CAP88 WEB TRAINING

USEPA

What is CAP88 ?

- Clean Air Act Assessment Package - 1988.
- A set of computer programs, datasets and associated utility programs for estimation of dose and risk from radionuclide air emissions.
- Uses AIRDOS, a Gaussian Plume dispersion model which predicts air concentrations, deposition rates, concentrations in food, and intake rates for people.

What is CAP88? (continued)

- Estimates Dose (EDE) & risk to individuals, populations.
- Dose and risk is calculated for ingestion, inhalation, ground level air immersion and ground surface irradiation exposure pathways.
- Dose and risk factors were generated from the computer program RADRISK.

Regulatory Requirement

- Subpart H: 61.93 (a) states:
  - Radionuclide emissions shall be determined and effective dose equivalent values to members of the public calculated using EPA approved sampling procedures and models.

    CAP-88 -- AIRDOS-PC
  - DOE facilities for which the maximally exposed individual lives within 3 kilometers of all sources of emissions in the facility, may use EPA's COMPLY model.
  - Alternate models can also be used.

Obtaining the Models

- EPA Web Site:

  www.epa.gov/radiation/assessment/cap88
- DOE Web Site:

  www.sc.doe.gov/sc-80/sc-83/cap88pc.shtml

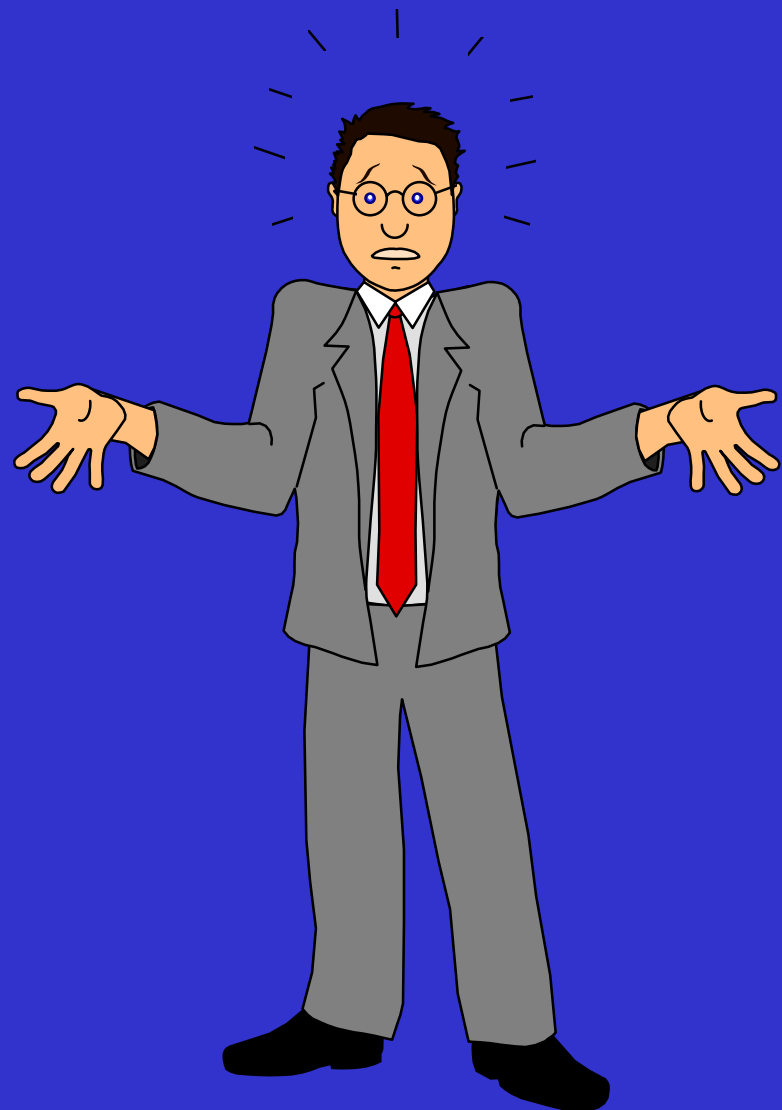
Characteristics

- Based on NCRP model and ICRP 26/30 methodology
- User-friendly Windows environment program
- 264 radionuclides are included in database
- Calculates dose and risk from multiple pathways
- Handles multiple stacks and area sources
- Uses site-specific meteorology
- Considers decay of parent/daughter build up
- Generates compliance report & other reports

Limitations

- No Resuspension
- Assumes flat terrain
- Assumes uniform Area Sources
- Only for low level chronic releases
- No building wake or tip down wash
- One plume rise mechanism assumed for all sources
- Multiple sources are assumed to be co-located.

