

QUALITY ASSURANCE/QUALITY CONTROL DOCUMENTATION SERIES

TITLE 35 MM PHOTOGRAPHIC SLIDE ARCHIVES

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1.0 PURPOSE AND APPLICABILITY

This technical instruction (TI) is a guide to the archiving and maintenance of 35 mm color photographic slides. This TI is referenced in Standard Operating Procedure 4610, *Scene Monitoring Archives*, and specifically describes all archive procedures associated with photographic slides.

2.0 RESPONSIBILITIES

2.1 PROJECT MANAGER

The project manager shall ensure that archives are accessible, orderly, complete, and current.

2.2 DATA TECHNICIAN

The data technician shall:

- Place 35 mm slides and accompanying documentation in folders.
- File the slides in file cabinets by site and season.
- Maintain additional support documentation in file cabinets.

3.0 REQUIRED EQUIPMENT AND MATERIALS

The 35 mm slide archives are designed to allow accessibility and to maintain maximum film quality for the life of the film. Equipment and materials used include:

- 35 mm photographic slides
- Polyethylene slide protector sheets
- Slide Coding Log Sheets
- Visibility Monitoring Status/Assessment Sheets
- Master Logs
- Miscellaneous hard copy documentation
- Manila file folders
- Hanging file folders
- Standard file cabinets

4.0 METHODS

This section includes three (3) subsections:

- 4.1 Physical Film Archives
- 4.2 Supporting Hard Copy Documentation Archives
- 4.3 Photographic Digital Data Archives

4.1 PHYSICAL FILM ARCHIVES

All 35 mm slides are labeled by site and slide number and stored chronologically in polyethylene slide sheets (such as Vue-all Slide Saver sheets). Slides for each film roll are placed in a manila file folder, along with a Slide Coding Log Sheet and the corresponding Visibility Monitoring Status/Assessment Sheet. Refer to TI 4305-4000, *Collection, Processing, and Handling of 35 mm Slide Film*, for detailed handling and labeling procedures. The manila folders for each site are labeled with the site abbreviation, roll number, and slide numbers (e.g., GRCA 148 1593-1613), then placed in hanging folders for each season. The hanging folders are placed in standard file cabinets chronologically, by season. Standard monitoring seasons are:

Winter	(December, January, and February)
Spring	(March, April, and May)
Summer	(June, July, and August)
Fall	(September, October, and November)

4.2 SUPPORTING HARD COPY DOCUMENTATION ARCHIVES

Supporting hard copy documentation for 35 mm slides includes the Visibility Monitoring Status/Assessment Sheets, Slide Coding Log Sheets, Master Logs, and data coordinator/operator correspondence. The Visibility Monitoring Status/Assessment Sheets and Slide Coding Log Sheets are filed with the corresponding 35 mm slides in the manila folder. Refer to TI 4305-4000, *Collection, Processing, and Handling of 35 mm Slide Film*, for detailed documentation procedures. All other supporting documentation is stored in hanging file folders in standard file cabinets, in chronological order by site.

4.3 PHOTOGRAPHIC DIGITAL DATA ARCHIVES

Digital data produced from 35 mm photographic slides (qualitative condition codes, slide contrast values, and standard visual range values) are archived as detailed in TI 4610-5030, *Photographic-Based Teleradiometric Data Archives*.

QUALITY ASSURANCE/QUALITY CONTROL DOCUMENTATION SERIES

TITLE 8 MM TIME-LAPSE FILM ARCHIVES

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1.0 PURPOSE AND APPLICABILITY

This technical instruction (TI) is a guide to the archiving and maintenance of 8 mm time-lapse movie film. This TI is referenced in Standard Operating Procedure 4610, *Scene Monitoring Archives*, and specifically describes all archive procedures associated with time-lapse film.

2.0 RESPONSIBILITIES

2.1 PROJECT MANAGER

The project manager shall ensure that archives are accessible, orderly, complete, and current.

2.2 DATA TECHNICIAN

The data technician shall:

- File 8 mm time-lapse film in storage cabinets by site and roll number.
- Maintain additional support documentation in storage cabinets.

3.0 REQUIRED EQUIPMENT AND MATERIALS

The 8 mm film archives are designed to allow accessibility and to maintain maximum film quality for the life of the film. Equipment and materials used include:

- 8 mm film rolls
- Visibility Monitoring Status/Assessment Sheets
- Master Logs
- Miscellaneous hard copy documentation
- Storage boxes (3.5" computer diskette storage boxes)
- Metal storage cabinets with adjustable shelves
- VHS videotapes (if applicable)
- Three-ring notebooks

4.0 METHODS

This section includes two (2) subsections:

4.1 Physical Film Archives

4.2 Supporting Hard Copy Documentation Archives

4.1 PHYSICAL FILM ARCHIVES

All 8 mm time-lapse film rolls are labeled by site and roll number. Refer to TI 4305-4003, *Collection, Processing, and Handling of 8 mm Time-Lapse Movie Film*, for detailed handling and labeling procedures. Film rolls are maintained in the Kodalux roll boxes, then stored by site and chronological sequence (roll number) in cardboard storage boxes (3.5" computer diskette storage boxes), and storage cabinets (six foot metal storage cabinet with adjustable shelves). The cardboard storage boxes are labeled by site, roll number, and date. Supporting hard copy documentation is stored alongside the film rolls in three-ring notebooks.

If duplicate film rolls or film transferred onto videotape is required, these duplicate copies are also stored in the same configuration as the original 8 mm film rolls.

4.2 SUPPORTING HARD COPY DOCUMENTATION ARCHIVES

Supporting hard copy documentation for 8 mm time-lapse movie film includes the Visibility Monitoring Status/Assessment Sheets, Master Logs, and data coordinator/operator correspondence. Refer to TI 4305-4003, *Collection, Processing, and Handling of 8 mm Time-Lapse Movie Film*, for detailed documentation procedures. All supporting documentation is stored in three-ring notebooks by site and filed in storage cabinets alongside the film rolls.

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1.0 PURPOSE AND APPLICABILITY

In 1995, the IMPROVE (Interagency Monitoring of Protected Visual Environments) Steering Committee formed a consensus that five years of scene monitoring at a location where visual air quality is not rapidly changing yields sufficient examples of most visual air quality conditions. To secure a representative set of observed air quality conditions, a series of slides for each site is selected from the visibility database and archived on CD-ROM. The series of slides making up this historical archive (spectrum) consists of clear sky slides that represent the range of visibility conditions observed at the site during the morning and afternoon hours, a selection of the cleanest clear sky slides to represent pristine conditions for each monitoring season, specific slides that show the most scenic views of the vista during the historical monitoring period, and selected visibility events.

The total number of slides selected for each site depends on the vista, the variability in visual air quality at the monitoring location, the period of monitoring, and completeness of the slide database. All historical slide spectrums are reproduced digitally on photo-CD, by site, to yield a long-term digital storage media. A master CD is produced for each site containing all photo-CD images as well as graphic images of the monitoring location, descriptions of the site and historical monitoring period, and plots, tables, and/or data listings of data collected at the site. Multiple copies of the master CD are produced as needed.

The 35 mm historical spectrum archives are produced to provide a representative set of historical photographic data that can be maintained at maximum archive quality for many years beyond the life of the original 35 mm film. The CD-ROM archive medium was chosen to provide end-users convenient access to the historical archive without any loss in image quality (first generation duplication).

This technical instruction (TI) is a guide to archiving 35 mm color photographic slides and associated graphic and data presentations in the form of historical slide spectrums. This TI is referenced in Standard Operating Procedure 4610, *Scene Monitoring Archives*, and specifically describes all archive procedures associated with producing a historical 35 mm slide archive.

2.0 RESPONSIBILITIES

2.1 PROJECT MANAGER

The project manager shall:

- Determine the COTR's (Contracting Officer's Technical Representative) project-specific archive and distribution requirements.
- Oversee the slide selection process, review all spectrum series and selections prior to permanent archive.
- Coordinate with the data technician and secretary to oversee the preparation of associated graphic and data presentations, and the production of master CD-ROMs.
- File and maintain all support documentation.
- Verify that completed master CD-ROMs are properly distributed.
- Archive and maintain all original historical slide series.

