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
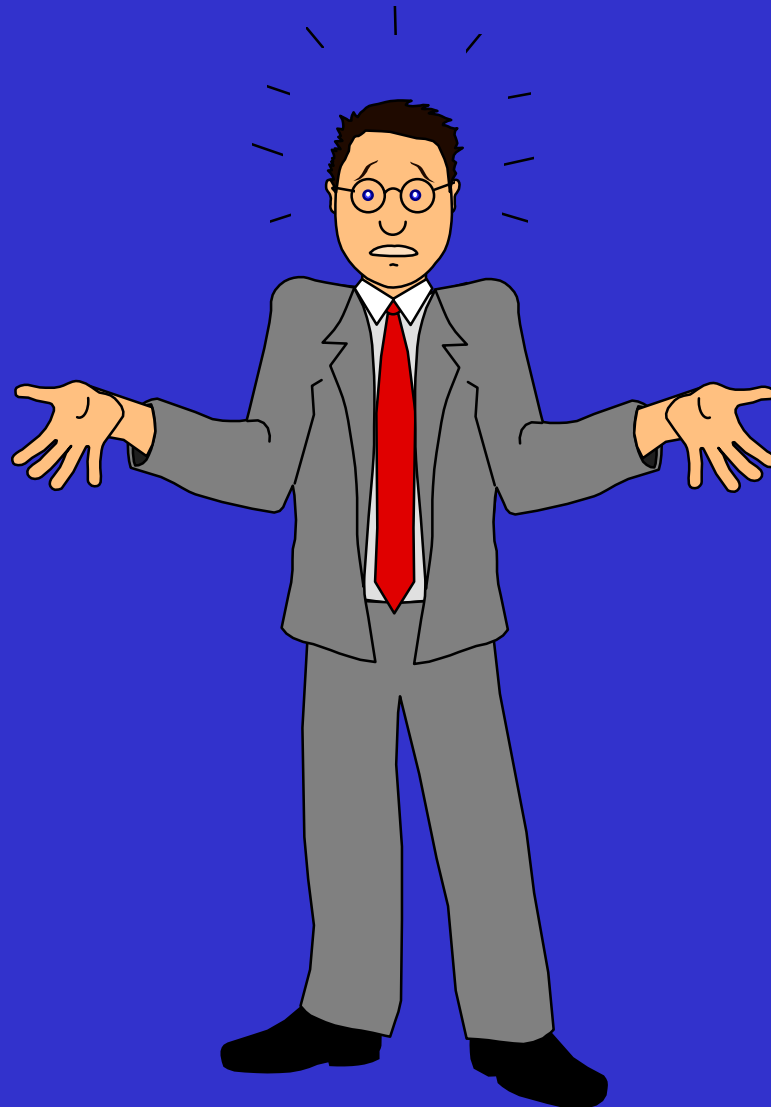
Input Parameters Needed

- 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
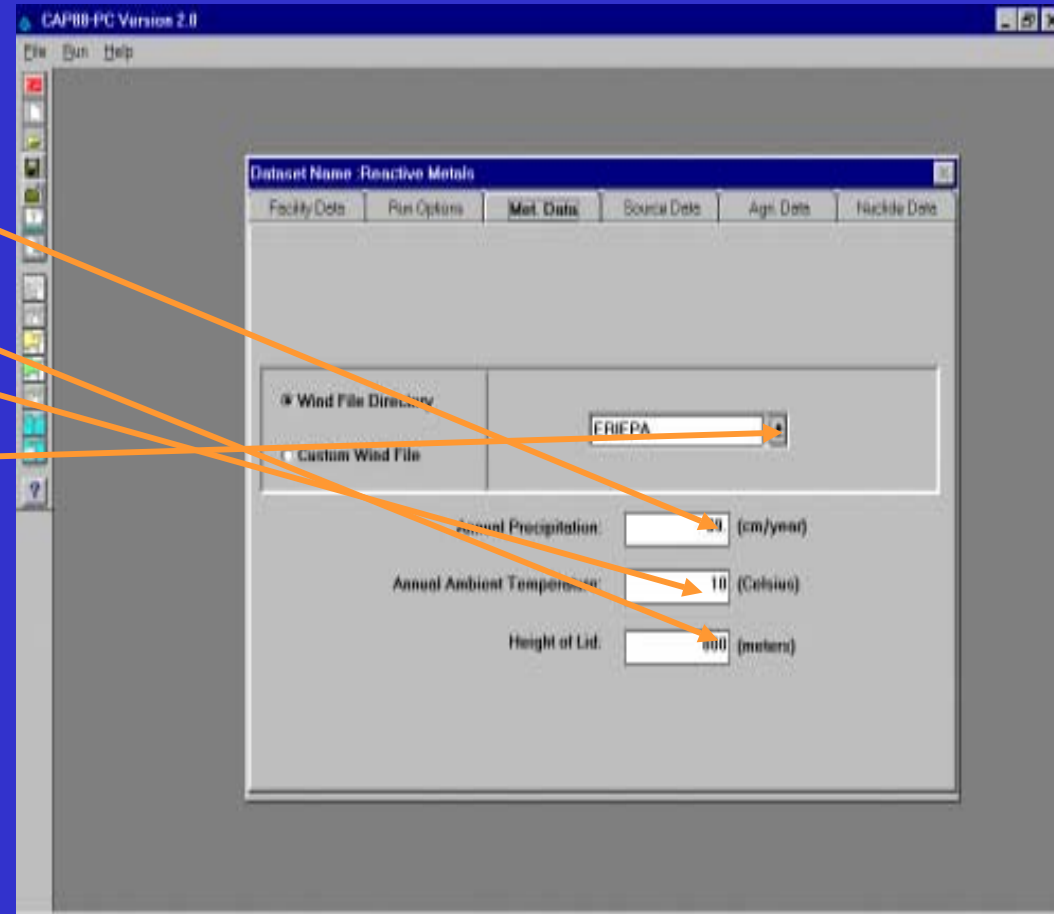
Agricultural Data