How To Run An Assessment



Input Parameters Needed

- Facility information
- Population file or distance to receptors
- Meteorological data (STAR file, average rainfall, average temp., and lid height)
- Source data: stack height/diameter, plume rise
- Agricultural data
- Release data

Sample Assessment

- DOE facility
- Six stacks, stack heights and diameters are given
- The radionuclide release rates are known
- Wind file is given
- Population file is given
- Calculate the effective dose equivalent (EDE)

Facility Data

- Facility name
- Address
- City
- State (important)
- Emission year

Facility Data Screen

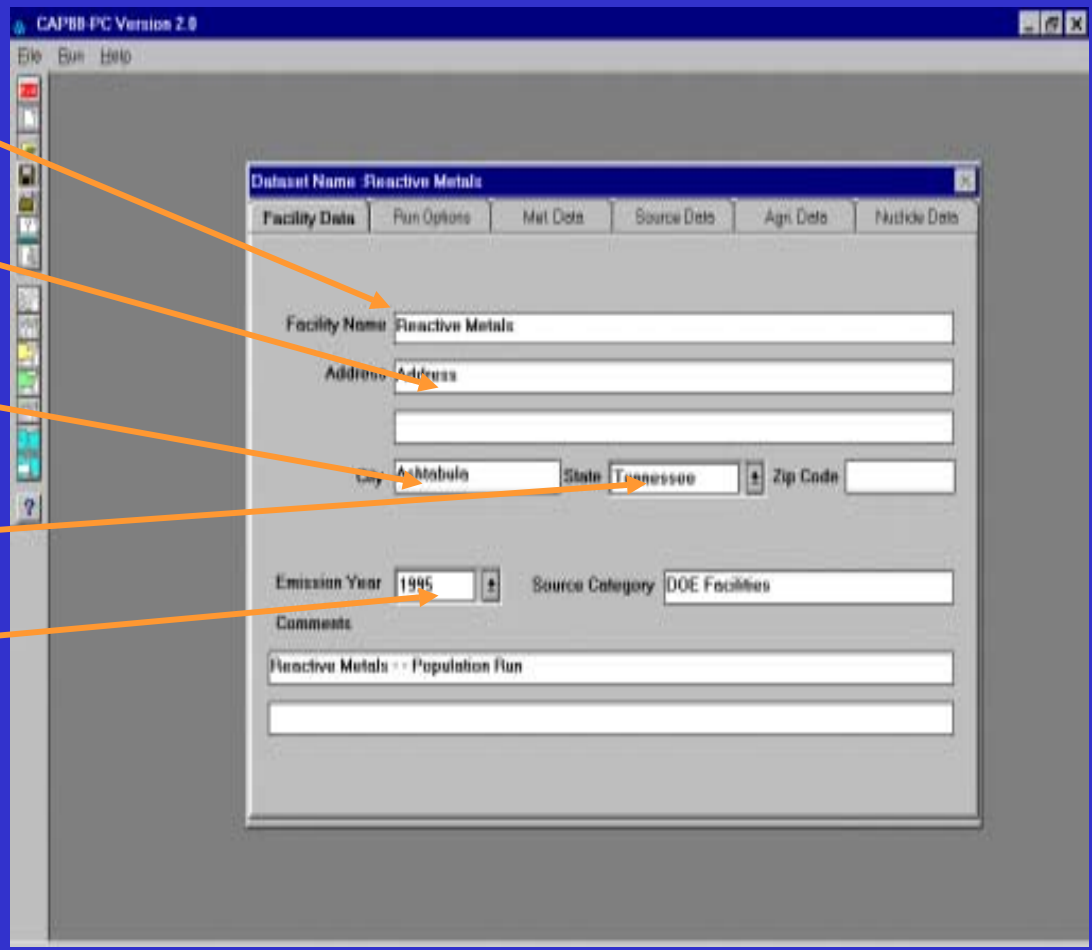
Facility name

Address

City

State (important)

