

# New EPA AP-42 Equation and Example of Measures with Continuing Increases in Benefit

## Air Quality TAC Meeting

February 24, 2011



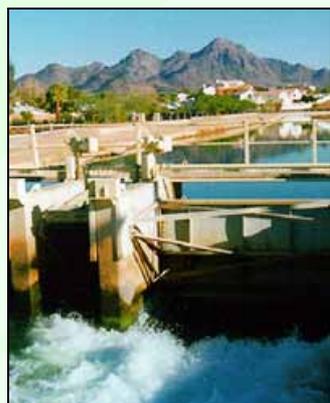


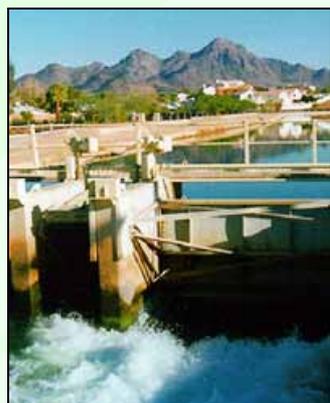
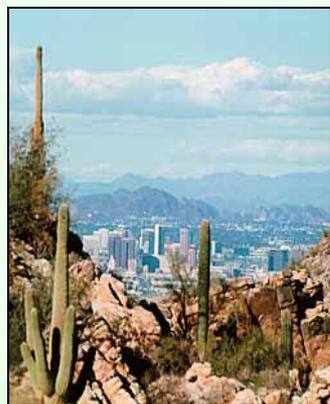
## New EPA AP-42 Paved Road Emissions Equation

- n Methods for developing Air Pollution Emission Factors are published in EPA's AP-42 document
  - ▀ Section 13.2.1 addresses particulate emission factors for vehicles traveling on paved roads
  - ▀ The AP-42 equation for paved roads (Nov 2006) used in the 2008 PEI for Maricopa County (June 2010):

$$E = k(sL/2)^{0.65} \times (W/3)^{1.5} - C$$

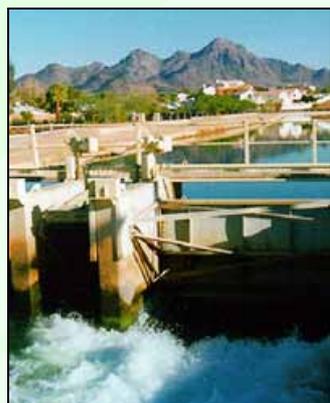
- where:
- E = particulate emission factor
  - k = particle size multiplier (from Table 13.2.1-1)
  - sL = road surface silt loading (grams per square meter)
  - W = avg weight of vehicles traveling on the road (tons)
  - C = emission factor for 1980's vehicle fleet exhaust, brake wear, and tire wear (from Table 13.2.1-2)





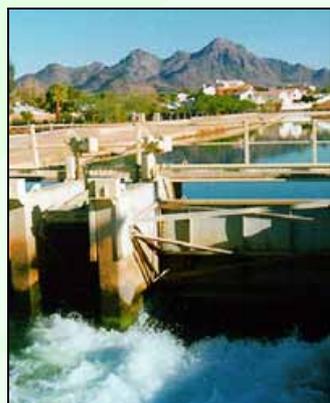
## New EPA AP-42 Paved Road Emissions Equation

- n In June 2010, EPA proposed two alternatives to the November 2006 AP-42 equation for paved roads:
  - ▀ With Speed Term:  $E = 6.79(sL/2)^{0.98} \times (W/3)^{0.53} \times (S/30)^{0.16}$
  - ▀ Without Speed Term:  $E = 4.10(sL/2)^{0.92} \times (W/3)^{0.91}$ 
    - where: E, emission factor in grams per vehicle mile traveled
    - sL, silt loading in grams per meter squared
    - W, average vehicle weight in tons
    - S, average vehicle speed in miles per hour
- n EPA used data from vehicle test runs to develop the alternative regression equations
  - ▀ 71 test runs with speeds; 93 test runs without speeds
  - ▀ 22 new test runs conducted by Midwest Research Institute (MRI) for the Corn Refiners Association
    - n Final report issued in May 2008



## New EPA AP-42 Paved Road Emissions Equation

- n EPA's public comment period on the alternative AP-42 equations closed August 31, 2010
  - MRI and Clark County expressed concern about higher PM-2.5 emissions
- n In September through December 2010
  - Statisticians checked EPA's calculations
  - EPA made several intermediate changes before releasing the final equation on January 13, 2011:
$$E = k(sL)^{0.91} \times W^{1.02}$$
  - MAG staff closely monitored EPA's intermediate changes to the AP-42 equation
    - n Conducted tests to determine if the new equation would allow the region to meet the lower transportation conformity budget in the 2000 Serious Area PM-10 Plan of 59.7 metric tons/day vs. 103.3 metric tons/day in the 2007 Five Percent Plan for PM-10



## New EPA AP-42 Paved Road Emissions Equation

- n Application of new EPA AP-42 equation reduces 2008 paved road emissions in the Maricopa County PM-10 nonattainment area by 61%
- n The decrease in paved road emissions reduces the total PM-10 in 2008 and the tons/year needed to meet the 5% reduction target in the Five Percent Plan
- n MAG has updated the paved road emissions and control measure benefits in the 2008 PEI using the new equation
- n The new AP-42 paved road equation will be used in developing the new Five Percent Plan to be submitted to EPA in early 2012

