

Case Study Number 7-2

Estimating PM₁₀ and PM_{2.5} Emissions from Residential Construction Activities

Exercise Objective

This exercise will test your ability to apply the methodology used to estimate PM₁₀ and PM_{2.5} emissions from residential construction activities.

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 hypothetical case study involves developing a PM₁₀ and PM_{2.5} inventory for residential construction at the county level in a PM nonattainment area. In this example, local officials provided data that represent actual housing unit starts for single unit houses, duplexes, and apartment buildings. NEI default values are used where local level data is not available.

Available Data

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

Data for Residential Construction Case Study

	Single Family Houses (No Basements)	Duplexes	Apartments
Housing Structure Starts (B)	251	2	44
Acres Disturbed per building (f)	0.184	0.184	0.07
Duration (m) (months)	6	6	12

In addition, the Thornthwaite Precipitation Evaporation Index for the soil in the county being inventoried is 6, and the dry silt content of the county is 40 percent.

Problem

You have been asked by your supervisor to develop an estimate of fugitive dust emissions from the residential construction activities in the past year. Furthermore, the emissions estimates need to be categorized by single-family homes, duplexes, and apartments. It is suggested that you approach the problem in the following manner.

1. What PM emission factors are applicable to residential construction activities?
2. What is the basis of the activity data for residential construction activities and how is it measured?
3. What is the methodology for estimating PM₁₀ and PM_{2.5} emissions from residential construction activities?

4. What is your estimate of the PM_{10} and $PM_{2.5}$ emissions from the residential construction activities in the county within the past year without accounting for rule effectiveness, rule penetration, soil moisture, and silt content?

5. What is your estimate of the PM_{10} and $PM_{2.5}$ emissions from the residential construction activities in the county within the past year accounting for control efficiency and rule penetration, but not for soil moisture and silt content?

6. What is your estimate of the PM_{10} and $PM_{2.5}$ emissions from the residential construction activities in the county within the past year accounting for control efficiency, rule penetration, and soil moisture?

7. What is your estimate of the PM_{10} and $PM_{2.5}$ emissions from the residential construction activities in the county within the past year accounting for control efficiency, rule penetration, and silt content (but not soil moisture)?

8. What is your estimate of the PM_{10} and $PM_{2.5}$ emissions from the residential construction activities in the county within the past year accounting for control efficiency, rule penetration, soil moisture, and silt content?

9. Explain the significance of the adjustments that are made for soil moisture content and silt content.

Notes

- Assume that none of the houses in the inventory area include basements
- Assume a Rule Effectiveness of 100%
- Assume a Control Efficiency of 50%
- Assume a Rule Penetration of 75%
- Assume PM_{2.5} is 20 percent of PM₁₀