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QUALITY ASSURANCE/QUALITY CONTROL DOCUMENTATION SERIES	
TITLE	**SITE SELECTION FOR OPTICAL MONITORING EQUIPMENT (IMPROVE PROTOCOL)**
TYPE	**STANDARD OPERATING PROCEDURE**
NUMBER	**4050**
DATE	**FEBRUARY 1994**

AUTHORIZATIONS		
TITLE	NAME	SIGNATURE
ORIGINATOR	Ivar J. Rennat	
PROJECT MANAGER	Mark Tigges	
PROGRAM MANAGER	David L. Dietrich	
QA MANAGER	Gloria S. Mercer	
OTHER		

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OTHER		

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1.0 PURPOSE AND APPLICABILITY

This standard operating procedure (SOP) outlines site selection criteria for optical monitoring instruments operated according to IMPROVE Protocol. Documented site selection criteria and procedures assure consistent, quality data at sites that exhibit most or all of the following characteristics:

- Be located in an area representative of the air mass to be monitored
- Be removed from local pollution sources (e.g., vehicle exhaust, wood smoke, road dust, etc.)
- Have telephone lines and AC power or solar exposure available
- Allow for proper orientation of nephelometer sample inlet
- Be close to an existing aerosol monitoring station or other instruments that are being used to monitor the air mass of interest
- Be representative of the same air mass measured by associated aerosol (particle monitors) and scene (camera) instrumentation
- Have a clear, unobstructed sight path between the transmissometer components
- Be representative of regional (not local) visibility
- Be secure from vandalism
- Have available servicing personnel (operator)
- Be reasonably accessible during all months of the year

The two (2) types of optical monitoring instruments currently operating in the IMPROVE monitoring network are Optec NGN-2 ambient nephelometers and Optec LPV-2 transmissometers. Additional, detailed instrument-specific site characteristic criteria are described in the following technical instructions (TIs):

- TI 4050-3000 *Site Selection for Optec NGN-2 Nephelometer Systems*
- TI 4050-3010 *Site Selection for Optec LPV-2 Transmissometer Systems*

This SOP serves as a guideline to facilitate the following:

- Locating potential sites
- Evaluating potential sites
- Selecting the most appropriate site from the potential sites
- Finalizing the selected site

2.0 RESPONSIBILITIES

2.1 PROGRAM MANAGER

The program manager shall:

- Inform the project manager of the location area and site-specific monitoring objectives for a proposed optical monitoring site.
- As required, review the selected site with the project manager and the project-specific Contracting Officer's Technical Representative (COTR).

2.2 PROJECT MANAGER

The project manager shall:

- Prepare project-specific siting and operational objectives, guidelines, and considerations.
- Review with the field specialist photographic documentation, maps, and other information to determine the suitability of a site.
- Select the site based on the criteria outlined in the appropriate instrument-specific technical instructions (TIs).
- As required, review the selected site with the program manager.

2.3 FIELD SPECIALIST

The field specialist shall:

- Initiate the search for potential sites by sending pertinent siting criteria and associated materials to the local contact.
- Conduct a siting visit if required (always required for transmissometer sites).
- Contact the local power and telephone companies for information concerning availability and installation.
- Obtain permission to perform any site preparation that may be required.
- Obtain permission from private or public landowners for permanent access to the monitoring location.
- Obtain permits or Environmental Impact Statements if required.
- Work with the local contact or sponsoring agency to identify a site operator and local primary contact to service the equipment.
- Review with the project manager photographic documentation, maps, and other information to determine the suitability of a site.
- Enter all site selection information in the site-specific Quality Assurance Database.

2.4 LOCAL (ON-SITE) CONTACT

The local contact shall:

- Locate and document potential sites upon receiving the siting criteria and associated materials from the field specialist.
- Provide the field specialist with any pertinent site-related information.
- Assist the field specialist in obtaining any site access and/or installation-related clearances or permissions.

3.0 REQUIRED EQUIPMENT AND MATERIALS

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

- Topographic maps of the area of interest
- Camera(s) to photograph the proposed site and area
- A list of monitoring objectives, requirements, and associated IMPROVE Protocol 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
- A Photographic Log
- Nephelometer sitings:
  - An Optec NGN-2 Nephelometer Siting Information Form
  - Installation Site Photographs and Drawing Instructions
- Transmissometer sitings:
  - Brunton compass
  - Transmitter telescope unit with tripod
  - Tape measure
  - Signal mirrors
  - Binoculars
  - Shelter option diagrams
  - Solar panel array installation configuration diagrams

4.0 METHODS

This section describes site selection procedures and includes two (2) major subsections:

4.1 Nephelometer Site Selection Methods
4.2 Transmissometer Site Selection Methods

4.1 NEPHELOMETER SITE SELECTION METHODS

4.1.1 Locating Potential Sites

- Obtain siting and monitoring objective criteria from the project manager.
- Locate potential sites using maps and through consultation with the local contact(s).
- Send siting package to the local contact.
- Perform a field survey, document site selection with photographs and maps, and collect information about site accessibility, security, and special requirements.
- Check returned siting package for completeness.

