INDOT Air Quality Post-Processor Training Webinar

December 12, 2011

Agenda

- Project History and Background

- Post Processor Development
  - Methodology
  - Directory Structure
  - Input Files
  - Live Demonstration
  - Questions and Answers

- What's Next?

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Project History and Background

- INDOT contracted with WSA to provide air quality analysis with the following specific scope items:
    - Task 1: Develop MOVES Data Method
    - Task 2: Prepare MOVES2010 Input Data
    - Task 3: Run MOVES2010 & Calculate Emission Rates
    - Task 4: Develop Air Quality Post-Processor
    - Task 5: Calculate Emissions and Planning Support

- Work started on May 27th and is due to end fairly soon.

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Highlights of WSA Work

- Coordination w/ INDOT and MPOs

- Moves data methodology and data
  - Quality assurance of 2009 vehicle registration data
  - MOVES2010a input data and parameters
    - Terre Haute, Delaware County, La Porte County, Allen County, Lake and Porter Counties, Greene County, Jackson County

- Developed post processor, building on Indy MPO (Cambridge's) post processor, using Terre Haute as test case

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Post Processor Development

- Design philosophy focused on highest level of disaggregation

- Flexible enough to use on data from any model

- Meet the needs of the state and MPOs out into the foreseeable future
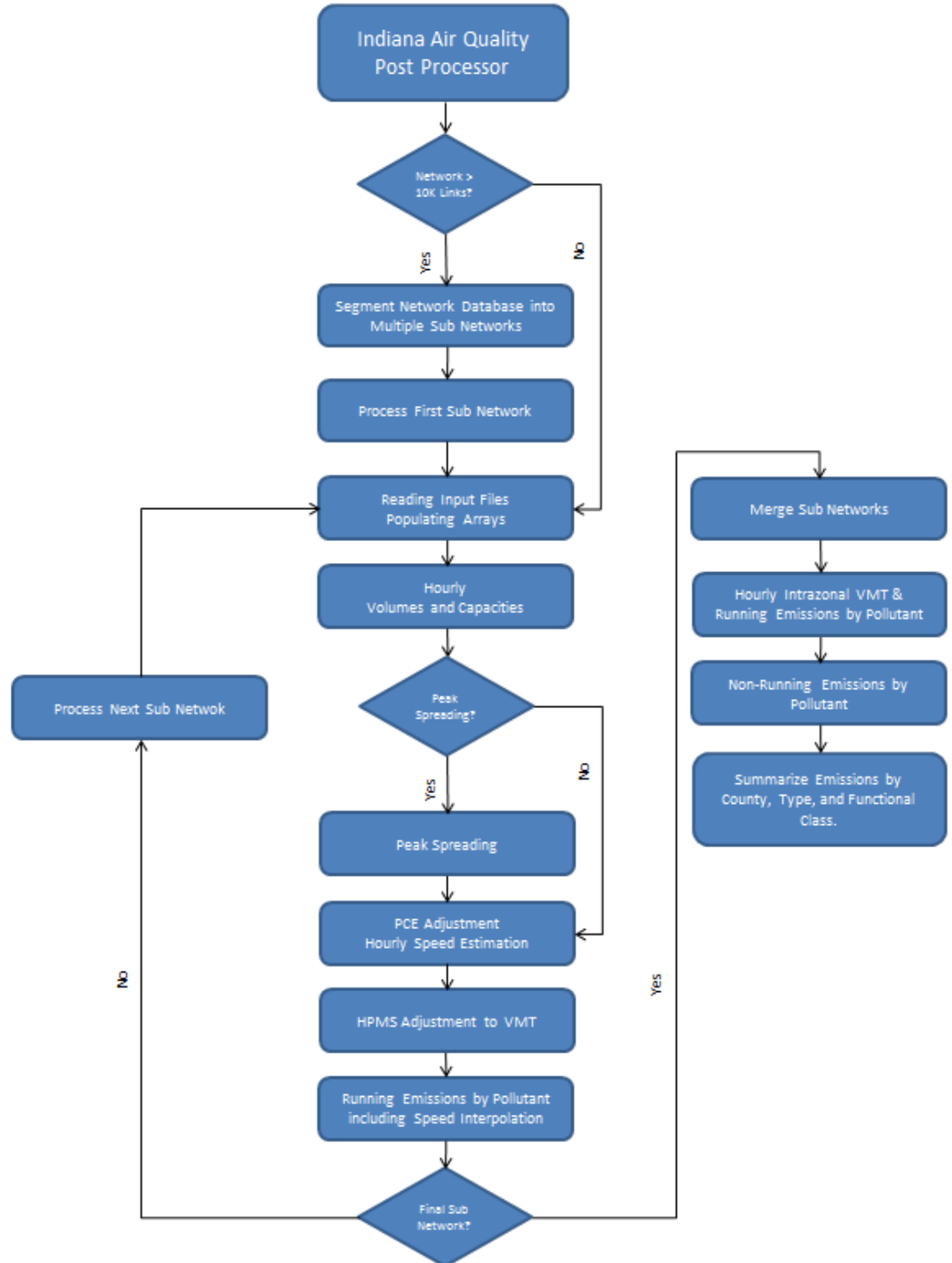
- Can run for Ozone or PM 2.5

Key Features

- Uses MOVES emissions rates in the CSV format as exported from MOVES

- Hourly volume and vehicle source type disaggregation from total daily volumes using INDOT traffic data

- Optional peak spreading model keeps hourly volumes to reasonable estimates

Key Features (cont.)

