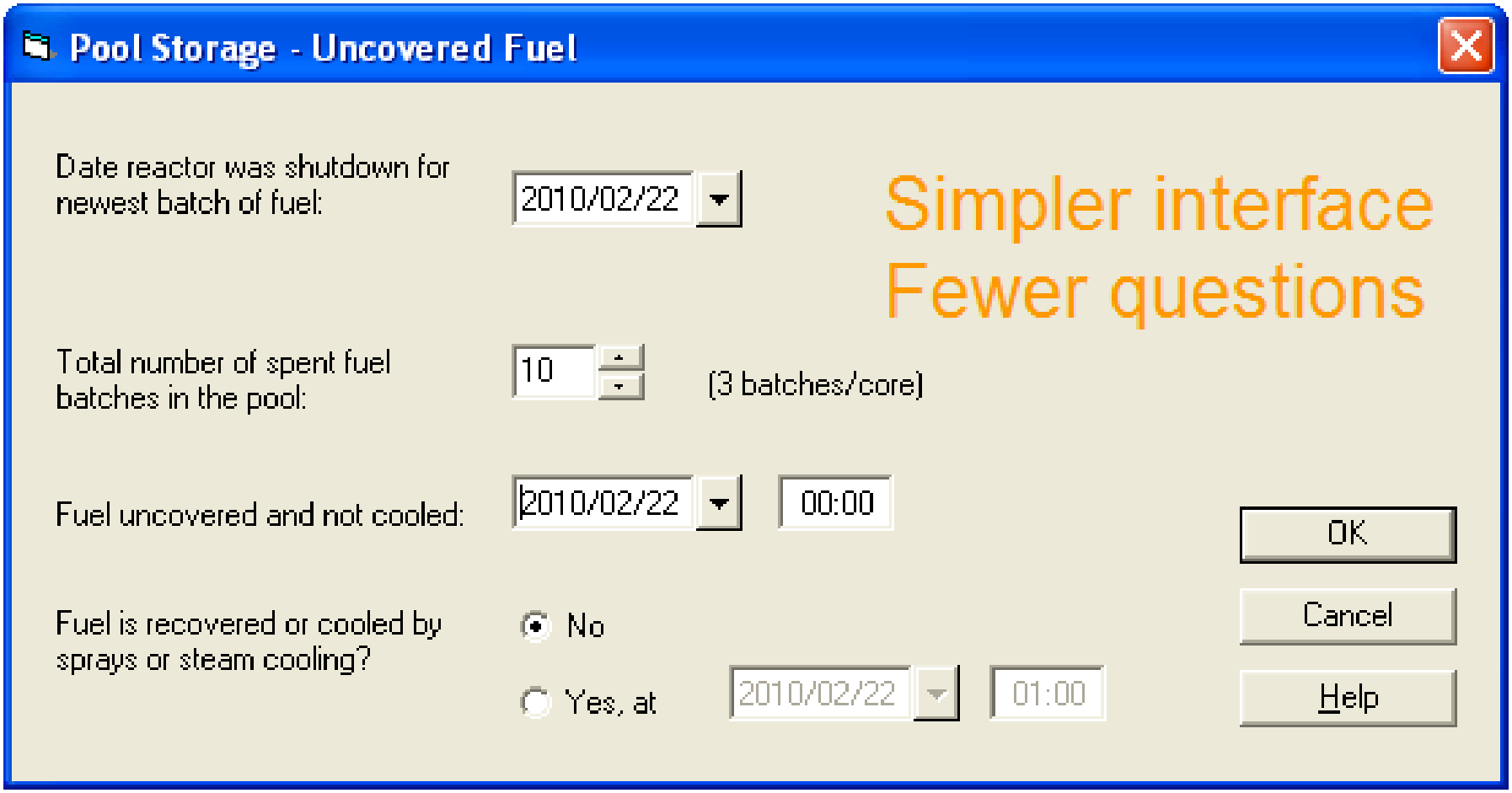
Spent Fuel Pool Uncovered



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Changes in SF Pool

- New version requires only age of newest batch, total batch count, and times for cooling lost and regained
- Assumes a 18 month refuel interval and cladding fire if not cooled for 2 hours
- Release over 24 hours unless recooled
- Impact – generally smaller source terms

H7

Slide 11

H7 Original text said "mon"...I expanded to month. Please change if that was not the correct expansion
HXP3, 2/24/2010

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Export Footprint to Shapefile

- Requires the MapWindow GIS open source software
- www.mapwindow.org
- Separate installation required for this feature to work
- Latest installation available with RASCAL installation

