Los Alamos National Laboratory **Environmental Restoration Program** **Standard Operating Procedure**	No: LANL-ER-SOP-06.25 Rev: 0

TOTAL SUSPENDED PARTICULATE AIR SAMPLING

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Total Suspended Particulate Air Sampling

1.0 PURPOSE

This procedure describes the methods for the determination of suspended particulate matter in the atmosphere using a high-volume air sampler.

2.0 SCOPE

2.1 APPLICABILITY

This procedure is applicable for air sampling using a high-volume air sampler.

2.2 TRAINING

All site workers who operate a high-volume air sampler should document that they have read and do understand this procedure, the operation manual for the high-volume sampler, and the procedures in Section 1.0, General Instructions, of the Los Alamos National Laboratory's Environmental Restoration Standard Operating Procedures (LANL-ER-SOPs).

3.0 DEFINITIONS

N/A

4.0 BACKGROUND AND/OR CAUTIONS

This method provides a measurement of the mass concentration of total suspended particulate matter (TSP) in ambient air for determining compliance with the primary and secondary national ambient air quality standards for particulate matter. The measurement process is nondestructive, and the size of the sample collected is usually adequate for subsequent chemical analysis.

An air sampler properly located at the measurement site draws a measured quantity of ambient air into a covered housing and through a filter during a 24 hour or other appropriate sampling period. The sampler flow rate and the geometry of the shelter favor the collection of particles up to 25-50 microns (μm) (aerodynamic diameter), depending on wind speed and direction. The filters used are specified to have a minimum collection efficiency of 99 percent as measured by the American Society for Testing and Materials (ASTM)-2986 method for particles of 0.3 μm diameter.

The filter is weighed (after moisture equilibration) before and after use to determine the net weight (mass) gain. The total volume of air sampled, corrected to the Environmental Protection Agency (EPA) standard conditions [25°C, 760 millimeters mercury (mm Hg)], is determined from the measured flow rate and the sampling time. The concentration of TSP matter in the ambient air

is computed as the mass of collected particles divided by the volume of air sampled, corrected to standard conditions, and is expressed in micrograms per standard cubic meter (µg/std m^3). For samples collected at temperatures and pressures significantly different than standard conditions, these corrected concentrations may differ substantially from actual concentrations (micrograms per actual cubic meter), particularly at high elevations. The actual particulate matter concentration should be calculated using the actual temperature and pressure during the sampling period.

The approximate concentration range of the method is 2 to 750 µg/std m^3. The upper limit is determined by the point at which the sampler can no longer maintain the specified flow rate due to the increased pressure drop of the loaded particle size distribution, moisture content of the collected particles, and variability from filter to filter, among other things. The lower limit is determined by the sensitivity of the balance and by inherent sources of error.

At wind speeds between 1.3 and 4.5 meters per second (3 and 10 miles per hour), the high-volume air sampler has been found to collect particles up to 25 to 50 µm, depending on wind speed and direction. For filters that meet EPA specifications as described in 40 CFR 50, Appendix B, there is effectively no lower limit on the particle size collected.

5.0 EQUIPMENT

The equipment needed for this procedure is listed below.

High-volume air sampler
Filters
Cassette filter holder
Flow rate measurement devices
    Flow indicator (e.g., orifice, rotometer)
    Pressure indicator (e.g., manometer)
Thermometer
Barometer
Timing/control device
Flow rate transfer standard
Manila and glassine envelopes
Electrical generator, if necessary
Unleaded gasoline for generator, if necessary
Extension cords

6.0 PROCEDURE

1. Ensure that the high-volume air sampler has been calibrated within the past six months. If it has not been calibrated within the past six months, then calibrate the instrument according to the operations manual.

2. Number each filter with an unique identification number and ensure that the filters have been weighed (after moisture equilibration) at the laboratory which will analyze the filters.

3. Backlight each filter and inspect for pinholes, particles, and other imperfections; a filter with visible imperfections must not be used.

4. Read the operator's manual for the specific high-volume air sampler to be used.

5. Place sampler motor/blower unit and filter holder in the servicing position by raising both of them up until the filter holder is above the top level of the shelter. Then rotate the unit one-quarter turn, clockwise or counterclockwise (depending on placement), so that the filter holder hangs in the rectangular hole in the sampler support pan.

6. Remove faceplate part of the filter holder by loosening the four wing nuts, allowing the swing bolts to swing down out of the way.

7. Carefully center a numbered 8" x 10" filter, rougher side up, on the supporting screen of the filter holder. Properly align the filter on the screen so that when the faceplate is in position, the gasket will form an airtight seal on the outer edges of the filter.

8. Secure the filter with the faceplate, tighten the four swing bolts with sufficient pressure to avoid air leakage, lower the filter holder and sampler blower/motor unit to its normal operating position, and close the shelter.

9. Plug the high-volume air sampler into an outlet or a gasoline operated generator. If a generator is used, ensure that it is placed downwind of the high-volume air sampler.

10. Run motor/blower unit for 5 minutes to allow it to warm up.

11. Record the flow rate for the sampler using the rotometer.

12. Set the timer to start and stop the sampler for the specified time period. Record the start and stop times.

13. After the sampling period, record the flow rate, again using the rotometer.

14. Carefully remove the exposed filter from the supporting screen by holding it gently at the ends (not at the corners). Fold the filter lengthwise so that sample touches sample.

15. Place filter in a glassine or similar folder.

16. Record all pertinent field information on the Daily Activity Log. For example, all weather conditions (e.g., barometric pressure and temperature) and instrument readings should be noted.

7.0 REFERENCES

40 CFR Part 50, Appendix B

ASTM Standard 2986, "Filter Collection as Measured by the DOP Test", American Society for Testing and Materials, Philadelphia, PA, 19103.

8.0 RECORDS

The Operable Unit Project Leader is responsible for transfer of the records to the ER Record Processing Facility (MS M707) in accordance with procedures for LANL ER Records Management (LANL-ER-AP-02.1). The records which will be generated include but are not limited to the following:

Daily Activity Log which will include all daily activities and any deviations from this procedure.

9.0 ATTACHMENTS

N/A