IMPROVE

STANDARD OPERATING PROCEDURE

SOP 126 Version 2 (SOP 126-2)
Site Selection for IMPROVE

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APPROVAL SHEET

This Standard Operating Procedures Manual was developed by Crocker Nuclear Laboratory (CNL) to document the activities of the IMPROVE project. The following signatures of key participants in this indicate agreement with the procedures specified within this SOP manual.

Crocker Nuclear Laboratory

Charles E. McDade _____ 7/18/08

Charles McDade Date

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Date

DOCUMENT HISTORY

Date Modified	Initials	Section/s Modified	Brief Description of Modifications
July 2008	CEM	Entire document	Revised and reorganized SOP.

SOP 126: SITE SELECTION FOR IMPROVE

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1. PURPOSE AND APPLICABILITY

This standard operating procedure (SOP) outlines the site selection and preparation procedures for the installation of IMPROVE aerosol samplers and covers the following topics.

- locating potential sites.
- evaluating potential sites.
- selecting the most appropriate site from the potential sites.
- finalizing and authorizing the selected site.
- preparing the site.
- selecting the site operator.

2. RESPONSIBILITIES

This section describes the responsibilities of the individuals involved in Site Selection for the IMPROVE Aerosol Sampling Network.

2.1 PROJECT MANAGER

The project manager shall

- prepare project specific siting and operational objectives, guidelines, and considerations.
- select the most appropriate site for the aerosol samplers based on the criteria described in the SOP.

2.2 FIELD SPECIALIST

The field specialist shall

- initiate the search for potential sites by sending pertinent siting criteria and associated siting materials to a local contact.
- maintain communications with the local contact during the field survey of potential sites, verifying that all potential sites have been identified and thoroughly evaluated and that all materials are returned for review in a timely fashion. The actual field survey may be performed by the local contact, the field specialist, or both.
- review potential sites with the project manager.
- work with the local contact to obtain permission from private or public landowners for permanent access to the aerosol sampling site.
- work with the local contact to obtain permission to perform any special site preparation that may be required.
- work with the local contact to identify a local site operator to service the equipment.
- maintain careful records in permanent files and in the site database on all site selection information..
- provide detailed specification and guidance to the local contact in selecting, planning, and constructing the sampler mount.

2.3 LOCAL (ON-SITE) CONTACT

The local contact shall

- review the technical and monitoring requirements provided by the field specialist.
- identify potential sites.
- maintain communication with the field specialist during the field survey of potential sites.
- photograph and document potential sites, providing a set of digital photos showing each potential site, as well as the views from the sampling site toward the north, the south, the east, and the west.
- document the selected site location(s) on a topographic map; measure the latitude, longitude, and elevation using an electronic GPS device.
- identify and contact local landowners, primary contacts, and operators regarding site installation and routine maintenance requirements.
- prepare a list of known local sources affecting the air in the area of interest.
- provide information about the availability of AC power and telephone service in the area of interest.
- prepare the selected site, including arranging for electrical power at the site, and provide a shelter or mounting rack to house the sampler.

3. REQUIRED EQUIPMENT AND MATERIALS

The following materials are required to complete the site selection process:

- maps
- a digital camera to take photographs of the proposed site and surrounding areas.
- an electronic GPS device
- a list of monitoring requirements and the associated IMPROVE monitoring equipment
- a list of local sources affecting the air in the area of interest
- information about the availability of AC power and telephone service for associated monitoring equipment

4. BACKGROUND

The IMPROVE aerosol sampler collects ambient aerosols on a variety of substrates for the analysis of elemental, ion, and carbon species involved in visibility impairment. The data collected provide information for calculating trends in visibility and tracking sources of visibility impairment in Class 1 areas such as National Parks and Wilderness Areas.

The IMPROVE aerosol sampler collects ambient $PM_{2.5}$ aerosol samples every third day, beginning at midnight and sampling for 24 hours. The sampler is designed simply and ruggedly in order to withstand ambient field conditions and to make operation and maintenance easy.

To assure consistent quality data and to minimize data loss, aerosol sampling sites are selected to meet most if not all of the following criteria. The site must

- be removed from local sources, such as diesel, wood smoke, automobile emissions, road dust, or construction
- adhere to siting requirements conducive to regional aerosol sampling, including inlet height, an absence of interference in air flow from trees or buildings in a 30° cone above the sampler, and a minimum of 270° of free air flow around the sampler
- be located at a site where aerosols are representative of regional, not local, visibility conditions.
- be secure from potential vandalism
- have an operator available to service the site
- be accessible during all months of the year
- be at ambient outdoor temperature (e.g., no air conditioning or heating)

After the site is selected, the local Federal Land Manager (FLM) will normally obtain permits and have power, as well as a shelter or a rack, installed at the site. UC Davis will ship the sampler to the site. Once these tasks are completed, UC Davis personnel will travel to the site, install the sampler, and train the site operators. The sample changing by the site operator will require about 20 minutes per week, plus transit time to the site.

4.1 DESCRIPTION OF THE IMPROVE SAMPLER

The IMPROVE sampler is designed to obtain a complete signature of the composition of the airborne particles affecting visibility. $PM_{2.5}$ (fine) particles are collected on Teflon®, nylon, and quartz filters and PM_{10} particles on a Teflon filter. Each filter is in a separate module, as shown in Figure 1. The PM_{10} module is on the right with the larger inlet head, and the inlets are normally 24 inches apart. The controller module is the box with no inlet. The analytical measurements are shown in Table 1.

