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QUALITY ASSURANCE/QUALITY CONTROL DOCUMENTATION SERIES	
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TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1.0	PURPOSE AND APPLICABILITY	1
2.0	RESPONSIBILITIES	2
2.1	Project Manager	2
2.2	Field Specialist	2
2.3	Local (On-Site) Contact	3
3.0	REQUIRED EQUIPMENT AND MATERIALS	3
3.1	Site Configuration Equipment for 35 mm Automatic Camera Systems	3
3.2	Site Configuration Equipment for 8 mm Time-Lapse Camera Systems	3
3.3	Site Configuration Equipment for Digital Camera Systems	4
3.4	Site Configuration Equipment for SVHS Time-Lapse Video Systems	4
4.0	METHODS	5
4.1	Configuration of 35 mm and 8 mm Automatic Camera Monitoring Equipment	6
4.2	Configuration of Digital Camera Monitoring Equipment	6
4.3	Configuration of SVHS Time-Lapse Video Monitoring Equipment	6
4.4	Operator Training	6

1.0 PURPOSE AND APPLICABILITY

This standard operating procedure (SOP) describes site configuration requirements for photographic monitoring systems. These requirements may differ from system to system depending upon specific project goals and siting specifications. The purpose of this SOP is to assure constant, quality data and minimize data loss by:

- Ensuring that the monitoring systems are configured at locations that view important features, that meet monitoring or surveillance objectives, and are secure from potential vandalism.
- Training site operators on photographic or video monitoring system configuration requirements and operation.

Documenting visibility or visual events and trends is an important aspect of evaluating existing or potential impairment in Class I and other visibility-sensitive areas. Photography is an efficient way to document these events and trends and is an effective method of communicating visual relationships to decision-makers and to the public. Self-contained, automatic camera monitoring systems or time-lapse video monitoring systems are easily installed and operated. Camera-based monitoring, referred to as scene monitoring, is an effective, economical component of any visibility monitoring program.

An automatic camera visibility monitoring station takes 35 mm slides or high-resolution digital images of a selected vista at user-selected times throughout the day. The station can also be outfitted with an 8 mm time-lapse camera or an SVHS time-lapse recorder to document the dynamics of visibility events. Day-to-day variations in visual air quality captured on 35 mm color photographic slides, digital images, 8 mm color movie film, or SVHS videotape can be used to:

- Document how vistas appear under various visual air quality, meteorological, and seasonal conditions. Scene characteristics include observer visual range, scene contrast, color, texture, and clarity.
- Record the frequency that various visual air quality conditions occur (e.g., incidence of uniform haze, layered haze, or weather events).
- Provide a quality assurance reference for collocated measurements.
- Determine the visual sensitivity of individual areas or views to variations in ambient air quality.
- Identify areas of potential impairment.
- Estimate the optical properties of the atmosphere under certain conditions.
- Provide quality media for visually presenting program goals, objectives, and results to decision-makers and to the public.
- Provide support data for the computer image modeling of potential impairment.
- Support color and human perception research.

Slides, digital images, movie film, and videotape, however, do not provide quantitative information about the cause of visibility impairment. Aerosol and optical properties of the atmosphere must be independently monitored where cause and effect relationships are required.

In addition to visibility monitoring, time-lapse video systems can be used for a variety of other purposes, including:

- Environmental monitoring such as wildlife, waterflow, and source monitoring.
- Security monitoring for remote industrial sites and storage depots.
- Construction monitoring for building sites or highway and bridge construction.
- Event monitoring for remote weather documentation or highway and airport conditions.
- Recreation monitoring for ski areas and river rafting.

Specific information regarding site selection criteria is provided in SOP 4055, *Site Selection for Scene Monitoring Equipment*. The following technical instruction (TI) provides detailed information regarding specific site configuration procedures:

- TI 4080-3100 *Site Configuration for SVHS Time-Lapse Video Monitoring Equipment for the Healy Clean Coal Project*

2.0 RESPONSIBILITIES

2.1 PROJECT MANAGER

The project manager shall:

- Provide the field specialist with site configuration materials including photographic documentation, maps, and approved installation location, vista, and configuration specifications.
- As required, review the determined site configuration requirements with the project engineers.
- Schedule an operator training session with pertinent routine servicing personnel and the field specialist.

