

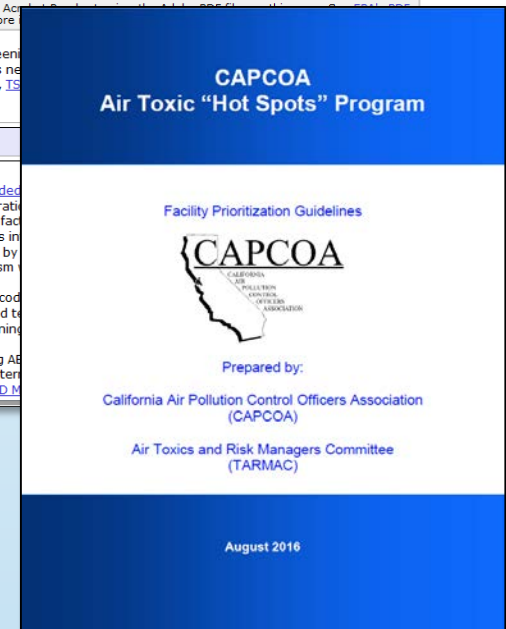
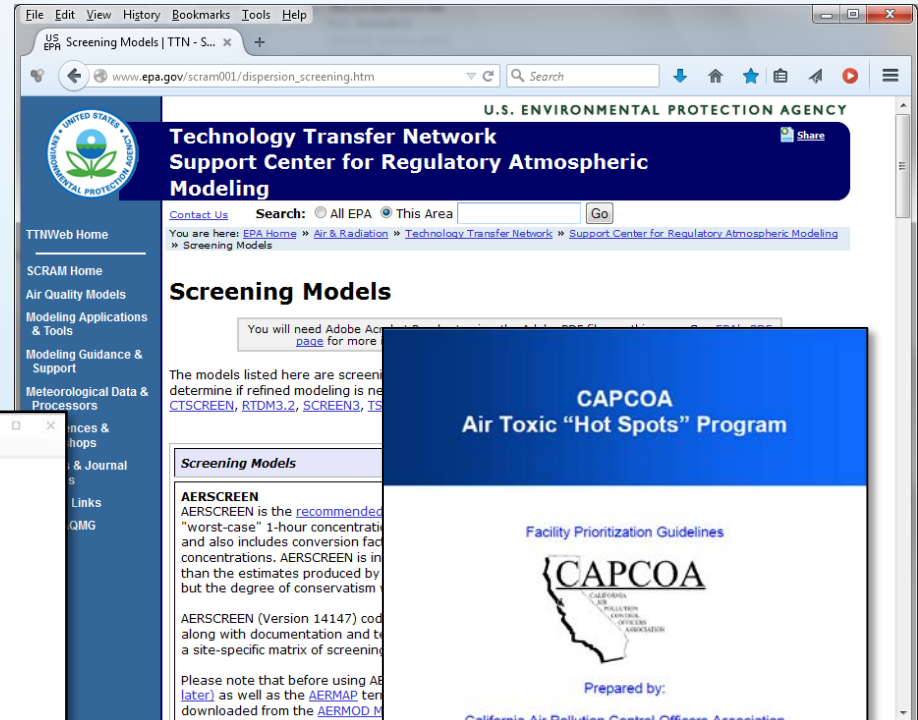
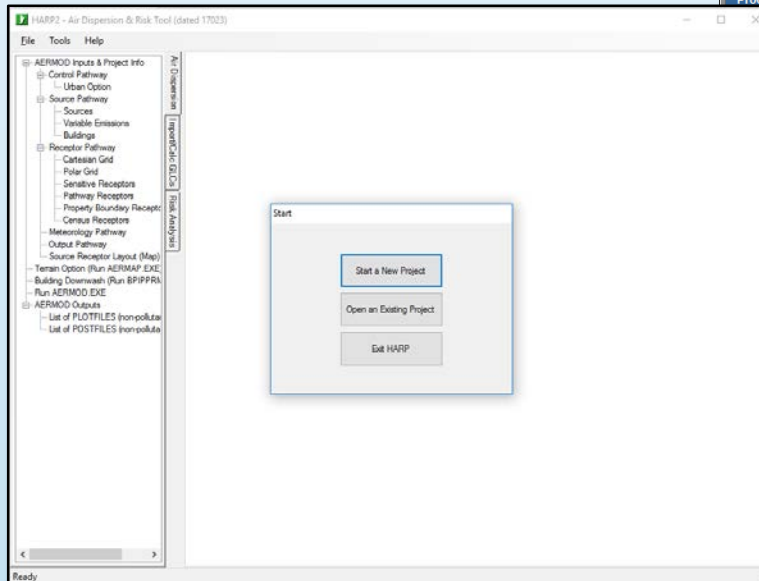
# Health Risk Assessment Overview



