



EPA's Area Source Emissions Model

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Introduction

■ National Emission Inventory (NEI)

- EPA currently estimates emissions from area sources as part of the NEI development process.
- Estimation procedures for area sources are a related, but cumbersome set of estimation tools that use either a “top down” or “bottom up” approach to estimating emissions.
- Interest in PM and ozone has caused EPA to initiate work to combine the existing NEI calculation procedures into a consolidated area source emissions model (ASEM).



Introduction (cont'd)

■ About ASEM

- Conceived as a windows-based software tool to facilitate State, local, and tribal improvements to the NEI.
- Provides the activity data and emission factors for area source categories in an “editable” software similar to a spreadsheet.
- The underlying data base for the model contains default activity data and emission factors used to calculate emissions estimates for Version 2.0 of the 1999 NEI.



Introduction (cont'd)

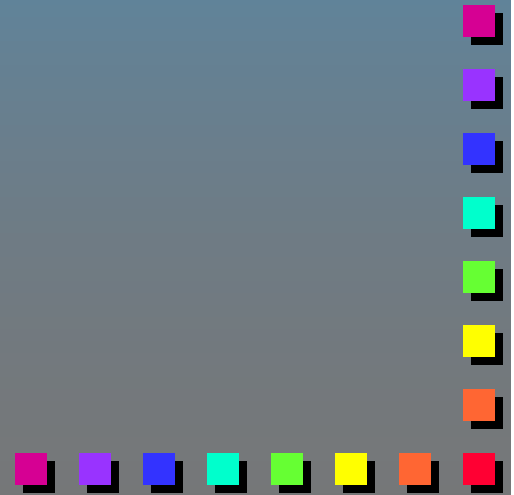
■ ASEM Facilitates:

- The use of consistent methodologies and activity data to calculate emissions;
- Changing selected parameters and recalculating emissions for one or more categories for specific counties or an entire State;
- Ease of calculation when using location-specific data in lieu of model defaults; and
- The development of data output files in Version 2.0 of the NIF for exchanging data among States and EPA.



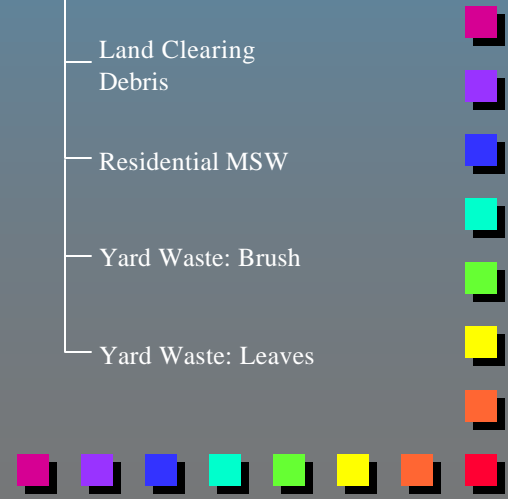
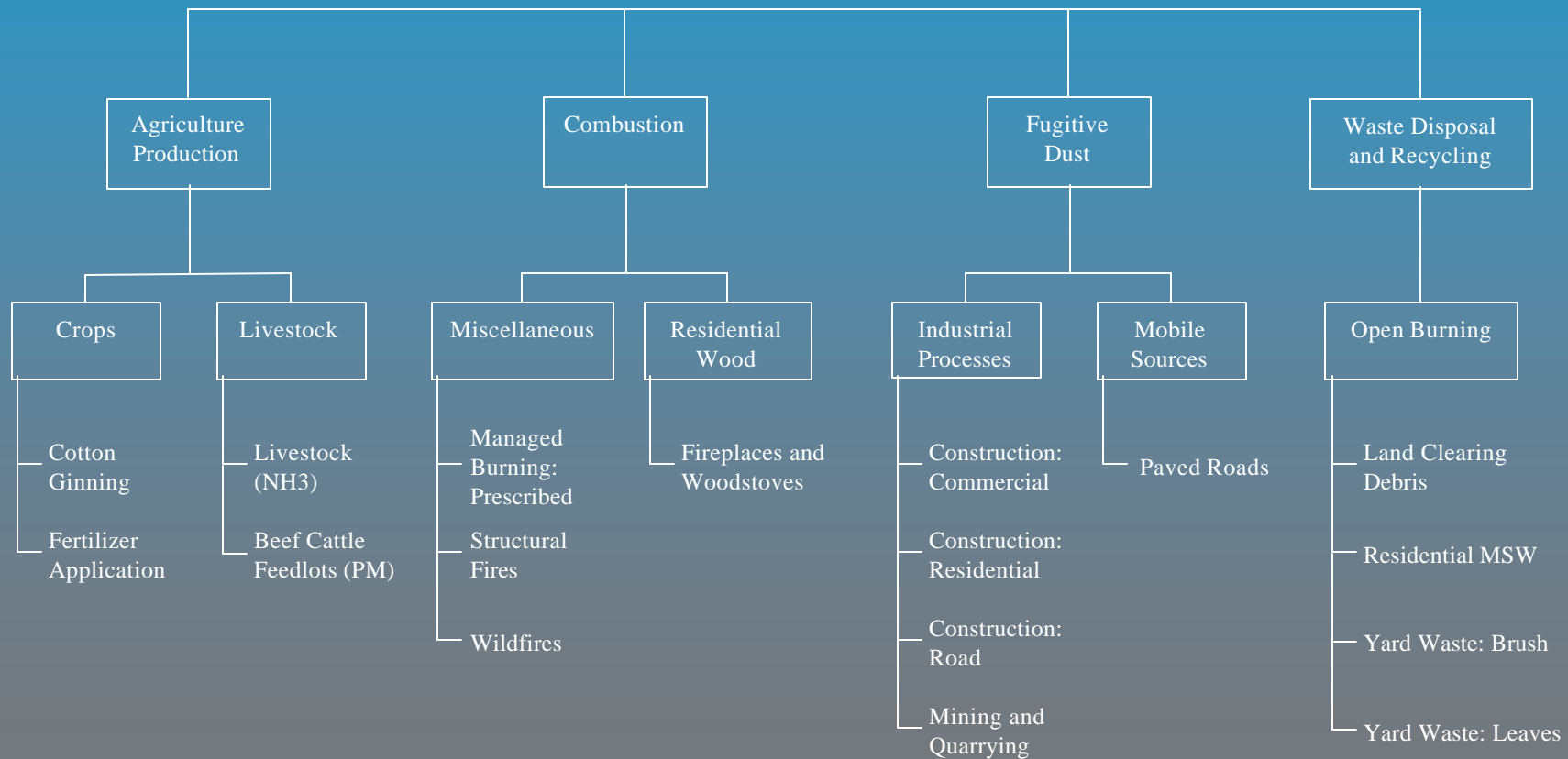
Model Development