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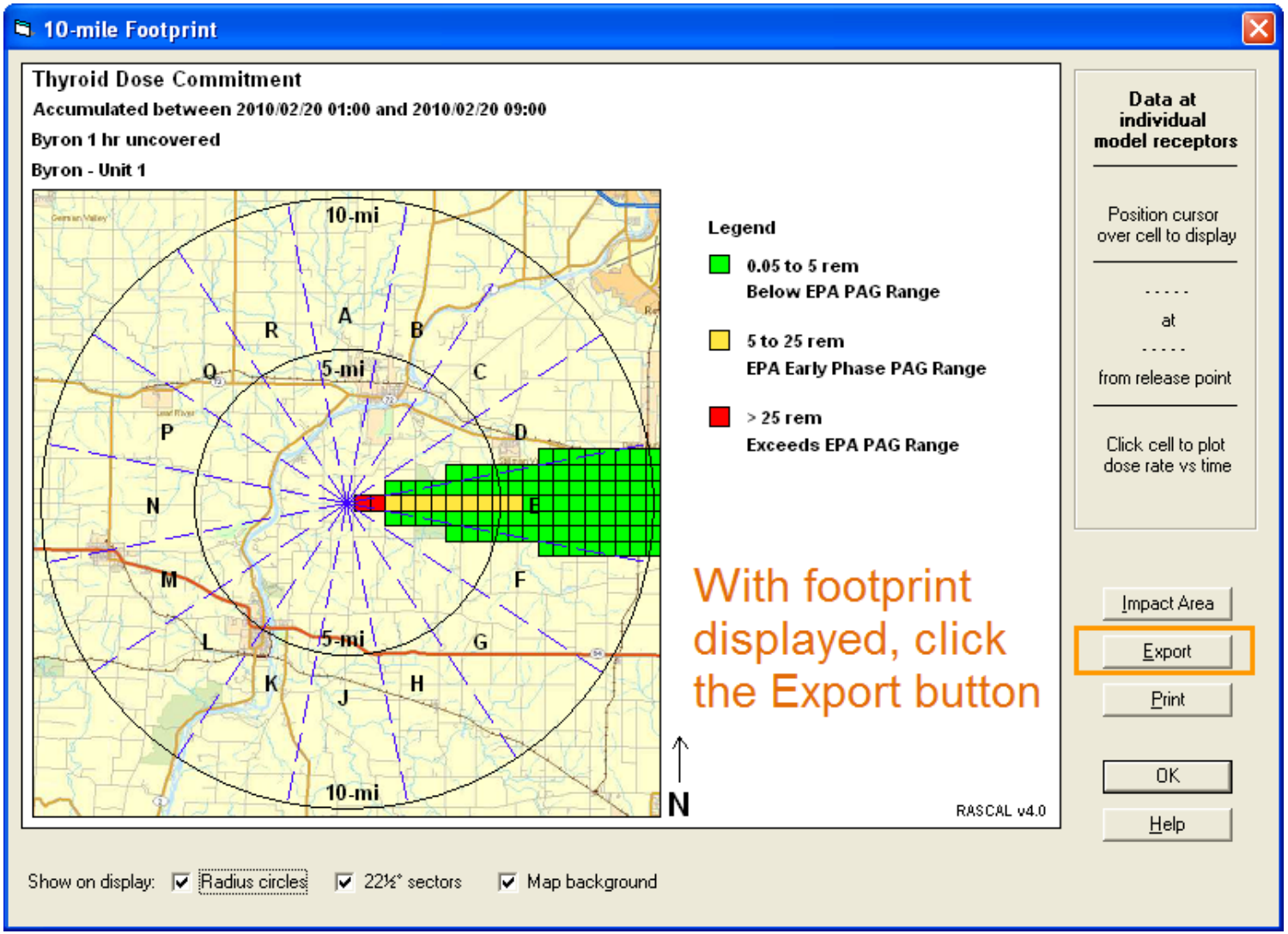

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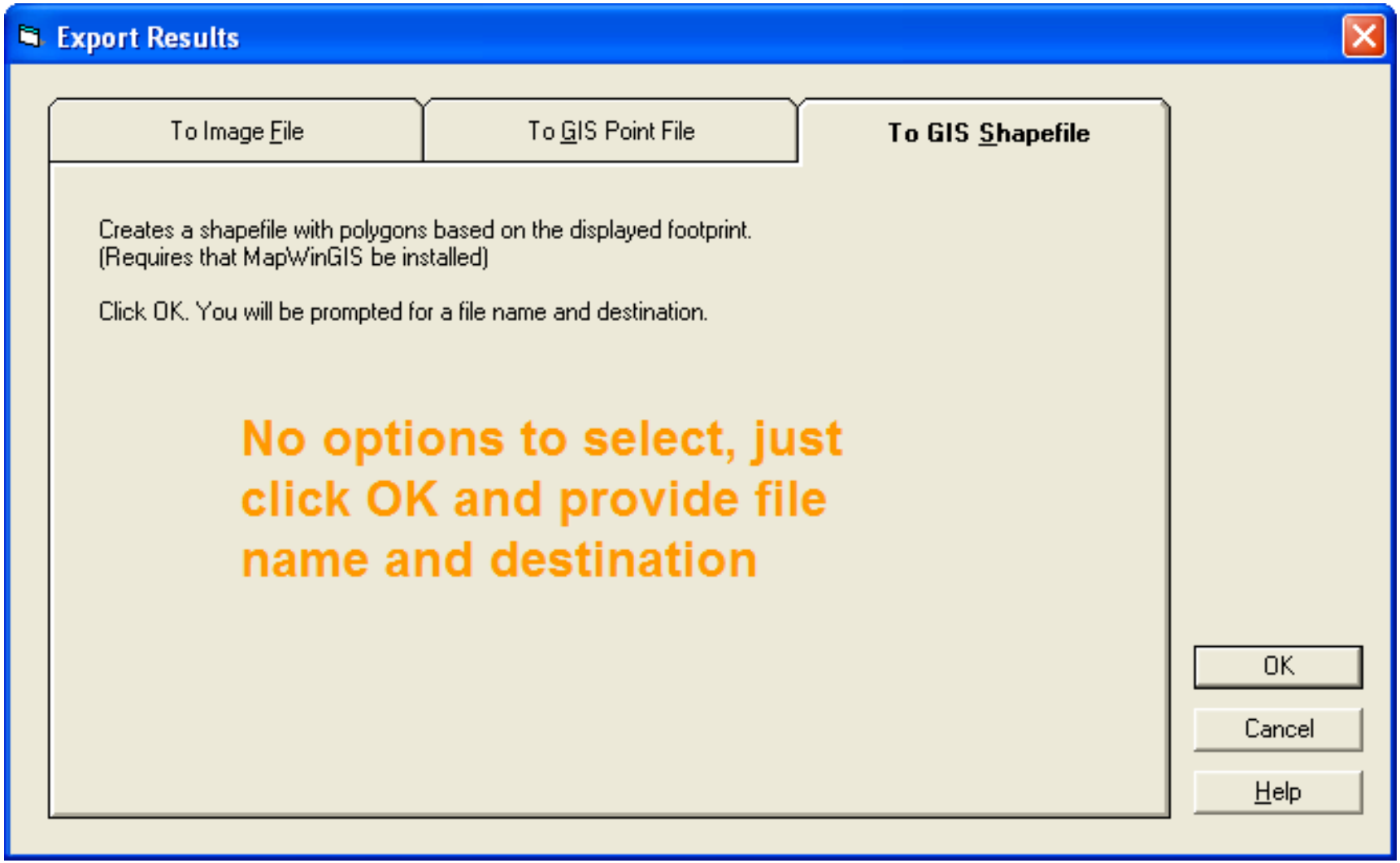