4.1.2 Reviewing and Selecting Potential Sites

- Evaluate potential sites after review of the siting information.
- Select the best site.

4.1.3 Finalizing Site Selection

After evaluating potential sites and selecting the most appropriate site, the following actions are required to finalize the site selection:

- Obtain approval of the selected site from the project manager.
- Obtain approval from the program manager.
- If required, obtain approval from the project-specific COTR.
- Provide a detailed description of the proposed installation to the local contact and property manager.
- Obtain permission for site use and any site preparation.
- Complete permits or Environmental Impact Statements if required.
- Initiate installation protocols as described in TI 4070-3000, *Installation of Optec NGN-2 Nephelometer Systems (IMPROVE Protocol)* and TI 4070-3001, *Site Documentation for Optec NGN-2 Nephelometer Systems.*

4.2 TRANSMISSOMETER SITE SELECTION METHODS

4.2.1 Siting Criteria

Criteria that must be considered when siting a transmissometer system are:

- Sight path (height above ground, length, vertical angle, and azimuth)
- Air mass (the air mass along the sight path must be representative of the regional air mass)
- Location characteristics (of the individual transmissometer transmitter and receiver stations)
- Selection of appropriate shelters and solar panel arrays (solar-powered sites)

4.2.2 Locating Potential Sites

- Obtain siting and monitoring objective criteria from the project manager.
- Locate potential sites using maps and through consultation with the local contact(s).
- Send siting package to the local contact.
- Perform a field survey, document site selection with photographs and maps, and collect information about site accessibility, security, and special requirements.
- Check returned siting package for completeness.
- Make a preliminary evaluation of the proposed sites.
- Schedule a siting trip and coordinate with the site operator.
- Determine the need for any clearances and document related information.
- Gather additional information and evaluate potential sites.

4.2.3 Reviewing and Selecting Potential Sites

- Evaluate potential sites after review of the siting information and site visit.
- Select the best site.

4.2.4 Finalizing Site Selection

After evaluating potential sites and selecting the most appropriate site, the following actions are required to finalize the site selection:

- Obtain approval of the selected site from the project manager.
- Obtain approval from the program manager.

- If required, obtain approval from the project-specific COTR.
- Provide a detailed description of the proposed installation to the local contact and property manager.
- Obtain permission for site use and any site preparation.
- Complete permits or Environmental Impact Statements if required.
- Initiate installation protocols as described in TI 4070-3010, *Installation and Site Documentation of Optec LPV-2 Transmissometer Systems (IMPROVE Protocol).*

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OTHER		

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LIST OF FIGURES

1.0 PURPOSE AND APPLICABILITY

This technical instruction (TI) describes site selection requirements for Optec LPV-2 transmissometer systems to be operated according to IMPROVE Protocol. The purpose of documented site selection requirements and procedures is to assure consistent quality data capture and minimize data loss by selecting a site that exhibits all or most of the following characteristics:

- Be located in an area representative of the air mass to be monitored
- Have a clear, unobstructed sight path between the receiver and transmitter
- Have adequate sight path length and height for representative monitoring of the air mass
- Be representative of the same air mass measured by associated aerosol (particle monitors) and scene (camera) instrumentation
- Have AC power or adequate solar exposure for continuous year-round operation
- Be oriented so that lighting conditions do not affect measurements
- Be removed from local pollution influences (e.g., vehicle exhaust, wood smoke, road dust, etc.)
- Be representative of regional (not local) visibility
- Be secure from vandalism
- Have available servicing personnel (operator)
- Be reasonably accessible during all months of the year

This TI serves as a guideline to facilitate the following:

- Locating potential sites
- Evaluating potential sites
- Selecting the most appropriate site from the potential sites
- Finalizing the selected site

2.0 RESPONSIBILITIES

2.1 PROGRAM MANAGER

The program manager shall:

- Inform the project manager of the location area and site-specific monitoring objectives for a proposed transmissometer site.
- As required, review the selected site with the project manager and the project-specific Contracting Officer's Technical Representative (COTR).