- BETA Version
 - Currently in the testing phase.
 - 37 SCC's in 17 area source categories.



Model Development (cont'd)

Source Categories in ASEM



Model Development (cont'd)

■ Temporal Coverage

- ASEM estimates annual emissions.
- Regional modeling preprocessors can be used to provide daily, hourly or monthly estimates.

■ Geographic Coverage

- State and county level.
- Emissions can be summed to regional or national level.



Model Operation

■ Cases

- Cases are the “building blocks” for developing an emissions inventory using ASEM.
- A case is a set of user-provided input parameters that enable the model to estimate emissions for one source category.
- Cases can be created or modified using the ASEM Case Wizard.



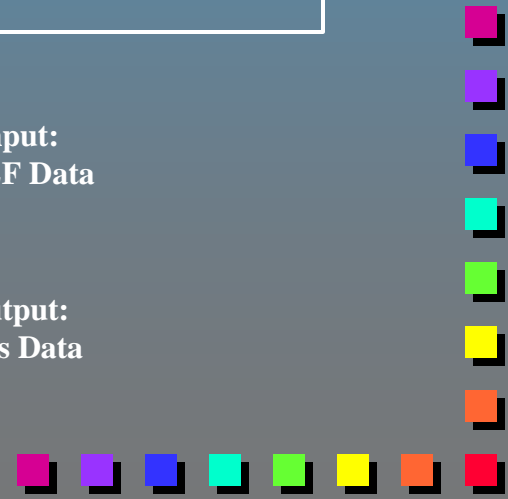
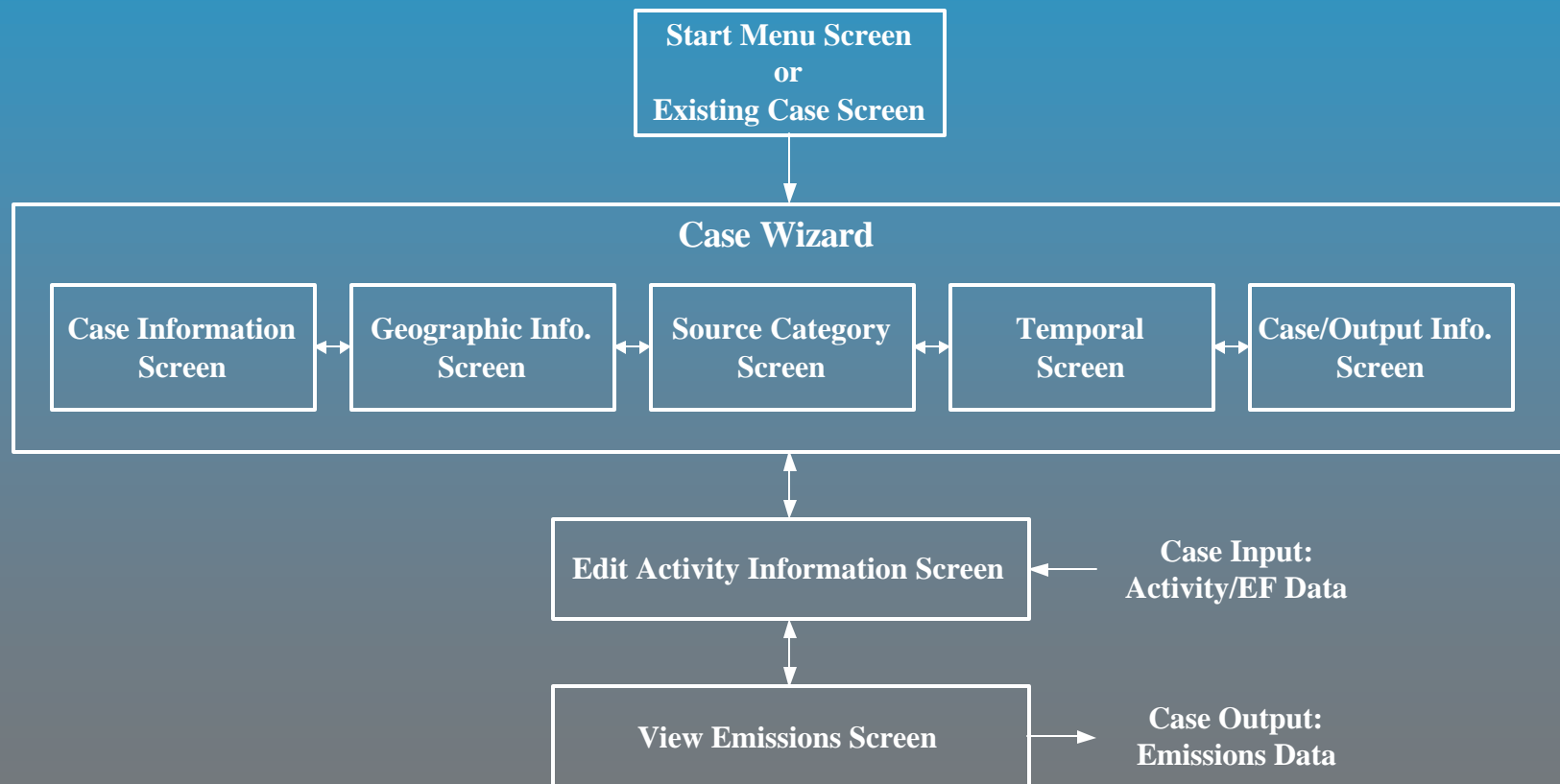
Model Operation (cont'd)

- For each case, the user may:
 - Use ASEM default activity and emission factor data to replicate 1999 NEI Version 2.0 emissions estimates.
 - Supply own activity and emission factor data and/or modify control levels, rule effectiveness, or rule penetration to calculate new emissions estimates.



Model Operation (cont'd)

ASEM Flow Diagram



Model Operation (cont'd)