2.2 DATA TECHNICIAN

The data technician shall:

- Review all photographic slides available from each site and create a subset of all initial historical spectrum selections from the 35 mm film archive.
- Compile a series of morning and afternoon spectrums, pristine, scenic, layered hazes, etc., for the project manager's review.
- Scan and estimate contrast values for each slide in the morning and afternoon spectrum series.
- Compile all historical monitoring specifications and graphic data as required.
- Coordinate with the project manager and secretary for the preparation of monitoring location site descriptions and historical photographic monitoring specifications.
- Verify that all unused original slides are properly returned to the 35 mm slide archives (as described in TI 4610-5000, *35 mm Photographic Slide Archives*).

2.3 SECRETARY

The secretary shall:

- Coordinate with the project manager and data technician for complete documentation information, format, and word processing procedures.
- Word process all graphic and tabular materials into a final document.
- Produce final documents in Portable Digital Format (.PDF) for archive to CD-ROM.

3.0 REQUIRED EQUIPMENT AND MATERIALS

The slide spectrums are taken to a photographic dealer for production onto CD-ROMs. Equipment and materials needed to select spectrum slides include:

- 35 mm photographic slides
- Slide Coding Log Sheets
- Visibility Monitoring Status/Assessment Sheets
- Master Logs
- Historical photographic data request correspondence
- Polyethylene slide protector sheets
- Light table
- Hand-held lens

Equipment and materials used to compile historical monitoring specifications and associated graphic and data presentations include:

- Photographic site and target specifications
- U.S.G.S. topographic maps
- ARS Monitoring History Database records
- IMPROVE historical aerosol total reconstructed extinction data
- Windows-based personal computer with the following system requirements:
 - x86-based personal computer (486DX minimum, Pentium, or Pentium Pro recommended), CD-ROM drive, 8-bit SVGA graphics card
 - Microsoft Windows 3.1, Microsoft Windows for Workgroups, Microsoft Windows 95, or Microsoft Windows NT 3.51 or 4.0
 - Adobe Acrobat 3.01 or better (including Acrobat Exchange and Acrobat Reader), Kodak QuickSolve Browser, Microsoft Word, Lotus WordPro, and Microsoft Excel
 - 8 MB application RAM
 - 5 MB hard disk space, plus 7 MB additional temporary disk space available during installation
 - True Color (32-bit) display and 2 MB video RAM recommended for optimal viewing
- Polaroid SprintScan 35/LE Scanner
- PolaColor Insight scanning software
- ARS software OLDHAZE.EXE (image haze simulation for windows)
- ARS software CONTRAST.EXE

4.0 METHODS

Historical slide spectrum archives are produced on CD-ROM, and contain, for each monitoring site:

- Morning and afternoon spectrum slides
- Pristine slides
- Scenic view and visibility events slides
- Monitoring site specifications
- Visibility conditions summary and cumulative frequency statistics

This section includes four (4) subsections:

- 4.1 Selecting Slides for the Historical Spectrum
- 4.2 Creating Other Materials Included With the Spectrum
- 4.3 Producing the CD-ROM
- 4.4 Archiving Spectrum Materials

4.1 SELECTING SLIDES FOR THE HISTORICAL SPECTRUM

To secure a representative set of observed air quality conditions, a series of slides for each site is selected from the visibility database and archived on CD-ROM. The slide series comprising this historical archive (spectrum) consists of:

- Clear sky slides that represent the range of visibility conditions observed at the site during the morning and afternoon hours.
- Pristine condition clear sky slides to serve as masters for computer imaging or modeling applications (WinHaze, 1997).
- Scenic views and meteorological conditions observed during the historical monitoring period.
- Selected visibility events regardless of illumination conditions such as layered hazes (surface and elevated), coherent plumes, and intense visibility degradation associated with fires, meteorology, or pollution episodes.

The total number of slides selected for each site depends on the vista, the variability in visual air quality at the monitoring location, the period of monitoring, and completeness of the slide database.

4.1.1 Review of Photographic Visibility Database and Initial Slide Selections

All 35 mm color slides in the entire archive of each site and vista are reviewed. This archive usually includes slides for at least 5 years of monitoring at three times a day.

4.1.1.1 Morning and Afternoon Clear Sky Selections

Clear sky slides that represent range of visibility conditions observed at a site during the morning and afternoon hours are selected and categorized using the following criteria:

- Only clear sky slides are selected. Predominant clouds, layered haze, or fog layers should not be evident in the photographs.
- Slide exposure must be reasonable. No extremely overexposed or underexposed slides are selected for the spectrum.
- Slide exposure and scenic color must be consistent.
- Slides should be properly aligned on the selected vista. Slides where the vista is extremely off-center, or out-of-alignment should not be selected.
- If possible to determine, no slide should contain a precipitation/weather-related event or total domination of the scene by precipitation/weather.
- Slides should represent a time of day with the most consistent exposure and adequate number of clear-sky events to choose from, preferably 0900 and 1500.

Selected slides are grouped according to observation time period and consistent exposure and alignment. No more than three groupings are compiled for any time period. Each grouping is arranged, by eye, in order of best to worst visual air quality. Grouped slides are then placed in polyethylene slide protector sheets for the project manager's review and slide spectrum analysis.

Selecting an incremental series of slides consistent in composition, time of day, and exposure can be difficult due to the limited amount of data available, variable nature of meteorology, associated lighting, and film response conditions. Most visibility spectrums for the western United States consist of 10-20 slides each. Spectrums for eastern U.S. sites typically consist of 8-15 slides each.

4.1.1.2 Pristine Selections

Clear sky slides to represent pristine conditions for one or more monitoring seasons are selected in the same manner as above. An effort is made to select the cleanest of the cleanest slides to represent one or more time periods (i.e., 0900, 1200, 1500). Pristine slides often serve as the basis for image-processing and/or modeling applications such as WinHaze - Level 1 Visual Air Quality Modeler.

4.1.1.3 Scenic and Visibility Event Selections

In addition to clear sky images, slides are also selected for the historical spectrum to represent unique scenic conditions and dynamic visibility events and/or episodes. Scenic selections often include scenic qualities such as interesting cloud formations, seasonal color, or storms. Visibility event and episode selections often include layered haze, plumes, intense regional hazes, as well as periods of ongoing dynamic visibility impairment that has occurred at the site. The final number of slides selected to represent scenic and visibility events is quite variable. Most historical spectrums contain 10-30 slides in this category.

4.1.2 Slide Spectrum Analysis

4.1.2.1 History of Slide-Based Visibility Measurements

A primary goal of visibility monitoring is to quantify how well the image-forming information in a vista is transmitted through the atmosphere to an observer some distance away. Determining how well the information is transmitted and assigning a quantitative value to that information is known as quantitative visibility analysis. Historically, 35 mm color photographic slides were used to obtain quantitative estimates of "visual range," defined as how far a black object could be seen on a distant horizon. Quantitative visibility estimates from color slides are based on densitometry measurements of the sky/target contrast of selected horizon features within a photographic vista. Sky/target contrasts are measured in the 550 nm (green) wavelength. The 550 nm wavelength is used because it is the most dominant visible wavelength in the solar spectrum. These measurements are reduced and reported as visual range (km) or extinction b_{ext} values. The equations and considerations used to calculate visual range (km) and extinction from measured sky/target contrasts are based on various derivations and approximations by visibility scientists (Middleton, 1958; Malm, 1979; Allard and Tombach, 1981; ARS, 1994).

Although used in the past, quantitative estimates of b_{ext} or visual range from slides can have substantial error due primarily to naturally-occurring variations in the condition and illumination of the sky, target, and site path. Estimated errors in individual slide-based measurements also leads to a systematic bias in reported slide-based cumulative frequency values. The exact magnitude of cumulative frequency bias is not easily quantifiable; however, it is apparent that reported "clean" values are too clean, reported "dirty" values are too dirty, and median cumulative frequency values for large data sets are reasonably accurate. For this reason, the slide spectrum analysis results should be used, reported, or publicized with extreme caution.

All calculated slide spectrum visual range estimates are rounded for precision. All cumulative frequency values presented are derived from historical aerosol data summaries rather than 35 mm densitometry data summaries. It should also be noted that all visual range summaries and spectrum grouping archives should remain intact and be referenced only in relation to other slides in the same grouping.