Figure 1. Photo of the IMPROVE Aerosol Sampler

Table 1. Improve aerosol measurements

Module	Particle Size	Filter	Analytical Measurement
A	$PM_{2.5}$ particles	Teflon®	mass, optical absorption, elemental (H, Na-Pb)
B	$PM_{2.5}$ particles	nylon with denuder	nitrate, sulfate, chloride
C	$PM_{2.5}$ particles	quartz	organic and elemental carbon
D	PM_{10} particles	Teflon®	PM_{10} mass

The IMPROVE aerosol sampler consists of the following:

- A controller. The controller module contains a microprocessor to start and stop sample collection and record the flow rates for each module continuously. The controller module measures 16" x 12" x 7" and weighs 30 pounds. The controller has a viewing screen, a keypad, a slot for a removable memory card, and all necessary electronic components. A schematic of the controller module with the cover open is shown in Figure 2.

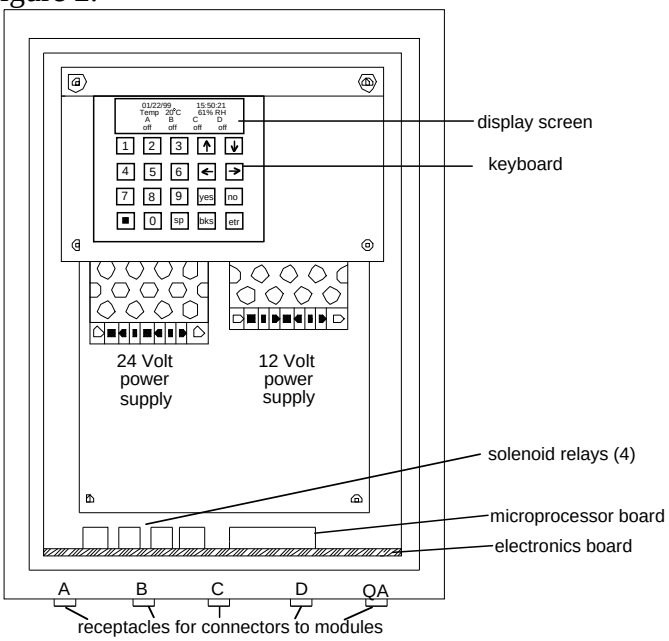


Figure 2. Schematic of the IMPROVE controller module

- Three $PM_{2.5}$ modules (A, B, C). Each module measures 16" x 12" x 7" and weighs 40 pounds. A schematic of a $PM_{2.5}$ module with the cover open is shown in Figure 3

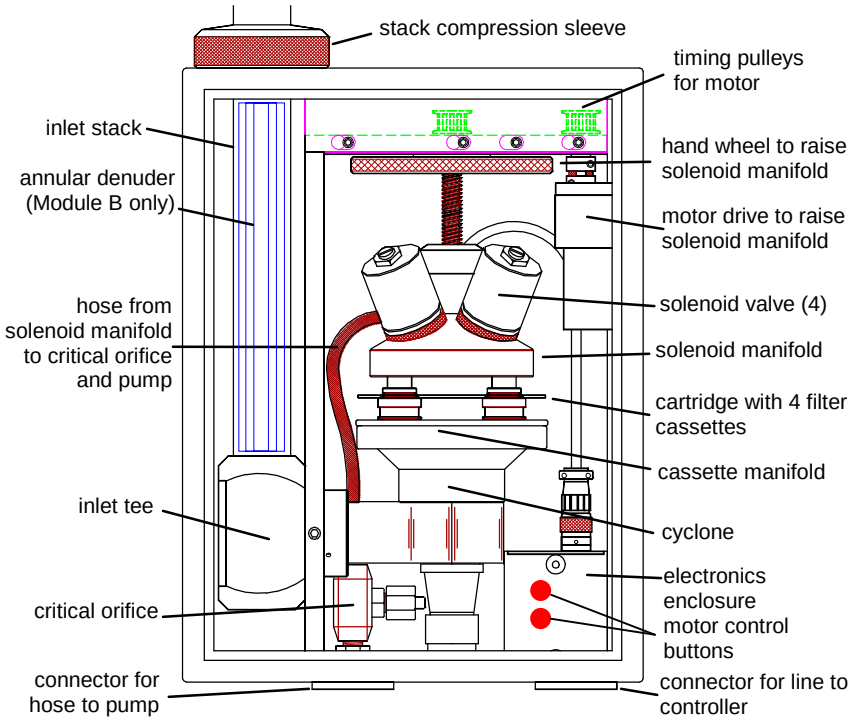


Figure 3. Schematic of a PM2.5 module

- One PM_{10} Module (D). This module is the same as a PM2.5 module, except the inlet and cyclone are replaced by a commercial PM10 inlet.
- An additional module (at selected sites) for quality assurance.
- Four vacuum pumps to provide air flow through the filters. Each pump measures 12" x 7" x 9 ", weighs 25 pounds, and draws about 3.2 amperes of power at 120 volts. The pumps will generally be on the floor of the shelter. The complete sampler requires 120 volt, 60 hertz AC power on two 20-ampere circuits.