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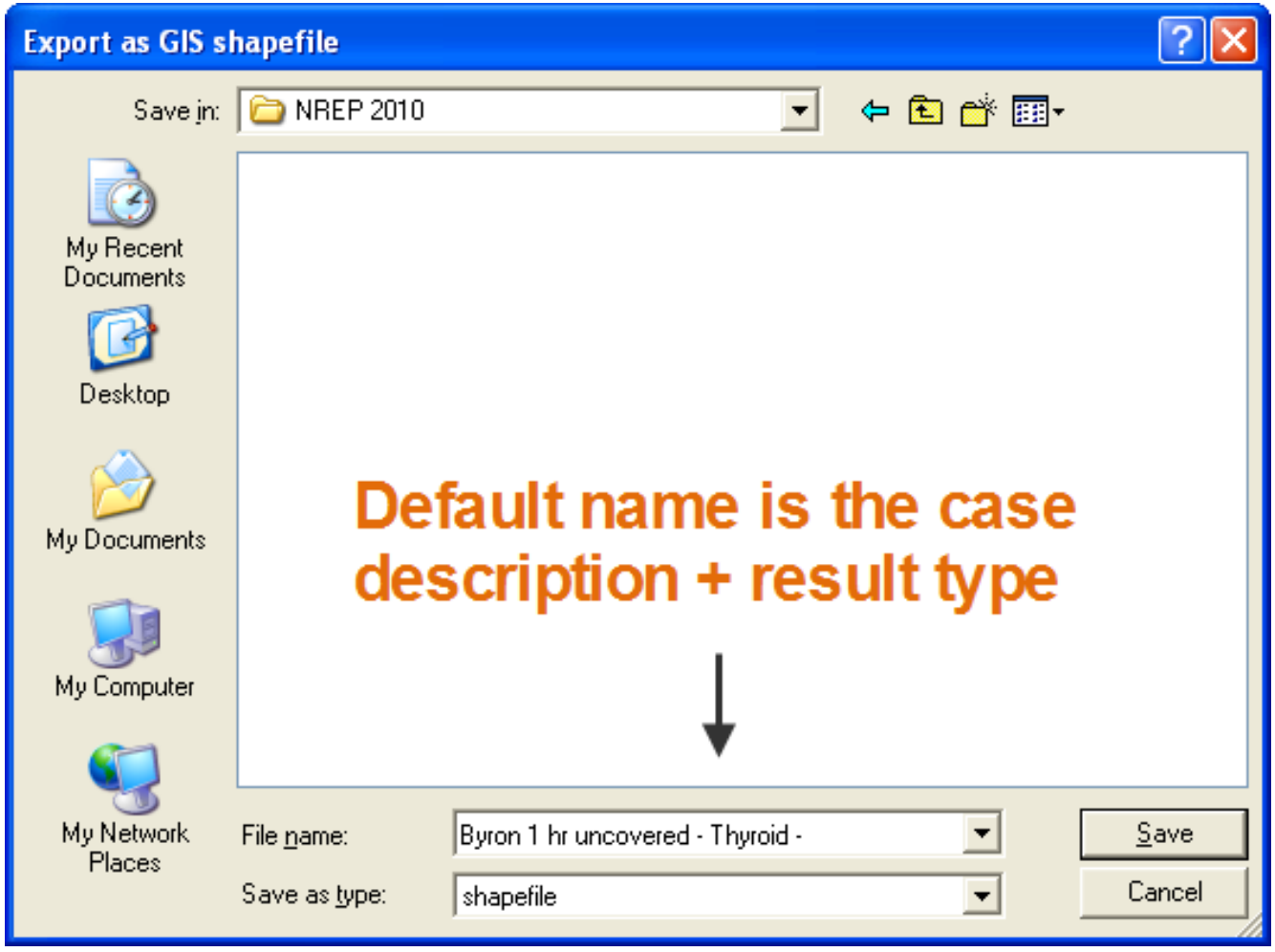