# How Do We Model

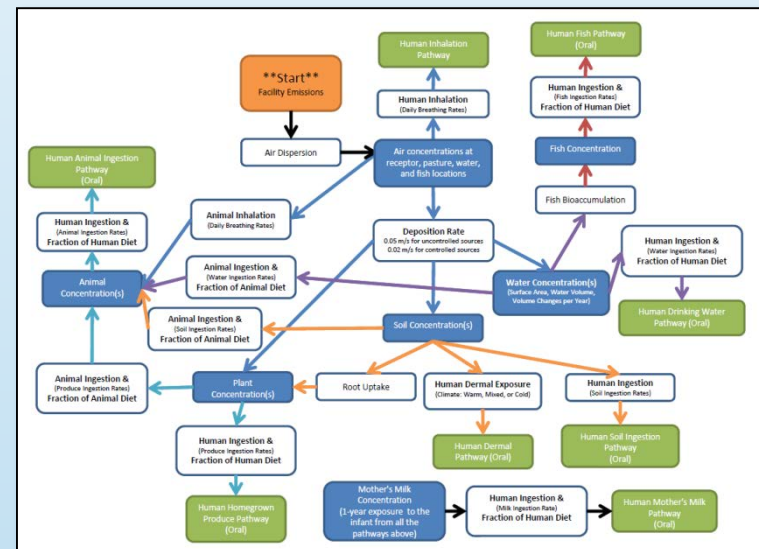
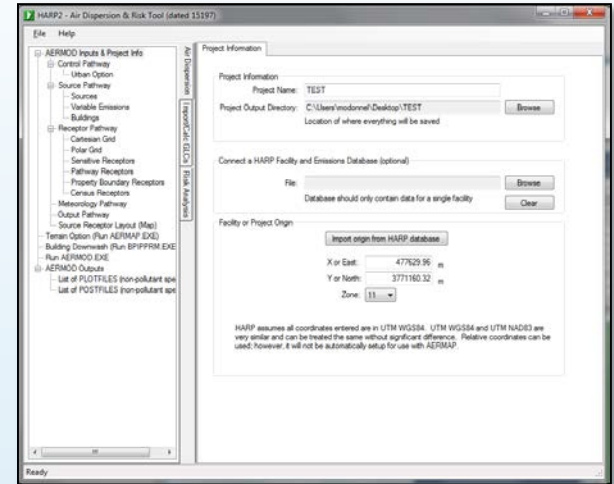
- Types of Modeling Tools

- Prioritization
- Screening
- Refined



# HRA Process

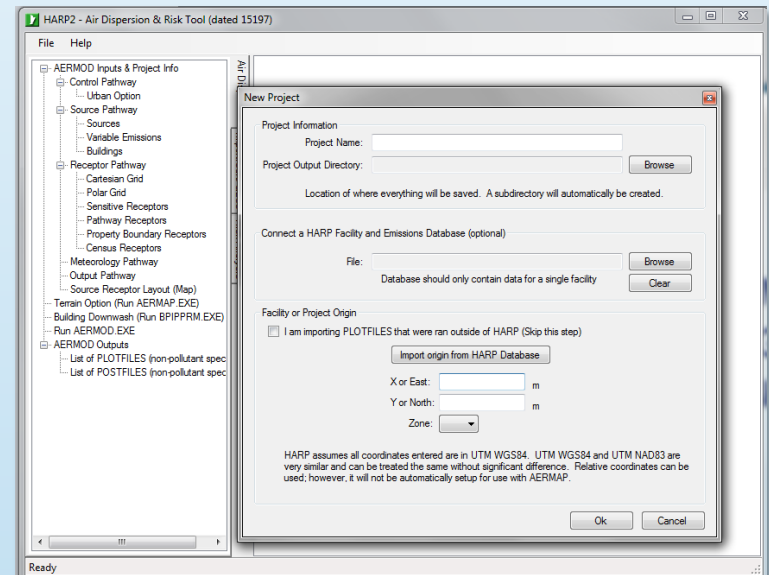
- Refined HRA
  - Consists of Three Parts
    - Dispersion Modeling
    - Calculating Pollutant Specific GLCs
    - Risk Analysis



# HARP 2

## ADMRT

- Run Dispersion Model (AERMOD)
- Calculate Pollutant Specific GLCs
- Calculate Cancer Risk and Non-Cancer Hazard Indices