2.2 PROJECT MANAGER

The project manager shall:

- Prepare project-specific siting and operational objectives, guidelines, and considerations.
- Review with the field specialist photographic documentation, maps, and other information to determine the suitability of a site.
- Select the site for the transmissometer installation based on the criteria described in this TI.
- Review the selected site with the program manager.

2.3 FIELD SPECIALIST

The field specialist shall:

- Initiate the search for potential sites by sending pertinent siting criteria and associated materials to the local contact.
- Conduct a siting trip to the area to evaluate potential sites as determined by the local contact and identify any other potential sites.
- Fully document and evaluate each potential site according to the criteria outlined in this TI.
- Obtain permission to perform any site preparation that may be required.
- Obtain permission from private or public land owners for permanent access to the transmissometer locations.
- Complete permits or Environmental Impact Statements if required by the property managers.
- Contact the existing site operator or arrange for a new site operator to service the instruments.
- Review with the project manager, photographic documentation, maps, and other information to determine the suitability of a site.
- Enter all site selection information in the site-specific Quality Assurance Database.

2.4 LOCAL (ON-SITE) CONTACT

The local contact shall:

- Locate and document potential sites upon receiving the siting criteria and associated materials from the field specialist.
- Provide the field specialist with any pertinent site-related information.
- Review the potential sites with the field specialist during the siting visit and assist in locating additional potential sites.
- Assist the field specialist in obtaining any site access and/or installation-related clearances or permissions.

3.0 REQUIRED EQUIPMENT AND MATERIALS

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

- Topographic maps of the area of interest
- GPS receiver
- Camera(s) to photograph the proposed site and area
- A list of monitoring objectives, requirements, and associated IMPROVE Protocol monitoring equipment
- A list of local sources affecting the air in the area of interest
- Brunton compass
- Transmissometer transmitter telescope unit with tripod
- Tape measure
- Signal mirrors
- Binoculars
- Instrument shelter option diagrams
- Solar panel array installation configurations
- A Photographic Log

4.0 METHODS

This section describing site selection criteria and procedures and includes four (4) major subsections:

4.1 Siting Criteria
4.2 Locating Potential Sites
4.3 Reviewing and Selecting Potential Sites
4.4 Finalizing Site Selection

4.1 SITING CRITERIA

The following sections outline and describe the siting criteria as they pertain to the instrument, the monitored air mass, and site operation.

4.1.1 Sight Path Siting Criteria

The fundamental requirement for operation of the LPV-2 transmissometer is a clear, unobstructed line-of-sight (sight path) between the transmitter and receiver. Specific criteria for sight path height, length, vertical angle, and azimuth are discussed in the following subsections.

4.1.1.1 Sight Path Height

Adequate sight path height is dependent on minimizing distortion of the transmitter light beam as viewed by the receiver. The LPV-2 transmissometer is optically configured as follows:

Transmitter:	0.17° uniform portion of beam
	1.00° total cone of light
	2.30° telescope field of view
Receiver:	0.07° detector acceptance cone
	1.30° telescope field of view

Also refer to Figure 4-1, Transmissometer and Receiver Telescope Reticule Diagrams.

The field of view of both transmitter and receiver telescopes should be considered when selecting a sight path. Optimally, the sight path should be elevated as much as possible above the terrain surface, with both receiver and transmitter located at the edge of a dropoff. Refer to Figure 4-2, Sight Path Profile Examples, for depictions of acceptable and unacceptable sight path profiles. Figure 4-2 shows four examples:

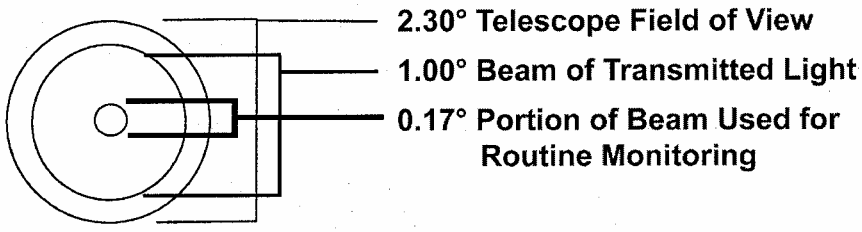
4-2 (a) - This figure depicts an ideal sight path where both the transmitter light beam and the receiver detector cone of acceptance are well elevated above terrain features.

4-2 (b) - This figure depicts a good sight path. Although the transmitter beam touches the terrain surface, it does so at a point well away from the detector cone. The detector cone is also well elevated above the terrain.