Emission year



Source and Nuclide Data

- Up to 6 stacks or area source
  - Height
  - Diameter or area
  - Plume rise (momentum, buoyant, fixed or zero)
- Source term (radionuclides emissions)
  - Release rate (Ci/yr)
  - Particle size
  - Clearance class

Source Data Screen

–Height

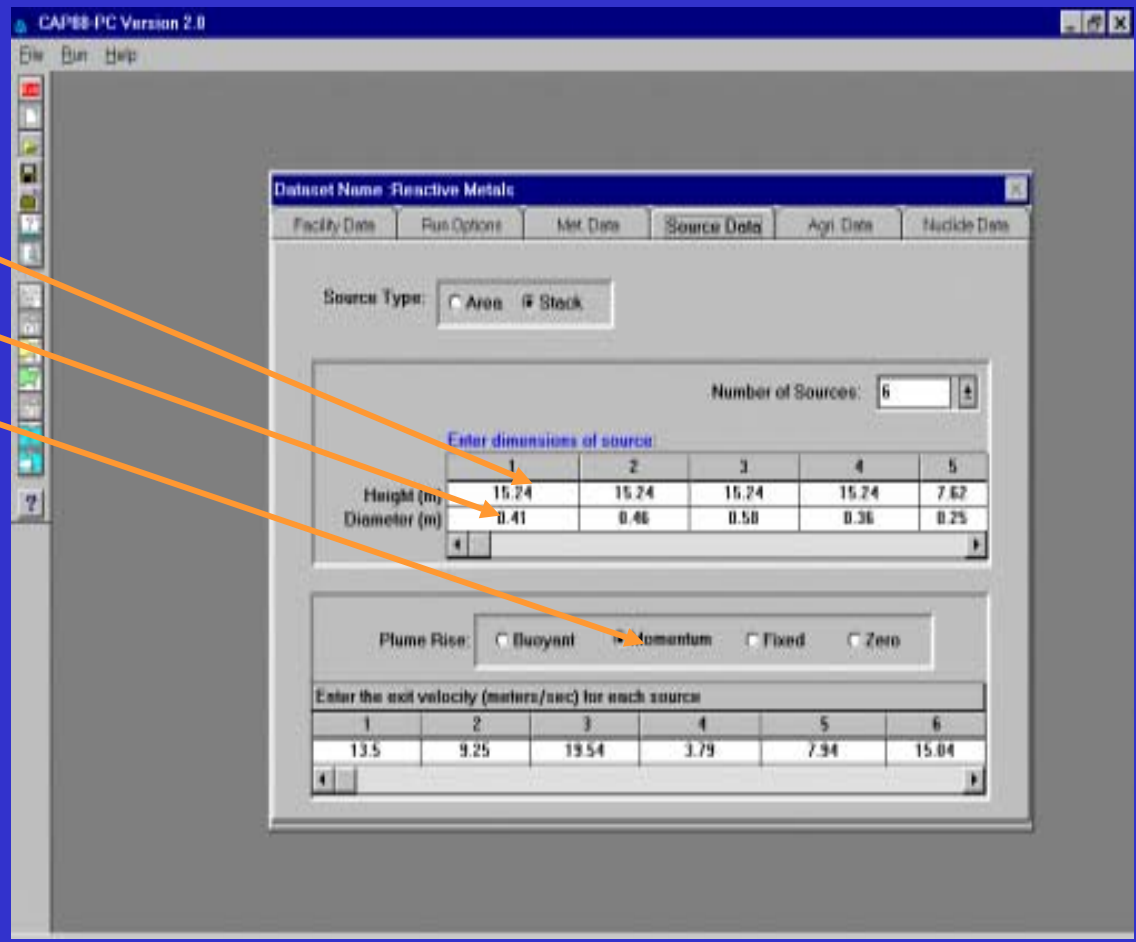
–Diameter or area

–Plume rise

– (momentum,

– buoyant,

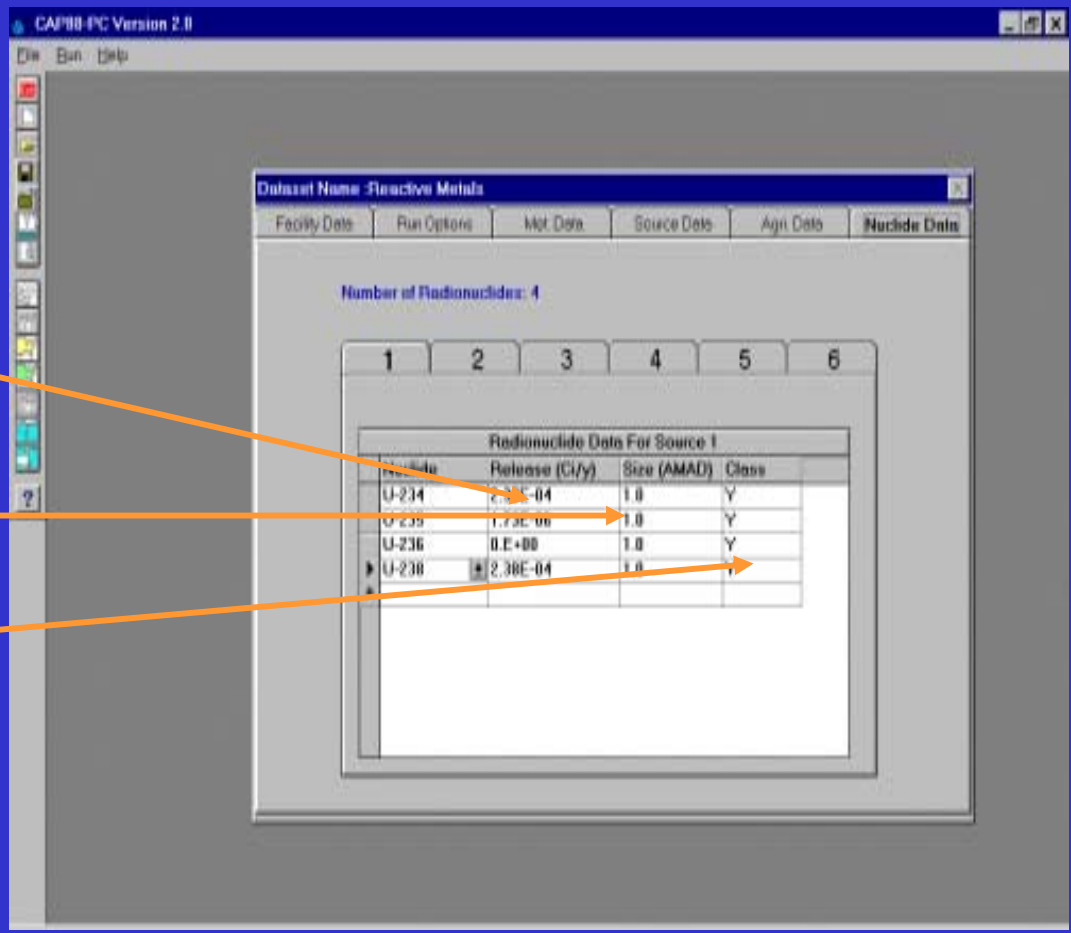
–fixed or zero)



Nuclide Data Screen

Source term (radionuclides emissions)

