QUALITY ASSURANCE/QUALITY CONTROL DOCUMENTATION SERIES

TITLE	**COLLECTION OF SCENE MONITORING PHOTOGRAPHIC FILM, VIDEOTAPE, AND DIGITAL IMAGES**
TYPE	**STANDARD OPERATING PROCEDURE**
NUMBER	**4305**
DATE	**JANUARY 1994**

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REVISION HISTORY			
REVISION NO.	CHANGE DESCRIPTION	DATE	AUTHORIZATIONS
0.1	Delete references to operational timelines.	February 1996	
1.0	Change title/add SVHS video system references.	February 1999	
2.0	Add digital camera system files.	August 2001	

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1.0   PURPOSE AND APPLICABILITY

This standard operating procedure (SOP) outlines the quality assurance and quality control actions associated with the collection, processing, and handling of photographic and video monitoring data. This SOP serves as a guide to assure high quality data collection from automatic camera or video monitoring stations.

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 record the dynamics of visibility events. Day-to-day variations in visual air quality captured on 35 mm color film, compact memory cards (with varying storage capacity), 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 image files, 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.

The following technical instructions (TIs) provide detailed information regarding specific photographic film, videotape, and digital image collection, processing, and handling procedures:

- TI 4305-4000   *Collection, Processing, and Handling of 35 mm Slide Film*

- TI 4305-4003   *Collection, Processing, and Handling of 8 mm Time-Lapse Movie Film*

- TI 4305-4050   *Collection, Processing, and Handling of Time-Lapse Videotapes for the Healy Clean Coal Project*

- TI 4305-4100   *Collection and Handling of Digital Images*

2.0   RESPONSIBILITIES

2.1   PROJECT MANAGER

The project manager shall oversee all collection, processing, and handling procedures.

2.2   DATA COORDINATOR

The data coordinator shall:

- Supply the site operator with all necessary monitoring supplies.

- Verify that scheduled site visits are performed and notify the site operator if he/she fails to make a scheduled visit.

- Review all documentation completed by the site operator for completeness and accuracy, and file all documentation and correspondence in the site-specific notebooks and quality assurance database.

- Oversee film, videotape, and digital image memory card tracking.

- Review all film, videotape, and digital images for quantity and quality.

- Resolve problems reported by the site operator and data technician.

- Verify that all Master Log documentation is complete and accurate.

- Complete an Operational History Log for each videotape cassette.

- Determine collection and recovery statistics.

- Prepare all duplicate videotapes.

2.3   DATA TECHNICIAN

The data technician shall:

- Log receipt of all film rolls, videotapes, and memory cards mailed to Air Resource Specialists, Inc. (ARS) from site operators.

- Ship all exposed film to the Kodalux laboratory for developing.

- Log all developed film returned from Kodalux processing.

- Complete Master Log documentation for each film roll, videotape cassette, or memory card.

- Identify and chronologically label all 35 mm slides, 8 mm film rolls, videotapes, and digital images by site.

- Complete Visibility Monitoring Slide Logs.

- Report any noted documentation or data inconsistencies to the data coordinator.

- File all fully documented film products and videotapes.

- Distribute duplicate videotapes as specified to project participants.

2.4   SITE OPERATOR

The site operator shall:

- Report any noted inconsistencies upon site servicing and film, videotape, or memory card changing to the data coordinator.

- Complete a Visibility Monitoring Status/Assessment Sheet and label for each film roll or memory card.

- Complete a Time-Lapse Visibility Monitoring Status/Assessment Sheet and videotape label for each videotape cassette.

- Mail exposed film, videotape, or full memory card and accompanying documentation to ARS.