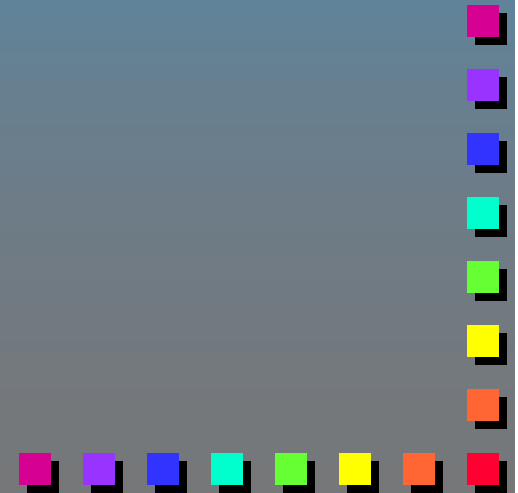
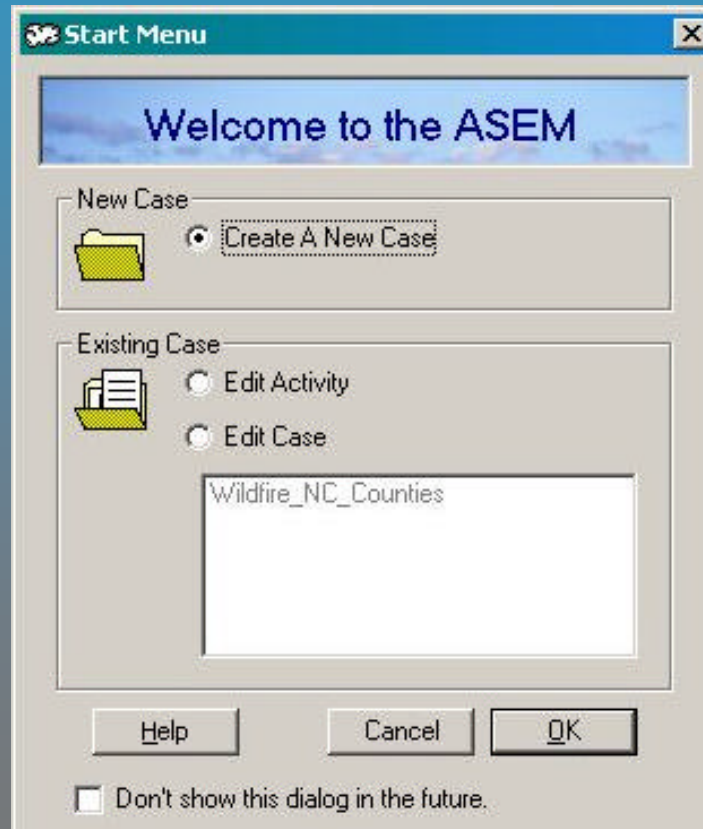
■ Start Menu Screen

- Appears after an introductory “splash” screen when ASEM is first started.
- Provides the option to either create a new case or edit an existing case.
- Once a selection has been made, this screen will not be shown again and cases must be manipulated using the Existing Case Screen.



Model Operation (cont'd)

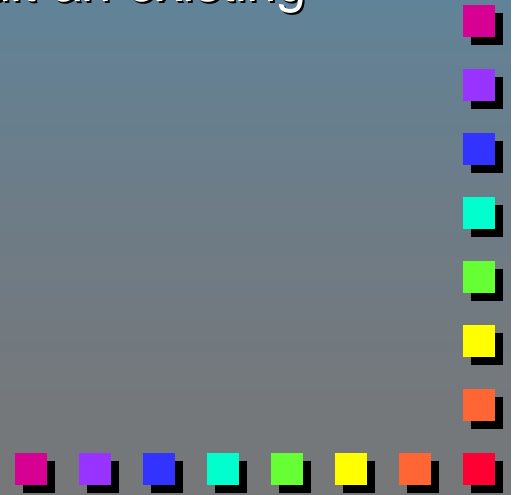
Start Menu Screen



Model Operation (cont'd)