# HRA Process

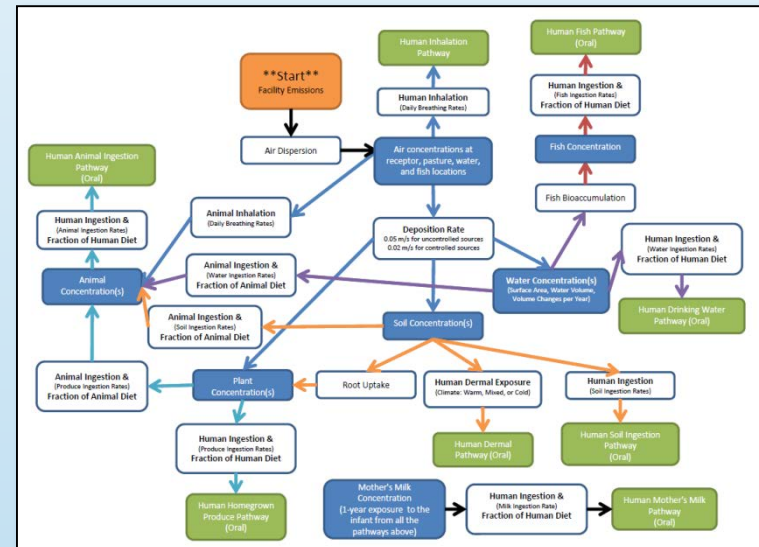
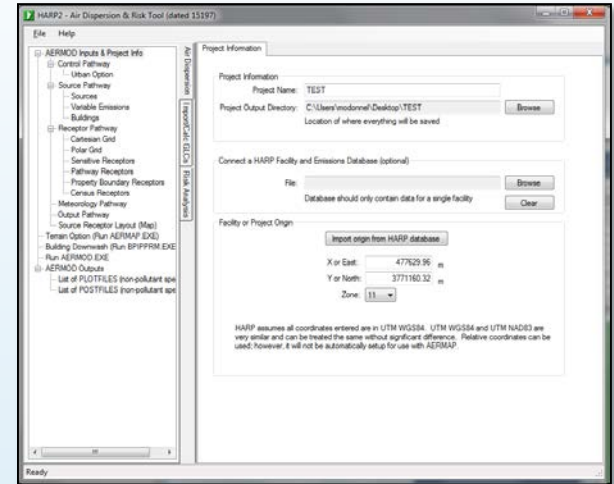
- Refined HRA

- Consists of Three Parts

- Dispersion Modeling

- Calculating Pollutant Specific GLCs

- Risk Analysis



# AERMOD

- Gaussian Dispersion Model
  - 3D Gaussian Steady State Distribution
  - Normal or bell curve
  - Models dispersion of gasses or particulates downwind of a source
  - Only provides information about downwind concentration not risk
  - All emissions calculated at a rate of 1 g/s or 1 g/s-m<sup>2</sup> for area sources

# AERMOD In HARP2

HARP2 - Air Dispersion & Risk Tool (dated 17023)

File Tools Help

AERMOD Inputs & Project Info

- Control Pathway
  - Urban Option
- Source Pathway
  - Sources
  - Variable Emissions
  - Buildings
- Receptor Pathway
  - Cartesian Grid
  - Polar Grid
  - Sensitive Receptors
  - Pathway Receptors
  - Property Boundary Receptors
  - Census Receptors
- Meteorology Pathway
- Output Pathway
- Source Receptor Layout (Map)
- Terrain Option (Run AERMAP.EXE)
- Building Downwash (Run BPIPFRM.EXE)
- Run AERMOD.EXE

AERMOD Outputs

- List of PLOTFILES (non-pollutant specific)
- List of POSTFILES (non-pollutant specific)

Control Pathway

Some control parameters are preset for a HARP run. The options shown below are what you are allowed to change. If you wish to modify the control parameters further, you must manually edit the AERMOD input file.

Title Information for AERMOD

Title 1

Title 2 (Optional)

Dispersion Options

Regulatory Default Options (AERMAP should be ran with this option) [See Preset Parameters including Averaging Options](#)

Non-fatal Warning for Non-sequential Met Data (WARNCHKD)

Non-Default Options

Terrain

Flat

Flat and Elevated (AERMAP should be ran with this option)

Run AERMOD in Screening Mode (SCREEN)

No Stack-Tip Downwash (NOSTD)

No Checks for Non-Sequential Met Data (NOCHKD)

FASTALL

FASTAREA

Ignore the transition from nighttime urban boundary layer to daytime convective boundary layer (NOURBTRAN)

Beta Options (BETA)

Enable Capped and Horizontal Stack Releases

Process met inputs derived using ADJ\_U\* option

LOWWIND

LOWWIND1

LOWWIND2

Min sigma-v:  (0.01-1.0)

Min wind speed:  (0.01-1.0)

