

## Case Study Number 7-1

### Estimating PM<sub>10</sub> and PM<sub>2.5</sub> Emissions from Unpaved Roads

#### *Exercise Objective*

This exercise will test your ability to apply the methodology used to estimate emissions from unpaved roads.

#### *Directions*

- Review the background information and data provided.
- Convene groups of 4-5 people.
- Answer the questions in the “Problem” section. These will guide you in your thinking to organize the data and then using it to estimate emissions.
- You will have 15 minutes to complete these tasks before the class reconvenes for discussion. Each group will be assigned specific questions and asked to present its results. Other groups will be asked if they agree or disagree with the findings.

#### *Background*

This case study involves developing a PM<sub>10</sub> inventory for unpaved roads in a hypothetical county. The method is to develop a local PM<sub>10</sub> inventory using county level data where available, and filling in the gaps with NEI default data.

#### *Available Data*

In this case study, daily vehicle miles traveled (VMT) data was provided by a local metropolitan planning organization, and VMTs were calculated using TransCAD GIS-based modeling software.

The emission factor input values for surface material silt content were obtained from samples taken on dirt roads in the county for which the inventory was conducted. Default values were used for the mean vehicle weight value and the surface material moisture content. The number of days that were exceeding the precipitation threshold of 0.01 inches was obtained from a local meteorological station. The inventory is a county level inventory with a temporal resolution of monthly.

The following table shows a summary of the data that are available for use in the case study.

VMT for the Month of June	2.964 million miles
Surface Material Silt Content	7.5 percent

***Problem***

You have been asked by your supervisor to develop an estimate of resuspended road surface material from unpaved roads in a county for the month of June. It is suggested that you approach the problem in the following manner.

1. How is the PM emission factor for unpaved roads calculated?
2. What emissions from unpaved roads are accounted for by the emission factor?
3. What is the basis of the activity data for unpaved roads?
4. What is the methodology for estimating PM<sub>10</sub> emissions from unpaved roads?
5. What is the value for the empirical constant in the emission factor equation?
6. What is the value for the default surface material moisture content?

7. How is mean vehicle weight considered in the estimation of PM emissions from unpaved roads?
  
8. What is your estimate for the PM<sub>10</sub> emission factor for unpaved roads in the hypothetical county?
  
9. What is your estimate of the PM<sub>10</sub> emissions from unpaved roads in the county for the month of June?
  
10. How would PM<sub>2.5</sub> emissions be estimated if this case study required that an estimate of PM<sub>2.5</sub> be developed?
  
11. How would annual PM<sub>10</sub> emissions from unpaved roads be calculated?

*Notes*

- Assume that the mean vehicle speed for vehicles on unpaved roads is 35 mph.
  
- Assume that PM emissions from vehicle exhaust, brake wear, and tire wear are equal to 0.2819 lbs/VMT.
  
- 1 lb/VMT = 281.9 g/VMT