2.2 FIELD SPECIALIST

The field specialist shall:

- Review the determined site configuration requirements with the local contact and project manager.
- Ensure that the equipment is installed and configured according to project guidelines.
- Schedule an operator training session with pertinent routine servicing personnel and the project manager.

2.3 LOCAL (ON-SITE) CONTACT

The local contact shall:

- Review the determined site configuration requirements with the field specialist.
- Schedule an operator training session with the field specialist and the project manager.

3.0 REQUIRED EQUIPMENT AND MATERIALS

3.1 SITE CONFIGURATION EQUIPMENT FOR 35 MM AUTOMATIC CAMERA SYSTEMS

A 35 mm automatic camera monitoring system consists of a camera and other components in an enclosure. A 35 mm camera may be configured with an 8 mm camera within the same enclosure. Components for a 35 mm camera configuration include:

- A 35 mm automatic camera
- A camera lens, generally 50 mm to 135 mm
- A programmable timer to trigger the camera
- A databack to imprint date and time on the film
- Batteries to operate all components
- A camera mount
- An environmental enclosure (with heater if required)
- A mounting post

3.2 SITE CONFIGURATION EQUIPMENT FOR 8 MM TIME-LAPSE CAMERA SYSTEMS

An 8 mm time-lapse camera monitoring system consists of a camera and other components in an enclosure. . An 8 mm camera may be configured with a 35 mm camera within the same enclosure. Components for an 8 mm camera configuration include:

- An 8 mm time-lapse movie camera with internal intervalometer
- A camera lens, generally 50 mm to 135 mm
- A programmable timer to trigger the camera on and off
- Batteries to operate all components
- A camera mount

- An environmental enclosure (with heater if required)
- A mounting post

3.3 SITE CONFIGURATION EQUIPMENT FOR DIGITAL CAMERA SYSTEMS

A high-resolution digital camera system consists of a camera, image capture computer, and image capture software in an enclosure. Specific components include:

- A digital camera that provides:
 - High-resolution JPEG images – 1280 x 960, 24-bit true color
 - Optical zoom of 38 to 114 mm (35 mm SLR equivalent)
 - RS-232 serial interface (high-resolution images can be taken at up to 3-minute intervals)
- An image capture computer with:
 - A Pentium processor
 - Windows 95/98/NT
 - A 1.2 gigabyte hard disk
 - (2) Type 2 PCMCIA slots
 - A PC-card 56K telephone modem or PC-card cellular telephone/modem
- Image capture software for:
 - Windows 95/98/NT
 - A 32-bit Windows program
 - Image acquisition via telephone, cellular telephone, or on-site image collection
 - User selectable JPEG image resolutions
- An environmental enclosure (with heater if required)
- A camera mount
- Electrical power (AC power or DC solar power)

3.4 SITE CONFIGURATION EQUIPMENT FOR SVHS TIME-LAPSE VIDEO SYSTEMS

An SVHS time-lapse video monitoring system consists of a camera assembly and a video recording assembly. Components included in each assembly are:

- Camera assembly:
 - A color video camera
 - A zoom camera lens, generally 8 mm to 48 mm
 - A pan/tilt camera mount
 - A mounting post with mounting plate
 - A camera enclosure
 - An uninterruptible power supply

- Video recording assembly:
 - A shelter (6' x 6' with heater)
 - An SVHS VCR for time-lapse recording
 - A color review monitor
 - An uninterruptible power supply

Other components may be required such as microwave transmission/receiver assemblies, or various remote control assemblies, depending upon siting requirements and situations, and project objectives.