- Release rate (Ci/yr)
- Particle size
- Clearance class

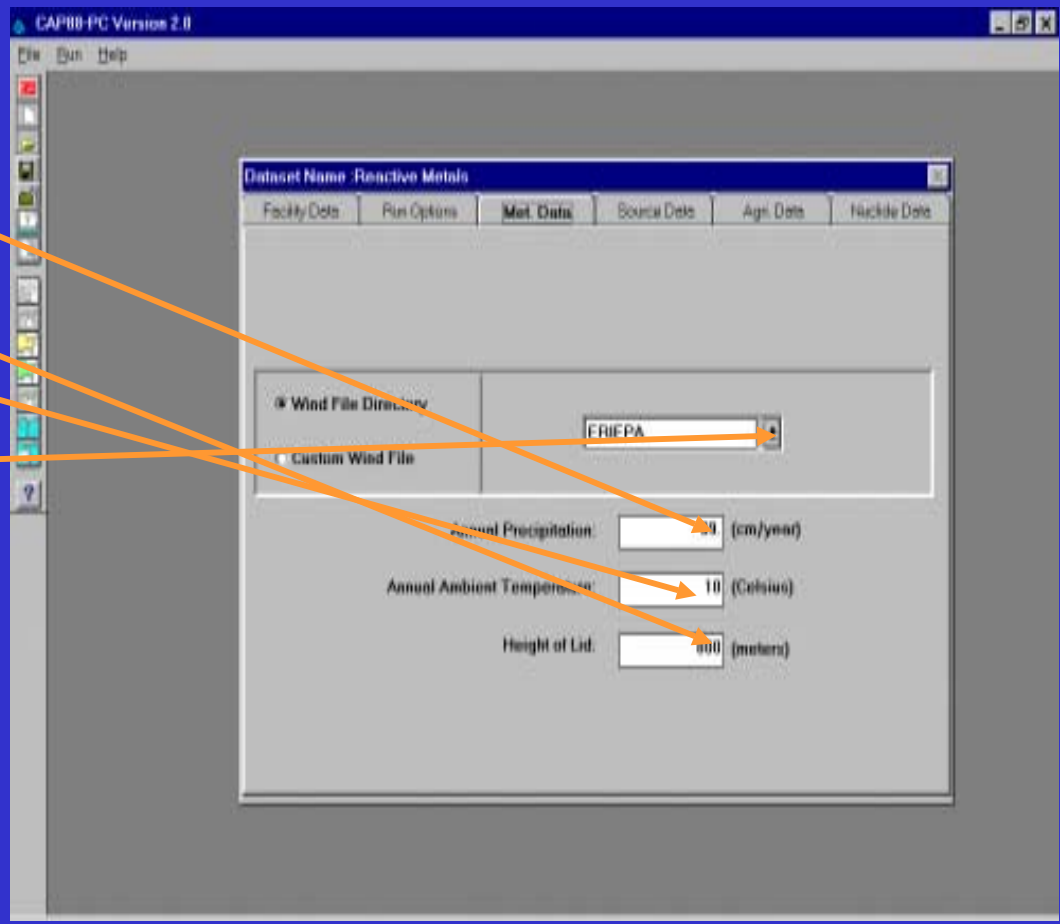


Meteorological Data

- STAR FORMAT - stability array
- Precipitation
- Lid height
- Temperature

Meteorological Data Screen

- Precipitation
- Lid height
- Temperature
- Wind File

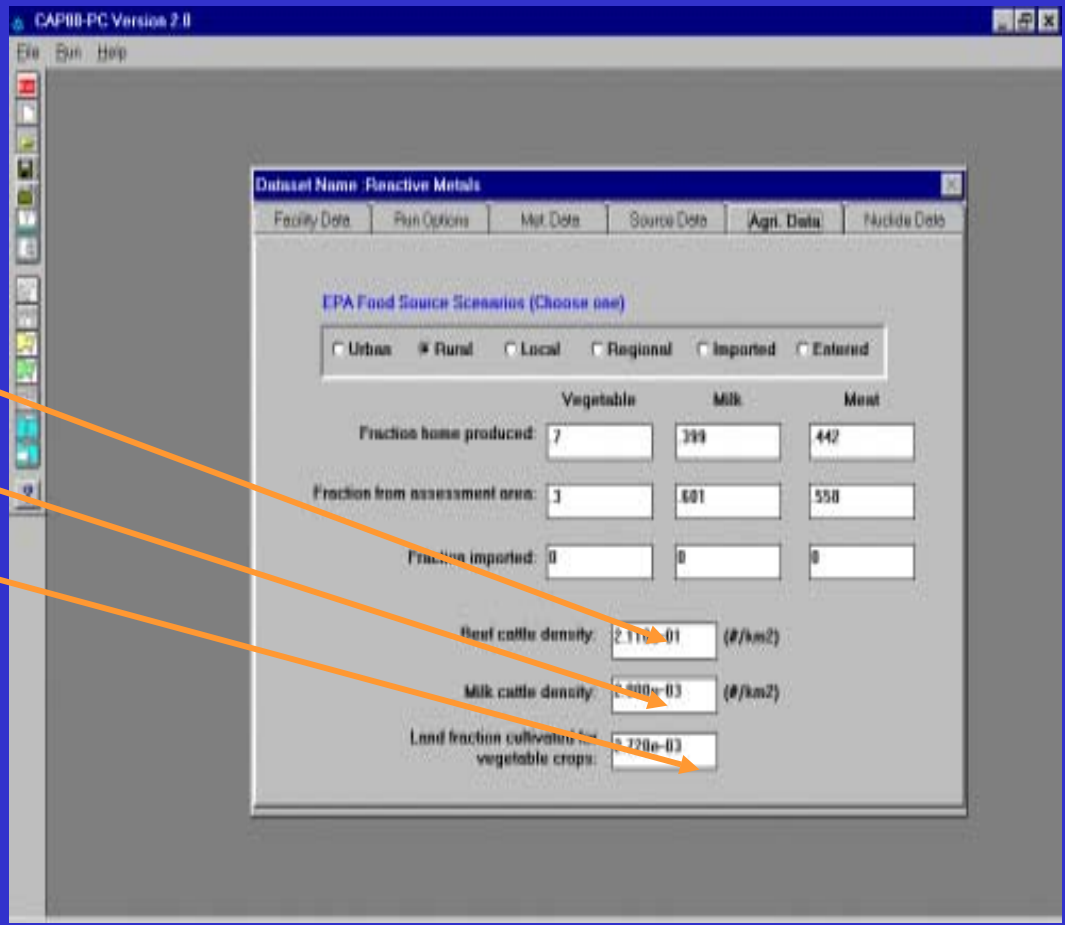


Agricultural Data

- Ingestion pathway: milk, beef, crops
- Uses state-wide averages to construct distributions
- Assumes none within 500 meters of facility

Agricultural Data Screen

- Ingestion pathway:
  - milk
  - beef
  - crops
- Uses state-wide averages to construct distributions



Run Options

- Population or individual
- Output
  - Genetic effects
  - Dose and risk factors
  - Concentration tables
  - Chi/Q tables