Transmitter

Alignment Reticule

The figure below depicts the reticule as viewed through the transmitter eyepiece:



Receiver

Alignment Reticule

The figure below depicts the reticule as viewed through the receiver eyepiece.

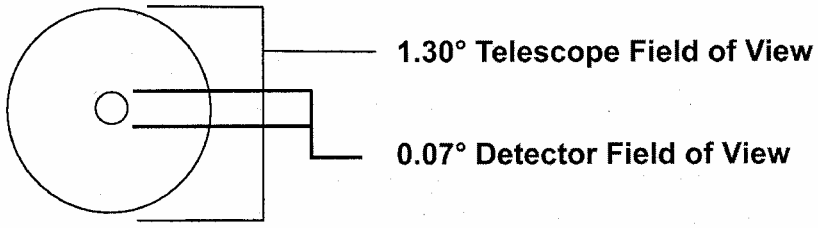


Figure 4-1. Transmitter and Receiver Telescope Reticule Diagrams.

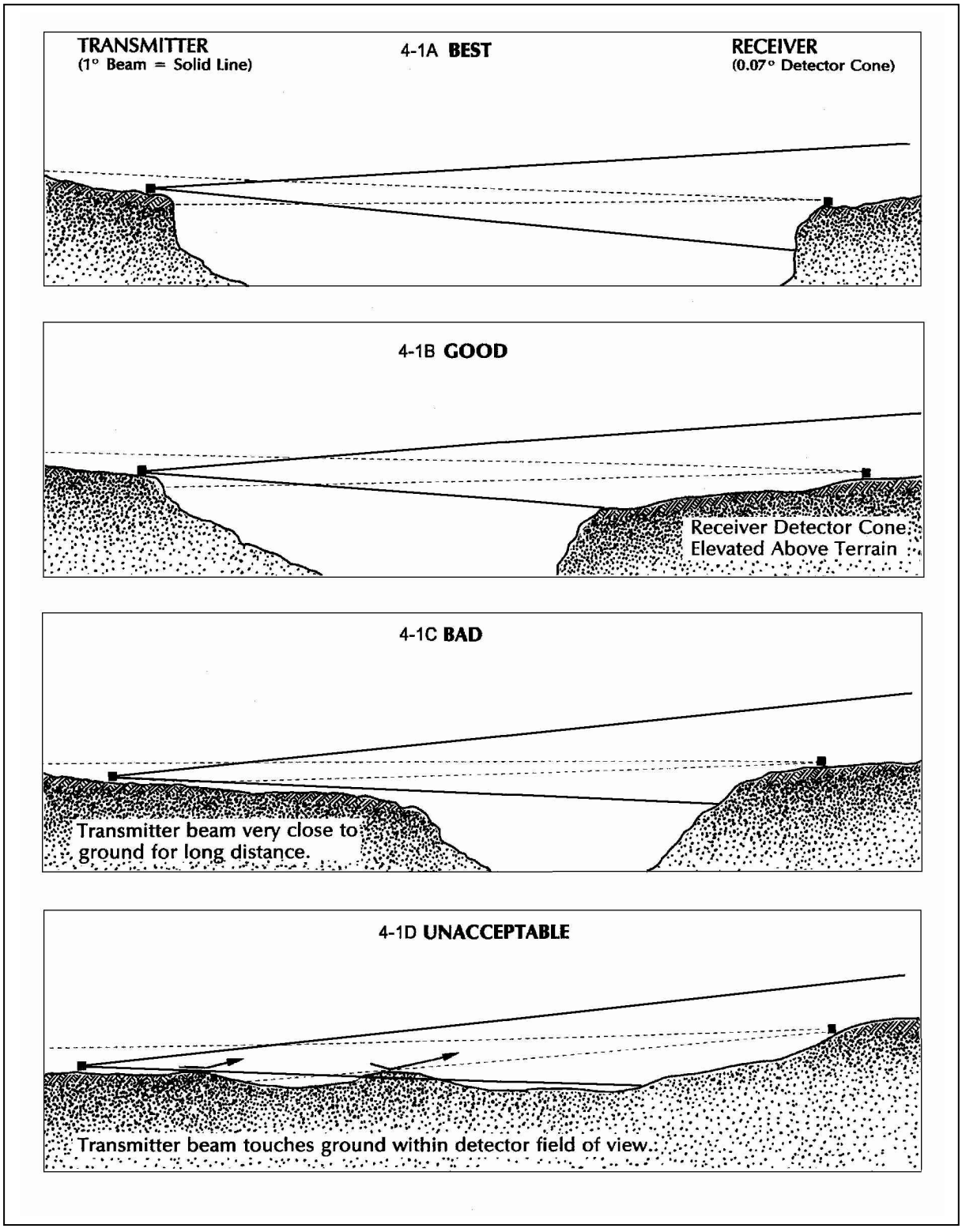


Figure 4-2. Sight Path Profile Examples.