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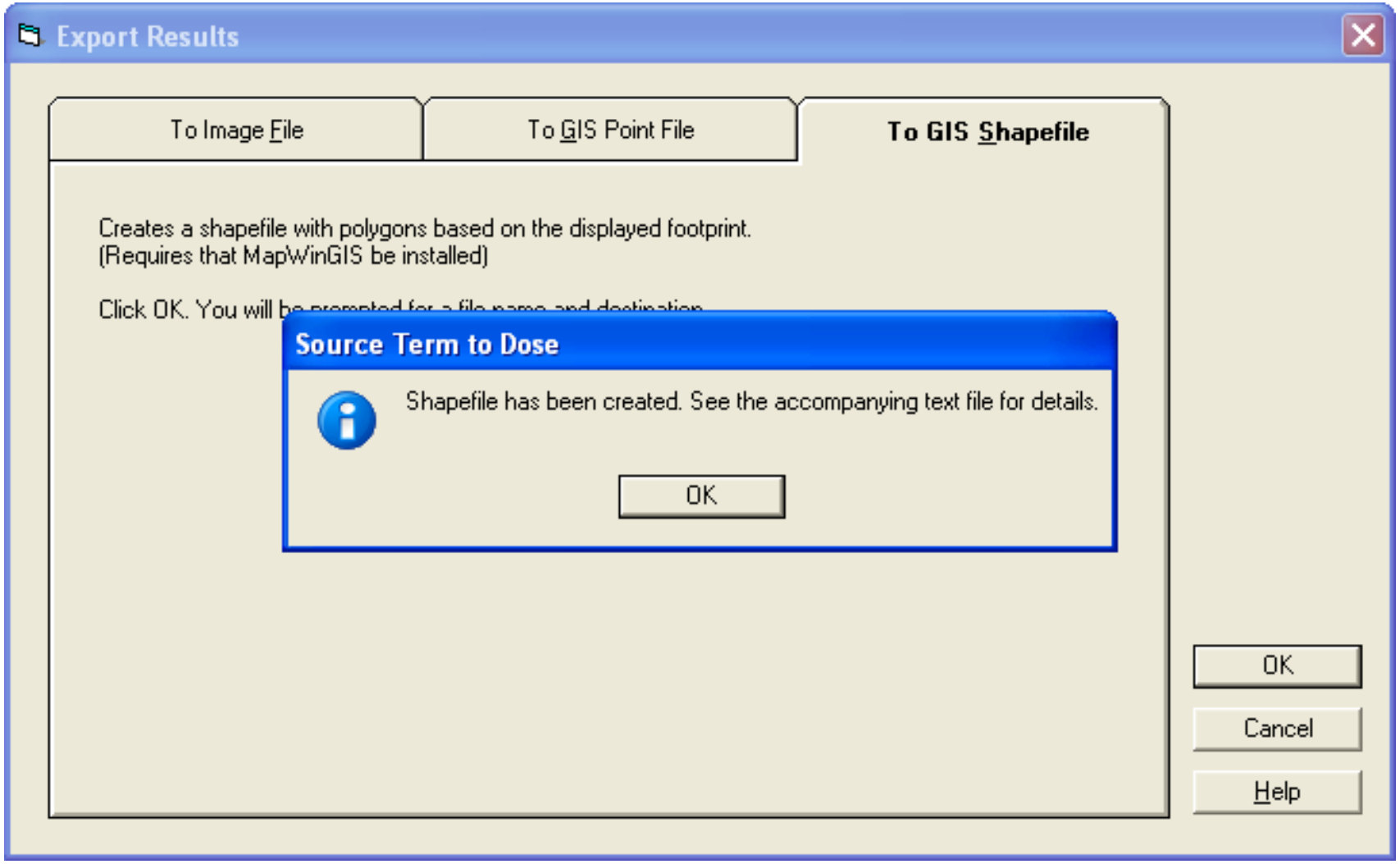