A shelter or mounting rack to house the sampler is to be provided by the host agency. UC Davis will supply detailed specifications and guidance to the local staff in selecting, planning, and constructing the sampler mount. IMPROVE samplers are typically mounted in one of three configurations, as shown in Figure 4:

a. in an ambient temperature shelter (not heated or air conditioned)
b. outside, on the side of an existing shelter or building
c. outside, on a rack built expressly for the IMPROVE sampler

a)  b) 

c) 

Figure 4. Three possible mounting configurations for the IMPROVE sampler.

4.2 OPERATOR INTERACTION WITH THE SAMPLER

The samples for all sites in the IMPROVE network are changed every Tuesday by a local site operator. The change takes 15-30 minutes. The site operator receives a box with all the necessary filters, a microprocessor memory card, and a field log sheet. The steps for the change are as follows.

1. The operator presses the appropriate buttons on the microprocessor keyboard to read and display the flow rates for the exposed filters in the sampler. The operator records the displayed values on the log sheet.
2. The operator removes the cartridges of exposed filters from each module, seals them in the provided bag, and places the bag in the shipping box for these samples. The operator removes the memory card from the controller and places it in the same shipping box.
3. The operator inserts the cartridges of clean filters in each module and a new memory card in the controller.
4. The operator presses the appropriate buttons on the microprocessor keyboard to read and display the flow rates for the clean filters. The operator records the displayed values on the log sheet.
5. The operator verifies that the readings are reasonable. The microprocessor will also make checks and flash a warning if there are problems.
6. The operator records any relevant notes on the logsheet (fires, missed sample changes, bad sample changes, problems).

7. The operator then returns the shipping box with exposed filters, the completed log sheet, and the old memory card to UC Davis.

If problems are encountered, the operator will be asked to troubleshoot the samplers with the assistance of a UC Davis technician.

5. METHODS

This SOP should be sent to the local contact to initiate the site selection process. The local contact should fill out the photographic log and the site evaluation form in Appendices 1 and 2. A digital camera and a GPS device should be sent to the local contact if these devices are not available locally.

5.1 LOCATION OF PROSPECTIVE SITES

The lead role in the selection of prospective sites is normally assumed by the local FLM and the state and/or local air quality agency, but the national or regional FLM may want to participate.

Site selection begins with the process of locating potential sites in the monitoring area of interest. Specific siting criteria should be obtained from the project manager, and this information may include regional or site-specific program objectives and meteorological conditions of the monitoring area, as well as other considerations. Potential sites may be located from maps and through consultation with a local contact familiar with the monitoring area of interest.

The site should not be located in areas subject to unusual aerosol transport conditions. There should be no local pollution sources or unusual meteorology. The aerosol at the site should be representative of the regional air mass.

The site criteria fall into three categories: (1) the site must represent nearby Class I areas; (2) the site should be regionally representative, avoiding local pollution sources or areas with unusual meteorology; and (3) the site must avoid nearby obstacles that could affect sample collection. In most cases, the criteria are based on EPA guidelines. The criteria are not absolutes. A site that falls slightly outside a criterion may be the best choice. Significant variances from any criterion should be well documented and will be reviewed by the IMPROVE steering committee before the site is installed. The following criteria should be used as guidelines in selecting the specific location of a sampling site.

1. If a site is intended to represent Class I areas, it must meet the following criteria:
   a. The distance between the site and the closest portion of all Class I areas should not be greater than 100 km. A smaller distance would be desirable. Note that the closest site may not be the best site.
   b. The elevation of the site should lie between the highest and lowest elevations of all Class I areas to be represented. Exceedances of 100 feet or 10% are considered to be meeting this criterion. Larger exceedances are permitted if agreed to by the states and FLMs.
2. The site must avoid small valleys with non-representative meteorology. Valleys with towns or other emission sources are definitely to be avoided. Valleys without emission sources, but with significant inversions, should also be avoided. The site should not be located on barren ground that is not typical of the region.
3. The site must avoid all local sources of pollution.

a. automotive sources:

vehicle usage	**distance between road and sampler**
<10,000 vehicles per day	>25m between road and sampler
10,000-20,000 vehicles per day	50m between road and sampler
20,000-40,000 vehicles per day	75m between road and sampler
>40,000 vehicles per day	>100m between road and sampler

b. combustion sources:
Avoid any areas influenced by diesel generator emissions, wood smoke, or incinerators.

c. dust sources:
At least 400m from a large potential source of dust, such as a landfill, agricultural operations, or an unpaved road with more than 400 cars per day.

4. The site must not have large obstructions such as trees or buildings that would hinder the sampling of regional representative aerosols. If necessary, the sampler could be placed on a platform to clear obstructions or to stay above any snow pack.[1]

   a. There should be unrestricted airflow for an arc of at least 270°. The predominant wind direction must be in the unrestricted 270°. In practice, having unrestricted flow in all directions is preferable.
   b. ***Within 10m*** of the sampler, any solid barriers or trees should be at least 1m below the inlet, as shown on the left side of Figure 5. In general, a pole or meteorological tower will not be a solid barrier. We will set as a guideline that a solid barrier is any object that subtends more than 10°. (Example: Hold a ruler at arm's length [24 inches]; if the object subtends more than four inches, it is a solid barrier.)
   c. ***Beyond 10m*** of the sampler, the solid barriers or trees should not be higher than 30° above the horizontal with respect to the inlet, as shown on the right side of Figure 5. (Example: Hold a ruler at arm's length [24 inches]; 30° is a height of 14 inches.)