4-2 (c) - In this figure, the transmitter beam passes too close to the terrain surface. Surface heating/cooling may distort the beam.

4-2 (d) - This figure depicts a transmitter beam striking the ground within the detector cone. Both refraction and reflection of the beam will occur, producing invalid measurements.

If possible, avoid locating the sight path over a body of water due to the increased frequency of temperature inversions, fog, etc. Optical effects due to terrain heating/cooling turbulence can affect instrument readings if the sight path is too low over terrain features.

During the siting visit by the field specialist, the transmitter telescope (mounted on a tripod) can be used to determine beam clearances for potential sight paths. The transmitter telescope can also be used to estimate receiver telescope field-of-views. Refer to Figure 4-2, Transmitter and Receiver Telescope Reticule Diagrams, for diagrams and descriptions of the transmitter and receiver eyepiece reticules.

4.1.1.2 Sight Path Length

The primary consideration when determining whether a path length is acceptable, is the expected range of visual air quality in that area. Generally, remote areas in the western United States require path lengths from 4-8 km, while eastern sites require 1-4 km lengths. If the mean visual range for the area is known, a usable path distance can be calculated as follows:

Sight Path Length = Mean Visual Range x 0.033

In an area with a wide range of visual air quality, the path length should be carefully selected.

4.1.1.3 Sight Path Vertical Angle

Unless otherwise specified in the monitoring objectives for a transmissometer site, the sight path should be as level as possible. If siting constraints result in a significant (>1.0°) sight path vertical angle, orientation of the receiver telescope to lighting conditions throughout the year should be thoroughly considered (e.g., a receiver telescope viewing approximately south at an upward angle could be susceptible to periods of receiver detector saturation, especially with low winter sun angles). It is generally preferable in such situations to configure the site with the receiver at the higher point and viewing downward toward the transmitter.

4.1.1.4 Sight Path Azimuth

The path azimuth is important if the receiver telescope has a clear view of the sunrise or sunset horizon. The result of an east facing or west facing receiver can be over-ranging of the detector for periods of time in the mornings and evenings. No valid data are collected during over-ranging episodes. An east-west orientation should be avoided if it doesn’t compromise the sight path height, length, or vertical angle.

4.1.2 Air Mass-Related Siting Criteria

The primary siting criterion is to ensure that the air mass along the entire sight path between the receiver and transmitter is representative of the larger air mass to be monitored.

Specific air mass-related criteria to be considered when siting are:

- Proximity and influence of local pollution sources such as vehicle exhaust, wood smoke, dust, etc.
- Measurement of the same air mass as other aerosol or optical monitoring instrumentation.
- Potential of significant cold air drainage. Transmissometer readings can be adversely affected by the varying optical properties of the sight path if cold air (typically funneled down from higher, colder areas) flows through the sight path.
- Small-scale, localized weather/climate regimes that are not representative of the region (e.g., areas that are susceptible to localized inversions, fog, clouds, etc.).

4.1.3 Transmitter and Receiver Site-Specific Siting Criteria

Various siting criteria to be considered as they apply to the actual transmitter and receiver station locations are:

- Stability of Ground Surface - Frost-heaving, downslope soil movement, soil saturation, and other earth movements will affect alignment of the instrument.
- Line Power (AC) Availability - If a receiver or transmitter system is to be line-powered (AC), verify that 110 volt, 15 amp electrical service is available at the site.
- Potential of Power-Related Problems - Frequency of power outages at AC-powered sites and sufficient year-round solar exposure at solar-powered sites must be considered.
- Ease of Site Access - Accessibility of the site for installation and weekly operator servicing must be considered.
- Lightning Exposure - Sites that are susceptible to lightning strikes should be avoided.
- Security From Vandalism - Sites should be selected that minimize the potential of vandalism or make provisions for preventative modifications to the installation to deter vandalism.
- Local Land Manager or Land Owner Cooperation - Establish whether the local land manager or land owner will be cooperative in allowing installation of the sites and continuous access to the sites for the duration of the study.

- Vegetation Growth - Growth of vegetation into the sight path must be taken into account.

- Data Collection Platform (DCP) Transmission Clearance - Verify that DCP transmissions will not be blocked by vegetation, geographical features, or structures.