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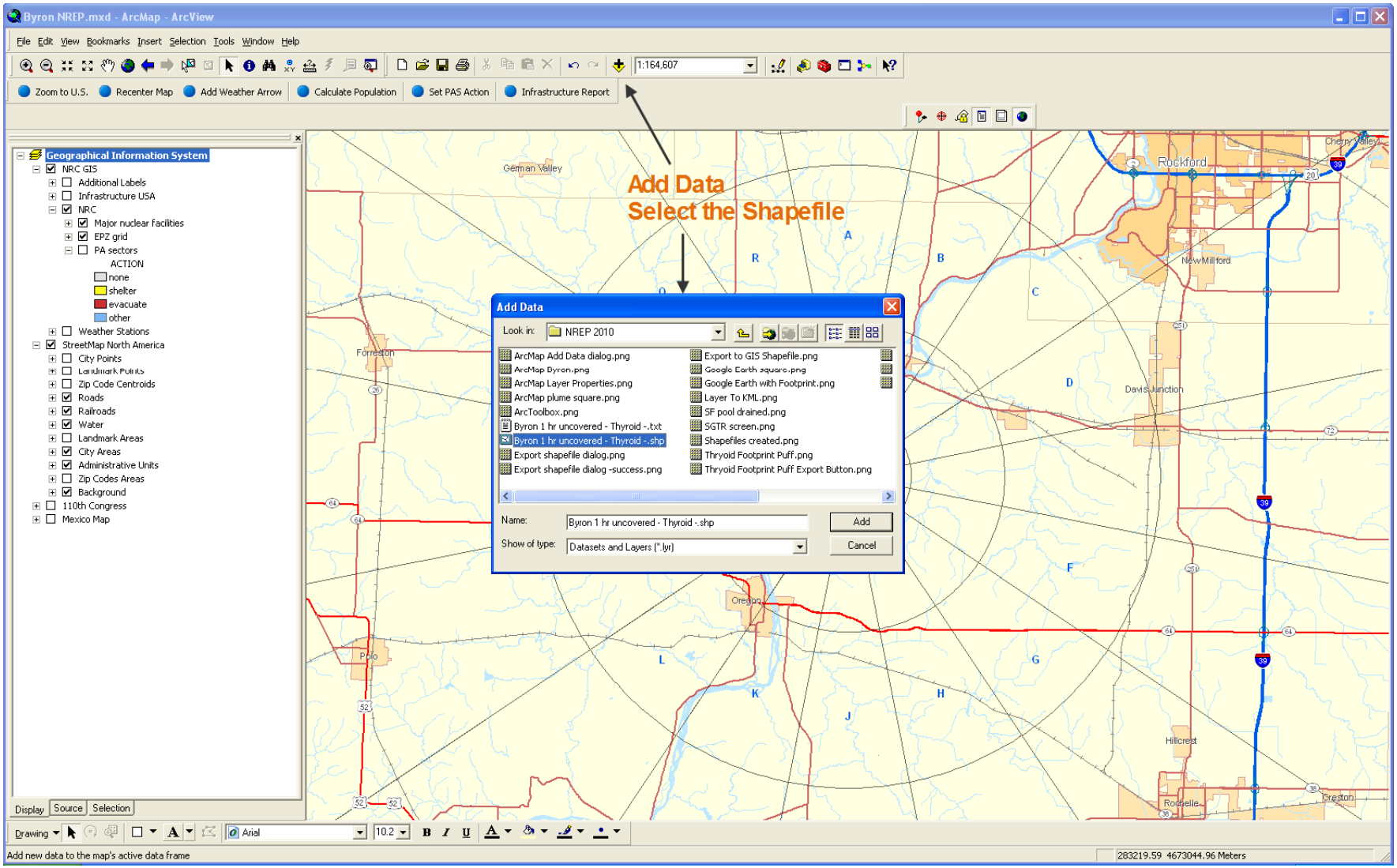
Add Shapefile to GIS



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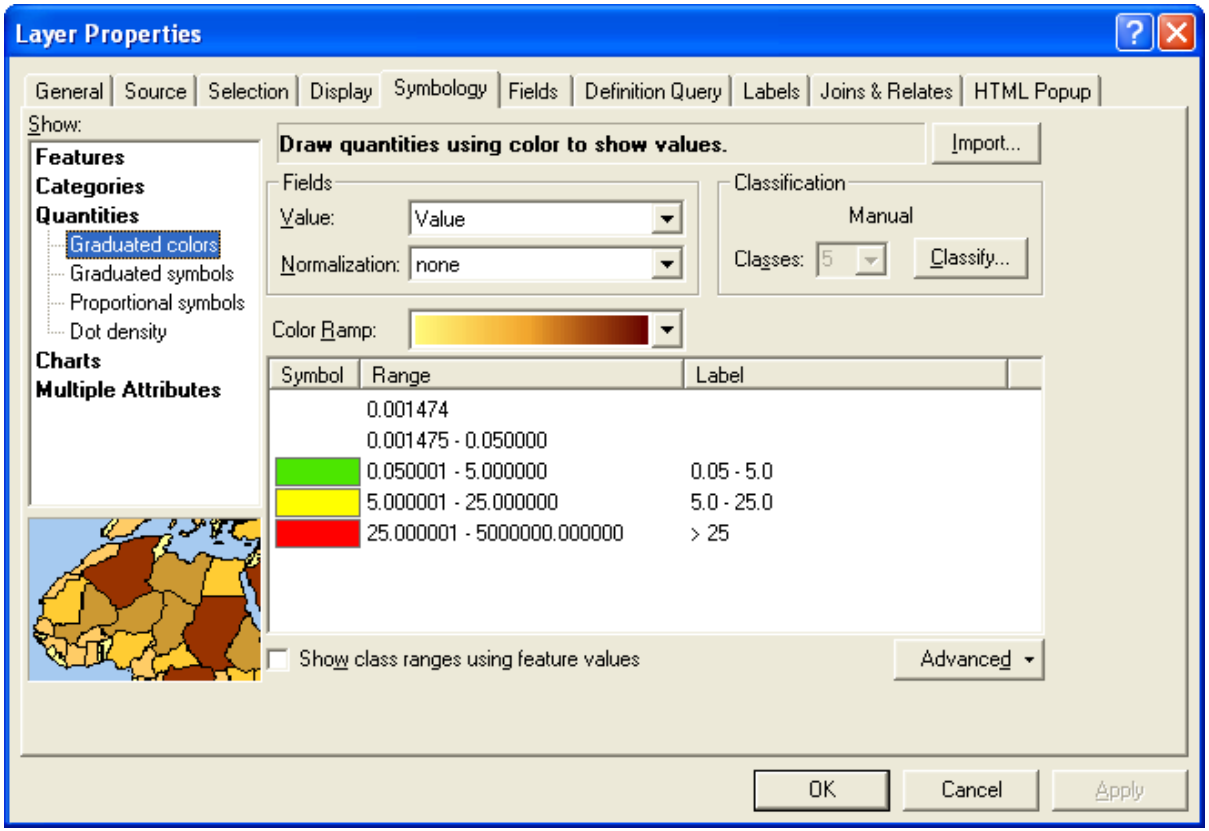
Adjust symbology to match the RASCAL legend



