Fugitive Road Dust Emission Inventories

OVERVIEW

The WRAP Mobile Sources Forum (MSF) funded a project to develop a mobile source emission inventory with regionally consistent methods. This emission inventory was used in a complete comprehensive emission inventory for Regional Haze Modeling efforts in the Western Region of the U.S. Previous road dust emission inventories by state were generated with inconsistent methods, and the goal of this work was to make the road dust emissions more consist across states. State and local air quality planning agencies were surveyed to provide estimates of paved and unpaved road activity (vehicle miles traveled); most agencies did not have reliable estimates of unpaved road activity. Road dust emissions account for 15-20% of coarse particulate matter, and less than 5% of fine particulate matter, and are not an important contributor to regional haze.

SIP DEVELOPERS AND POLICY MAKERS

- Inventory is a regionally consistent inventory (consistent approach and methods)
- Surveyed state/local agencies to get paved and unpaved VMT estimates
- Emissions developed on a regional basis are very uncertain, may not accurately characterize local situations, and should be used with caution for regulatory purposes
- Road dust emissions are not an important contributor to regional haze – work for NM Dust Pilot SIP (discussed separately) – shows large road dust emissions in close proximity to the Salt Creek Wilderness Class I area - based on more detailed local studies by NMED to refine estimates
- Transport and deposition of road dust emissions are only approximated in regional visibility modeling

STATE & LOCAL EMISSION INVENTORY DEVELOPERS

- Road dust emissions are difficult to estimate. Requires accurate paved and unpaved road VMT estimates, and local silt content data
- Daily average emissions can be estimated with good activity data and emission factors, but peak emissions are very difficult to characterize
- Transport factors must be considered

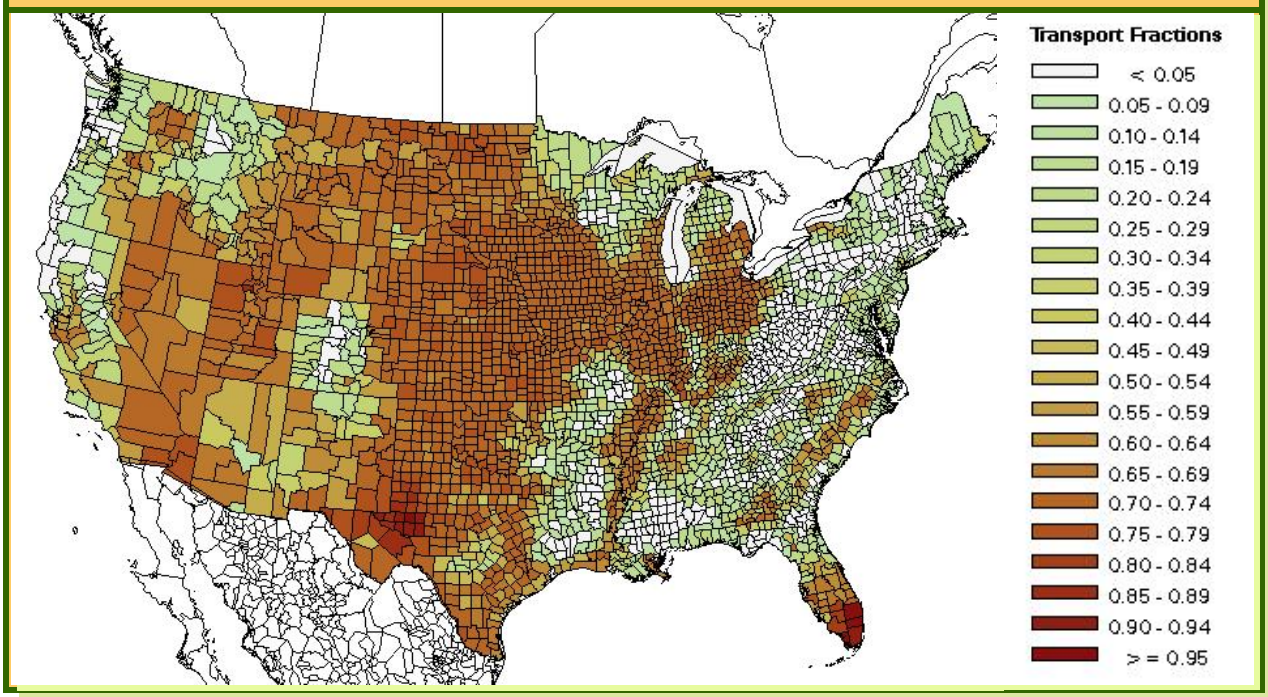
BACKGROUND

- **Prior to WRAP emissions work, road dust emissions estimates showed significant variation in adjacent counties, and EPA divided emissions by four to account for transport effects.**
- **In the first round of WRAP emissions work, goal was to develop regionally consistent emissions and to better account for transport**
- **In §309 modeling, removing *all* road dust had essentially no effect on visibility in Class I areas**
- **For the mobile source emission update project, minimal resources were allocated to updating road dust emissions**
- **Emission inventory scope:**
  - **Geographic resolution: WRAP states and tribes, county level**
  - **Temporal resolution: 2002 base year, 2008/2013/2018 future years, annual**