3.0 REQUIRED EQUIPMENT AND MATERIALS

3.1 REQUIRED EQUIPMENT AND MATERIALS FOR 35 MM SLIDES

The following equipment and materials are used to collect, document, and validate 35 mm color slide film:

- Kodachrome 64 36-exposure color slide film

- Film canister labels

- Mailing envelopes

- Film processing mailers

- Automatic Camera Visibility Monitoring Status/Assessment Sheets

- Master Logs

- Visibility Monitoring Slide Logs

- Light table

- Hand-held viewing lens

- Alpha-numeric slide number stamps

- Polyethylene slide protector sheets

- Manila and hanging file folders

- 3-ring notebooks

3.2 REQUIRED EQUIPMENT AND MATERIALS FOR 8 MM TIME-LAPSE FILM

The following equipment and materials are used to collect, document, and validate 8 mm time-lapse movie film:

- Kodachrome Super-8 color movie film

- Film cartridge labels

- Mailing envelopes

- Film processing mailers

- Time-Lapse Camera Visibility Monitoring Status/Assessment Sheets

- Master Logs

- 8 mm movie projector

- 3-ring notebooks

3.3   REQUIRED EQUIPMENT AND MATERIALS FOR TIME-LAPSE VIDEOTAPE

The following equipment and materials are used to collect, document, and validate SVHS time-lapse videotape:

- SVHS videotape cassettes

- Videotape labels

- Mailing envelopes

- Time-Lapse Video Monitoring Status/Assessment Sheets

- Operational History Logs

- SVHS video cassette player

- Review monitor

- 3-ring notebooks

3.4   REQUIRED EQUIPMENT AND MATERIALS FOR DIGITAL IMAGES

The following equipment and materials are used to collect, document, and validate digital images collected from memory cards:

- Memory cards

- Memory card pouches

- Memory card pouch labels

- Mailing envelopes

- Visibility Monitoring Status/Assessment Sheets

- Master Logs

- Personal computer (PC) with CD-ROM writer

- Memory card reader or adapter (PCMCIA Compact Flash reader, adapter, or USB Flash Card reader)

- ARS' Air Quality Database

- Blank CDs

- Manila folders

- Hanging folders

- File cabinet

- 3-ring binders

- SVHS videotape cassettes

4.0   METHODS

This section includes the following two (2) subsections:

4.1   Scene Monitoring Station Configurations
4.2   Collection, Processing, and Handling of Scene Monitoring Photographic Film, Videotape, and Digital Images

4.1   SCENE MONITORING STATION CONFIGURATIONS

Scene monitoring station configurations are configured 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 or AC digital camera system is used.

An automatic 35 mm camera system or high-resolution digital camera system documents observed visual air quality at user-selected times throughout the day. Photographic slides or digital images 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.

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.

4.2 COLLECTION, PROCESSING, AND HANDLING OF SCENE MONITORING PHOTOGRAPHIC FILM, VIDEOTAPE, AND DIGITAL IMAGES

Major steps in the data collection, processing, and handling of scene monitoring data are described below. Specific step-by-step procedures for each type of camera or video system are detailed in the technical instructions listed in Section 1.0.

4.2.1 Photographic Media Collection

All 35 mm or 8 mm film (from a single emulsion number) is purchased from a Kodalux direct distributor to cover two (2) consecutive monitoring seasons. High quality videotapes are purchased in bulk quantities. Film and videotapes are shipped to sites with specific handling and storage instructions, and supplemental monitoring supplies.

The site operator completes a film canister/cartridge label or videotape label and attaches it to each new film roll or videotape upon loading into the camera or time-lapse recorder. When the operator returns to remove the film or videotape, he or she completes the information on the label, places the film or videotape in a padded envelope, and mails it along with a Visibility (or Video) Monitoring Status/Assessment Sheet to ARS.

When servicing a digital camera site, the operator loads a formatted memory card into the camera. Camera scripting programs record the date and time that images are taken. The operator also completes a memory card pouch label and attaches it to the memory card pouch. The labeled pouch is shipped to ARS via FedEx, along with a completed Visibility Monitoring Status/Assessment Sheet.

4.2.2 Photographic Media Processing

4.2.2.1 Film Processing

Processing procedures for 35 mm and 8 mm film are nearly identical. Film that arrives from the field is immediately recorded on a site-specific Master Log according to the roll number and the time period the film documents. The following items are maintained on each Master Log:

- Site name

- Site operator

- Roll numbers

- Mailer numbers

- Emulsion number

- Dates when film rolls were sent to Kodalux processing and dates returned

- Beginning and ending dates and times of the photographs contained on the film roll

- Slide numbers

- Recovery statistics

- Correspondence

- Problem history

- Equipment changes

- Supplies mailed

The Visibility Monitoring Status/Assessment Sheet is thoroughly reviewed to verify proper camera operations and note any weather anomalies or requested operational supplies. Any discrepancies are documented by site and roll number on the Master Log and corrective action is initiated. Any requested monitoring supplies or equipment components are shipped.

