Effects of Wind and Precipitation on Airborne Particulate Levels Around a Frac Sand Mine

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**Background**
- Frac sand mining and processing generate particulate matter including respirable crystalline silica.
- Different sources of pollution cause human health concerns associated with frac sand mining in Wisconsin.
- Many cardiovascular and respiratory symptoms are associated with the inhalation of particulate matter:
  - PM$_{2.5}$ and PM$_{10}$ levels, wind speed, wind direction and precipitation were measured at the Chippewa Sand mine in Bloomer, WI.
  - Chippewa Sands mine is located Northwest of our equipment.
  - Theoretically, wind direction will need to come from NW to SE to hit our equipment.

**Objective**
- Determine correlation between met data and PM$_{2.5}$ levels found.

**Methods**
- Collect data from meteorological station at the Bloomer site.
- Use software “Weather link” to download data from field unit to computer.
- Analyze data to determine correlation of the met data and other direct reading instruments.

**Results**
- Compared direct reading equipment levels to met data.
- Compared high PM$_{2.5}$ level days to:
  - Wind direction.
  - Rain rate.

- Compared lower levels of PM$_{2.5}$ to Wind directions and precipitation.
- Wind Directions and speeds don’t correlate with PM$_{2.5}$ levels.

**Conclusion**
- Measurements have found higher levels of PM$_{2.5}$ around plants, compared to regional levels.
- Wind speed and direction don’t play a role in the movement of particulates.
- Precipitation seems to lower PM$_{2.5}$.
- Monitoring for PM$_{2.5}$ and silica is essential.
- These particles are known to cause health impact in the long term.

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**References**
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