METHODS

- General approach: Emissions = vehicle miles traveled (VMT) * g/mi emission factor
- In the first round of WRAP emissions work, goal was to develop regionally consistent emissions and to better account for transport.
  - Average daily traffic volume (ADTV), a key parameter, was revised
  - State-level silt loadings were revised
  - Transport fractions were applied
- For the mobile sources update project, minimal resources were allocated to road dust emissions revisions.
  - Surveyed state and local agencies for 2002 base year VMT for paved and unpaved roads, and paved/unpaved road VMT growth rates
  - Most States were not able to provide information on unpaved road VMT, or guessed a fraction of paved VMT by county and roadway type
  - Montana used ADTV estimates for unpaved roads, including “off system” roads, to revise unpaved road VMT
  - Updated transport fractions were applied in SMOKE

TRANSPORT FRACTIONS APPLIED TO PAVED AND UNPAVED ROAD DUST EMISSIONS FOR 36KM GRID MODELING

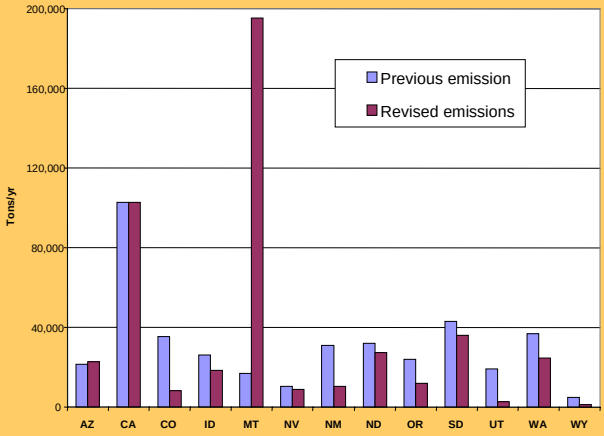


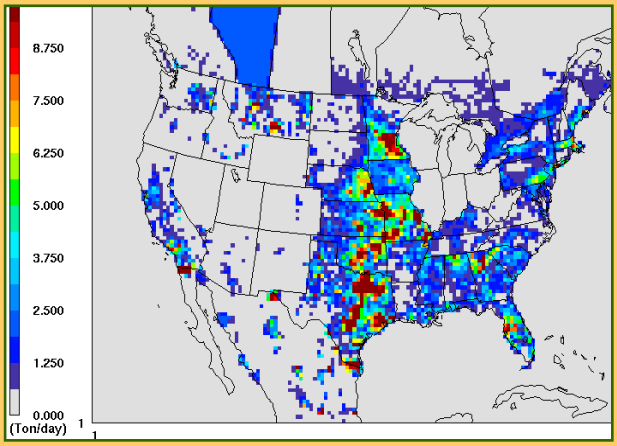
RESULTS

WRAP States road dust as a percent of total dust emissions

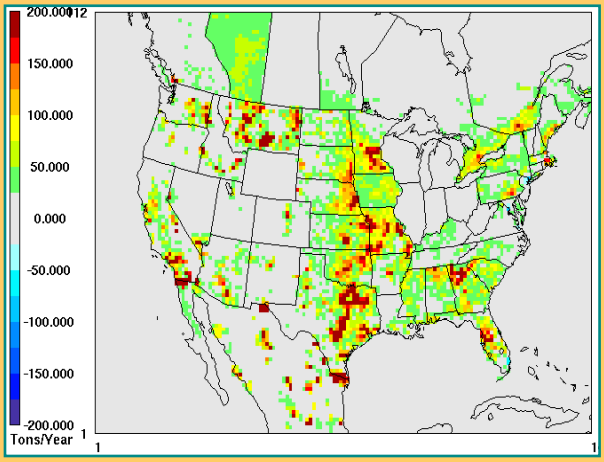
	PM2.5	PMC
2002	4%	16%
2018	1%	18%

Comparison of §309 and revised 2003 annual road dust PMC emissions





Spatial distribution of all RPO road dust PMC emissions, 2002 July weekday



Spatial distribution of all RPO annual road dust PMC emissions, Base18b – Base18a

Emissions summary files available on project web site:

Excel files with 2002 Paved and unpaved road dust emissions totals by state
Excel files with 2018 Paved and unpaved road dust emissions totals by state XLS

http://www.wrapair.org/forums/ef/UMSI/index.html

OTHER RELEVANT POINTS

EPA guidance on estimating paved and unpaved road dust emissions was updated in November 2006 (http://www.epa.gov/ttn/chief/ap42/ch13/)

In August 2007 EPA released Policy Guidance on the use of this AP-42 update for SIP development and transportation conformity (http://www.epa.gov/otaq/stateresources/transconf/policy.htm#ap-42)

RESEARCH / INFORMATION NEEDS

- Road dust emissions are difficult to estimate and can be highly uncertain. Peak emissions are even more difficult to estimate.
- Accurate paved and unpaved road VMT estimates are required, but most state/local agencies do not have estimates of paved vs unpaved VMT, nor traffic count data on unpaved roads to be able to estimate it.
- Emissions estimates are very dependent on silt content data, which can be very variable even in a small geographical area. Many local samples should be taken.

CONTACT INFORMATION

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