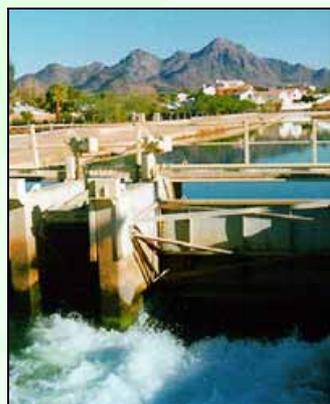


# New EPA AP-42 Paved Road Emissions Equation

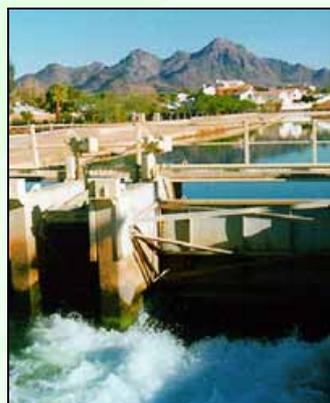
## n **Timeline**

- 1/13/11 - EPA released the new AP-42 equation for use in preparing State Implementation Plans
- 1/19/11 - Conformity finding issued by U.S. DOT on the amended FY2011-15 Transportation Improvement Program and Regional Transportation Plan
- 1/25/11 - ADEQ withdrew the Five Percent Plan
- 2/4/11 - EPA published a FR notice authorizing use of the new AP-42 equation for transportation conformity analyses
- 2/9/11 - EPA published a FR notice withdrawing the adequacy finding for the transportation conformity budget of 103.3 mt/day contained in the 2007 Five Percent Plan

- n With the new AP-42 equation, MAG expects to be able to meet the transportation conformity budget of 59.7 mt/day



## Example of Measures with Continuing Increases in Benefit



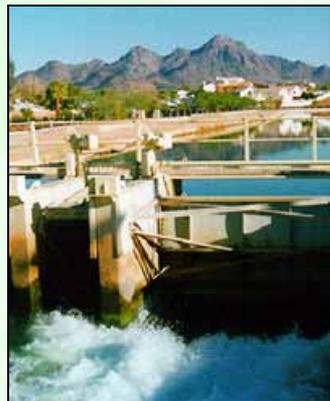
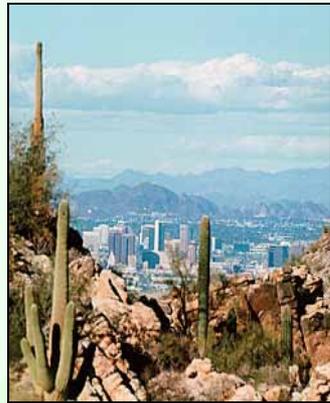
- n **Total Construction Activity in 2010**
    - l Source: MCAQD permitting records
    - l Permitted Acres = 21,310.9 (down 61% from 2007)
    - l Uncontrolled PM-10 Emissions = 23,951 tons/year\*
  - n **Rule 310 Measures in 2007 Five Percent Plan**
    - l Measures #2, 3, 9, 10, 11, 13, 16, 37, 38
    - l Increase in compliance with Rule 310 due to measures
      - n Past trends: 2008 = 80%, 2009 = 81%, 2010 = 82%
      - n Projected: 2011 = 83%, 2012 = 84%, 2013 = 85%
  - n **Reductions in PM-10 Emissions Due to Measures**
    - l 2011 -  $83\% \times 90\%^{**} \times 23,951 = 17,891$  tons/year
    - l 2012 -  $84\% \times 90\% \times 23,951 = 18,107$  tons/year
    - l 2013 -  $85\% \times 90\% \times 23,951 = 18,323$  tons/year
  - n **Continuing Increases in Benefits Due to Measures**
    - l 2011 – 74.7% Base Year in new Five Percent Plan
    - l 2012 – 75.6% +0.9% benefit in 2011-2012
    - l 2013 – 76.5% +1.8% benefit in 2011-2013
- \*Derived from the average emission rate in the 2008 PEI; in this example, emissions are assumed to remain constant between 2010 and 2013
- \*\*Effectiveness of controls at construction sites is assumed to be 90%



## Example of Measures with Continuing Increases in Benefit

### n **Issues with the Hypothetical Example**

- l **If construction sources represent 10% of total PM-10 emissions in the base year of 2011, the annual reduction for the Rule 310 measures would be less than 0.1% in 2012 and 2013**
  - n Compared with the 5% per year reduction required by Section 189(d) of the Clean Air Act
- l **In reality, construction emissions will not remain constant between 2010 and 2013**
- l **Most of the 53 control measures in the 2007 Five Percent Plan were implemented before Dec 31, 2010**
  - n Reduction credit for these measures will be assumed in the base year of 2011 for the new Five Percent Plan
  - n No increase in benefits can be assumed for most of these measures in 2012 and 2013
  - n As demonstrated by this example, it will be difficult to find measures that reduce PM-10 emissions by an additional 5% per year after 2011



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For more information

Contact:  
Cathy Arthur  
(602) 254-6300

[carthur@azmag.gov](mailto:carthur@azmag.gov)