4.1.2.2 Slide Spectrum Archive Visibility Measurements

The project manager reviews each visibility grouping selected (i.e., 0900 and 1500). One final clear sky spectrum is selected to represent each data collection period. Any supplemental groupings are retained as "runner-ups" in the circumstance that the selected set shows too many inconsistencies or is damaged (e.g., scratched) in some way.

Each final grouping is returned to the data technician for scanning and contrast calculations. Individual slides are scanned and archived as low resolution digital .TIF (or .TGA) files using the Polaroid SprintScan 35/LE scanner and associated software. Red, green, and blue wavelength pixel statistics are obtained for the selected target and sky areas of the image using image haze simulation software. Contrast measurements can then be calculated given the green target/sky pixel statistics and associated 10-step grayscale calibration curve. An automated version of all necessary contrast calculations is available in the CONTRAST.EXE batch program. All red-green-blue wavelength pixel statistics and associated contrast estimations are documented for further reference. Detailed scanning and contrast calculation procedures are outlined in Appendix A.

The project manager reviews all the estimated contrast values. Any inconsistencies in measured values and actual visual (by eye) appearance are investigated and rescanned, or thrown out of the selected spectrum grouping. All remaining spectrum slides and associated slide contrasts are charted, using the Microsoft Excel table shown in Figure 4-1. Comparisons are made between the measured contrast values of the selected spectrum and the calculated density curve, given the known target distance and estimated inherent contrast (Figure 4-2). Excess slides with repetitive contrasts are removed. If a large gap is apparent, or if the set does not uniformly represent visibility conditions from good to bad, then the "runner-up" spectrum grouping is scanned or individual "runner-up" slides are used to supplement the draft grouping.

Once the final spectrum slide sets have been selected and scanned, all associated slide numbers, dates of observation, and contrast estimates are charted in the final Excel table (Figure 4-1). Given the selected target distance, pristine contrast value, calculated target inherent contrast and individual slide contrast, the visual range, deciview, and b_{ext} (Mm^{-1}) are calculated automatically within the Excel table for each documented slide.

The final step in spectrum analysis consists of determining the frequency of occurrence of the given slide's visibility condition in relation to IMPROVE aerosol data collected at the site. If no aerosol data are available, then this step is excluded and no cumulative frequency data are documented. Site-specific total reconstructed extinction (Mm^{-1}) data should be obtained from the IMPROVE aerosol data contractor in a tabular cumulative frequency format, by season and all seasons combined, for the entire period of record. An example summary of aerosol cumulative frequency data is shown in Figure 4-3. Individual spectrum b_{ext} (Mm^{-1}) values are compared with the provided aerosol cumulative frequency values for all seasons combined. Corresponding cumulative frequency values are documented in the "Aero Cum Freq %" column of the Excel table. Note: it may be necessary to carry the spectrum b_{ext} (Mm^{-1}) calculations to two decimal places in order to more closely match the provided aerosol cumulative frequency statistics. The project manager makes a final review of the data to ensure that spectrum selection also represents an even distribution of aerosol cumulative frequency data.

4.1.3 35 mm Slide Selection Archive

The primary purpose of the historical slide spectrum archive is to secure a representative set of observed air quality conditions for many years to come. Because film emulsions degrade with time, a medium other than 35 mm slide film or prints was chosen. To better preserve a portion of the original visual information, all selected slides are digitized in high-resolution format and stored on a Kodak Photo CD. Once digitized, multitudes of data management and reproduction options are available with no loss to the quality or integrity of the original digitized image.

Up to 105, 35 mm slide images can be archived on a single Kodak Photo CD in Photo CD (.PCD) format. The project manager makes a final review of all the selected spectrum groupings, pristine, scenic, layered haze, and visibility episode slides selected to represent the site. The set is checked for its overall consistency, representativeness, and exposure quality. All gray scales used for slide spectrum analysis are also included as a calibration medium for future reproduction. If more than 105 slides have been selected for archive, either the scenic or episode selections will be reduced in size or a judgement to create a two-volume CD site-specific archive will be made. All selected slides are thoroughly cleaned (air-blown and/or cleaned with film cleaner) and organized in polyethylene slide protector sheets in the following order:

Visibility Condition Summary
Slide Contrast/Extinction Calibration Curve

Site Name	Slide #	Slide Date	Time Code	Target Code	RGB Slide Contrast	height	Est best	Est Contrast	Est VR	Rounded VR	div	b_{ext} (Mm ⁻¹)	Aero # (Cum Freq %)		
Canyonlands NP	7898	7/1/91		1	0.459		0.011		341	340	1	12	< 1%	Clearest Slide Contra	0.5
Visibility Condition Summary	7994	6/20/91		3	0.449		0.012		331	330	2	12	< 1%	Target Distance	58.7
	10792	6/6/94		3	0.404		0.014		287	290	3	13	= 1%	Cathedral Butte	0
	8185	7/18/89		3	0.374		0.015		267	280	4	15	1%	Col	0.90
	10814	6/15/94		3	0.357		0.015		249	250	4	16	2%		
	7870	6/22/91		3	0.321		0.018		223	220	6	18	5%		
	10626	4/15/94		3	0.284		0.021		187	190	7	21	10%		
	10638	4/19/94		3	0.207		0.025		156	160	9	24	30%		
	10623	4/14/94		3	0.160		0.025		133	130	11	30	60%		
	10869	7/5/94		3	0.137		0.032		122	120	12	33	70%		
	5205	9/1/89		3	0.116		0.035		112	110	13	36	80%		
	5158	7/0/89		3	0.091		0.067		68	70	17	56	97%		
	7704	5/15/91		3	0.000		#NUM!	#NUM!	#NUM!	50	21	76	= 99%		
Runner Ups, pulled from final	10736	5/21/94		3	0.441		0.012		322	320	2	12			
	10795	6/0/94		3	0.423		0.013		304	300	3	13			
	10779			3	0.400		0.011		340	340	1	11			
	7895			3	0.401		0.014		284	284	3	14			
	5085			3	0.380		0.015		267	267	4	15			
	7867			3	0.271		0.020		191	191	7	20			
	8183			3	0.258		0.021		183	183	8	21			
							#NUM!	#NUM!	#NUM!		#DIV/0!	#DIV/0!			
Canyonlands NP	7867			3	0.800		0.024		163		#DIV/0!	#DIV/0!		Clearest Slide Contra	0.90
Visibility Condition Summary	5205			3	0.662		0.043		61		#DIV/0!	#DIV/0!		Target Distance	10
???? These contrast values	10623			3	0.660		0.036		104		#DIV/0!	#DIV/0!		Foreground Ridge	
	10869			3	0.716		0.035		112		#DIV/0!	#DIV/0!		Col	1.00
	5158			3	0.733		0.033		120		#DIV/0!	#DIV/0!			
	7704				0.724		0.034		115		#DIV/0!	#DIV/0!			
							#NUM!	#NUM!	#NUM!						
							#NUM!	#NUM!	#NUM!						
							#NUM!	#NUM!	#NUM!						
							#NUM!	#NUM!	#NUM!						
							#NUM!	#NUM!	#NUM!						
							#NUM!	#NUM!	#NUM!						

Figure 4-1. Example Visibility Condition Summary.