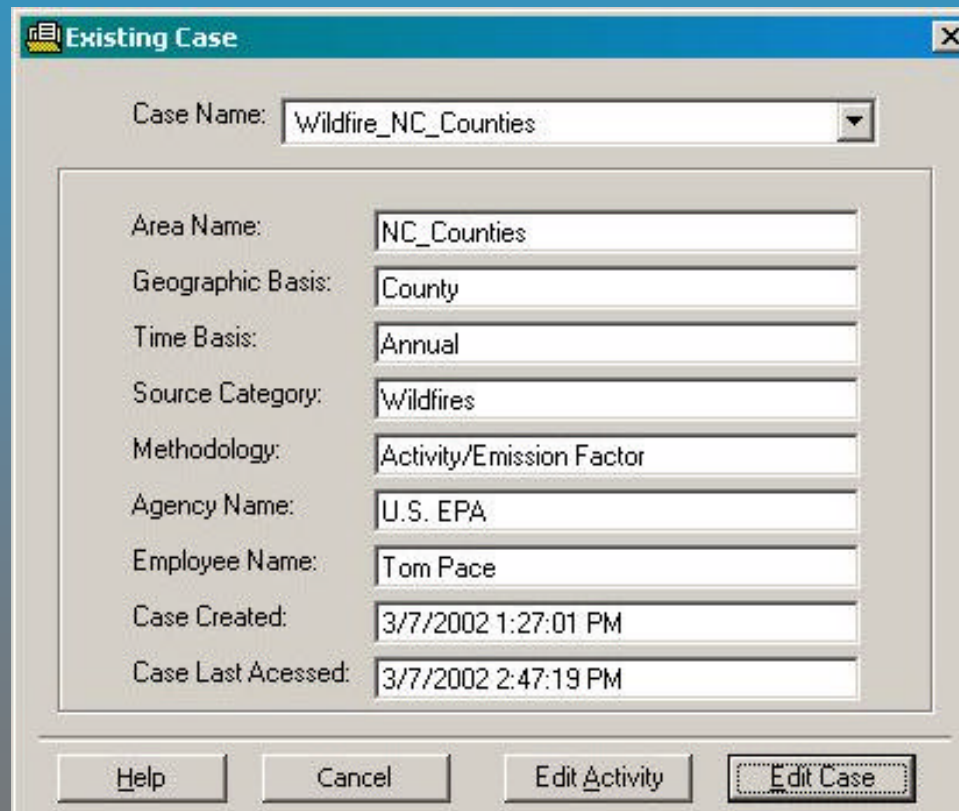
■ Existing Case Screen

- Opened from the main menu toolbar at the top of the main ASEM window, similar to that of most windows-based software.
- Provides the option to either create a new case or edit an existing case.



Model Operation (cont'd)

Existing Case Screen



Existing Case

Case Name: Wildfire_NC_Counties

Area Name: NC_Counties

Geographic Basis: County

Time Basis: Annual

Source Category: Wildfires

Methodology: Activity/Emission Factor

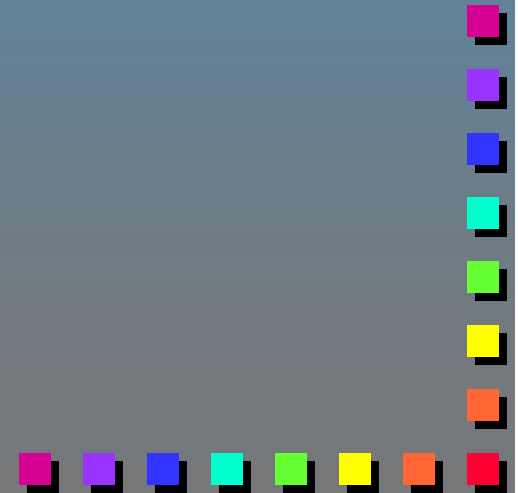
Agency Name: U.S. EPA

Employee Name: Tom Pace

Case Created: 3/7/2002 1:27:01 PM

Case Last Accessed: 3/7/2002 2:47:19 PM

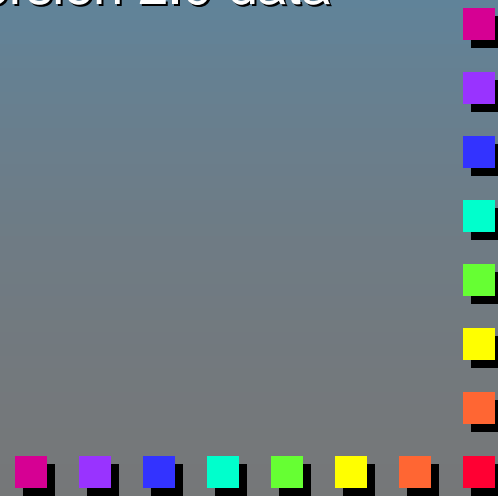
Help Cancel Edit Activity Edit Case



Model Operation (cont'd)

■ Case Wizard: Case Information Screen

- Data elements on this screen are used to specify information about the case (emission inventory) preparer.
- The information on this screen is used for the NIF Version 2.0 data export feature to populate mandatory values.




Model Operation (cont'd)

Case Wizard: Case Information Screen

Case Wizard: Wildfire_NC_Counties

Introduction | **Case Information** | Geographic Info | Source Category | Temporal | Case/Output Info



All data elements on this tab conform to the field lengths specified for NEI Input Format (NIF) version 2.0. Data entered on this tab will be used when exporting this case to the NIF.

Agency Name:

Employee Name:

Employee Phone:

Employee Email:

Case Description (Optional):

Help | Cancel | < Back | Next > | Save As/Finish | Save/Finish



Model Operation (cont'd)

■ Case Wizard: Geographic Information Screen

- Used to specify a geographic grouping name for the case.
- The geographic grouping name is associated with a specific State/county grouping for which the user wants to calculate emissions estimates.
- One State may be specified for each case, and any number of counties in that State may be selected to form the grouping.