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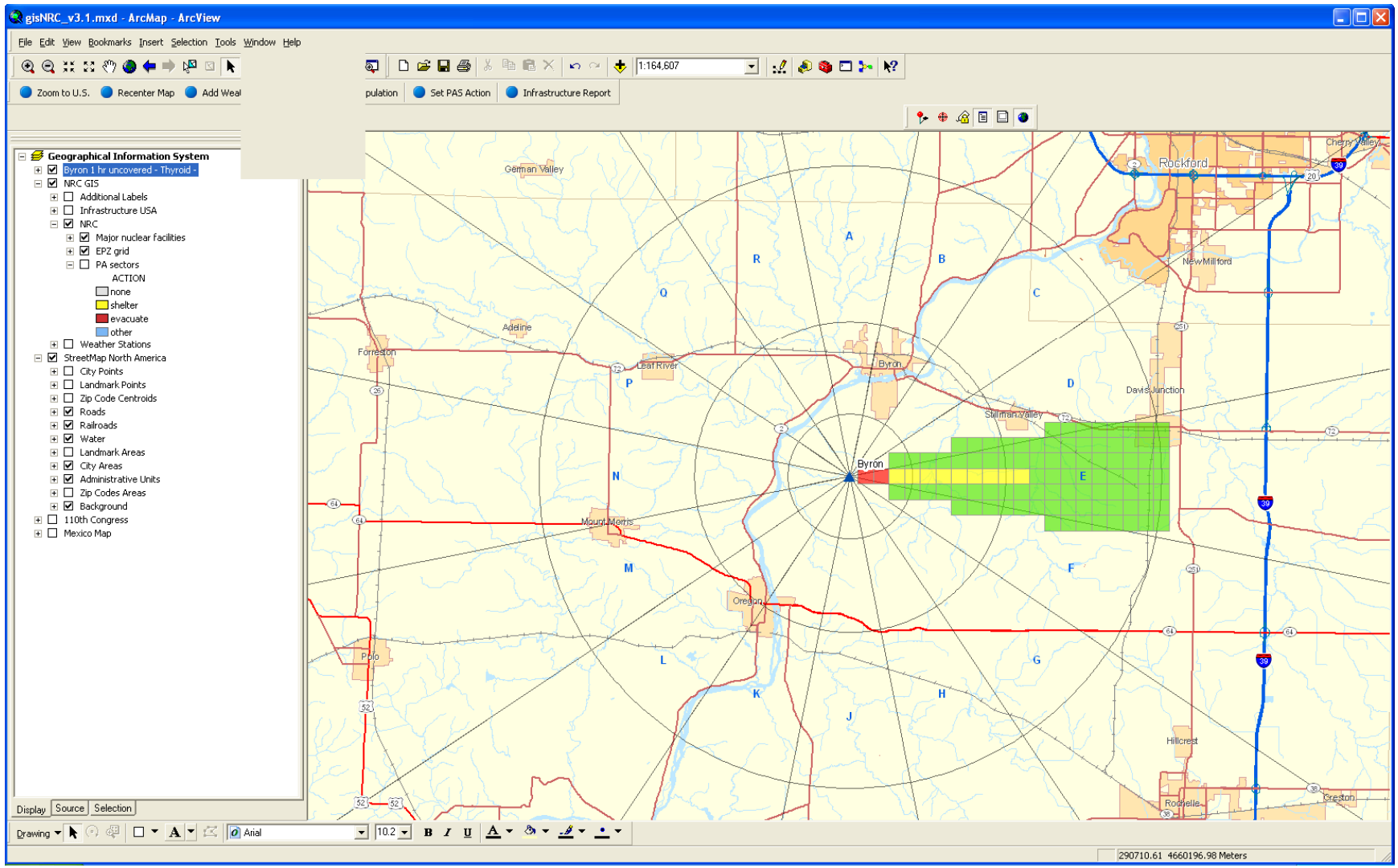
Adjust Transparency