- Isolation From Radio Interference - Instrument circuitry is sensitive to strong radio signals. Avoid siting close to broadcast antennas or repeaters.

- Snow Accumulation - The effects of significant snowfall accumulations on instrument, DCP, and solar panel operation should be considered.

- Avoidance of Lighting Interference - Sunlight reflecting from solar panels, large windows, or other large reflective surfaces near the transmitter can saturate the receiver detector and affect readings.

4.1.4 Shelter and Solar Panel Array Configuration Selection (Solar-Powered Sites)

The following subsections describe the different types of shelters and solar panel array installation configurations and the guidelines to be followed in the selection of these. The local monitoring project overseer and/or land manager should be consulted during the shelter and solar panel array selection process to ensure compliance with local guidelines and restrictions.

4.1.4.1 Selection of Transmitter and Receiver Shelters

Refer to Figure 4-3, Transmissometer Shelter Options.

Standard transmissometer system shelters are 6’ x 6’ x 8’ insulated wood shelters (receiver) and 3½’ x 3½’ x 4½’ wood or metal shelters (transmitter). The smaller transmitter shelters can be insulated, depending on climate severity. The larger receiver shelter provides substantial space for instrumentation, related equipment/supplies, and storage of shipping cases. It also allows the operator to perform instrument servicing while protected from weather.

The standard transmitter shelter provides adequate housing for the instrument and related servicing supplies. It is also relatively easy to transport and install. Use of other shelter types may be warranted by the following factors and constraints:

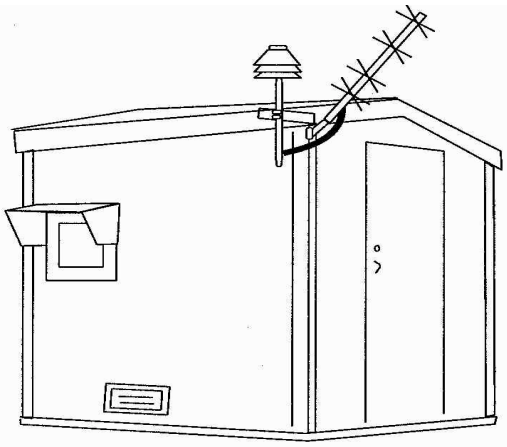
- Difficulty in transporting a larger shelter to the site

- Visual obtrusion of larger shelters

- Site configuration and/or space restrictions

- Need for additional height of transmitter telescope

- Need for protection from weather when servicing the transmitter

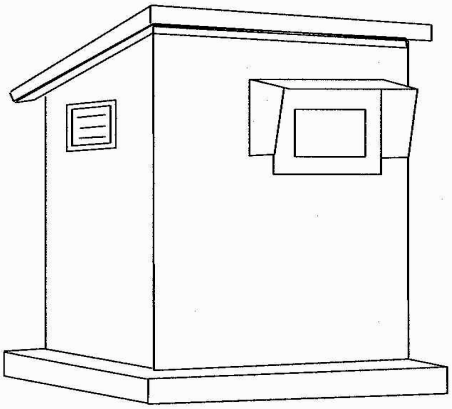


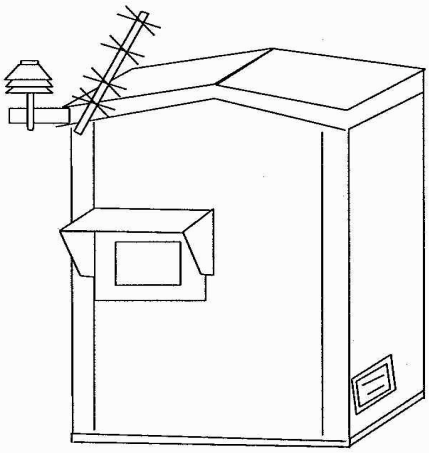
Transmitter or Receiver

3 ½’ x 3 ½’ x 4 ½’ Wood Shelter
Insulated

Receiver

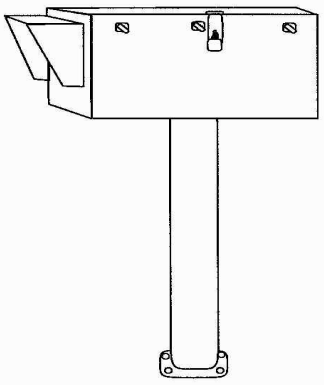
6’ x 6’ x 8’ Wood Shelter
Insulated





Transmitter or Receiver

4’ x 4’ x 8’ Wood Shelter
Insulated
Receiver shelter where standard
shelter is too large
Transmitter shelter where outdoor
servicing is difficult (cold weather sites)



Transmitter

Metal Environmental Enclosure
Where space is very limited
and/or on existing structure

Figure 4-3. Transmissometer Shelter Options.