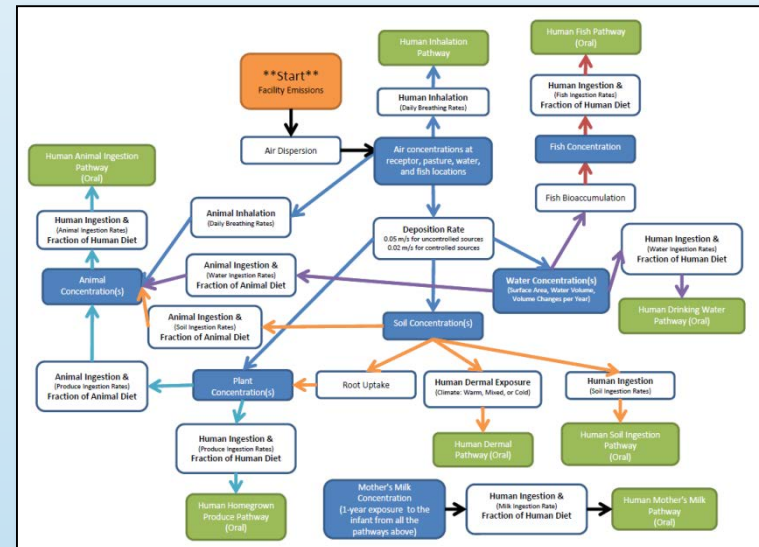
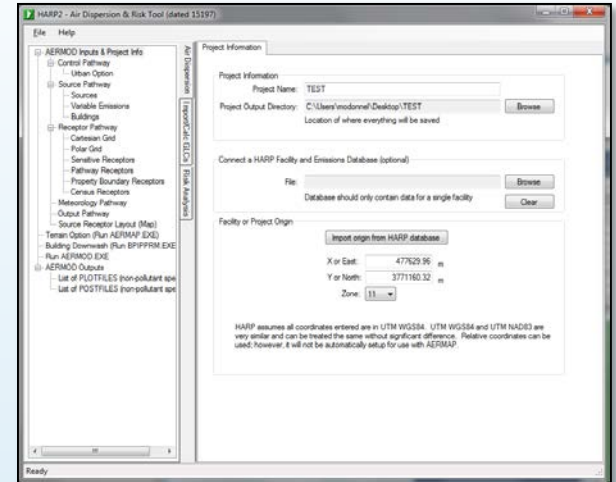
Max meander factor:  (0.5-1.0)

Save

Ready

# HRA Process

- Refined HRA
  - Consists of Three Parts
    - Dispersion Modeling
    - Calculating Pollutant Specific GLCs
    - Risk Analysis





# Calculating Pollutant Specific GLCs In HARP2

The screenshot displays the HARP2 - Air Dispersion & Risk Tool interface. The main window title is "HARP2 - Air Dispersion & Risk Tool (dated 17023)". The menu bar includes "File", "Tools", and "Help".

The left sidebar contains a tree view with the following structure:

- GLC Calc Setup
  - PLOTFILE List (non-pollutant specific)
  - Emission Inventory
  - Background Concentrations
  - Screening Adjustment Factors
  - Calculate \ Import GLCs
  - Pathway \ Spatial Avg GLCs
  - Contour GLCs (AERPLOT.EXE)
- Post Process
  - Max 30-Day Rolling Ave for Pb
  - Daily 8-Hr Ave GLCs for 8-Hr RELs
  - Refined Worker Period Ave for Cancer Risk

The "Air Dispersion" and "Risk Analysis" sections are visible in the sidebar. The "Import Calc GLCs" option is highlighted with a red rectangular box.

The main window area shows a "List of PLOTFILES to Convert" table with columns for "Add", "Import", and "Max 1-Hr File". The "Import" menu is open, showing options: "Import CSV", "Import List from Current Run" (highlighted), and "Change File Path of All files".

Add	Import	Max 1-Hr File
	Import CSV	
	Import List from Current Run	
	Change File Path of All files	

Below the table, there are two rows of data:

	...SSING_REFINED_8-HOUR\plt\PERIODPS001.PLT	C:\03. Project Folder\POST PROCESSING_REFI
	...SSING_REFINED_8-HOUR\plt\PERIODPS002.PLT	C:\03. Project Folder\POST PROCESSING_REFI

The status bar at the bottom left shows "Ready". The bottom right corner shows "Count:" followed by a small icon.

# Calculating Pollutant Specific GLCs In HARP2

HARP2 - Air Dispersion & Risk Tool (dated 17023)

File Tools Help

GLC Calc Setup

- ... PLOTFILE List (non-pollutant specific)
- ... Emission Inventory
- ... Background Concentrations
- ... Screening Adjustment Factors
- Calculate\Import GLCs
- Pathway\Spatial Avg GLCs
- Contour GLCs (AERPLOT.EXE)

Post Process

- ... Max 30-Day Rolling Ave for Pb
- ... Daily 8-Hr Ave GLCs for 8-Hr RELs
- ... Refined Worker Period Ave for Cancer Risk

