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| ole0 | Building Capture Study Protocol RequirementsAir Permitting, Monitoring and Modeling |

# MPCA Building Capture Study Protocol Requirements

MPCA Staff from Air Permitting, Monitoring, and Modeling have reviewed several proposed and completed building capture studies. Based on our review, various requirements were determined to best support an adequate study of building particulate emissions. This document is intended to outline requirements and final study deliverables for submitted Building Capture Study Protocols (hereafter “Protocols”) designed to obtain necessary permitting and/or modeling information.

## Purpose

The purpose of the building capture study is to determine, for permitting and/or modeling purposes, site-specific emission rates corresponding to wind speed and wind direction from a specific building that encloses operations emitting particulate matter in the form of PM, PM10, and PM2.5. Using the site-specific emission rates, an emission factor, likely in lb/ton of received grain or lb/gal of product produced, will be calculated for each emission source. This emission factor and the tested emission rates will be used for both permitting and modeling purposes.

Eventually enough data may be obtained to create industry-wide emission factors that could be used for future permitting purposes. This is an additional reason that a complete and thorough study with accurate data and supporting information is requested.

## Requirements

Protocols should be submitted for MPCA review, and should include all aspects of, but are not limited to, the following requirements.

All underlined requirements should be included with the final report.

**Table 2.1:** Instrumentation and Set Up

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| **Subject** | **Requirements** |
| 1. Instrumentation for Particulate Monitors
 | 1. Instrumentation must be EPA-approved method (e.g., Met One E-Sampler, E-BAM or equivalent). This method must be specified in the proposal.
2. Include sampling equipment manufacturer’s operating method (e.g., controlled sampling flow rates, etc.).
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| 1. Particulate Monitor Locations
 | 1. Monitors shall be placed at all key building openings during all runs (e.g., bay doors for trucks and railroad cars).
2. A diagram shall be included showing the location of the measurement points.
 |
| 1. Quality Assurance/ Quality Control
 | 1. A complete QA/QC Plan needs to be submitted to ensure that data collected is representative.
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| 1. Instrumentation for On-site Meteorological Monitor
 | 1. Identify reference method and include copy.
2. Identify the specific reference method procedure that will be used on site.
3. Identify method for location of monitor.
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| 1. Instrument Maintenance and Upkeep
 | 1. Documentation of compliance with manufacturer specifications for instrument upkeep must be presented in the final report.
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**Table 2.2:** Meteorological Data and Conditions

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| **Subject** | **Requirements** |
| 1. Timing of Study Based on Met Data
 | 1. Using the closest Meteorological Data station (airport), determine the month with the highest average wind speed using the most recent readily-available five years of meteorological data. Note: April is usually the month with the highest average wind speed in southern Minnesota.
2. Study shall take place during the month with the highest average wind speed, or within two weeks of the month with the highest average wind speed.
 |
| 1. Comparison of On-site Meteorological Data and Airport Meteorological Data
 | 1. A comparison between on-site meteorological data and airport meteorological data must be presented in the final analysis.
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**Table 2.3:** Operating Conditions during Testing

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| **Subject** | **Requirements** |
| 1. Accurate Representation of Operating Conditions
 | 1. Data shall be taken for representative operating scenarios (e.g., hopper truck, straight truck, train, or DDGS loadout).
2. Documentation of actual operation from previous year. This must include but is not limited to maximum and average number of vehicles processed per hour, typical number of straight trucks per day and maximum and average amount of material processed per hour.
3. Sampling times cannot include a disproportionate amount of time when vehicles are not receiving or loading out material. (See Table 2.4 Requirement A-1)
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| 1. Operation Log
 | 1. An operation log must be used and maintained.
2. Log shall include
	1. Type of vehicle loaded, specify type of truck,
	2. Date, time of day and duration of loadout/loading,
	3. For each loadout/loading, the amount of material processed
	4. Date, time of day meteorological data is collected,
	5. Date, time of day flow rate and concentration from monitors is recorded.
3. Log shall document all conditions (operation and meteorological), date and time of day that data is collected.
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| 1. Instrument and Manual Time Synchronization
 | 1. Use log to document that all instruments are synchronized to collect data at the same time for each trial.
2. Make sure all time-keeping devices are synchronized for accurate data recording.
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NOTE: Consider carefully which operating conditions you use during testing. Permitting limits and modeling limits may be imposed as a result of testing during operating conditions that are not representative of conditions allowed by your permit. For example, if the number of straight trucks received in a 24-hour period is historically higher than that represented by the tested conditions; you may receive a limit on the allowable number of straight trucks received during a 24-hour period.

**Table 2.4:** Quality Assurance / Quality Control

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| --- | --- |
| **Subject** | **Requirements** |
| 1. Data Collection
 | 1. One continuous hour sample constitutes one test.
2. Minimum of five tests per each identified scenario of operation (e.g., straight truck, hopper truck, train, etc.) and per type of pollutant: PM, PM10, and PM2.5.
3. Minimum of five days of data collection (allow additional time for set up, calibration, clean up, and inclement weather). Samples from all types of wind speed and direction should be well represented. A sampling matrix provided in Table 3.1 is an example of deliverable data. 60 samples will be taken with the ideal case being that three samples would fall into each cell. This would be considered as sufficient data points. If this is not the case alterations to the final emission factor are up to the discretion of the MPCA.
4. Identify sampling regime that represents normal operating conditions (e.g., number of trucks per hour, types of trucks).
5. Identify sampling regime that represents worst-case operating conditions.
6. Identify background correction method (e.g., Blank sample).
7. Report specifications of drop pit and baghouse (e.g., dimensions, fan speed, air flow).
8. Report orientation and opening size of doors (Ratio of opening area to enclosure volume).
 |
| 1. Data Analysis and Reduction
 | 1. Identify data quality method (Proof of good quality data).
2. Identify subsequent data collection plan if data quality is poor.
3. Identify final reduced data output (emission factor based on wind speed and wind direction for each scenario).
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## Protocols and Deliverables

This document contains an overview of minimum requirements needed to prepare a complete protocol for the purpose of collecting data for both air permitting and modeling. If a proposed protocol is for determining permitting factors only, modeling requirements including modeling files as deliverables may be overlooked. This document is not meant to be an outline or an exhaustive list of protocol parameters. Submitted protocols should be complete and adequate for the specific source.

Deliverables shall include:

* A hardcopy report. All underlined guidelines should be included in the final report. The hardcopy report shall discuss the above subject requirements in sufficient detail such as that provided in the Valero-Welcome study.
* Electronic data files which include hour-by-hour data collected, and if possible, data visualizations similar to that of Valero-Welcome study. The electronic data files shall also include ready-to-run modeling files (e.g., AERMOD EMISFACT scalars; AERMOD HOURMIS files). If you are not going to be using the data for modeling purposes now, or in the future, you may exclude the ready-to-run modeling files from your submittal.
* Proposed capture efficiency to be used in permitting calculations based upon the results of the study. Depending upon the facility, there may be a different efficiency proposed for use in hourly calculations, than that proposed for annual calculations.

A digital copy of the Valero-Welcome report can be sent upon request.

**Table 3.1:** Emission rates and emission factors based on wind speed and direction.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | North 315-45° | East 45-135° | South 135-225° | West 225-315° |
| 0-10 mph |  |  |  |  |
| 10-20 mph |  |  |  |  |
| 20< mph |  |  |  |  |