

CAP88-PC V4 TRAINING

Module 1.1

Introduction to CAP88-PC



COURSE OBJECTIVES

1. Explain the purpose of the CAP88-PC code
2. Introduce the underlying models that implement the model
3. Learn how to install and operate the CAP88-PC Version 4 code
4. Understand some basic limitations of the code



INSTRUCTORS

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COURSE LAYOUT

Four Modules:

1. This Introduction
2. Description of the Model & Implementing Equations in CAP88-PC
3. Downloading, Installing, Operating CAP88-PC Version 4
4. Summary and Questions

Intended to be Interactive; feel free to ask questions as they come to mind!



CAP88-PC PURPOSE

Primary: Perform Dose Calculations to demonstrate compliance with 40 CFR Part 61

- Known as the National Emission Standards for Hazardous Air Pollutants (NESHAP)
- 40 CFR 61.93(a) requires Dept. of Energy to use CAP88-PC or other approved methods to calculate effective dose equivalent to members of the public.
- Sets 10 mrem per year limit on effective dose equivalent

Secondary: Provide the capability to perform modeling of radiation dose resulting from release of airborne radionuclides associated with operation of facilities. The code is also useful for generating dispersion values, known as Chi/Q



CAP88-PC HISTORY

CAP88 = Clean Air Act Assessment Package 1988

Initial Distribution composed of AIRDOS-EPA and DARTAB programs

- FORTRAN 77 running under OS/VS2 on IBM 3090 mainframe

AIRDOS and DARTAB Ported to PC in 1992 as CAP88-PC V1

- FORTRAN 77 running under MS-DOS, character based input
- Added risk calculations, pop doses, more data flexibility
- Added DEFAULT program to verify use of EPA-approved data

CAP88-PC V2 written for Windows published in 1999

- Changed to Visual Basic user interface that called FORTRAN programs
- Retained the original AIRDOS, DARTAB, DEFAULT programs

CAP88-PC V3 written for Windows XP published in 2007

- Changed to FGR-13 isotope set and dose/risk coefficients
- Changed ground buildup model to address new isotopes
- NCRP-123 environmental transfer factors



CAP88-PC LIMITATIONS ON USE

CAP88-PC basic models:

- Long-term Gaussian Plume for air dispersion
- Food-chain accumulation model based on NRC Reg. Guide 1.109

CAP88-PC is not generally applicable to short term airborne releases of radioactivity

To produce useful results, CAP88-PC requires some up-front work to develop

- Joint-frequency weather data (typically annual average wind speeds and directions)
- Receptor locations and regional population data
- Optimum grid layout for either population files or as input to individual run
- Understand your release sources
 - Isotopes and activity release rate
 - Temperature and flow rates if a stack, size and resuspension rates if an area
 - Special cases such as horizontal stacks, isotopic chemical forms, etc.



CAP88-PC MODELING BASICS

To produce useful results, CAP88-PC requires some up-front work

Know your receptors

- Receptor locations and regional population data
- Optimum grid layout for either population files or as input to individual run
- Food scenario and (now) ages

Understand your release sources

- Isotopes and activity release rate
- Temperature and flow rates if a stack, size and resuspension rates if an area
- Special cases such as horizontal stacks, isotopic chemical forms, etc.

Understand your atmosphere

- Joint-frequency weather data (typically annual average wind speeds and directions)
- Typical lid height
- Rainfall rates, average temperatures and humidity