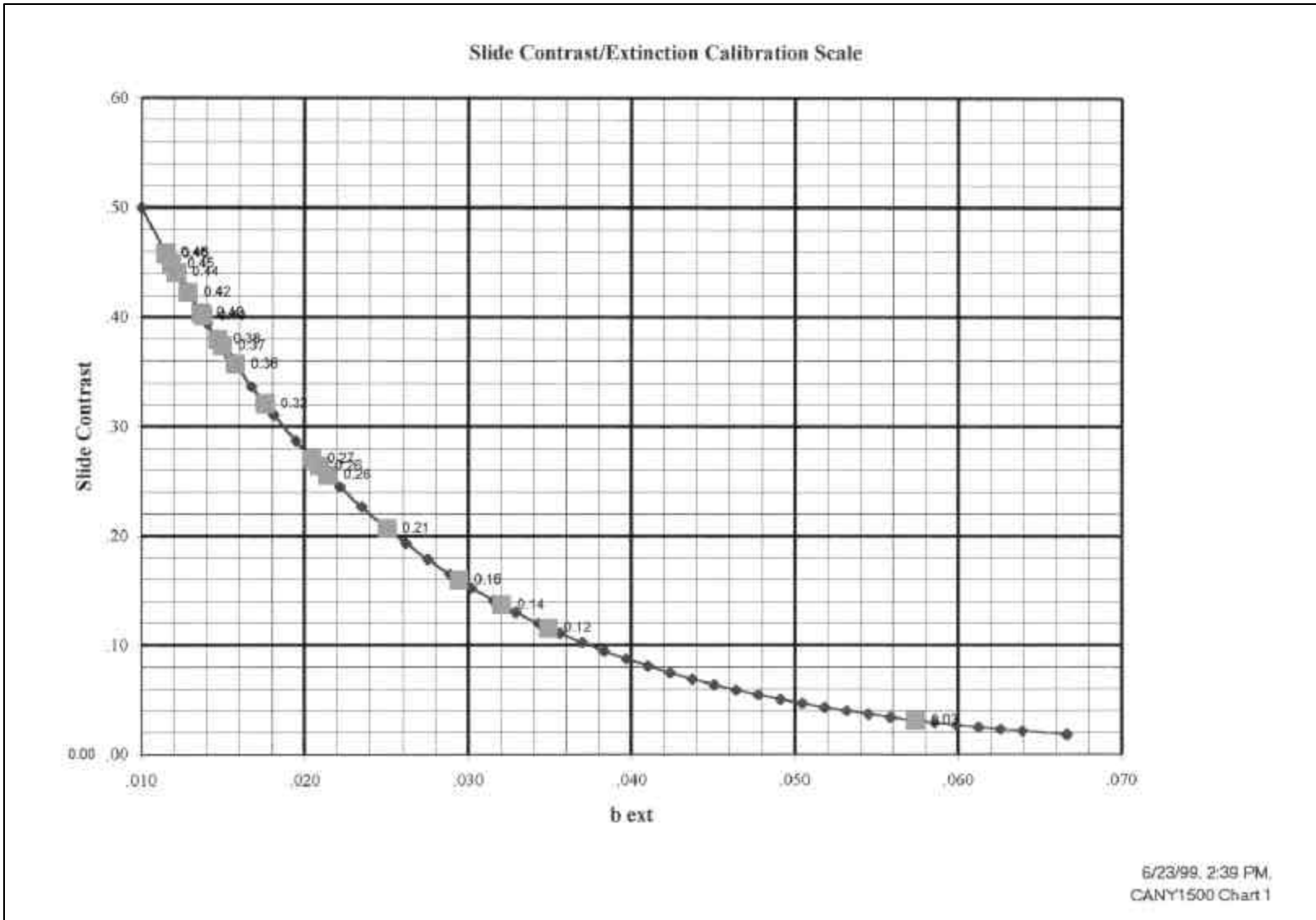


Figure 4-2. Example Slide Contrast/Extinction Calibration Scale.

		3/88-2/97	4.00									
-----		SITE=BRID										
OBS	SEASON	P_0	P_1	P_2	P_3	P_4	P_5	P_10	P_20	P_30	P_40	
1	spring	13.22	13.80	14.14	15.14	15.84	16.09	17.71	20.23	22.19	23.83	
2	summer	13.73	14.92	16.08	16.37	16.72	17.42	19.65	22.59	24.99	26.01	
3	autumn	12.34	13.12	14.09	14.60	14.83	15.33	16.80	18.64	20.43	21.92	
4	winter	12.12	12.96	12.62	12.86	13.15	13.20	13.51	14.66	15.33	16.14	
5	ANNUAL	12.12	12.86	13.22	13.56	13.78	14.09	15.41	17.47	19.42	21.50	
OBS		P_50	P_60	P_70	P_80	P_90	P_95	P_96	P_97	P_98	P_99	P_100
1		25.44	28.06	30.60	33.43	37.16	42.04	42.81	43.26	44.47	47.46	48.08
2		27.71	29.67	30.79	32.93	37.30	43.58	44.81	53.98	56.03	56.08	58.50
3		24.19	26.50	28.96	31.74	37.06	40.02	40.51	43.99	46.50	48.62	52.98
4		17.32	16.42	19.25	21.35	24.28	27.75	29.30	31.51	33.43	36.47	42.26
5		23.87	26.02	28.46	31.43	35.89	39.34	41.27	43.16	44.81	50.94	58.50
-----		3/88-2/97	5.00									
-----		SITE=CANY										
OBS	SEASON	P_0	P_1	P_2	P_3	P_4	P_5	P_10	P_20	P_30	P_40	
1	spring	14.75	14.84	15.40	16.35	16.74	17.01	18.40	21.86	23.04	24.41	
2	summer	17.41	19.29	20.19	20.84	20.92	21.54	24.18	25.41	26.84	28.44	
3	autumn	13.03	13.16	16.79	17.23	17.40	17.45	18.35	20.71	23.17	25.20	
4	winter	14.56	14.74	15.11	15.29	15.50	15.90	17.92	21.50	24.12	26.56	
5	ANNUAL	13.03	14.91	15.51	16.73	17.10	17.42	19.35	22.60	24.54	26.17	
OBS		P_50	P_60	P_70	P_80	P_90	P_95	P_96	P_97	P_98	P_99	P_100
1		25.94	27.33	30.27	32.99	36.81	39.98	42.29	45.36	48.01	55.58	64.12
2		29.80	31.45	32.83	35.32	41.22	45.51	47.68	51.18	52.02	53.08	63.57
3		26.70	29.21	31.79	33.68	37.87	39.00	39.14	40.11	40.75	42.61	46.89
4		29.64	32.38	36.04	42.78	53.90	60.35	61.38	64.99	69.03	73.24	79.27
5		28.11	30.31	32.37	35.37	40.73	46.01	51.25	53.94	57.73	63.57	79.27
-----		3/88-2/97	6.00									
-----		SITE=CHIR										
OBS	SEASON	P_0	P_1	P_2	P_3	P_4	P_5	P_10	P_20	P_30	P_40	
1	spring	14.97	16.67	17.07	17.68	19.76	20.04	22.43	24.50	25.83	27.19	
2	summer	18.03	23.01	23.82	24.81	25.90	26.21	27.96	30.50	33.08	35.34	
3	autumn	17.72	18.36	18.53	18.55	19.32	19.82	21.99	24.64	26.21	27.93	
4	winter	14.74	15.83	16.38	17.03	17.16	17.49	19.49	21.54	23.05	24.86	
5	ANNUAL	14.74	16.95	17.68	18.21	18.99	19.62	21.65	24.52	26.50	28.53	
OBS		P_50	P_60	P_70	P_80	P_90	P_95	P_96	P_97	P_98	P_99	P_100
1		30.03	32.44	35.05	38.19	43.48	45.93	46.55	48.19	48.79	61.31	61.33
2		38.06	39.80	42.89	47.05	53.02	56.44	58.71	59.35	65.13	69.90	95.07
3		29.38	32.32	36.16	39.11	42.61	47.03	47.46	49.77	51.26	55.18	64.86
4		27.16	28.92	30.88	34.39	39.53	43.80	46.11	46.91	50.07	53.00	61.49
5		30.80	33.64	36.89	39.89	45.45	50.07	51.31	53.83	56.41	61.33	95.07
Prepared by JS												
Thursday 12/18/97 11:13												
		secret01_example.xls 4/16/99										

Figure 4-3. Example Summary of Aerosol Cumulative Frequency Data.

- Range of visibility spectrums (0900, 1200, and/or 1500)
- Layered haze
- Visibility episodes
- Pristine and scenic
- Miscellaneous original slides of interest (e.g., data requests of national interest)

If a slide repeats anywhere in the selection, a placeholder is inserted identifying the slide and its residing location in the set. Each site-specific image is archived onto a Kodak Photo CD by a Kodak processing lab. A detailed description of how the Photo CD image archive is cataloged and combined with site-specific graphic and data presentation materials is provided in Section 4.3.

4.2 CREATING OTHER MATERIALS INCLUDED WITH THE SPECTRUM

To establish a self-contained scene monitoring archive, all site-related monitoring information and spectrum analysis statistics associated with the archived images are also maintained. This section describes the procedures and formats used to compile the associated graphic and data presentation materials. The type and amount of materials archived varies depending upon the site and the client's needs. The primary items considered are outlined below.

