

NMIM Training

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Additional Credits

- Dave Brzezinski—roaming assistance
- Gary Dolce (TRPD)—slides dealing with SIP, Conformity, and Retrofit Guidance.

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Course Objectives

- Install NMIM (Done—Congratulations!)
- Run NMIM from the GUI
- View and post-process output
- Edit, save, and modify Run Specifications
- Simulate a Fleet
- Run a Retrofit program

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Course Objectives (cont.)

- Along the way, you will learn a little about how NMIM works
- Because NMIM is a little complicated and not idiot proof, you need to understand a little of how it works in order to troubleshoot it and look at its output critically.

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Other topics, if time/demand, e.g.:

- Modify/customize the NMIM County Database
- Run NMIM from the command line
- Configure NMIM
- Read NMIM's diagnostic output
- Look at the SharedWork Folder
- Run NMIM standalone and in distributed modes

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Logistics

- Hours: 8:00 AM - 12:00 PM
- One break
- Please turn off or set pagers and cell phones on vibrate
- If you need to talk on your cell phone, please leave the room.

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Logistics (cont.)

- For the hands-on exercises, I'll do it, then we'll walk through it together.
 - Work together – you'll learn more.
 - If you finish an exercise, please help others who are having trouble.
 - Ask questions if you get stuck.
 - I'll be here tomorrow and Wednesday morning.

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Expected Preparation

- Software installed
- Basic familiarity with the Windows operating system
 - How to start a command prompt
 - How to use Windows Explorer
- How to use Notepad or another text editor
- Some familiarity with MOBILE6 and NONROAD

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Questions

- Feel free to ask at any time--if you are confused, so are other people
- The answer may be
 - I'll cover that later
 - I don't know
 - Out of the scope

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Miscellaneous

- NMIM has bugs, some known.
 - See Handout "Potential Problems Running NMIM 2005"
 - See "NMIM User's Guide" on Help Menu
- I have run NMIM mostly to generate national monthly inventories for NEI and EPA rulemaking.
- I have also provided telephone support to people producing inventories for States and RPOs so I'm familiar with the kind of difficulties people run into.

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Miscellaneous (cont.)

- Download latest software and database:
<http://www.epa.gov/otaaq/models.htm>
- Important: subscribe to the mobile listserver to learn about updates, bugs, fixes in NMIM, MOBILE, and NONROAD: all are important.
- We won't be able to cover everything
- I'll be around for the rest of the week
- You can ask questions by phone or email

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Resources

- Handouts—These Slides
- Handout—Listserver notice "Potential Problems Running NMIM 2005"
- The NMIM User Guide is in the Help menu of the NMIM GUI
- NMIMInstall20060328\NMIMDocumentation
 - 420r05024.pdf — How NMIM Works
 - nmim_technical_memorandum_1104.pdf— Instructions for updating the NCD
 - VMT_Fractions.pdf — How to map the 8 M5 vehicle classes to the 28 M6 Vehicle Classes

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Resources (cont.)

- Readme folder in C:\mysql\data\NCD20060201— Database documentation
 - CountyDB.doc - Lists of tables and fields
 - CountyDB.pdf, CountyDB1.pdf – NCD Design Diagrams
 - CountyDB2.pdf – NMIM output database design diagram
 - NCD20060201Documentation.doc – Information about this version of the NCD
 - changelog.wpd – a running record of how the NCD has changed over time
- MOBILE listserver
- Email mobile@epa.gov
- C:\mysql\Docs—excellent documentation; includes a tutorial.
- NMIMInstall20060328\MySQLTools
 - "MySQL from an ACCESS mdb.doc"

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State of the software

- The most reliable functions are those we have used to produce the inventories we have generated for NEI, rulemaking.
- Post-Processing/Aggregate and Export menu
 - NIF3 production worked at state level for 2002 NEI
 - Questionable for very large databases—better off writing MySQL scripts
- Not idiot-proof—it helps to understand how it works
- See handout "Potential Problems Running NMIM 2005"

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What is NMIM?