4.1.4.2 Selection of Solar Panel Array Configuration (Solar-Powered Sites)

Refer to Figure 4-4, Solar Panel Array Installation Configurations.

The three (3) standard types of solar panel array installation configurations are: free-standing, shelter wall-mounted, and shelter roof-mounted. General guidelines and considerations for selection of solar array type are:

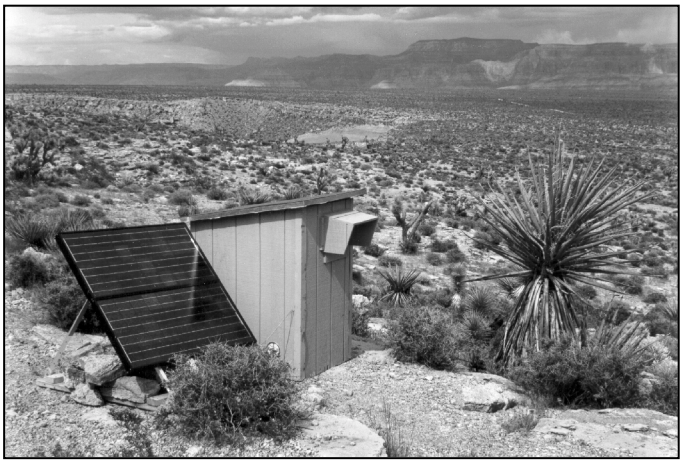
- Adequacy of year-round solar exposure
- Orientation of large shelter conducive to wall-mounting of array
- Minimizing visual obtrusion of the array
- Expected snowfall accumulations
- Location-specific constraints due to site configuration, terrain, vegetation, etc.

4.2 LOCATING POTENTIAL SITES

Site selection begins with the process of locating potential sites in the monitoring area of interest by the local contact. The local contact and field specialist then prepare a site visit. Methods and procedures are described in the following two (2) subsections.

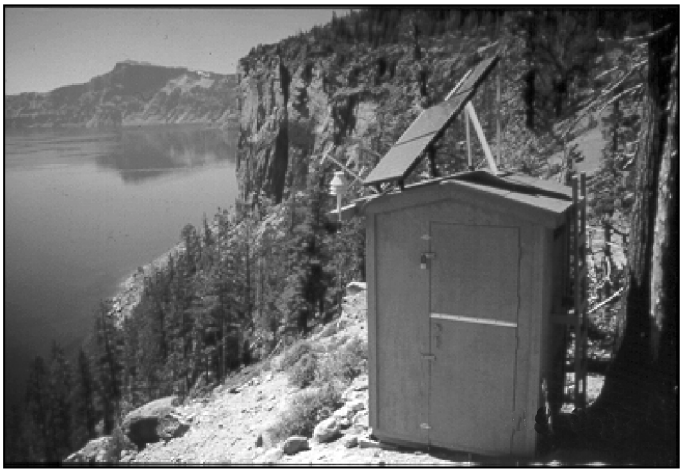
4.2.1 Local Contact Potential Site Location Methods and Procedures

OBTAIN SITING CRITERIA	The field specialist obtains specific siting criteria from the project manager. Siting criteria may include regional or site-specific program objectives, meteorological conditions of the monitoring area and/or other considerations.
LOCATE POTENTIAL SITES	Locate potential sites from maps and through consultation with local contacts familiar with the monitoring area of interest.
SEND SITING PACKAGE TO LOCAL CONTACT	Send the transmissometer siting package to a local contact familiar with the proposed monitoring area. The siting package includes the following: • A cover letter that includes a brief description of the monitoring area and associated program objectives. • Instrument shelter option diagrams (Figure 4-3). • Solar panel array installation configurations (Figure 4-4). • A disposable 35 mm camera or a digital camera. • A Photographic Log (Figure 4-5).



Free-standing
Solar Array

Shelter
Wall-mounted
Solar Array



Shelter
Roof-mounted
Solar Array

Figure 4-4. Solar Panel Array Installation Configurations.

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Site _____

PHOTOGRAPHIC LOG

EXPOSURE NUMBER OR NAME	DATE	TIME	DESCRIPTION/COMMENTS

Figure 4-5. Example Photographic Log.