4.2.1 Scene Monitoring Site Specifications

A Scene Monitoring Site Specification Summary, shown in Figure 4-4, is created to identify the monitoring site location and field of view, summarized by the historical spectrum images. A graphic depiction (topographic map) is included to give the user an idea of the terrain surrounding the photographic site path, as well as the location of additional air quality monitoring instruments. A tabular summary of all scene monitoring (35 mm, 8 mm, and special study) that has occurred within the region is also provided for additional reference. A "Period Reviewed" summary denotes the period of data evaluated to establish the historical range of visibility spectrums for the summarized vista.

If a site has monitored more than one photographic vista during its history, then only the vista(s) included in the spectrum analysis data summaries are included in the CD archive presentation.

4.2.2 Spectrum Visibility Condition Summary and Cumulative Frequency Statistics

A tabular summary of all slide spectrum analysis results (compiled in Section 4.1.2.2) for each range of visibility grouping is also provided in the final archive. Shown in Figure 4-5, the information summarized includes:

- Spectrum sequence number
- The representative visibility condition for each archived image, in units of deciview (dv), b_{ext} (Mm^{-1}), and VR (km).
- The frequency of occurrence of the given image's visibility condition in relation to IMPROVE aerosol data collected at the site.

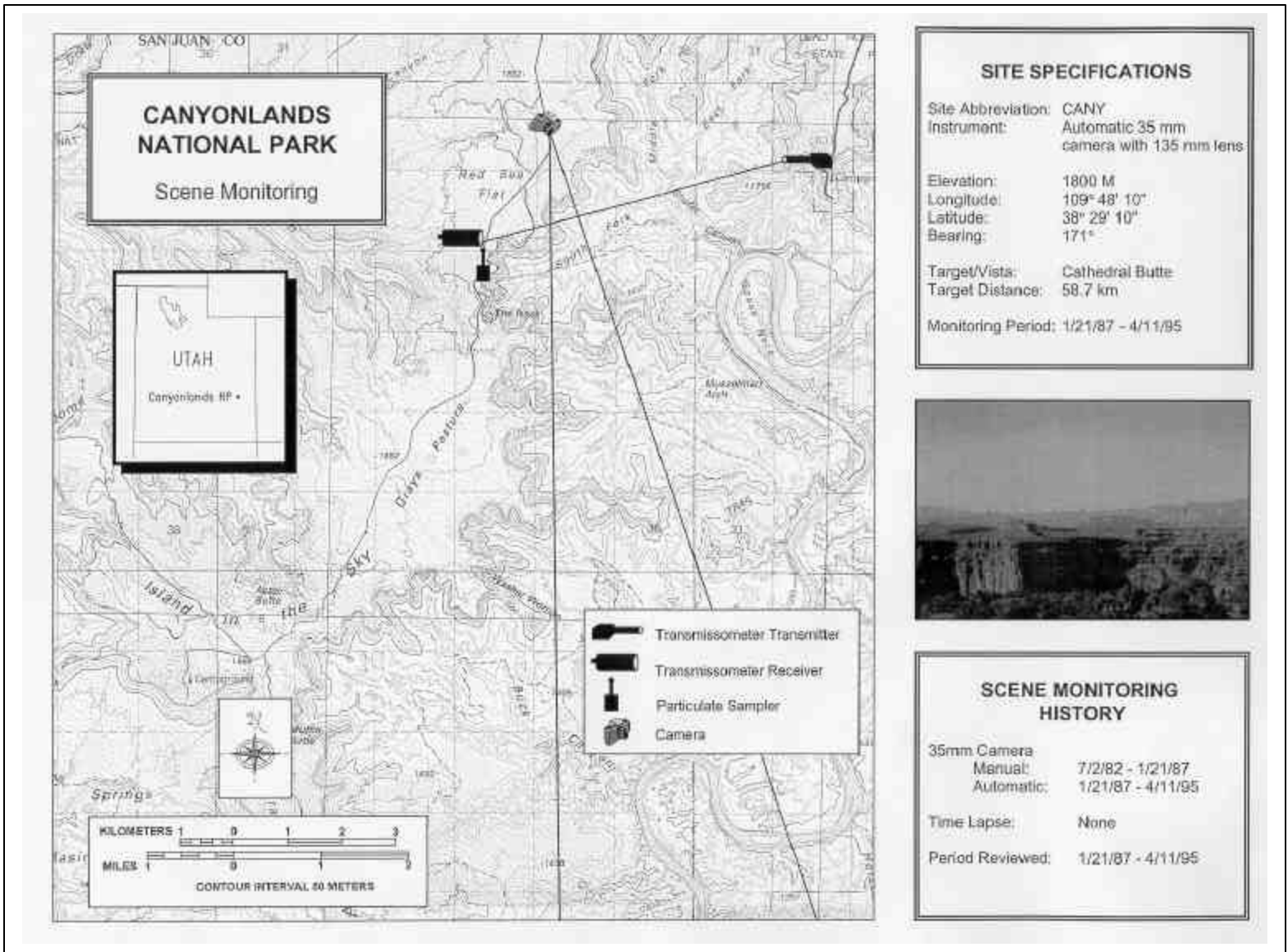


Figure 4-4. Example Scene Monitoring Site Specification Summary.

**Canyonlands National Park, Utah
0900 Slide Spectrum Series (1987 – 1995)
Cumulative Frequency Summary**

Spectrum Sequence #	Representative Visibility Condition Summary			Representative Cumulative Frequency of Reconstructed Extinction IMPROVE Aerosol Data (1988 – 1997)
	dv	$b_{ext} (Mm^{-1})$	VR (km)	
1 of 11	2	13	310	< 1%
2 of 11	3	13	300	< 1%
3 of 11	4	15	260	1%
4 of 11	5	17	230	4%
5 of 11	6	19	210	10%
6 of 11	8	23	170	20%
7 of 11	10	26	150	40%
8 of 11	11	30	130	60%
9 of 11	14	39	100	90%
10 of 11	15	46	85	90%
11 of 11	17	56	70	97%

**Canyonlands National Park, Utah
1500 Slide Spectrum Series (1987 – 1995)
Cumulative Frequency Summary**

Spectrum Sequence #	Representative Visibility Condition Summary			Representative Cumulative Frequency of Reconstructed Extinction IMPROVE Aerosol Data (1988 – 1997)
	dv	$b_{ext} (Mm^{-1})$	VR (km)	
1 of 13	1	12	340	< 1%
2 of 13	2	12	330	< 1%
3 of 13	3	13	290	< 1%
4 of 13	4	15	260	1%
5 of 13	4	16	250	2%
6 of 13	6	18	220	5%
7 of 13	7	21	190	10%
8 of 13	9	24	160	30%
9 of 13	11	30	130	60%
10 of 13	12	33	120	70%
11 of 13	13	36	110	80%
12 of 13	17	56	70	97%
13 of 13	21	78	50	> 99%

Figure 4-5. Example Summary of Slide Spectrum Analysis Results.

4.2.3 CD-ROM Archive-Related Presentation Materials

4.2.3.1 Table of Contents

A detailed CD-ROM Table of Contents is provided as shown in Figure 4-6. Included is a list of image, graphic presentation, and software files that may be searched for by the user. A complete description of each image includes: image file name, image description, slide number, date and time the image was taken, comments related to the vista or past use of the image, and the path description where the file can be found on the CD. It is necessary to maintain a unique site-specific file name, in the instance that all National Park Service data are someday combined in a one-image database. Graphic and data presentation descriptions include the software required to access the file(s) and a brief description of the information contained. The Table of Contents is compiled in an Excel file and then reformatted to Adobe Acrobat Reader format (.PDF) for the final CD-ROM archive.

A second copy of all tabular information associated with the historical spectrum images is prepared and retained in Excel. Label descriptors are reduced to 25 characters/field for a graphic pitch of 6.0, or 17 characters/field for a graphic pitch of 8.0. During the final archive process, described in Section 4.3, this Excel file is imported into the Kodak QuickSolve image database (Qbrowser). Within the Qbrowser database, each image is labeled with the abbreviated image descriptions, associated slide number, date and time, as well as any comments related to the vista or past use of the image.

4.2.3.2 Title Slide/Cover Sheet

A Title Slide file is created to serve as a header for the graphic and data presentation materials included on the CD (Figure 4-7). Included in the Title Slide is the full site name, monitoring period reviewed, and any associated contract, preparation date, or ARS archive information.