- 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
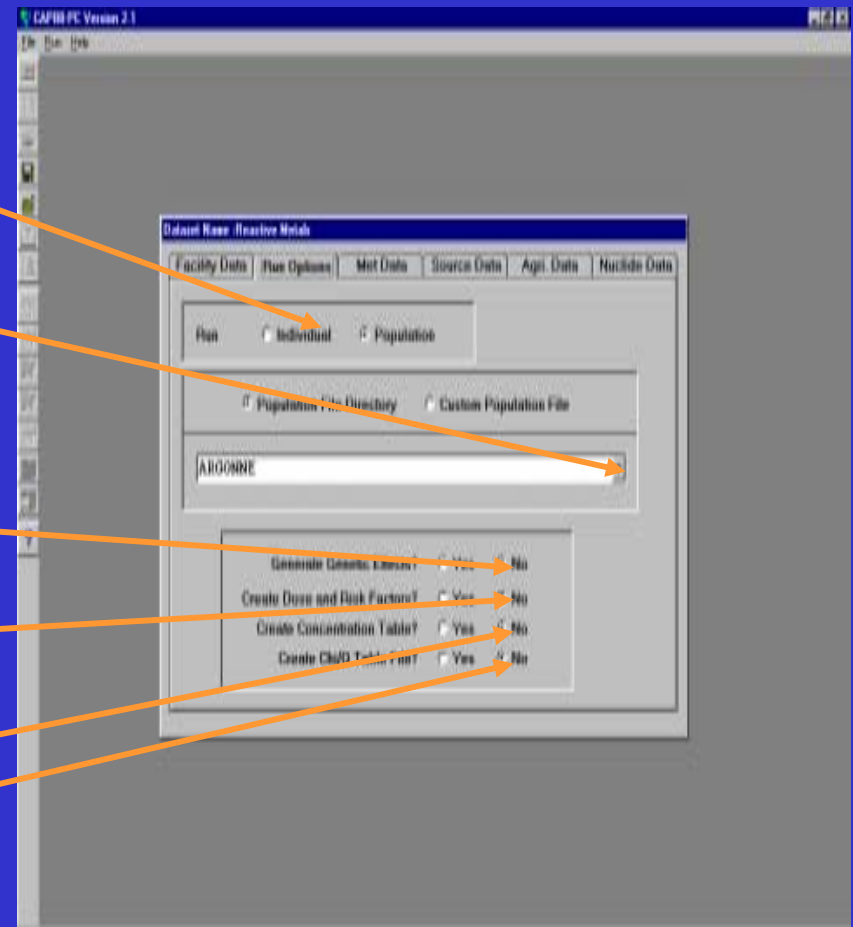 - Concentration tables
  - Chi/Q tables