- The **National Mobile Inventory Model**
 - a consolidated emissions modeling system for MOBILE6.2 and NONROAD2005
- Main use case:
 - national county-level inventories for the National Emission Inventory (NEI) and for rulemaking
- Combines a Java™ framework with MOBILE, NONROAD, and a national county database.
- Capable of stand-alone or distributed processing.

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What NMIM is not

- a complete GUI front-end for MOBILE and NONROAD.
- a replacement for MOBILE or NONROAD.
- a substitute for the complete reworking of MOBILE and NONROAD that is taking place in MOVES.

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What does NMIM do?

- Simplifies the process of creating national county-level inventories
 - Creates input files, runs MOBILE6.2 and NONROAD, and processes output to create inventories
- Includes capability to estimate emissions from user-specified fleets
- Includes capability to estimate reductions from diesel retrofit projects based on user inputs
 - Can be used for general inventory development or just to calculate reductions from retrofit projects

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NMIM in SIPs and conformity analyses

- NMIM incorporates MOBILE6.2 and NONROAD2005, EPA's current approved models for SIP and conformity purposes
 - NMIM can be used to create inventories for SIPs and conformity analyses
- NMIM is not considered a new motor vehicle emissions factor model or nonroad equipment emissions model
 - A new conformity grace period was not started for NMIM
- Use of NMIM for inventory creation is optional
 - States can continue to use MOBILE6.2 and NONROAD2005 without using NMIM to create input files and process results

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Limitations of NMIM for SIPs and conformity analyses

- Some states may already be using more sophisticated inventory processing methods
 - Continue to use those methods rather than NMIM
- Need to verify that the most recent and best available local information is incorporated in NMIM database
 - Must modify the database to incorporate newer or better local data
- Most recent VMT in NMIM is 2002
 - Must include estimates or projections of VMT for any later years that are included in your SIP or conformity analysis

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NMIM County Database (NCD)

- Single consistent data source
- Hourly temperatures, relative humidity (real and 30-year averages)
- Fuel properties, altitude, barometric pressure, stage 2, VMT, VMT monthly allocation, etc.
- References to MOBILE and NONROAD external files
- ExternalFiles folder
- Updated with state inputs

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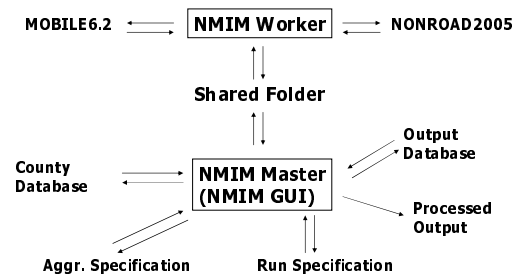
NCD Warnings

- Don't run an onroad inventory for years after 2002 unless you supply VMT.**
 - 2050=2002 VMT, and all years in between.
- See NCD20060201Documentation.doc in C:\mysql\data\NCD20060201\Readme
- For SIP and Conformity analyses, do not rely on the NCD, but develop your own data.

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How NMIM Works



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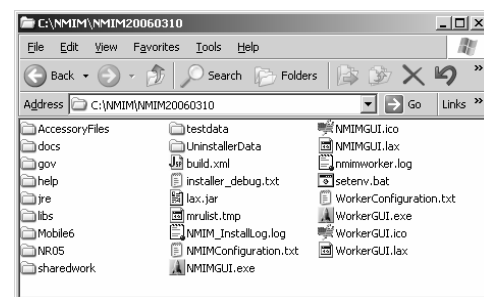
There are Three NMIM Configuration Files

- NMIMConfiguration.txt
 - Default NCD
 - Path to SharedWork folder
- WorkerConfiguration.txt
 - Paths to MOBILE and NONROAD
 - Path to SharedWork folder
- Setenv.bat
 - Paths to Java & its libraries

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NMIM Root Folder



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Exercise 1: Start Master and Worker Using Icons

- Start the Master and Worker using the desktop icons.
 - Notice the console window associated with each.