All film is sent by courier to the Kodalux processing laboratory in Dallas. Roll and film processing mailer numbers are documented on the Master Log. All shipments are tracked and traced if necessary by mailer number.

4.2.2.2 Videotape Processing

SVHS videotape cassettes that arrive from the field are immediately recorded on an Operational History Log. The following items are maintained on each log:

- Site name

- Site operator

- Videotape number

- Date when the videotapes were received at ARS

- Comments or correspondence

- Monitoring period dates documented on each videotape

- Recovery statistics

- Videotape review status

- Delivery status of duplicate videotapes made

4.2.2.3 Digital Image Processing

No processing is required for digital images. Images (in JPEG format) are taken directly off the memory card onto a personal computer for viewing.

4.2.3 Photographic Media Handling

Receipt of the developed 35 mm or 8 mm film from Kodalux is recorded on the site Master Log. Film rolls are stored chronologically in a pollutant-free, controlled environment.

4.2.3.1 Handling of 35 mm Slide Film

Extraneous 35 mm slides (if any) are removed and documentation and target photographs are arranged in polyethylene protector sheets by date and time. Following verification of slide arrangement, each slide is numbered sequentially and stamped with a four-letter site code. The slide set is placed in a manila folder along with a completed Visibility Monitoring Slide Log and the associated Visibility Monitoring Status/Assessment Sheet.

Slides are reviewed to verify that the vista alignment is correct, the databack date and time is recorded on the film, the slides are arranged in proper order, and that no exposure inconsistencies exist. Any discrepancies are documented by site and roll number on the Master Log and corrective action is initiated.

When all slides are collected for the monitoring season, final collection and recovery statistics are determined. Final Master Logs are stored in 3-ring notebooks.

4.2.3.2 Handling of 8 mm Movie Film

Movie film is reviewed for camera and system component operation, exposure quality, frame alignment and focus, exposure timing (including on/off times and exposure interval), film processing problems, the detection of unusual visual events or anomalies, and dirty or obscured shelter windows. Any problems or discrepancies observed are documented by site and roll number on the Master Log and corrective action is initiated.

Labeled film rolls are placed chronologically in site-specific storage boxes within storage cabinets. Final collection statistics are determined and recorded on the Master Logs. All supporting documentation including the Master Logs, Visibility Monitoring Status/Assessment Sheets, and other notes or important observations are kept in 3-ring notebooks by site, and filed alongside the film rolls.

4.2.3.3 Handling of SVHS Time-Lapse Videotapes

Videotape cassettes are reviewed for camera and system component operation, exposure quality, frame alignment and focus, timing, the detection of unusual visual events or anomalies, and dirty or obscured shelter windows. Any problems or discrepancies observed are documented by site and videotape number on the Operational History Log and corrective action is initiated.

Labeled videotape cassettes are placed chronologically in site-specific storage boxes within storage cabinets. Final collection statistics are determined and recorded on the Operational History Logs. All supporting documentation including the Operational History Logs, Time-Lapse Video Monitoring Status/Assessment Sheets, and other notes or important observations are kept in 3-ring notebooks by site, and filed alongside the videotapes.

4.2.3.4 Handling of Digital Image Memory Cards

Digital images collected on memory cards are downloaded to a personal computer, written to a CD for archive, and placed in the Air Quality Database. All images are reviewed for correct date and time sequence, proper exposure, alignment, and zoom angle. Any discrepancies are documented on the Master Log and corrective action is initiated.

When all images are collected for the monitoring season, final collection and recovery statistics are determined. Completed Master Logs, Visibility Monitoring Status/Assessment Sheets, thumbnail printout of images, and image parameter file are stored in 3-ring notebooks.