5. If possible, all other samplers located at the site should use brushless pump motors (i. e., high-volume samplers often use motors with brushes that can result in high copper emissions). If brush pumps exist, the Project Manager should be notified and provided with the sampler specifications and the sampling schedule. The Project Manager will devise a site-specific approach for minimizing the effects of pump emissions.

6. The site must have electrical power (2 circuits; 120 volt, 60 hertz, 20 amperes). If new power must be installed it is anticipated that the local FLM will be able to obtain the necessary financial resources. The Steering Committee will consider exceptions.

7. The site must be accessible for a weekly sample change in all but the most severe weather conditions

8. The site should be located near existing particulate monitoring stations to provide continuity to the data set whenever possible.

[1] Raising the height of the inlet by increasing the length of the stack beyond the standard 2m is not recommended, although theoretical calculations show no significant loss of particles on the wall of a stack much longer than 2m. (For a 1% loss of particles larger than 0.3 μm, the stack length would have to be over 250m.)

9. The sampler inlets must be located between 3 and 4 meters above the ground, and at least 1 meter above the shelter roof or above any other obstruction within 10 meters of the inlets. The spacing between inlet stacks must be at least 24 inches.
10. There must be an available and reliable site operator.
11. The site should be secure from potential vandalism.
12. If possible, the sampler should be located in an open-air shelter.
13. There should be local land manager or landowner cooperation.

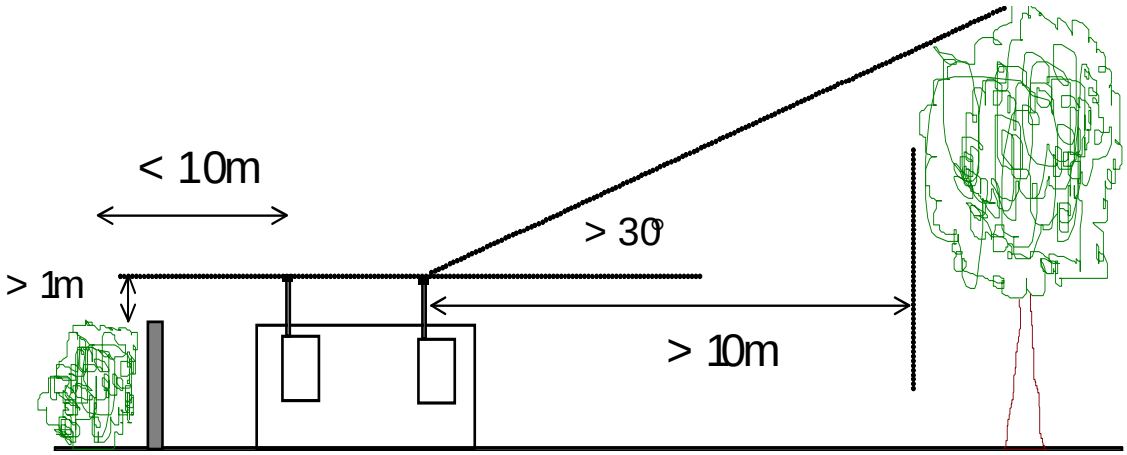


Figure 5: Schematic of location with respect to trees and solid barriers

5.2 DOCUMENTATION OF PROSPECTIVE SITES

Once potential sites have been found to meet the siting criteria listed above, the local FLM manager, or other persons leading the initial search, will send photos, sketches, and siting information for each potential site to UC Davis. A summary will be distributed to all parties involved in the selection.

1. **photographic**: The local FLM manager will complete and return the requested documentary photographs along with the attached photographic log. (See Appendix A: Photo Log.) The following photos will facilitate site selection:
    a. photographs taken from North, South, East, and West, with the prospective site in each view
    b. a photograph of the 120-volt power source in relation to the proposed site
    c. close-up photographs of the location proposed as a sampler site
    d. photographs of the four walls inside the existing building, if an existing building is proposed to shelter the sampler
    e. photographs of any air quality or meteorological monitoring equipment located nearby
    f. any additional photographs that may be beneficial in preparation for the sampler installation

2. **written**: The local FLM manager will complete and return the site evaluation form for each potential site, using a separate copy of the blank form for each potential site. (See Appendix B: Site Evaluation Form for Potential Sites.)

    a. The local FLM manager should fill out the information at the top of the form. Include as much information as possible.
    b. The local FLM manager should provide a sketch of the proposed sites on the reverse side. List approximate dimensions (including height). Also include distances between buildings, fenced compounds, obstructions, etc.
    c. The local FLM manager should provide a map or sketch of how to get to each potential site from a main road.
    d. If possible, the local FLM manager should include a copy of a *topographic map* with all potential sites indicated.

When UC Davis receives the documentation and photographic log, it will check it for completeness, evaluate the information for compliance with IMPROVE siting guidelines, and obtain any missing information from the local contact.

5.3 FINAL SELECTION OF THE SITE LOCATION

A joint decision must be made by all concerned parties as to where to locate the sampling site. The concerned parties will be the local FLM, the national and/or regional FLM, the state and/or local air quality agency in which the site is located, and UC Davis. If significant disagreements exist between the concerned parties, UC Davis will prepare a summary for the IMPROVE steering committee, discussing each siting alternative and the tradeoffs among them. The IMPROVE steering committee will work with the parties to reach a decision.

1. The UC Davis field specialist will prepare a packet on the site with the documentation for each of the potential sites.
2. UC Davis will provide this packet and recommendations to all concerned parties.
3. The UC Davis field specialist will coordinate the final selection of the site location. This will generally be done with individual telephone calls or a conference call. If this is unsatisfactory, the UC Davis field specialist will coordinate an on-site visit with all concerned parties.