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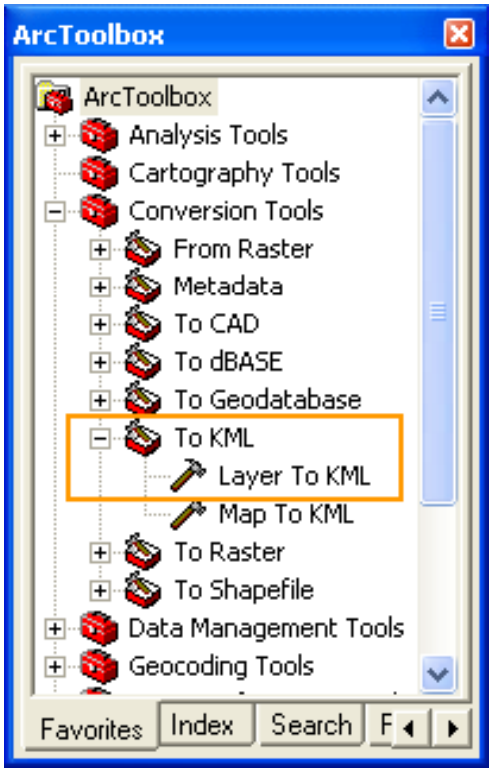
ArcMap to Google Earth



Use the conversion tool "Layer to KML" in the ArcToolbox

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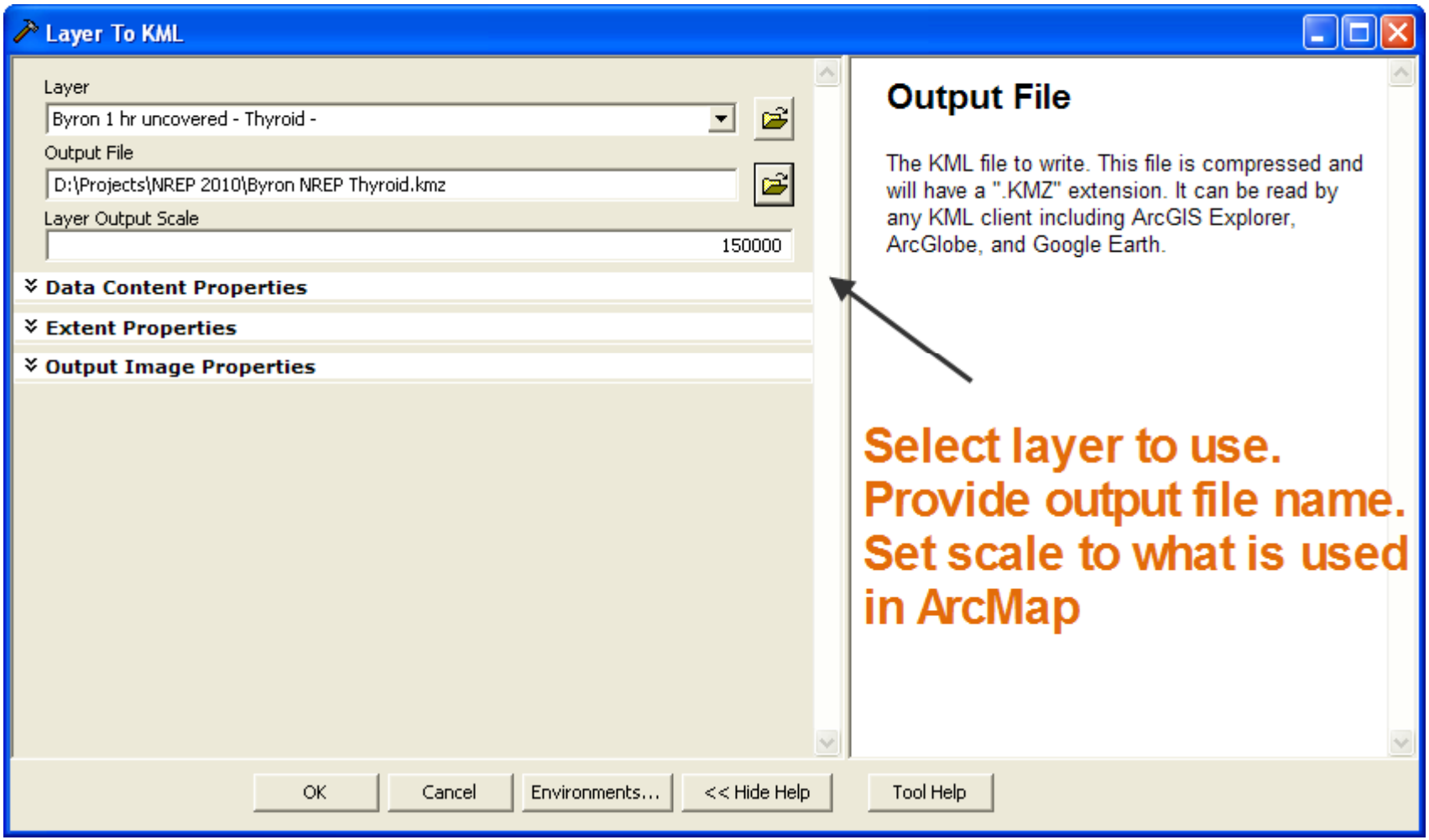
Layer to KML