4.2.3.3 CD Cover

The CD cover, like the Title Slide, provides an informative summary of the contents of the CD (Figure 4-8). It should include the full site name, monitoring period reviewed, and any associated contract, preparation date, or ARS archive information.

4.2.3.4 CD Access Instructions

A file summarizing the CD contents, type of file formats, and access requirements is provided as a courtesy to the user. Recipients of the historical CD may or may not be familiar with computer access related information. The CDINFO document, shown in Figure 4-9, provides a brief overview of what types of image and graphic files are provided, as well as how the images can be best accessed or printed for future use. In order to view CDINFO the user must launch the provided Adobe Acrobat software and open file CDINFO.PDF.

Figure 4-6. Example Historical Spectrum CD Table of Contents.

Table of Contents							
Canyonlands National Park Permanent Photographic Archive 1987-1995 Kodak Master ID - 7314-3252-1466 (2/24/98)							
Pathname d: = CD-ROM drive	File name	Catalog #	File/Image Description			File Type	Comments
d:	CDINFO.PDF		Contents and access information related to this disk			Adobe Acrobat (Portable Digital Format)	WORD file printed in PDF format
d:	READ1st.PDF		Software and system requirements related to this disk			Adobe Acrobat (Portable Digital Format)	WORD file printed in PDF format
d:	READ1st.TXT		Software and system requirements related to this disk			ASCII Text File	
d:	CONTENTS.PDF		Detailed table of contents containing all file access information			Adobe Acrobat (Portable Digital Format)	WORD file printed in PDF format
d:	HISTDATA.PDF		Title slide, site specifications, and spectrum cumulative frequency summaries			Adobe Acrobat (Portable Digital Format)	WORD file printed in PDF format
d:\catalog	PHOTOS.CAT		Kodak Qbrowser catalog file containing reference to all archived PCD images			Kodak QuickSolve Browser	
d:\images	IMG0001.JPG	1	Regional Haze Spectrum #1 of 11	7/2/91, 9:00	7899	JPEG Image	Cathedral Butte 1987 - 1995 (all 135mm lens unless noted otherwise)
d:\images	IMG0002.JPG	2	Regional Haze Spectrum #2 of 11	8/8/91, 9:00	8004	JPEG Image	Cathedral Butte
d:\images	IMG0003.JPG	3	Regional Haze Spectrum #3 of 11	7/9/94, 9:00	10880	JPEG Image	Cathedral Butte
d:\images	IMG0004.JPG	4	Regional Haze Spectrum #4 of 11	5/28/94, 9:00	10846	JPEG Image	Cathedral Butte
d:\images	IMG0005.JPG	5	Regional Haze Spectrum #5 of 11	8/2/94, 9:00	10953	JPEG Image	Cathedral Butte
d:\images	IMG0006.JPG	6	Regional Haze Spectrum #6 of 11	7/13/89, 9:00	6168	JPEG Image	Cathedral Butte
d:\images	IMG0007.JPG	7	Regional Haze Spectrum #7 of 11	7/20/89, 9:00	6190	JPEG Image	Cathedral Butte
d:\images	IMG0008.JPG	8	Regional Haze Spectrum #8 of 11	7/17/89, 9:00	6181	JPEG Image	Cathedral Butte
d:\images	IMG0009.JPG	9	Regional Haze Spectrum #9 of 11	7/11/89, 9:00	6182	JPEG Image	Cathedral Butte
d:\images	IMG0010.JPG	10	Regional Haze Spectrum #10 of 11	7/6/94, 9:00	10870	JPEG Image	Cathedral Butte
d:\images	IMG0011.JPG	11	Regional Haze Spectrum #11 of 11	7/5/94, 9:00	10867	JPEG Image	Cathedral Butte
d:\images	IMG0012.JPG	12	Regional Haze Spectrum #1 of 13	7/1/91, 15:00	7896	JPEG Image	Cathedral Butte
d:\images	IMG0013.JPG	13	Regional Haze Spectrum #2 of 13	6/20/91, 15:00	7864	JPEG Image	Cathedral Butte
d:\images	IMG0014.JPG	14	Regional Haze Spectrum #3 of 13	6/8/94, 15:00	10792	JPEG Image	Cathedral Butte
d:\images	IMG0015.JPG	15	Regional Haze Spectrum #4 of 13	7/16/89, 15:00	6186	JPEG Image	Cathedral Butte
d:\images	IMG0016.JPG	16	Regional Haze Spectrum #5 of 13	6/15/94, 15:00	10814	JPEG Image	Cathedral Butte
d:\images	IMG0017.JPG	17	Regional Haze Spectrum #6 of 13	6/22/91, 15:00	7870	JPEG Image	Cathedral Butte
d:\images	IMG0018.JPG	18	Regional Haze Spectrum #7 of 13	4/15/94, 15:00	10626	JPEG Image	Cathedral Butte
d:\images	IMG0019.JPG	19	Regional Haze Spectrum #8 of 13	4/19/94, 15:00	10636	JPEG Image	Cathedral Butte
d:\images	IMG0020.JPG	20	Regional Haze Spectrum #9 of 13	4/14/94, 15:00	10623	JPEG Image	Cathedral Butte
d:\images	IMG0021.JPG	21	Regional Haze Spectrum #10 of 13	7/5/94, 15:00	10869	JPEG Image	Cathedral Butte
d:\images	IMG0022.JPG	22	Regional Haze Spectrum #11 of 13	9/1/88, 15:00	6205	JPEG Image	Cathedral Butte
d:\images	IMG0023.JPG	23	Regional Haze Spectrum #12 of 13	7/9/89, 15:00	6158	JPEG Image	Cathedral Butte
d:\images	IMG0024.JPG	24	Regional Haze Spectrum #13 of 13	5/19/91, 15:00	7264	JPEG Image	Cathedral Butte

Figure 4-6 (continued). Example Historical Spectrum CD Table of Contents.