5.4 AUTHORIZATION FOR SITE USE

The local FLM will complete the necessary paperwork required to use the site, install power, and build structures. His duties will also include

1. obtaining any needed permission to use the property.
2. preparing and submitting any Environmental Impact Reports.
3. obtaining any needed authorization to install and use electrical power. The FLM will normally be expected to pay for the electrical power used. (An annual usage of approximately 5000 kilowatt hours is expected.)

5.5 SITE AND SHELTER PREPARATION

Once the specific location of an individual site has been agreed upon, the site must be prepared for installation of the sampling equipment. This primarily involves providing a structure and adequate electrical power. The local FLM manager will

1. supervise the installation of the shelter, or another agreed upon alternative. (The cost of the shelter will paid for by the local agency. The design specifications for the shelter will be provided by UC Davis.)
2. supervise the installation of the required electrical power (120 Volt, 60 Hertz, two 20 amp circuits) at the site; the electrical line should be terminated with two fourplex outlets.
3. notify UC Davis field specialist of approximate date when the site will be ready for sampler installation, with mandatory updates on electrical and structure completion.
4. fill out and return the site information summary sheet. (See Appendix C: Site Information Form.) This is only for the final specific location.
5. receive and record Federal Express shipments of the sampler and any additional installation equipment.
6. arrange for transportation of equipment to the site before UC Davis personnel arrive.

The shelter for the IMPROVE sampler may take the form of a purpose-built shelter, a rack on the side of a pre-existing structure, or a free-standing rack. With each of these configurations, the sampling inlets should ideally be between 3 and 4 meters above ground, although exceptions are sometimes made when local conditions dictate. Each type of installation is described below.

5.5.1 Mounting within a shelter

IMPROVE samples are intended to be collected under conditions as close to ambient temperature as possible. Hence, we prefer that samplers be mounted outdoors, either on a rack or on the side of an existing structure. Nevertheless, some sites experience severe weather and it is preferable to mount the samplers within a shelter to minimize exposure to the equipment and to protect the operator from severe wind and cold during the weekly sample changes. The parameters for the shelter are as follows:

> The inside dimensions will be at least 6 feet x 8 feet and the shelter shall meet any requirements by the local FLM for appearance.
>
> The shelter will be well-ventilated, but not heated or air conditioned. It will be able to support heavy snow loads. At some sites, with deep snow pack, the shelter may have to be installed on a platform, and extended inlets may be required to keep the inlets at least 1 m above the typical winter snow pack. The siting criteria allow for this possibility.

5.5.2 Mounting on the side of a pre-existing shelter or building

Where a shelter or building already exists, it is sometimes convenient to mount the samplers on the side of the shelter. The parameters for this type of mounting are as follows:

> The sampler should be located just below the roof level, with the inlets extending at least 1 m above the roof. Either the sampler should be at eye level or lower, or the operator should be provided with a platform or ladder to permit sampler servicing.
>
> The inlets should be at least 24 inches from any other equipment located at the site.

5.5.3 Mounting on an outdoor rack

Where no existing structure exists, a outdoor wooden rack can be constructed. UC Davis can provide the plans for a rack, built from commonly available lumber and typically mounted on concrete post bases. The parameters for this type of mounting are as follows:

The footprint of the rack is 4 feet by 8 feet, and it requires two to three days to acquire and prepare the materials and to assemble the rack.

The rack should be assembled according to the detailed specifications provided in Appendix D.

5.6 SELECTION OF A SITE OPERATOR

Only one primary site operator is required but backup operators must be trained and available to cover for the primary operator in cases of planned and unplanned absences. The operator(s) should have some technical expertise, but this does not mean that any operator must have had previous experience in aerosol monitoring. The most important qualification is that the operators be motivated and responsible. It is essential that the operators have adequate time to pay particular attention to the sample changing duties every week. Sometimes this may involve using local personnel in unrelated work areas or contracting the work duties to an outside contractor. This type of arrangement offers the best recovery rate in situations in which air quality personnel are far away from the site, required to travel often, or already perform too many duties.

IMPROVE site operator duties include

- reviewing the IMPROVE sampler manual and attending a one-hour training session at the site on the day of sampler installation.
- meeting with UC Davis personnel during the annual site maintenance trip once per year. The site maintenance visit will generally occur in the spring or summer. Site operators will be contacted two to three weeks before a visit by UC Davis personnel.
- receiving and inventorying the blue transport boxes (containing the filter cassettes), which are shipped by FedEx to and from the sampling site and the filter handling laboratory at UC Davis. The boxes are labeled by site and sample week date with prepaid mailing labels.
- shipping the used filter cassettes back to Davis via FedEx in their blue transport box after they are exposed in the sampler.
- performing weekly sample changes. This requires 15-30 minutes at the site every Tuesday. The changing can be done at any time during the 24-hour day. The time estimate includes troubleshooting and documentation duties, but does not include travel time to site. In some cases troubleshooting could require up to two hours, perhaps with multiple visits to the site, to diagnose and repair problems. Telephone assistance will be provided by the UC Davis laboratory whenever there are problems.
- performing a four-point flow rate audit of each filter module as required for troubleshooting purposes. This takes approximately 30-60 minutes. Instructions and equipment will be provided by mail.
- performing necessary repairs, usually in the form of replacing problem equipment and/or replacing problem components.