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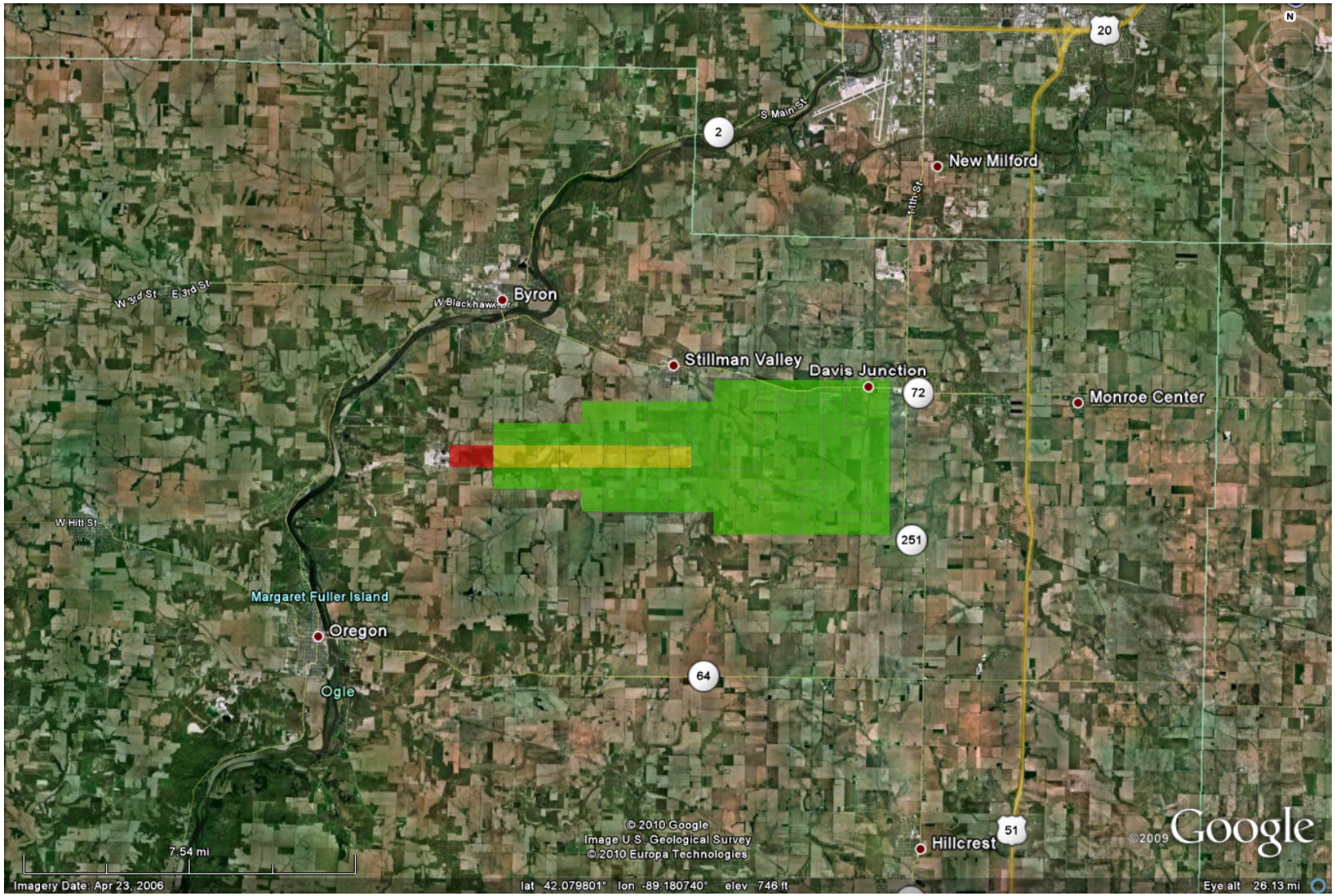
Drag KML into Google Earth



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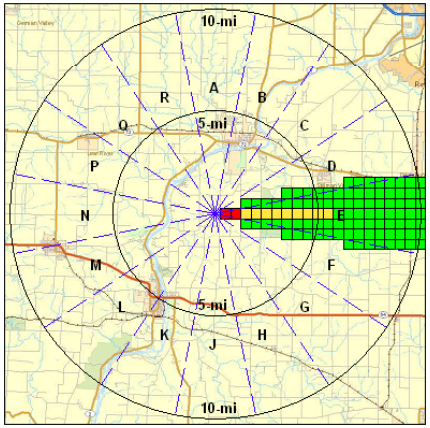
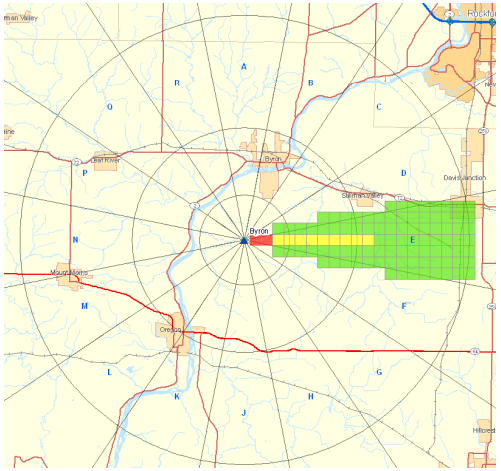
Display Plume in:

RASCAL



ArcMap



Google Earth