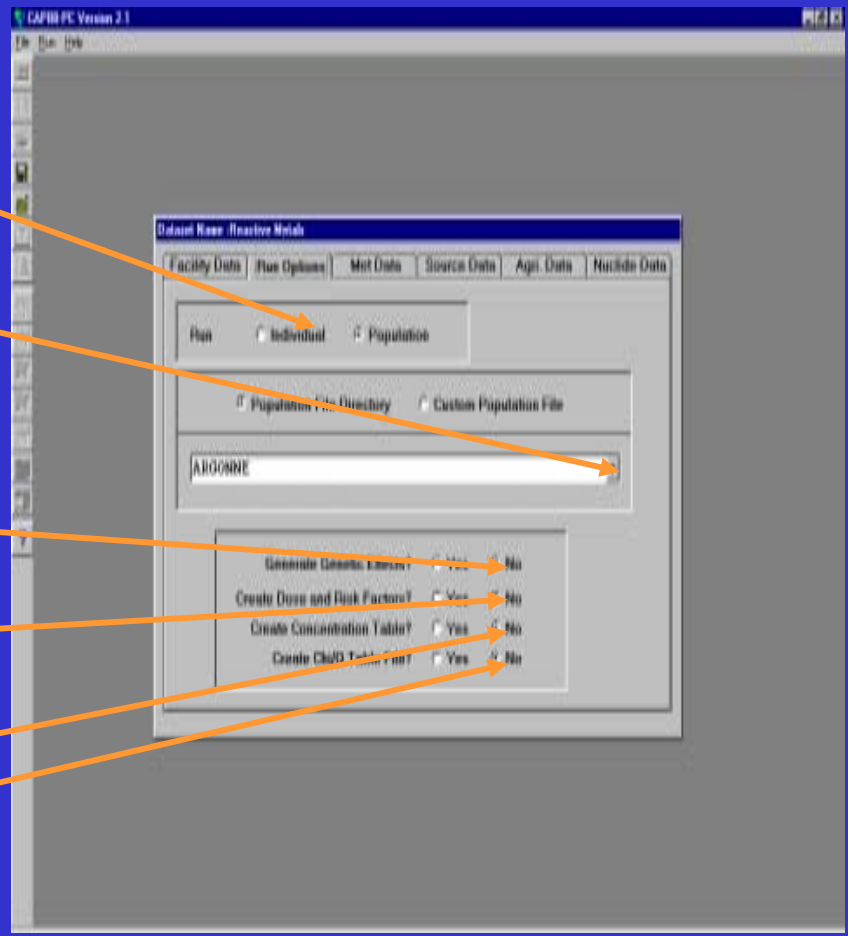
Run Options Screen

Population or individual

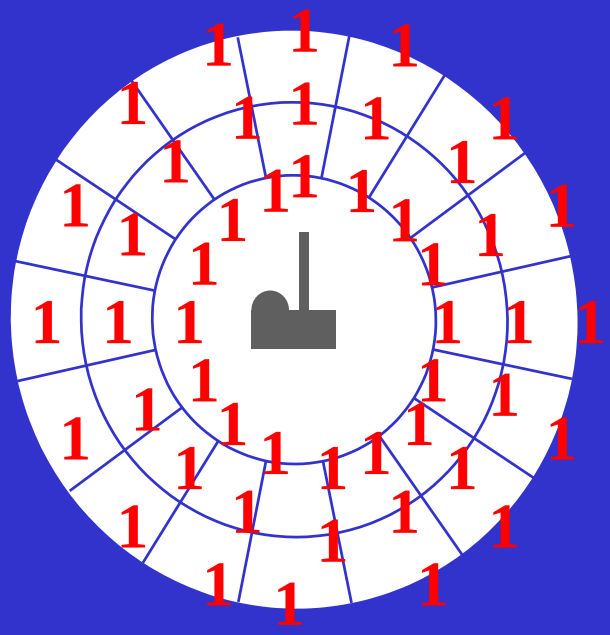
Population File

Output

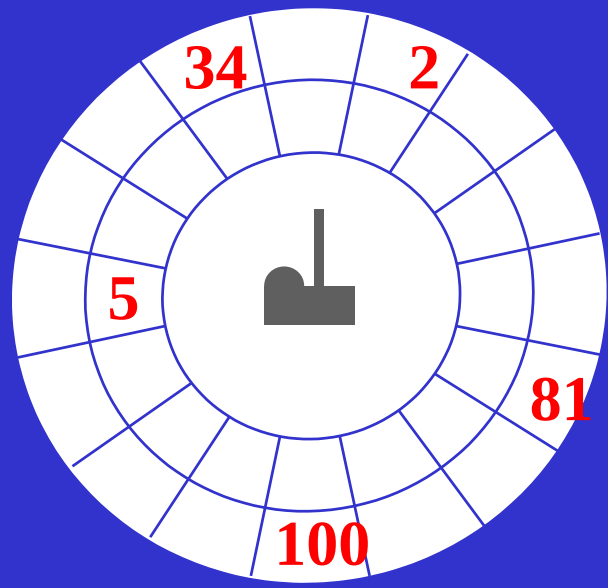
- Genetic effects
- Dose and risk factors
- Concentration tables
- Chi/Q tables