- keeping the site adequately clean to avoid filter contamination and to discourage wildlife from nesting at the site.

5.7 INSTALLATION AND OPERATION OF SAMPLERS

- The local FLM manager and the UC Davis field manager will arrange a two-day time period when UC Davis personnel can install the IMPROVE sampler at the site.
- The local FLM will direct the UC Davis technician to the location of the shelter and the previously shipped sampling equipment.
- After the site set-up is completed, the site operator(s) will attend a one-hour training session on sampler operating procedures at the site.
- The operation of the site will typically begin immediately.

APPENDIX A. PHOTO LOG

POTENTIAL SITE #1 NAME:_____

Photo #	Date	Time	Description/Comments
			Photo from N. including site
			Photo from E. including site
			Photo from S. including site
			Photo from W. including site
			Photo toward N. from site
			Photo toward E. from site
			Photo toward S. from site
			Photo toward W. from site
			Photo of power source relative to site; include circuit breaker
			Photo of electrical outlets available
			Close-up of building or location from N.
			Close-up of building or location from E.
			Inside of building facing N.
			Inside of building facing E.
			Inside of building facing S.
			Inside of building facing W
			Photo of nearby air sampling/meteorological equipment
			Photo of nearby air sampling/meteorological equipment
			Photos of any potential problems

POTENTIAL SITE #2 NAME:_____

Photo #	Date	Time	Description/Comments
			Photo from N. including site
			Photo from E. including site
			Photo from S. including site
			Photo from W. including site
			Photo toward N. from site
			Photo toward E. from site
			Photo toward S. from site
			Photo toward W. from site
			Photo of power source relative to site; include circuit breaker
			Photo of electrical outlets available
			Close-up of building or location from N.
			Close-up of building or location from E.
			Inside of building facing N.
			Inside of building facing E.
			Inside of building facing S.
			Inside of building facing W
			Photo of nearby air sampling/meteorological equipment
			Photo of nearby air sampling/meteorological equipment
			Photos of any potential problems

APPENDIX B. SITE EVALUATION FORM

One form for each potential site

(send completed form to UC Davis)

Site Name:_____

Site Access Constraints (4-wheel drive road, gates/locks, time of day/week/month/year):_____

_____

Elevation (meters):_____

Latitude (GPS reading):_____

Longitude (GPS reading):_____

How were these readings determined (GPS, topo map, etc.)? _____

Nearest City or Town:_____ Distance:_____ Direction_____

Potential for Vandalism:_____

Site Area Uses Within 200 Yards (type, dates of usage): _____

Average and Maximum Snow Depth at Proposed Site:_____

Is there any nearby air monitoring instrumentation (aerosol, meteorological, nephelometer, gaseous)?_____

If yes, describe type of instrument(s) and operating schedule._____

_____

If yes, describe location, distance and, direction from the proposed site._____

_____

Is 120 volt AC power available (distance?; can be wired for two independent 20 amp circuits?):_____

Reliability of Electrical Power (i.e. history of power outages):_____

_____

Is a telephone available nearby? (distance?):_____

Percent of Ground Cover:

Site (within 200 yards.):

_____ trees _____ shrubs _____ grass _____ crops _____ bare soil
_____ rock _____ pavement _____ building _____ water

Local (200 yards–10 miles):

_____ trees _____ shrubs _____ grass _____ crops _____ bare soil
_____ rock _____ pavement _____ building _____ water

Regional (10 miles–100 miles)

_____ trees _____ shrubs _____ grass _____ crops _____ bare soil
_____ rock _____ pavement _____ building _____ water

Particulate Sources: Type/Distance/Direction

Site (within 200 yards.)

Fugitive Dust:_____

Combustion:_____

Other:_____

Local (200 yards–10 miles)

Fugitive Dust:_____

Combustion:_____

Other:_____

Regional (10 miles–100 miles)

Fugitive Dust:_____

Combustion:_____

Other:_____

Comments / suggestions:____

Other:

On the back of this page:

1. Please draw a quick sketch of the proposed site. Indicate North, and include the dimensions of nearby buildings and the distances to prominent objects seen in the photos.
2. Also sketch the route taken to get from a main road to the site.

Please send a topographic map (or photocopy) of the site area when you return this form.

APPENDIX C. SITE INFORMATION FORM

Single form for final site
(send copy of completed form to UC Davis)

Site Name:_____ Class I area(s):_____

Contact	Phone Information	e-mail
Primary	**home:**	
	cell:	
	office:	
	fax:	
Backup 1	**home**	
	cell:	
	office:	
	fax:	
Backup 2	**home:**	
	cell:	
	office:	
	fax:	

Comments: _____

Mailing Address:_____

UPS/FedEx Shipping Address (cannot be a Post Office Box):_____

Freight Address:_____

Site Access Route (directions):_____

_____

Site Access Constraints (4-wheel drive road, gates/locks, time of day/week/month/year):_____

_____

Elevation:_____ Latitude: _____deg. _____Min Longitude: _____deg. _____min. (to tenths of minute)

How were these readings determined (GPS, topo map, etc.)?_____

Topographic Map Name (1/25,000 or other appropriate scale):_____

(Please send or photocopy the topographic map that includes the site when you return this form)

Nearest City or Town:_____ Distance:_____ Direction_____

Potential for Vandalism:_____

Site Area Uses within 200 Yards:_____

Average and Maximum Snow Depth at Proposed Site:_____

Is there any nearby air monitoring instrumentation (aerosol, meteorological, nephelometer, gaseous)?_____