Model Operation (cont'd)

Case Wizard: Geographic Info. Screen

Case Wizard: Wildfire_NC_Counties

Introduction | Case Information | **Geographic Info** | Source Category | Temporal | Case/Output Info

 Estimation Basis:

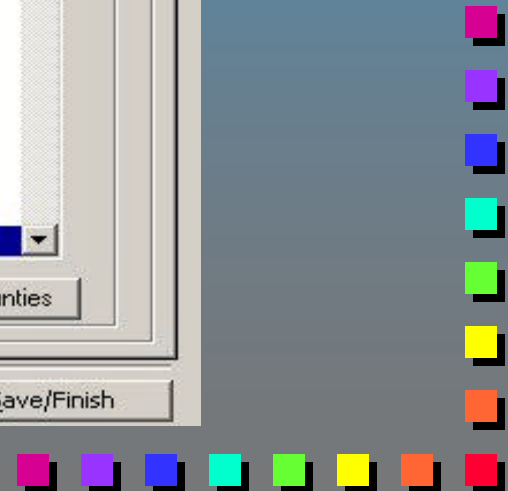
Geographic Grouping Name (User Defined): [Required]

States

- Maryland
- Massachusetts
- Michigan
- Minnesota
- Mississippi
- Missouri
- Montana
- Nebraska
- Nevada
- New Hampshire
- New Jersey
- New Mexico
- New York
- North Carolina

Counties

- Alamance Co, NC
- Alexander Co, NC
- Alleghany Co, NC
- Anson Co, NC
- Ashe Co, NC
- Avery Co, NC
- Beaufort Co, NC
- Bertie Co, NC
- Bladen Co, NC
- Brunswick Co, NC
- Buncombe Co, NC
- Burke Co, NC
- Cabarrus Co, NC



Model Operation (cont'd)

■ Case Wizard: Source Category Screen

- Used to specify the source category and pollutants for case by selecting from drop down lists.
- ASEM BETA uses the default EPA methodology for each source category to calculate emissions estimates.
- Only pollutants which have emission factors for the specified source category will be available. Available pollutants include: CO, NH₃, NO_x, PM₁₀, PM_{2.5}, SO₂, VOC and 68 HAPs.




Model Operation (cont'd)

Case Wizard: Source Category Screen

Case Wizard: Wildfire_NC_Counties

Introduction | Case Information | Geographic Info | **Source Category** | Temporal | Case/Output Info



Categories

General Category:

Sub-Category:

Specific Category:

Methodology

Default:

Pollutants

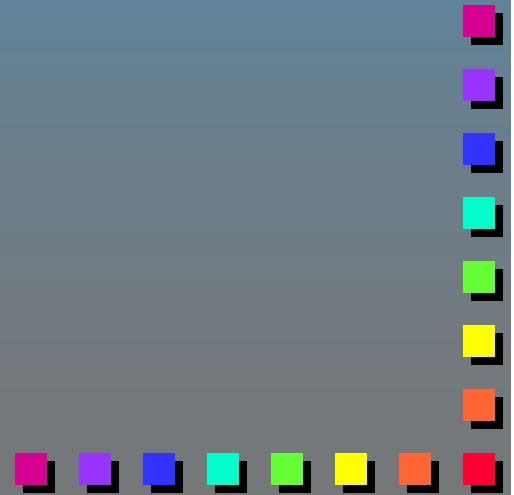
<input checked="" type="checkbox"/> CO	<input checked="" type="checkbox"/> PM-25
<input checked="" type="checkbox"/> NOx	<input checked="" type="checkbox"/> SO2
<input checked="" type="checkbox"/> PM-10	<input checked="" type="checkbox"/> VOC



Model Operation (cont'd)

■ Case Wizard: Temporal Screen

- Used to specify the emission inventory year.
- The temporal allocation time basis for ASEM BETA is annual.




Model Operation (cont'd)

Case Wizard: Temporal Screen

Case Wizard: Wildfire_NC_Counties

Introduction | Case Information | Geographic Info | Source Category | Temporal | Case/Output Info



For all source categories, the default data provided in ASEM will be for 1999 no matter what year is specified as the inventory year. The inventory year should only be changed when you choose to project the emissions for a year other than 1999 by changing the activity on the "Edit Activity Information" screen.