Air Dispersion

ImportCalc GLCs

Risk Analysis

Calculate\Import GLCs

Calculate GLCs from GLC Calc Setup

Import	Export	Delete All	Tools	
	PolID	PolAbbrev	Period Ave File	Max 1-Hr Ave File
▶	1746016	2,3,7,8-TCDD	C:\03. Project Folder\POST PROCESSING_REFINE...	C:\03. Project Folder\POST PROCESSING_REFINE...
	75070	Acetaldehyde	C:\03. Project Folder\POST PROCESSING_REFINE...	C:\03. Project Folder\POST PROCESSING_REFINE...
	1016	As cmpd(inorg)	C:\03. Project Folder\POST PROCESSING_REFINE...	C:\03. Project Folder\POST PROCESSING_REFINE...
	7782505	Chlorine	C:\03. Project Folder\POST PROCESSING_REFINE...	C:\03. Project Folder\POST PROCESSING_REFINE...
	50000	Formaldehyde	C:\03. Project Folder\POST PROCESSING_REFINE...	C:\03. Project Folder\POST PROCESSING_REFINE...
	75092	Methylene Chlor	C:\03. Project Folder\POST PROCESSING_REFINE...	C:\03. Project Folder\POST PROCESSING_REFINE...
	51796	Urethane	C:\03. Project Folder\POST PROCESSING_REFINE...	C:\03. Project Folder\POST PROCESSING_REFINE...

Count: 7

Ready



# Calculating Risk Values In HARP2

HARP2 - Air Dispersion & Risk Tool (dated 17023)

File Tools Help

Calculate Risk

- Select Risk Scenario
- Select Pathways to Evaluate and Define Site Parameters
- Press Calculate
- View Risk Results
- Refined Acute Analysis
- Spatial Averaging Risk (Optional)
- Project Summary Report

Air Dispersion  
Import/Calc GLO  
**Risk Analysis**

Select Risk Scenario

Analysis Type

- Cancer Risk
- Chronic Risk (Non-cancer)
- 8-Hour Chronic Risk (Non-cancer)
- Acute Risk (Non-cancer)
- Cancer, Chronic, and Acute

[Help me choose](#)

Receptor Type

- Individual Resident
- Population-Wide
- Worker

[Help me choose](#)

Exposure Duration

- 70 Year
- 30 Year
- 25 Year (Worker)
- 9 Year
- User Defined (Tier 2)

Start Age (years) [Help me choose](#)

Intake Rate Percentile

- OEHHA Derived Method
- 95th (High End)
- 65th (Mean)
- Risk Management Policy (RMP) - \*Inhalation Only\*
- RMP using the Derived Method

[Help me choose](#)

Ready

OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT

# Air Toxics Hot Spots Program

Risk Assessment Guidelines

Guidance Manual for  
Preparation of Health Risk  
Assessments

February 2015



Air, Community, and Environmental Research Branch  
Office of Environmental Health Hazard Assessment  
California Environmental Protection Agency