If yes, describe type of instrument(s) and operating schedule._____

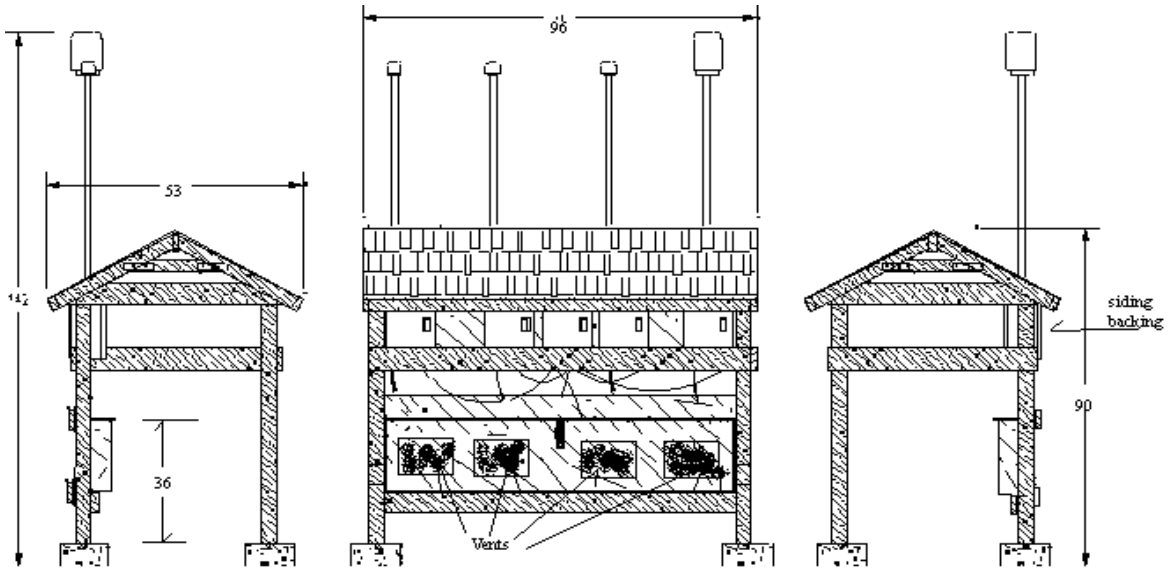
_____

If yes, describe location, distance, and direction from the proposed site._____

_____

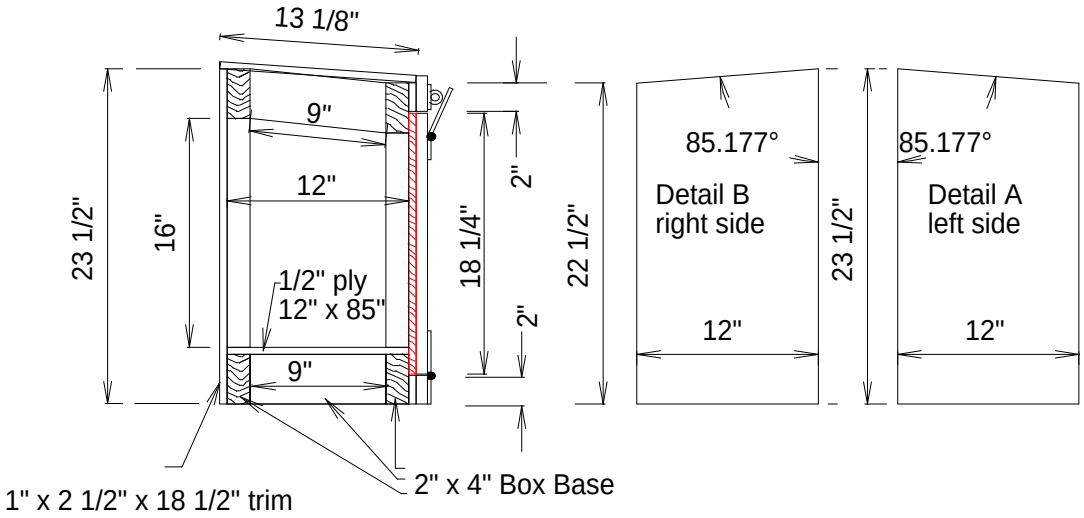
APPENDIX D. SPECIFICATIONS FOR BUILDING AN OPEN SHELTER FOR IMPROVE MONITORING

D.1.