Table of Contents						
Canyonlands National Park						
Permanent Photographic Archive						
1967-1995						
Kodak Master ID - 7314-3252-1465 (2/24/95)						
Pathname d:\cd-rom\drive	File name	Catalog #	File/Image Description		File Type	Comments
d:\images	IMG0025.JPG	25	Episodes - Layered Haze	3/23/86, 12:00	2722 JPEG Image	La Sal Mtns - Manual System 1962- 1987
d:\images	IMG0026.JPG	26	Episodes - Layered Haze	12/11/87, 9:00	3394 JPEG Image	La Sal Mtns - Manual System 1962- 1987
d:\images	IMG0027.JPG	27	Episodes - Layered Haze	1/10/87, 9:00	3481 JPEG Image	La Sal Mtns - Manual System 1962- 1987
d:\images	IMG0028.JPG	28	Episodes - Layered Haze	12/3/88, 12:00	5458 JPEG Image	Cathedral Butte
d:\images	IMG0029.JPG	29	Episodes - Layered Haze	1/26/89, 9:00	5656 JPEG Image	Cathedral Butte
d:\images	IMG0030.JPG	30	Episodes - Layered Haze	1/30/89, 12:00	5688 JPEG Image	Cathedral Butte
d:\images	IMG0031.JPG	31	Episodes - Layered Haze	1/26/92, 9:00	8495 JPEG Image	Cathedral Butte
d:\images	IMG0032.JPG	32	Episodes - Layered Haze	1/26/92, 12:00	8496 JPEG Image	Cathedral Butte
d:\images	IMG0033.JPG	33	Scenic	10/30/82, 9:00	CA255 JPEG Image	La Sal Mtns - Manual System 1962- 1987
d:\images	IMG0034.JPG	34	Scenic	1/4/83, 15:00	CA397 JPEG Image	La Sal Mtns - Manual System 1962- 1987
d:\images	IMG0035.JPG	35	Scenic	7/26/83, 15:00	CA837 JPEG Image	La Sal Mtns - Manual System 1962- 1987
d:\images	IMG0036.JPG	36	Scenic	8/17/83, 15:00	CA883 JPEG Image	La Sal Mtns - Manual System 1962- 1987
d:\images	IMG0037.JPG	37	Scenic	9/23/83, 9:00	CA967 JPEG Image	La Sal Mtns - Manual System 1962- 1987
d:\images	IMG0038.JPG	38	Scenic	10/13/83, 9:00	CA1008 JPEG Image	La Sal Mtns - Manual System 1962- 1987
d:\images	IMG0039.JPG	39	Scenic	9/21/84, 9:00	1672 JPEG Image	La Sal Mtns - Manual System 1962- 1987
d:\images	IMG0040.JPG	40	Scenic	12/11/84, 15:00	1845 JPEG Image	La Sal Mtns - Manual System 1962- 1987
d:\images	IMG0041.JPG	41	Scenic	1/30/84, 9:00	1939 JPEG Image	La Sal Mtns - Manual System 1962- 1987
d:\images	IMG0042.JPG	42	Scenic	11/6/87, 14:00	4394 JPEG Image	Cathedral Butte
d:\images	IMG0043.JPG	43	Scenic	11/14/87, 14:00	4418 JPEG Image	Cathedral Butte
d:\images	IMG0044.JPG	44	Scenic	11/23/88, 15:00	5429 JPEG Image	Cathedral Butte
d:\images	IMG0045.JPG	45	Scenic	12/23/88, 12:00	5520 JPEG Image	Cathedral Butte
d:\images	IMG0046.JPG	46	Scenic	11/5/90, 9:00	7243 JPEG Image	Cathedral Butte
d:\images	IMG0047.JPG	47	Scenic	1/8/92, 12:00	8441 JPEG Image	Cathedral Butte
d:\images	IMG0048.JPG	48	Scenic	12/19/93, 12:00	10297 JPEG Image	Cathedral Butte
d:\images	IMG0049.JPG	49	Colo. Plateau Report 4/87 - Good	7/25/89, 9:00	5205 JPEG Image	Cathedral Butte
d:\images	IMG0050.JPG	50	Colo. Plateau Report 4/87 - Medium	7/13/87, 9:00	6181 JPEG Image	Cathedral Butte
d:\images	IMG0051.JPG	51	Colo. Plateau Report 4/87 - Poor	7/5/94, 9:00	10667 JPEG Image	Cathedral Butte
d:\qbrowser	QBROWSER.EXE		Kodak QuickSolve Browser - abbreviated version		Executable file	Used to view JPEG images
d:\qbrowser	SETUP.EXE		Kodak QuickSolve Browser installation for Windows		Executable file	
d:\qbrowser	BROWSHLP.HLP		Help file, accessible through QBROWSER		Windows based help file	
d:\qbrowser	READMEQB.WRI		Software and system requirements related to Kodak QuickSolve Browser		Windows based text file	
d:\reader\win\reader	SETUP.EXE		Adobe Acrobat Reader 3.0 installation for Windows		Executable file	Used to view Portable Document Format (PDF) files
d:\reader	README.TXT		Software and system requirements related to Adobe Acrobat		ASCII Text File	

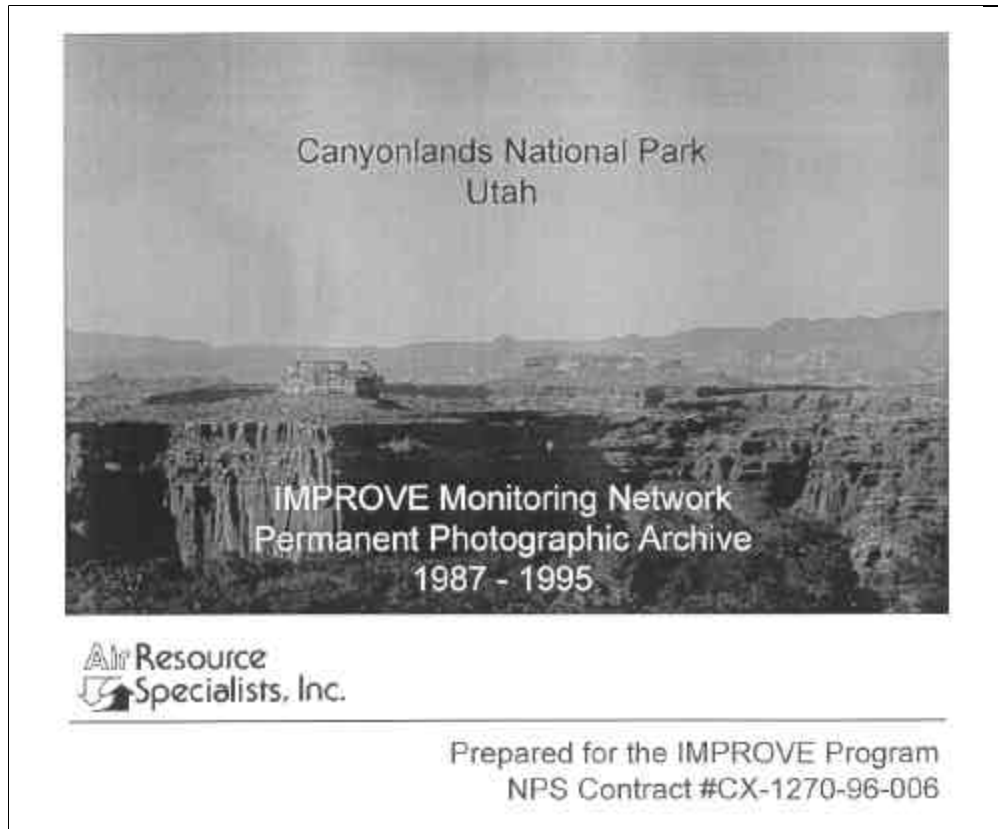
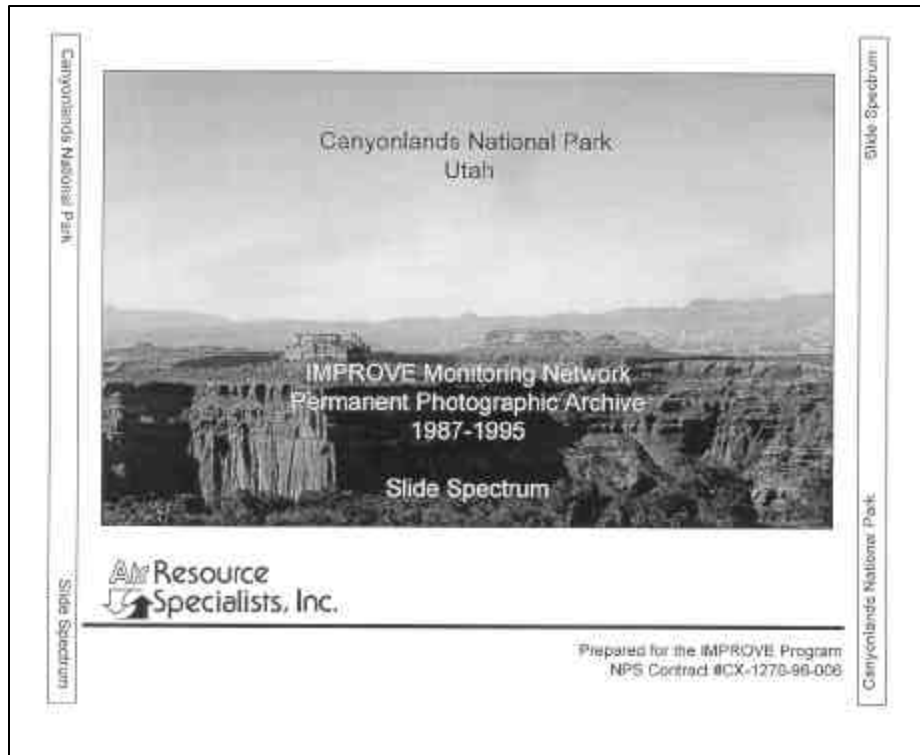


Figure 4-7. Example Title Slide.



IMPROVE Monitoring Network Permanent Photographic Archive

This CD-ROM contains Acrobat Reader 3.0 and Kodak QuickSolve Browser (QBROWSER) software as well as a series of readme text (TXT) files, PDF (Portable Document Format) files, and JPEG and PCD (Photo CD) images. Acrobat Reader 3.0 or later must be installed prior to viewing any PDF file. Qbrowser software can be accessed directly from the CD, however optimal performance is obtained by installing Qbrowser directly on your hard drive.