FIELD SURVEY AND SITE SELECTION DOCUMENTATION	The local contact should review the technical and monitoring requirements and identify potential sites and in relation to the protocols provided. Actual field surveys can be performed by the local contact, an ARS field specialist, or both. The results of the field survey should include a series of photographs of the area. Photographs of each site location should also be provided. The location, azimuth, and predominant scenic features should be documented on the provided Photographic Log. Identify and record the selected site location(s) and sight paths on a topographic map of the area. Record any pertinent information regarding accessibility, security, special requirements, etc. Return the photographic images, Photographic Log, site location maps, and any other selection materials to ARS for final review.
CHECK RETURNED SITING PACKAGE	Check the returned transmissometer siting package for completeness. Obtain any missing information from the local contact. Evaluate the photographs of each potential site. If additional photographs are required, send another camera to the local contact with instructions detailing the photographs required.
PRELIMINARY POTENTIAL SITE REVIEW	All the siting information received from the operator is reviewed by the field specialist and a preliminary evaluation is made of the proposed sites and sight paths.

4.2.2 Field Specialist Siting Visit Methods and Procedures

Once the preliminary review of potential sites and information provided by the local contact is complete, a siting visit is conducted by the field specialist. Siting visit methods and procedures are performed as follows:

TRIP SCHEDULING	When scheduling the siting trip, verify that the local contact will be present and have time to visit all potential sites (including any found by the field specialist during the siting visit).
VISITATION OF POTENTIAL SITES	The field specialist and local contact should visit all potential sites established by the contact. If necessary, more detailed documentation (photographs, map locations, etc.) should be made of the sites.

LOCATION AND DOCUMENTATION OF ADDITIONAL POTENTIAL SITES

The field specialist determines if there are any additional potential sites and documents these fully.

EVALUATION OF POTENTIAL SITES

The field specialist shall make a preliminary evaluation of all potential sites based on the criteria listed in Sections 4.1.1, 4.1.2, and 4.1.3; establish a primary potential site; and at least one alternative site. This evaluation should be reviewed with the local contact and also his/her supervisor. Tentative installation configurations, instrument shelters, power provisions, support equipment, installation assistance, site clearances, etc. should be discussed at this time.

CLEARANCES

Determine if any clearances (for installation access or related activities, clearing of vegetation, archeological, etc.) are needed. If so, establish and document who is involved in the process and the approximate time frame necessary to obtain the clearance(s).

MISCELLANEOUS INFORMATION

Document all miscellaneous information that could be pertinent to installation or operation of the system. This may include, but is not limited to, the following:

- Names, addresses, and numbers for regular and backup operators, land managers, etc.
- Local power company and the local contact person (if either transmitter or receiver site will be AC-powered).
- Local businesses that carry installation or operation-oriented supplies (hardware stores, lumber yards, electrical supply stores, etc.).
- Shipping address and other shipping information for the site.
- Obtain a local telephone book for future reference.

4.3 REVIEWING AND SELECTING POTENTIAL SITES

Upon completion of the siting trip, the following procedures and tasks are performed for review and selection of the transmissometer installation site:

COMPILATION OF INFORMATION

The field specialist compiles all information from the returned siting package and the siting trip for presentation to the project manager. The information materials should include the following for each potential site:

- Full photographic documentation of proposed transmitter and receiver sites and sight paths.

COMPILATION OF INFORMATION (continued)

- Sight path specifications (e.g., path length, height, vertical angle, azimuth, etc.) and individual site specifications (location, elevation, etc.).
- A list of advantages and disadvantages for each potential site and sight path. Degree of conformity with the monitoring program-specific criteria and the general siting criteria (refer to Section 4.1) should be noted for each site and sight path.
- Map(s) with designated sites and sight paths.

SELECT BEST SITE

The project manager and field specialist review all potential site-related information and select the sight path and transmitter and receiver sites that best meet the monitoring program-specific and general siting criteria.

4.4 FINALIZING SITE SELECTION

After evaluating potential sites and selecting the most appropriate site, the following actions are required to finalize the site selection:

- Obtain approval of the selected site from the project manager.
- As required, the final site selection and related information are presented to the program manager and/or the project-specific COTR for final review and approval.
- If required, obtain approval from the project-specific COTR.
- Provide a detailed description of the selected site, transmitter and receiver station configurations, and the installation methods to the local contact and property manager.
- Obtain permission to use the site and arrange for any site preparation from the property manager, land manager (public lands), or land owner (private lands).
- Compile permits or Environmental Impact Statements (EISs) if required by the property manager.
- Initiate installation protocols as described in TI 4070-3010, *Installation and Site Documentation for Optec LPV-2 Transmissometer Systems (IMPROVE Protocol).*