- Hourly speed model uses volume delay function to capture slower speeds during peak hours

- Emissions calculations reflect interpolated speed bin distributions developed from hourly average speeds as opposed to a single average bin

- Emissions summarized by functional class and county

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Flow Chart

Indiana Air Quality Post Processor

- Network > 10K Links?
  - Yes → Segment Network Database into Multiple Sub Networks → Process First Sub Network → Reading Input Files Populating Arrays
  - No → Reading Input Files Populating Arrays

Reading Input Files Populating Arrays → Hourly Volumes and Capacities → Peak Spreading?
- Yes → Peak Spreading → PCE Adjustment Hourly Speed Estimation
- No → PCE Adjustment Hourly Speed Estimation

PCE Adjustment Hourly Speed Estimation → HPMS Adjustment to VMT → Running Emissions by Pollutant including Speed Interpolation → Final Sub Network?
- No → Process Next Sub Netwok → Reading Input Files Populating Arrays
- Yes → Merge Sub Networks → Hourly Intrazonal VMT & Running Emissions by Pollutant → Non-Running Emissions by Pollutant → Summarize Emissions by County, Type, and Functional Class.

Directory Structure

- Parent Directory can be specified by user but default is C:\INDOT\AQPP\

- Folders:
    - "GISDK" – compiled interface
        - Scripts and interface images
    - "Model Files" – TDM outputs
    - "Master Inputs" – MOVES rates and other factors
        - Required folder name that requires specific files names within this folder. Do not change the input file names.

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Input Files

- Link Data – TransCAD fixed format binary table containing attributes from the travel demand model loaded highway network.

- Intrazonal Data – TransCAD fixed format binary table containing information on intrazonal vehicle-miles-traveled.

- Emissions Rates – Output data from MOVES.

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Link Data

- Data come directly from the travel demand model.

- Some post-processing is necessary to get the model data into the proper table format.

- Uniform table format makes it possible to apply the post-processor to any model in Indiana.

Link Data Fields

- LinkID
- Dir
- Length
- County
- HPMS_FC
- ROAD_TYPE
- AB_Alpha / BA_Alpha
- AB_Beta / BA_Beta
- AB_FF_Time / BA_FF_Time
- AB_CAP / BA_CAP
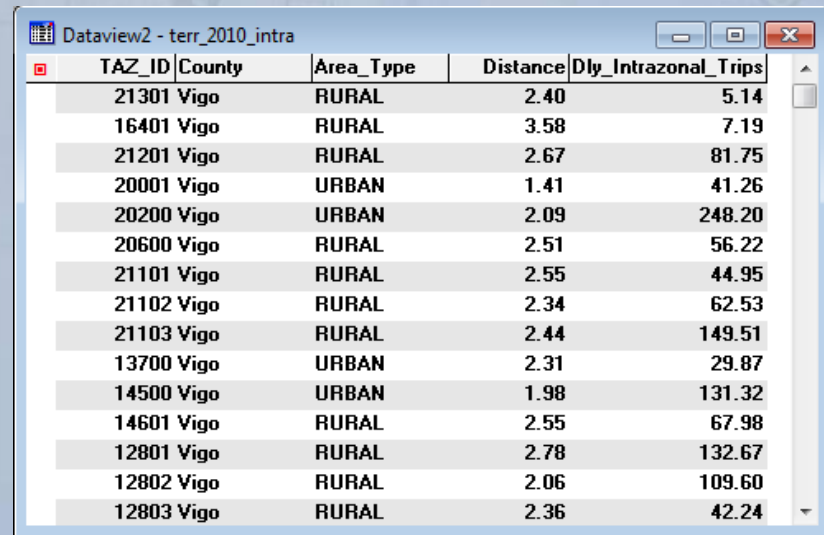- AB_Veh_Flow / BA_Veh_Flow

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Intrazonal Data

- Intrazonal VMT are used to account for local street traffic that never leaves a TAZ and as a result, never loads onto the highway network.

- Intrazonal VMT is not a standard output to most models so it can be calculated by multiplying intrazonal distances from a skims matrix with intrazonal volumes from an OD table.

Intrazonal Data Fields

- TAZ_ID
- County
- Area_Type
- Distance
- Dly_Intrazonal_Trips

TAZ_ID	County	Area_Type	Distance	Dly_Intrazonal_Trips
21301	Vigo	RURAL	2.40	5.14
16401	Vigo	RURAL	3.58	7.19
21201	Vigo	RURAL	2.67	81.75
20001	Vigo	URBAN	1.41	41.26
20200	Vigo	URBAN	2.09	248.20
20600	Vigo	RURAL	2.51	56.22
21101	Vigo	RURAL	2.55	44.95
21102	Vigo	RURAL	2.34	62.53
21103	Vigo	RURAL	2.44	149.51
13700	Vigo	URBAN	2.31	29.87
14500	Vigo	URBAN	1.98	131.32
14601	Vigo	RURAL	2.55	67.98
12801	Vigo	RURAL	2.78	132.67
12802	Vigo	RURAL	2.06	109.60
12803	Vigo	RURAL	2.36	42.24

Dataview2 - terr_2010_intra

Emissions Rates

- Direct export from MOVES.

- Data should be in comma-delimited text (CSV) format. This is a standard option when exporting MOVES output databases.

- Three rates files needed: rate per distance, rate per vehicle, and rate per profile.

Emissions Rates (cont.)

- Emission rates for MPO areas participating in the study will be provided.

- MPOs electing to develop rates on their own can still use the post-processor by plugging in their emission rates.

- Full documentation on data formats and naming conventions will be provided.

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Live Demonstration

What's Next?

- Provide support for MPOs testing methodology

- Close out project in January

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Questions?