Type of Assessment



Individual Option
5.89E+1 mrem/yr, EDE,
310 meters North



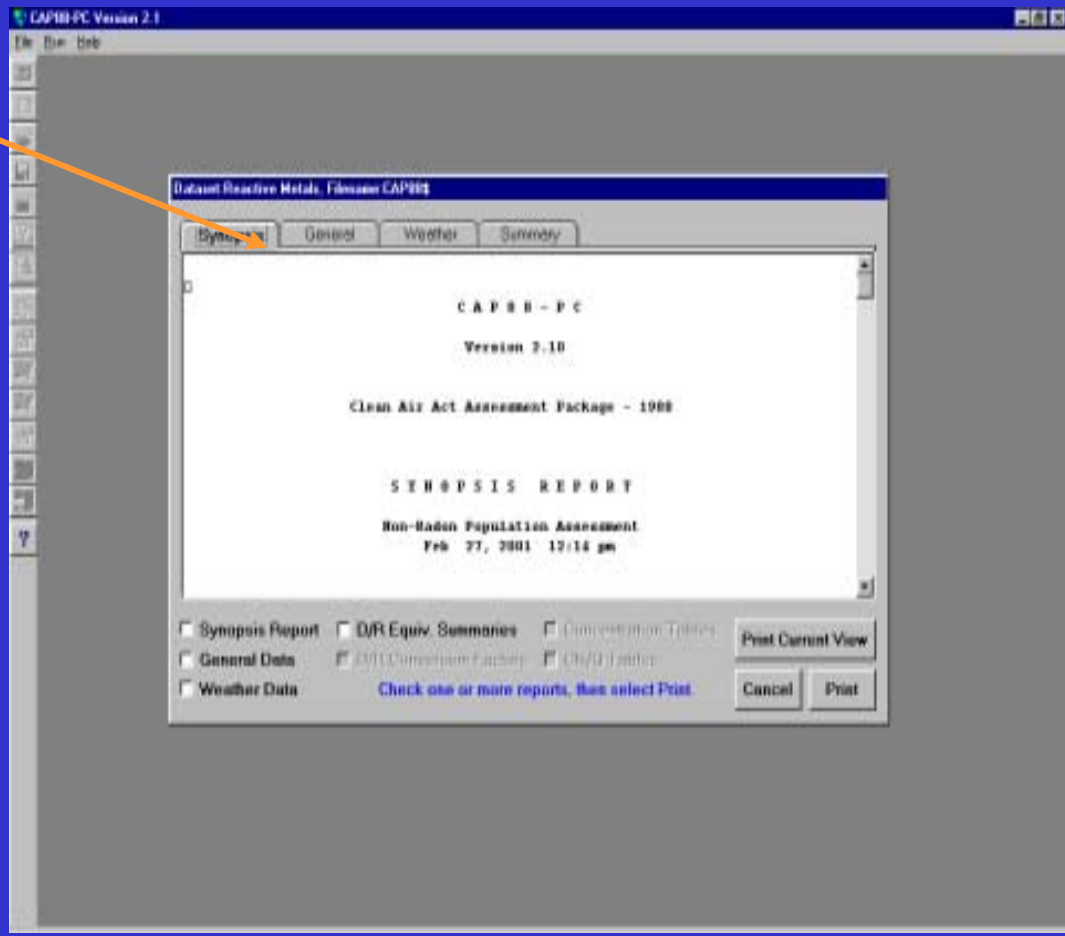
Population Assessment
1.67E+1 mrem/yr, EDE,
310 meters East Northeast

Print or View Reports

- Synopsis report
- General data
- Weather data
- Dose and risk equivalent summary
- Dose and risk conversion factors
- Concentration tables
- Chi/Q tables

Print Screen

- Synopsis report
- General data
- Weather data
- Dose and risk equivalent summary
- Dose and risk conversion factors
- Concentration tables
- Chi/Q tables



What is AIRDOS-PC?

- Computer Program for calculating Doses from radionuclide emissions to air.
- Replicates calculation in CAP88
- Menu driven for ease of data entry.

AIRDOS-PC: Characteristics

- User-friendly Menu Driven Program
- Based on Updated ICRP 26/30 Methodology
- Handles 41 Commonly Used radionuclides
- Calculates Dose from Multiple Pathways
- Handles Multiple Stacks and Area Sources
- Uses Site-Specific Meteorology
- Generates a Compliance Report

AIRDOS-PC: Limitations

- Source terms for annual averages only
- Ignores building wake factors
- Models only 18 radionuclides simultaneously
- Multiple sources are assumed to be co-located.
- Calculates only for circular grids
- Assumes 100% locally grown food source

What Is COMPLY?

- Calculates doses from airborne radionuclide emissions
- Various levels to reduce burden--greater input results in a more realistic dose.
- Used to demonstrate compliance with 40 CFR 61, Subparts I & H (mainly Subpart I).
- Based on NCRP Commentary No. 3

COMPLY: Components

- Table of Annual Possession - Level 1
- Table of Air Concentration - Level 1
- NCRP Screening Model - Level 2 & 3
- EPA’s Compliance Model - Level 4

COMPLY: Characteristics

- Requires Minimum Effort to Demonstrate Compliance
- Based on NCRP Model and ICRP 26/30 Methodology
- Handles Over 450 Radionuclides and Multiple Stacks
- Considers Building Wake Factors
- Calculates Dose from Multiple Pathways
- Uses Site-Specific Meteorology
- Considers Decay of Parent and Daughter Build-up
- Generates a Compliance Report

COMPLY: Limitations

- A screening model
- Compliance can be demonstrated at any level
- Only for point sources
- Assumes flat terrain
- Needs minimum input
- Handles only low level chronic releases

Alternative Models

- Prior EPA Approval is needed
- What needs to be submitted?
  - Why alternative model is needed
  - Source Code
  - Documentation on the model formulation
  - Input Parameters
  - Time Frame needed for approval
- Example of EPA Prior Approval
  - Los Alamos
    - Additional Radionulcide