# OEHHA HRA Guideline

- Change in Calculation Methodology
- Change in Dispersion Model


OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT

## Air Toxics Hot Spots Program

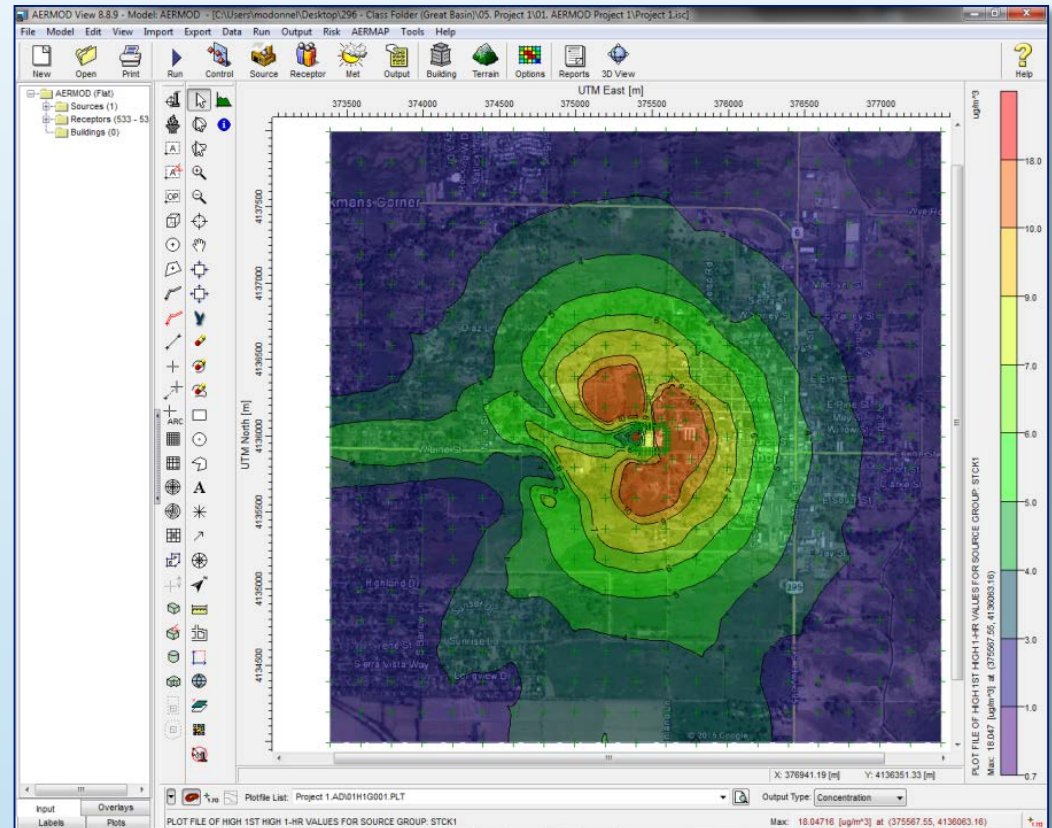
Risk Assessment Guidelines

Guidance Manual for  
Preparation of Health Risk  
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February 2015



Air, Community, and Environmental Research Branch  
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California Environmental Protection Agency



# OEHHA Methodology

## What's Changed

- Age Bins
  - Breathing Rates
  - Age Sensitivity Factors
  - Fraction of Time at Home (FAH)
- Exposure Periods
- Spatial Averaging
- Calculation of Cancer Risk



# Age Bins

## Age Bins

- 3<sup>rd</sup> Trimester
- 0-2 years
- 2-9 years
- 2-16 years
- 16-30 years
- 16-70 years

Rate	3rd Trimester	0 to 2 yrs	2 to 9 yrs	2 to 16 yrs	16 to 30 yrs	16 to 70 yrs
Mean	225	658	535	452	210	185
HighEnd	361	1090	861	745	335	290





# Exposure Periods

- Residential Exposure
  - Defaults to 30 yrs (70 yrs)
  - 9 yr Option (Average)
- Worker Exposure
  - Defaults to 25 yrs (40 yrs)
- Population Wide
  - Still 70 yrs



# Age Bins

## Age Sensitivity

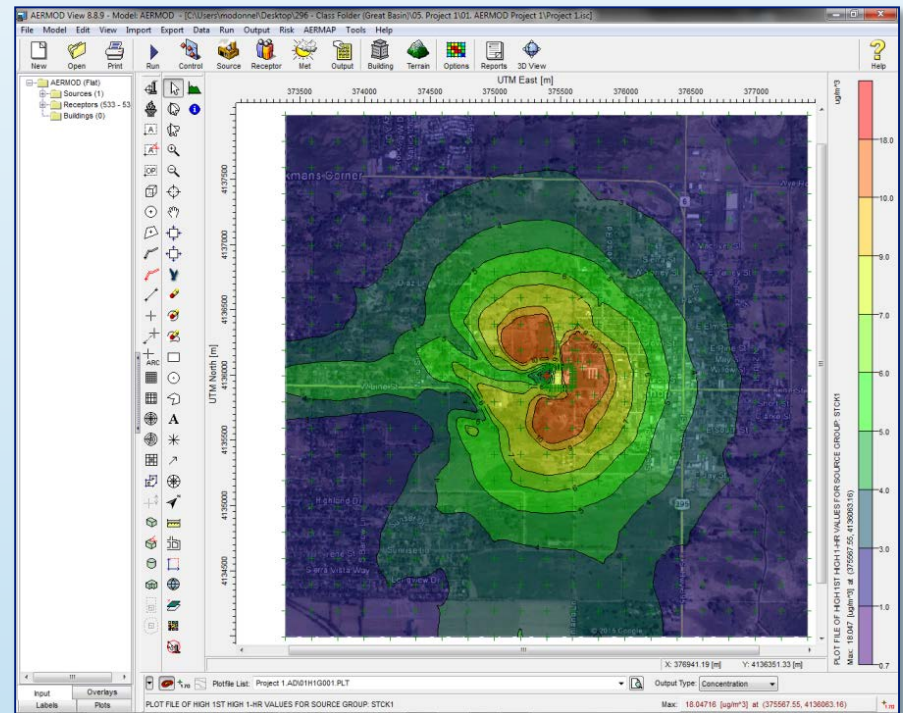
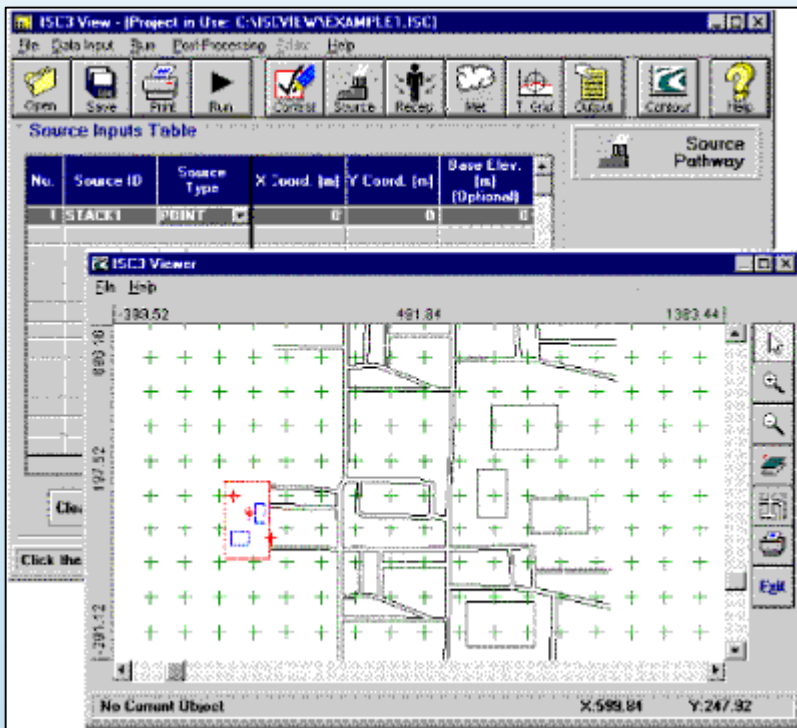
- Accounts for “Early Life” Exposure
- Based on Mean of Postnatal Studies