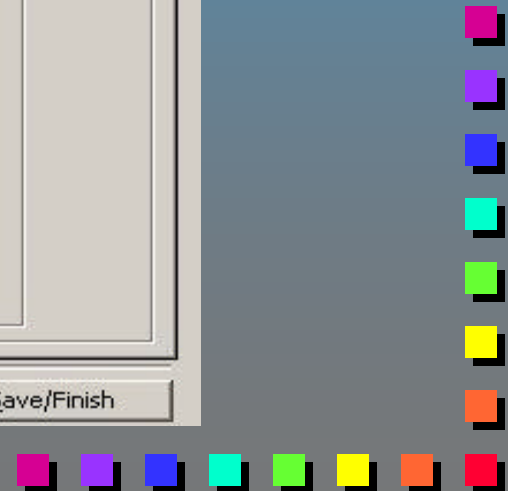
Year

Inventory Year

Temporal Allocation

Time Basis

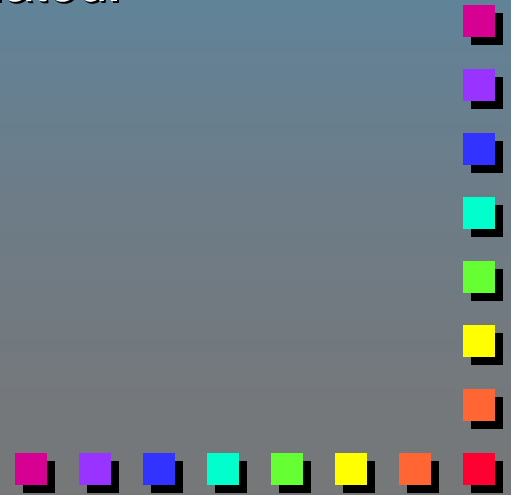
Help Cancel < Back Next > Save As/Finish Save/Finish



Model Operation (cont'd)

■ Case Wizard: Case/Output Information Screen

- Used to specify the name of the case.
- Also used to create or select the table (in the underlying data base) where emissions data is to be stored once it is calculated.




Model Operation (cont'd)

Case Wizard: Case/Output Info. Screen

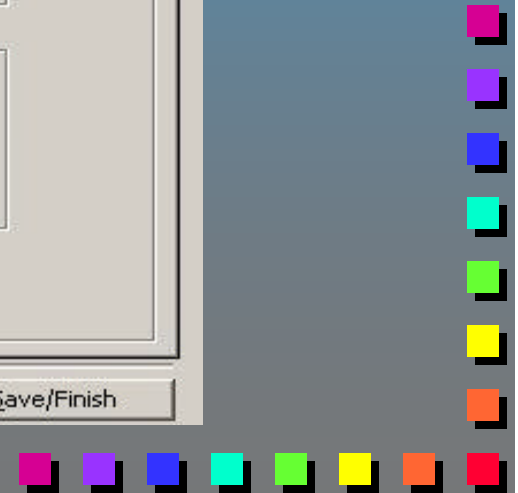
Case Wizard: Wildfire_NC_Counties

Introduction | Case Information | Geographic Info | Source Category | Temporal | Case/Output Info



Case Name

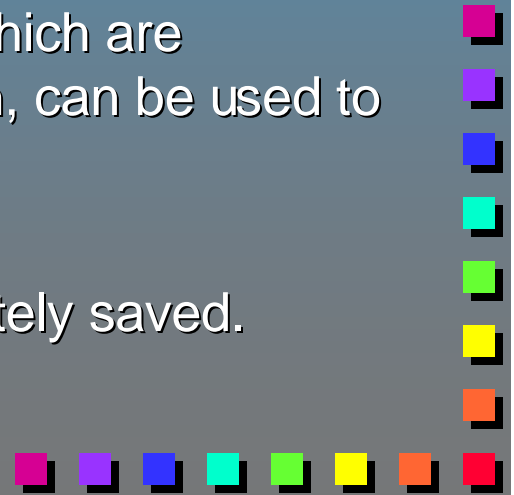
Output Data is Stored In Table...



Model Operation (cont'd)

■ Edit Activity Information Screen

- Allows the user to view and modify the activity data and emission factors and/or control level, rule effectiveness, or rule penetration data for which emissions estimates are to be calculated.
- Both the Find/Replace tool and the Import feature, which are accessible from the toolbar on the right of the screen, can be used to modify the data on the screen.
- Any changes to the data on this screen are immediately saved.



Model Operation (cont'd)