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Exercise 2: Create, Save, and Reload a RunSpec

- Start Master
- Description - Enter a brief description (optional)
 - This description will appear only in the RunSpec.
 - Do not use the five XML reserved characters: ` ` < > &
- Geography – experiment with different options, but select Wake County, North Carolina
- Time – experiment with this screen, then select 2002, click Add, check July
- Vehicles/Equipment
 - Experiment, then select:
 - Onroad - select LDGV
 - Offroad - select Diesel Construction

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Exercise 2: RunSpec (cont.)

- Pollutants – Experiment, then select NOx, HC as VOC
- Advanced – Important to define your input database
 - County Database Server: leave blank
 - Database: NCD20060201
- Output
 - Geographic Representation - Select County
 - General Output - name database "test1"
- Save RunSpec -
 - Suggestion: Make a directory: RunSpecs
 - Suggested RunSpec name: test1.nrs
- Close RunSpec (File,Close)
- Reload RunSpec (File, Open)—are your saved choices still there?

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Exercise 3: Execute

- Select "Action" from top-level menu
- Click Execute
- Start Worker
- Run is complete when navigation list returns
- Select Action, NMIM Run Error Log—any errors?

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Exercise 4: Where is the output?

(Introduction to NMIM's MySQL databases.)

- Open MySQL Query Browser, a handy utility for examining MySQL databases.
- Find your output database: test1
- What are the four tables?
 - How many records are in each table?
 - What are the fields of each table?
- Look at nmimpollutantoutput by double clicking on it. Note cryptic SCCID, PollutantcodeId and EmissionTypeId
- Look at nmimvmtoutput
- How to decode SCCID, etc. using NCD20060310

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Exercise 5: Post Processing, normalized (1 poll./line)

- Select "Post Processing" from top-level menu.
- Click Aggregate and Export
- Choose Database Test1
- Choose Output Format: NMIM native, normalized
- Choose Output: Tab-Delimited ASCII Text File, Path: Test1Native.txt
- View using Excel. Note that cryptic fields have been decoded.

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Exercise 6: Post Processing wide (all polls. on each line)

- Try Output Format: Wide Tables
- Choose Output: Tab-Delimited ASCII Text File, name output\Test1Wide.txt
- Save AgSpec: suggested name: test1Wide.nas
- View using Excel
- Overwrites, does not append
- Bug: wide doesn't decode EmissionTypeId. (1 exh, 2 evap, 3 tire, 4 brak, 5 refueling)
- Reload AgSpec.

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Exercise 7: Post Processing NIF3

- Try Output Format: NIF3
- Click "Get Additional Data" --Fill in
- (See sample on next slide)

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Exercise 7 (cont.):

Organization Name:	U.S. EPA/OTAG
Contact Person:	Harvey Michaels
Contact Phone:	734-214-4184
Telephone Type:	Office
Electronic Address:	h.aels.harvey@epa.gov
Electronic Address Type:	email
Affiliation Type:	report certifier
Submittal Flag:	
Transaction Type:	00
Incremental Submission #:	1
Reliability Indicator:	0.0
Transaction Comments:	EIOCH2002v2_Oct2004

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Exercise 7: NIF3 (cont.)

- Fill in NIF3 directory as NIF3test1
- Save as test1NIF3.nas
- Click OK
- Look at NIF3 output using Notepad (or other text editor)
 - Note 3 onroad, 4 NR, 4 refueling files (only OR)
- Overwrites, does not append

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Help Menu

- "About" will tell you your version of the software.
- NMIM User's Guide
 - You can print individual sections.
 - No, we don't have a stand-alone document.

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Modifying the NCD

- MySQL
 - Graphic tools for MySQL
 - MySQL Query Browser (QB)
 - MySQL Control Center (CC)
 - Structure and organization of the NCD
 - Adding VMT
 - Changing VMT

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MySQL

- The NMIM County Database is in MySQL
- NMIM Output is in MySQL
- Documentation on your hard drive:
c:\MySQL\Docs
- Web URL: www.mysql.com
- Worth understanding at least a little about it
- Put C:\mysql\bin in your path

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MySQL Query Browser

- A handy utility for examining MySQL Databases and tables
- Can modify individual entries in tables.
- MySQL scripts superior because
 - Can quickly modify many entries
 - Provide a record of what you did
- See installation ReadMe.doc for installation and startup.
- Supported by MySQL

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NMIM County Database (NCD)

- Tables are generally named in a way that suggests their primary key.
- Cryptic variables are decoded.
- Let's look.