**Table 8.3 Age Sensitivity Factors by Age Group for Cancer Risk Assessment**

<b>Age Group</b>	<b>Age Sensitivity Factor (unitless)</b>
3 <sup>rd</sup> Trimester	10
0<2 years	10
2<9 years	3
2<16 years	3
16<30 years	1
16-70 years	1

# Change in Dispersion Model

- ISCST3 vs. AERMOD
- On Average  $\approx 1.5$  Time Increase

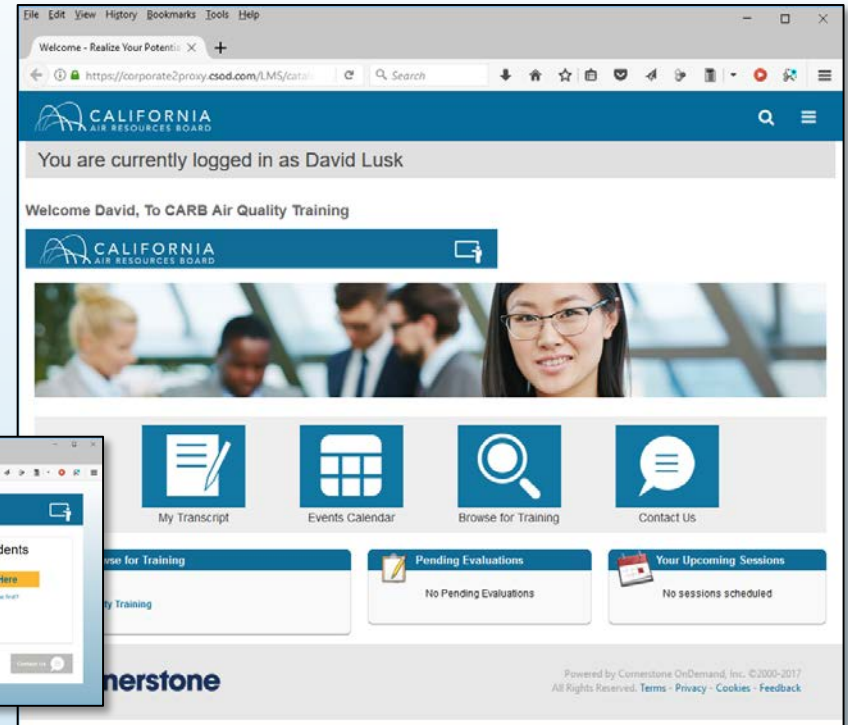
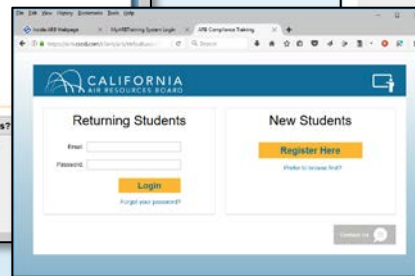
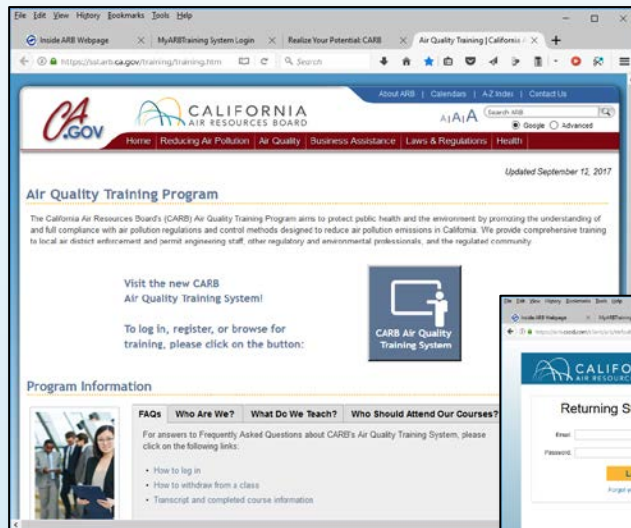