Edit Activity Information Screen

Edit Activity Information

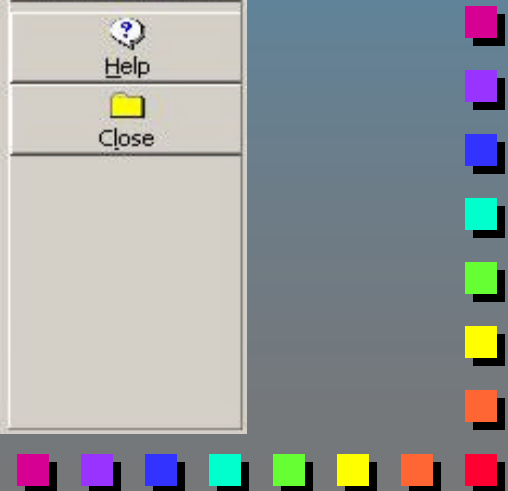
Wildfires

	FIPS State	FIPS County	SCC	Pollutant	Activity 1	Activity 2	Activity 3	Ac
▶	37	001	2810001000	NO _x	9.75E+01	9.00E+00	5.00E-04	
	37	001	2810001000	PM-10	9.75E+01	9.00E+00	5.00E-04	
	37	001	2810001000	PM-25	9.75E+01	9.00E+00	5.00E-04	
	37	001	2810001000	SO ₂	9.75E+01	9.00E+00	5.00E-04	
	37	001	2810001000	VOC	9.75E+01	9.00E+00	5.00E-04	
	37	001	2810001000	CO	9.75E+01	9.00E+00	5.00E-04	
	37	003	2810001000	PM-25	7.16E+01	9.00E+00	5.00E-04	
	37	003	2810001000	SO ₂	7.16E+01	9.00E+00	5.00E-04	
	37	003	2810001000	PM-10	7.16E+01	9.00E+00	5.00E-04	
	37	003	2810001000	NO _x	7.16E+01	9.00E+00	5.00E-04	
	37	003	2810001000	CO	7.16E+01	9.00E+00	5.00E-04	
	37	003	2810001000	VOC	7.16E+01	9.00E+00	5.00E-04	
	37	005	2810001000	CO	5.56E+01	9.00E+00	5.00E-04	
	37	005	2810001000	NO _x	5.56E+01	9.00E+00	5.00E-04	
	37	005	2810001000	PM-10	5.56E+01	9.00E+00	5.00E-04	
	37	005	2810001000	PM-25	5.56E+01	9.00E+00	5.00E-04	
	37	005	2810001000	SO ₂	5.56E+01	9.00E+00	5.00E-04	
	37	005	2810001000	VOC	5.56E+01	9.00E+00	5.00E-04	

Sort By: FIPS County SCC Pollutant

Navigation: [Home] [Left] [Right] [End]

Buttons: Show Emissions, Edit Case, Import, Find/Replace, Allocation, Output Location, Help, Close



Model Operation (cont'd)

■ View Emissions Screen

- Invoking this screen causes emissions estimates to automatically be calculated and displayed.
- Emissions data may be exported out of ASEM using the Data Export and the NIF 2.0 Export features.
- Both export features allow the data from multiple cases to be combined when exporting (as long as the cases are for the same State).



Model Operation (cont'd)

View Emissions Screen

The screenshot shows a software window titled "View Emissions" with a table of data and a sidebar of controls. The table has columns for FIPS State, FIPS County, County, SCC, Pollutant, Emissions (tons), CE (%), RE (%), RP (%), Emission Factor, and Time Basis. The first row is highlighted in blue. The sidebar contains buttons for Edit Activity, Edit Case, Data Export, NIF Export, Help, and Close. At the bottom, there is a "Sort By" section with radio buttons for FIPS County, SCC, and Pollutant.

FIPS State	FIPS County	County	SCC	Pollutant	Emissions (tons)	CE (%)	RE (%)	RP (%)	Emission Factor	Time Basis
37	001	Alam	2810001000	NOx	1.76	0	100	100	4	ANN
37	001	Alam	2810001000	PM-10	5.70	0	100	100	13	ANN
37	001	Alam	2810001000	PM-25	5.13	0	100	100	11.7	ANN
37	001	Alam	2810001000	SO2	0.07	0	100	100	0.15	ANN
37	001	Alam	2810001000	VOC	8.43	0	100	100	19.2	ANN
37	001	Alam	2810001000	CO	61.43	0	100	100	140	ANN
37	003	Alexa	2810001000	PM-25	3.77	0	100	100	11.7	ANN
37	003	Alexa	2810001000	SO2	0.05	0	100	100	0.15	ANN
37	003	Alexa	2810001000	PM-10	4.19	0	100	100	13	ANN
37	003	Alexa	2810001000	NOx	1.29	0	100	100	4	ANN
37	003	Alexa	2810001000	CO	45.09	0	100	100	140	ANN
37	003	Alexa	2810001000	VOC	6.18	0	100	100	19.2	ANN
37	005	Alleg	2810001000	CO	35.03	0	100	100	140	ANN
37	005	Alleg	2810001000	NOx	1.00	0	100	100	4	ANN
37	005	Alleg	2810001000	PM-10	3.25	0	100	100	13	ANN
37	005	Alleg	2810001000	PM-25	2.93	0	100	100	11.7	ANN
37	005	Alleg	2810001000	SO2	0.04	0	100	100	0.15	ANN
37	005	Alleg	2810001000	VOC	4.80	0	100	100	19.2	ANN
37	007	Anso	2810001000	CO	111.35	0	100	100	140	ANN

Future Model Enhancement Plans

(Subject to Funding Restrictions)

- Upon completion of the BETA review, enhancements will be made based on feedback.
- Addition of area source categories to account for 90 percent of fine PM emissions.