4.0 METHODS

Scene monitoring station configurations are based on:

- Monitoring location and monitored scenic vista or view of interest.
- Frequency that various visual air quality conditions or monitoring interests occur.
- Complexity of diurnal variations and observed visibility events.
- Collocated air quality monitoring instrumentation.
- Site-specific monitoring objectives.
- Proximity to AC power if an AC SVHS time-lapse system is used.

For further information on site selection requirements, see SOP 4055, *Site Selection for Scene Monitoring Equipment*.

An automatic 35 mm camera system documents observed visual air quality at user selected times throughout the day. Photographic slides often provide a quality assurance reference for collocated visibility measurements. Slides are also a quality media that can be easily replicated or digitized to support computer image modeling and perception research. A high-resolution digital camera system can internally store up to 1,400 high-resolution images on its hard disk, which can be downloaded on demand by telephone or be directed to an independent on-site computer or other mass storage media. Automatic 8 mm time-lapse camera systems or SVHS time-lapse recorders document the dynamics of ongoing air quality and meteorological related events or other events.

This section describes site configuration procedures in four (4) major subsections:

- 4.1 Configuration of 35 mm and 8 mm Automatic Camera Monitoring Equipment
- 4.2 Configuration of Digital Camera Monitoring Equipment
- 4.3 Configuration of SVHS Time-Lapse Video Monitoring Equipment
- 4.4 Operator Training

4.1 CONFIGURATION OF 35 MM AND 8 MM AUTOMATIC CAMERA MONITORING EQUIPMENT

The 35 mm and 8 mm automatic camera monitoring sites have few options in equipment configuration. Standard configuration for these systems includes a camera assembly located inside an environmental enclosure. The enclosure rests on a mounting post viewing the scene of interest. These monitoring systems are battery-powered and require periodic servicing. Configuration options include camera type (35 mm and/or 8 mm), lens size, exposure frequency, an enclosure heater option, and a single-port (one camera system) or double-port (two camera systems) enclosure.

4.2 CONFIGURATION OF DIGITAL CAMERA MONITORING EQUIPMENT

The digital camera system includes a high-resolution digital camera with computer located inside an environmental enclosure. The enclosure rests on a mounting post viewing the scene of interest. These monitoring systems require AC or DC solar power and may be serviced through remote telephone connections. Configuration options include a regular telephone or cellular telephone connection, or an independent on-site computer or other mass storage media to store the acquired images. Image resolution and frequency of image capture are other options.

4.3 CONFIGURATION OF SVHS TIME-LAPSE VIDEO MONITORING EQUIPMENT

SVHS video monitoring sites may be installed using a wide variety of equipment configurations. Configurations are determined by specific project goals and objectives, monitoring interests, availability of power, and environmental conditions.

Generally, video monitoring sites are configured in two parts, a camera assembly and a video recording assembly. The camera assembly consists of an SVHS color video camera located inside a heated enclosure. The enclosure rests on a mounting post viewing the scene of interest. The video recording assembly is situated in a nearby shelter and includes a color monitor and a VCR to record the monitoring. Additional equipment may include a modem to transfer recorded camera images, additional monitors and VCRs (for real-time event programming), or a remote control unit for the camera function. The VCRs may be programmed as required for the specific needs of the monitoring project.

4.4 OPERATOR TRAINING

Operator training is provided by the field specialist following the completion of the photographic or video system configuration and equipment installation. Supplemental and refresher training is provided during scheduled site visits by the field specialist, and ARS telephone support is always available. Site operators are trained on photographic or video system requirements and routine maintenance procedures, including:

- An overview of project and system components
- Power supply, distribution, and cabling

- Signal connectors and cabling
- Heater systems
- Component replacement
- Camera and component function and operation
- On-site video monitor operation
- Recorded videotape review
- Film or videotape replacement
- Log sheet completion
- Troubleshooting
- ARS contact personnel

A site operator's manual is also provided to site operators. This manual contains technical instructions applicable to the specific camera or video monitoring equipment located at the site. Additional manufacturer's instruction booklets and pertinent maintenance documentation forms are also included in the manual.