# Total Change

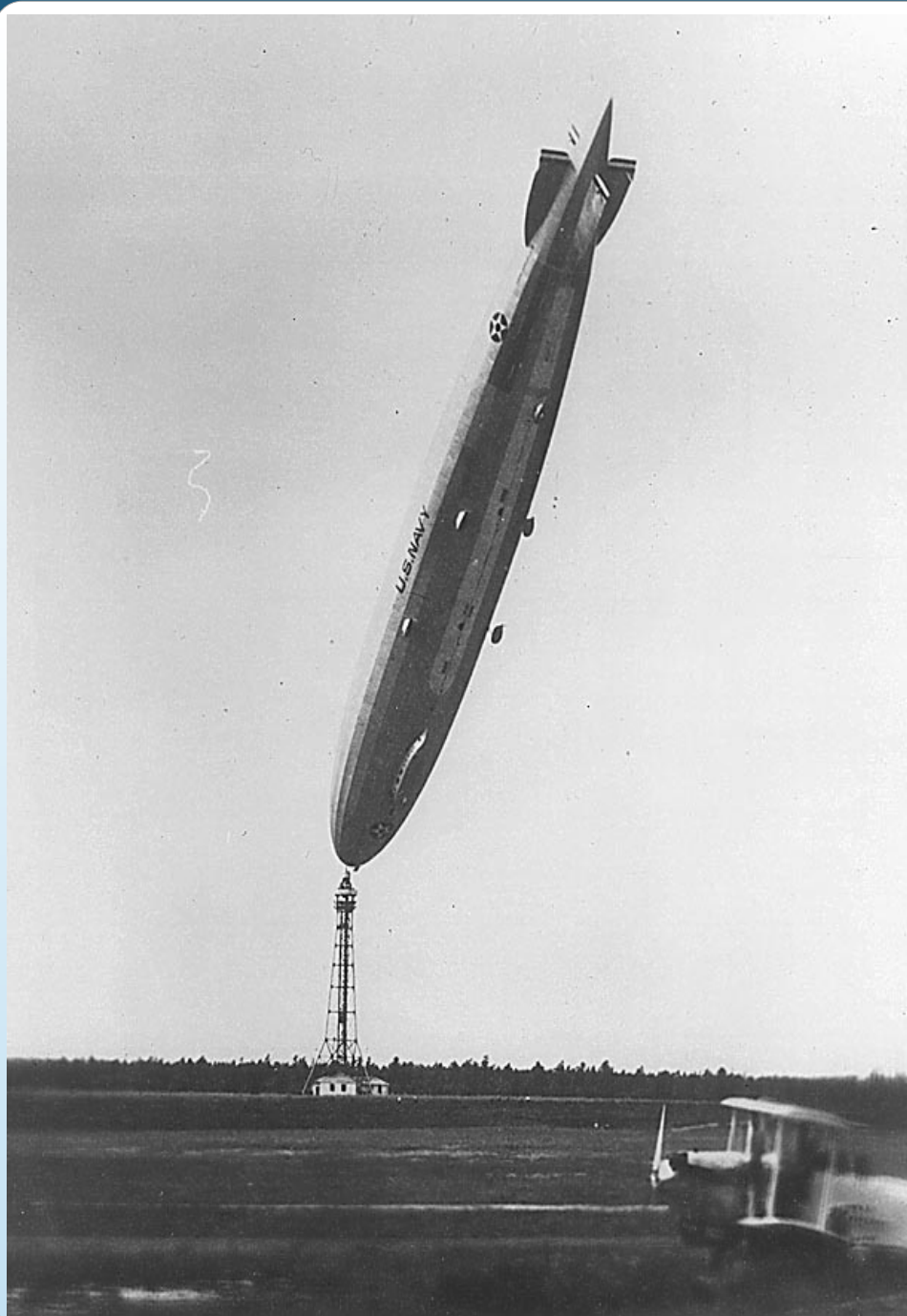
- CASE-BY-CASE
- Acute Results
  - Essentially Unchanged
- Chronic Results
  - Some Increases/Some Decreases
- Cancer
  - Residential (3-4.5 Increase)
  - Worker (Small Increase)

# Shameless Self Promotion Slide

- New LMS



- New Naming and Numbering Conventions
  - MM103 – HRA and Dispersion Modeling
  - MM203 – HARP2



# Thank You

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