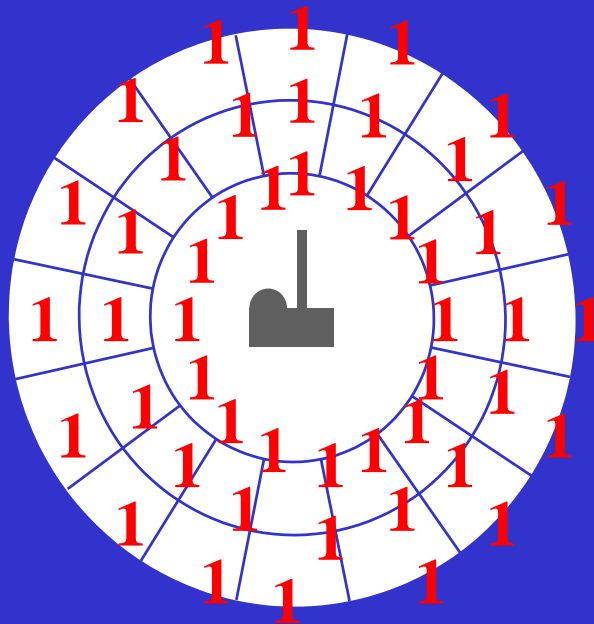# Run Options Screen

Population or individual

Population File

Output

– Genetic effects

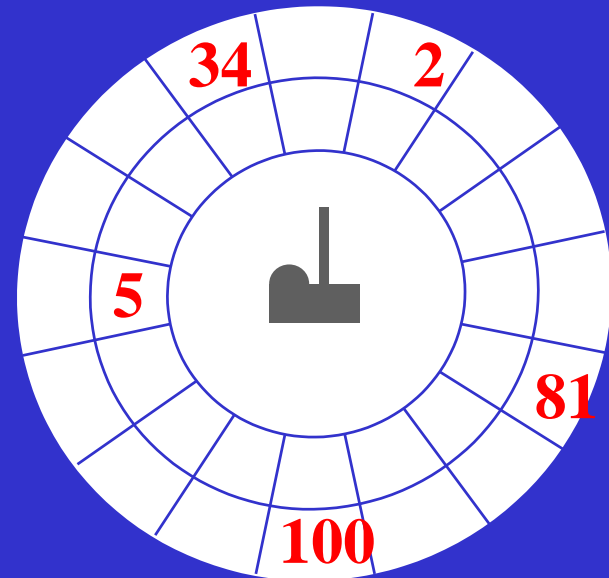– Dose and risk factors

– 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
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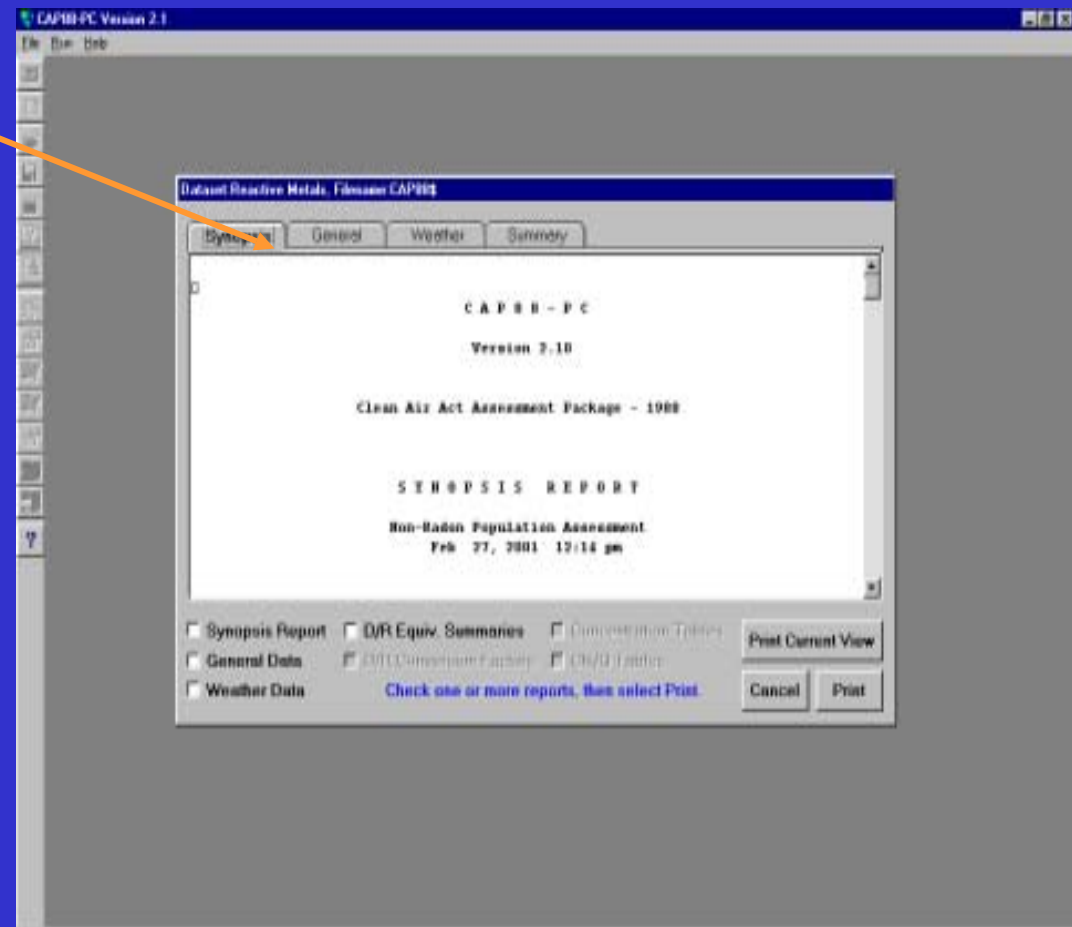
What is AIRDOS-PC?

- 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