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Exercise 12. Experiment looking at the NCD using Control Center or Query Browser

- Click the database NCD20060201
- Click tables
- Drag tables into panel to the left

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Structure of MySQL Databases

- C:\MySQL\data
- Each table consists of three files
 - .MYD - the data
 - .MYI - the index
 - .frm - the format
- So to copy a table you must copy three files.

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Exercise 13: Add 2005 VMT to the BaseYearVMT table

- a. Make a copy of the database.
- b. Find out what years have VMT.
- c. Create a text file with 2005 VMT.
- d. Write a MySQL script to import the text file into the BaseYearVMT table.
- e. Run the MySQL script.

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Ex. 13a: Make a copy of the NCD

- Copy NCD20060201 using Windows Explorer
 - Look in C:\mysql\data
- Rename the copy NCD20060201a
- Optional: Verify the copy exists using MySQLCC
 - Right click on Databases, Refresh
 - Verify that copy matches original
 - Table names, variables, number of records
- Optional: Verify using the command window
 - type `MySQL`
 - type `show databases;`
 - Type `use ncd20060201;`
 - Type `show tables;`

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Ex. 13b: What years have VMT?

- Use MySQLCC to look at variables in BaseYearVMT
- Open command window
 - Type `MySQL`
 - Type `use ncd20060201a;`
 - Optional: Type `describe baseyearvmt;`
 - Type `select distinct baseyear from baseyearvmt;`

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Ex. 13c: Create a BYVMT text file to import

- Create a folder: C:\NMIM\ChangeNCD
- Create an Excel spreadsheet (call it NewBYV.xls) in this folder
- Put in the correct headings
- Fill in the values for `vtype=1`
- To get values for RoadType, `mysql> select roadtype from hpmsroadtype;`
- Enter \N (for null) for DataSourceId
- Save as tab-delimited text
- You could have created this text file with FoxPro, Access, Oracle, SAS, etc., etc.

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Ex. 13d: Write a MySQL script to import the text file into the BaseYearVMT table

- In the ChangeNCD directory, create a new text file, and name it LoadBYV.sql
- This script will
 - add records if the primary key does not exist.
 - change records if the primary key does exist.
- It will work for every single table in the NCD.

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Ex. 13d: Write the script (cont.)

- In the script below, notice that
 - We use a complete path for the infile
 - Forward slashes separate directories
 - The order of variables must exactly match the order in the text file. The heading line in the text file is ignored.
 - "#" indicates a comment

```
# MySQL Script to alter BaseYearVMT table
use ncd20060201a;
load data
infile 'c:/NMIM/NMIM20050311/changencd/NewBYV.txt'
replace
into table BaseYearVMT
ignore 1 lines
(BaseYear, VClass, RoadType, FIPSCountyId, FIPSStateId,
DataSourceId, VMT)
;
```

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Ex. 13e: Run the script to import the text file into the BaseYearVMT table

- Open a command window
- `cd c:\nmim\nmim20050311\changencd`
- Type `MySQL -vvv < loadbyvmt.sql`
 - The `-vvv` means verbose
 - Note that you can now run any MySQL script!

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Ex. 14: Query the database

- We already did this in exercise 11b
- Verify that our data got added:
 - MySQL>select * from baseyearvmt where baseyear=2005;

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Ex. 15: Export SCC table to a text file we can read into Excel, SAS, Oracle, etc.

- Write a script,
c:\nmim\nmim20050311\changeNCE\ExportSCC.sql
- ```
use NCD20050318;
select sccid, scc, segment, sccdesc
into outfile
'c:/nmim/nmim20050311/changeNCD/scc.txt'
from scc;
```

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## Ex 15 (cont.): Run the script

- From command prompt  
C:\nmim\nmim20050311\changeNCD>
- Type  
MySQL < exportscc.sql
- Open scc.txt using Excel

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