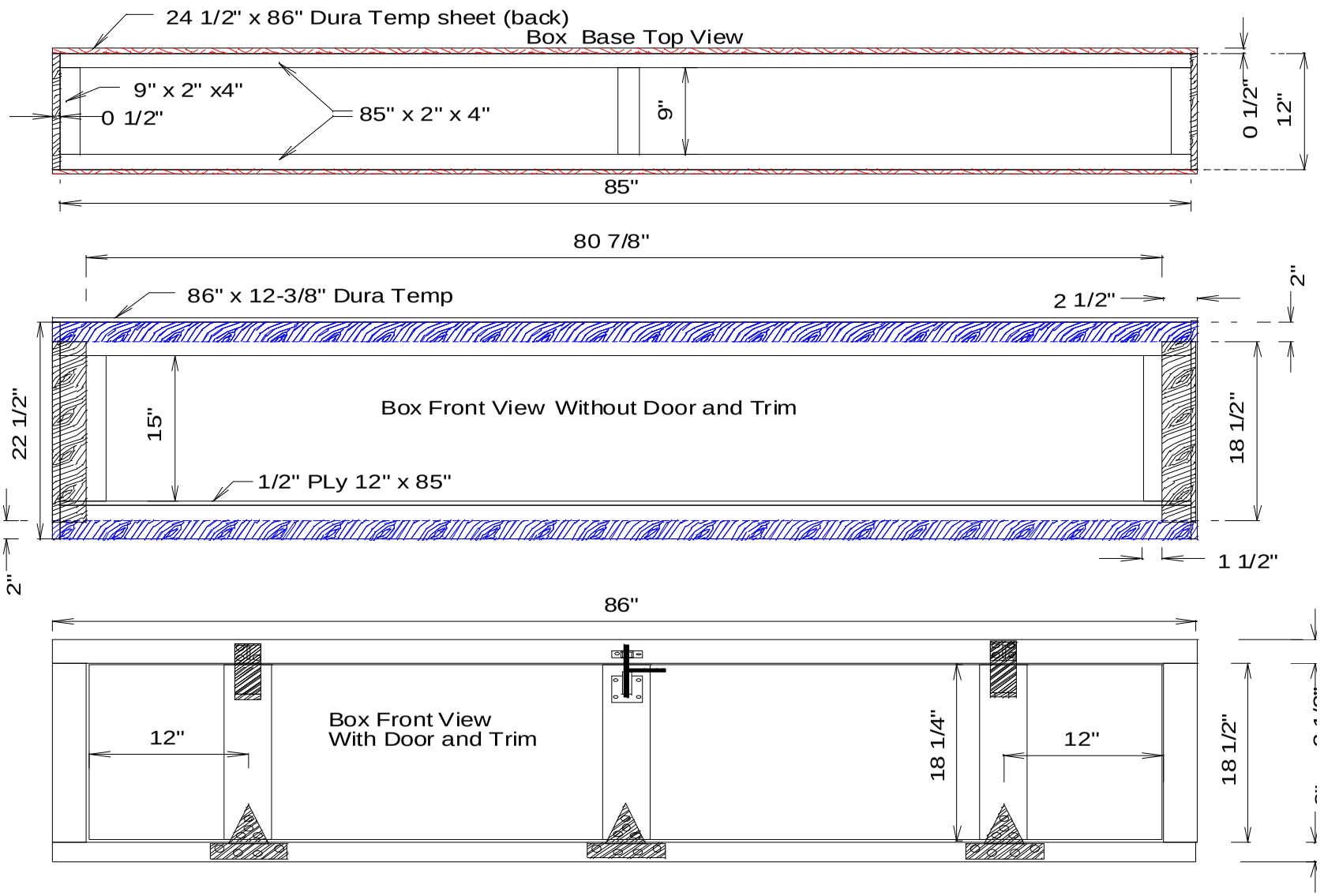


open shelter cut sheet: 7 ea 2” x 6” x 8’ redwood 4 ea 2” x 6” x 4’ redwood 4 ea 4” x 4” x 8’ redwood 6 ea 2” x 4” x 8’ Douglas fir studs for box 2 ea sheets of Dura Temp siding 2 ea 1” x 4” x 16’ Dura Temp trim 2 ea hinges 3 ea locking twist hasps 34 ea 3/8” x 5”-1/2” galvanized bolts 4 ea 3/8” x 4”-1/2” galvanized bolts	76 ea 3/8” washers galvanized 38 ea 3/8” nuts 5ea 6’ ranch truss (2 with siding and collar ties and 3 without) 6 ea Simpson truss ties (H1) 2 ea 3’ x 8’ x1/2” plywood for roofing base 2 ea squares of shingles 2 ea 3’ x 8’ vapor barrier paper 4 ea 8’ long aluminum roofing trim 4 ea vents across back of box

IMPROVE Sampler Open Shelter Box



box cut sheet:
4 ea 2x4's x 85" (two for base and 2 for top)
3 ea 2x4's x 9" (for base)
3 ea 2x4's x 9" (85.177 degree angle cut for top)
2 ea 2x4's x 16" (for back verticals)
2 ea 2x4's x 15" (for front verticals)
1 ea Dura Temp (DT) 23 1/2" x 86" sheet for back
1 ea Dura Temp 18 1/4" x 80 5/8" sheet for front
1 ea Dura Temp 13 1/8 x 86 sheet for top
1 ea Dura Temp left side sheet (see detail A)
1 ea Dura Temp right side sheet (see detail B)
2 ea 2" x 86" Dura Temp siding front top and bottom flashing
2 ea 2 1/2" x 18 1/2" Dura Temp siding front left and right flashing
3 ea trim 3/4"x 4" x 18 1/4" for vertical door trim
1 ea trim 3/4" x 2 1/2" x 86" for top front trim
1 ea trim 3/4" x 2 " x 86" for bottom front trim


24 1/2" x 86" Dura Temp sheet (back)
Box Base Top View
9" x 2" x4"
0 1/2"
85" x 2" x 4"
9"
0 1/2"
12"
85"
80 7/8"
86" x 12-3/8" Dura Temp
2 1/2"
2"
22 1/2"
15"
Box Front View Without Door and Trim
18 1/2"
1/2" PLy 12" x 85"
2"
1 1/2"
86"
12"
Box Front View
With Door and Trim
18 1/4"
12"
18 1/2"