System Requirements

- x86-based personal computer (486DX minimum, Pentium or Pentium Pro recommended), CD-ROM drive, 8-bit SVGA graphic card
- Microsoft Windows 3.1, Microsoft Windows for Workgroups, Microsoft Windows 95, Microsoft Windows NT 3.51 or 4.0
- 8 MB application RAM
- 5 MB hard disk space, plus 7 MB additional temporary disk space available during installation
- True Color (32-bit) display and 2 MB video RAM recommended for optimal viewing

Recommended Reading

- READ1st.TXT located on the root directory of this CD.
- CDINFO.PDF located on the root directory of this CD.

Prepared by Air Resource Specialists, Inc.
for the IMPROVE Program
1998

Figure 4-8. Example CD Cover (Front and Back).

CD INFORMATION

CONTENTS OF THE CD

This CD includes a series of readme.txt (.TXT) files, PDF (Portable Document Format) files, and JPEG (Joint Photographic Expert Group) and PCD (Photo CD) images.

TXT Format Files

Readme.txt files describe the software and system requirements for reading the provided information. The file READ1st.TXT (or READ1st.PDF) documents software and system requirements specific to the historical photographic archive provided on this CD.

PDF Format Files

all text and graphic files, including this CD information description, the fully referenced table of contents, site specifications, and spectrum cumulative frequency summaries have been archived in PDF format. Acrobat Reader 3.0 or later must be installed prior to viewing any provided PDF format file. PDF files can be accessed using the Adobe Acrobat Reader provided in the Adobe Acrobat folder on this CD.

JPEG Format Files

All photographs have been archived in JPEG High resolution (512 X 768) format. JPEG images are recommended for viewing and Internet transmission purposes. JPEG images can be viewed with the Kodak QuickSolve Browser (QBROWSER) provided in the Qbrowser folder on this CD.

PCD Format Files

For hard-copy printing purposes, all photographs have also been provided in high resolution (2048 X 3072) Photo CD format. Photo CD (PCD) images provide the highest resolution possible for printing. To access or print these PCD images, contact a local photo processing laboratory with digital capabilities or Air Resource Specialists, Inc.

ACCESS INSTRUCTIONS

Acrobat Reader 3.0 or later must be installed prior to viewing any provided PDF format file. To install Acrobat Reader 3.0 for Windows, run the SETUP.EXE program in the Reader\Win\Reader folder (directory) of this CD-ROM. Additional directions are available in the README files located in the Acrobat Reader folders.

-- continued --

Figure 4-9. CDINFO Document Included on the CD-ROM.

ACCESS INSTRUCTIONS (Continued)

Kodak QuickSolve Browser (QBROWSER) is also included on this CD-ROM to view the provided JPEG photographic archive. It is not necessary to install any Kodak software prior to running QBROWSER; however, optimal performance is obtained if QBROWSER is installed directly on your hard drive. To install Kodak QuickSolve Browser for Windows, run the SETUP.EXE program in the Qbrowser folder (directory) of this CD-ROM. Additional information regarding Kodak QuickSolve software is available in the README file located in the Qbrowser folder.

Additional system requirements are documented in the READ1st.txt (or READ1st.PDF) files located in the root directory of this CD.

TABLE OF CONTENTS

To view the fully referenced Table of Contents double-click the CONTENTS.PDF file in the root directory, or launch the installed Acrobat Reader and open the file named CONTENTS.PDF.

SITE SPECIFICATION AND SPECTRUM CUMULATIVE FREQUENCY SUMMARIES

To view these documents, double-click the HISTDATA.PDF file in the root directory, or launch the installed Acrobat Reader and open the file named HISTDATA.PDF.

PHOTOGRAPHIC ARCHIVE

To launch the photograph browser, go to the Qbrowser folder and launch QBROWSER.EXE. From Qbrowser, open the catalog file names PHOTOS.CAT.

This CD was created by Air Resource Specialists, Inc. for the IMPROVE Program under contract to the National Park Service (NPS), Air Resources Division. The National Park Service is the copyright owner of all provided images. Any commercial use or duplication of this material without prior approval or licensing is forbidden. Use of the provided images should reference the IMPROVE Program. Additional information regarding the IMPROVE and NPS Air Quality Programs can be obtained by accessing the NPS AIRWeb site at <http://www.aqd.nps.gov/natnet/ard/>.

4.2.3.5 Hardware/Software Requirements

A document specifically addressing the hardware and software requirements necessary to access the image and graphic files is provided in the archived file READ1st, shown in Figure 4-10. The READ1st file is provided in both Acrobat (.PDF) and Text (.TXT) formats to better ensure the user success in obtaining the hardware and software requirements necessary to read the provided historical archive data. Hardware and software requirements to use the CD are provided in Figure 4-10.

4.2.4 Archive

To maintain a cohesive record of all the materials and data associated with the historical archive, all the compiled graphics and data presentation materials (outlined in Sections 4.2.1 through 4.2.3) are archived on CD-ROM with the historical spectrum images. All created files are archived in Adobe Acrobat .PDF format, using Acrobat Writer software. This format is readable on any computer format. A shareware version of Adobe Acrobat Reader 3.0 is also provided on the CD-ROM, should a user not have access to the software to view and/or print the site-specific materials.

4.3 PRODUCING THE CD-ROM

Once all the selected images have been archived in Photo CD format (Section 4.1.3), and all associated data presentations and CD-ROM archive descriptors have been archived in Acrobat format, (Section 4.2.4), the final CD-ROM archive is prepared. A final review of all archive descriptors, data files, and data presentation images should be made by the project manager prior to compilation. Computer Outfitters of Fort Collins, Colorado, currently conducts this final compilation process and produces the spectrums on CD-ROMs. The final CD-ROM spectrum archives could be performed at ARS, however, time and experience limitations have warranted that the procedure be subcontracted at this time.

Figure 4-11 outlines the organization of the compiled historical archive materials. ARS provides all files on one or more 3.5" high-density diskettes. All images are provided on one or more Photo CDs. Note that site-specific title pages, site specification graphics, and cumulative frequency summaries are compiled into one Acrobat file (HISTDATA) for the final CD-ROM archive. A thumbnail layout of the HISTDATA contents displays to the user (Figure 4-12) whenever the file is launched. From the display the user can then maximize any one of the associated graphic presentations.

Computer Outfitters creates an archive of the original spectrum images in both Photo CD and JPEG format. In addition, all JPEG files are compiled in a Kodak QuickSolve database (Qbrowser) for easy user access, sorting, and on-screen image descriptor association. If necessary, a uniform contrast adjustment is made to the databased JPEG images. Figure 4-11 shows Qbrowser labeling instructions are of primary importance in relation to what image descriptor information appears when the user launches the Qbrowser image database. A limit of four lines of information can be displayed for each image. Figure 4-13 shows the thumbnail layout that displays to the user whenever the Qbrowser catalog file (photos.cat) is launched.

READ1st.PDF

Software Requirements

Adobe Acrobat Reader 3.0

Acrobat Reader 3.0 allows anyone to view, navigate through, and print a document in the Adobe Portable Document Format (PDF).

To install Acrobat Reader 3.0 for Windows, run the SETUP.EXE program located in the Reader\Win\Reader folder (directory) of this CD-ROM. Additional directions are available in the README files located in the Acrobat Reader folders.

You may make and distribute unlimited copies of the Acrobat Reader software, including copies for commercial distribution, as long as each copy that you make and distribute includes the following:

- Acrobat Reader installer, exactly as provided by Adobe
- Acrobat Reader Electronic End User License Agreement
- Copyright and other proprietary notices included in Acrobat Reader

Once installed, full instructions on using Acrobat Reader 3.0 can be viewed in the Acrobat Reader 3.0 Online Guide. The Acrobat Reader 3.0 Online Guide can be accessed via the Acrobat Reader or Acrobat Exchange Help menu.

Kodak QuickSolve Browser

Kodak QuickSolve Browser software can be used to retrieve JPEG (JPG) images stored on the master disk.

QuickSolve Browser software allows you to:

- View provided catalog files (e.g., Photos.CAT).
- Display, copy, and print thumbnails in a Database Thumbnail Viewer window.
- Display, zoom, crop, copy, rotate, and print JPEG resolution (512 X 768) images displayed in photo windows.
- Create slide shows of your imagery.

For full instructions on using the Kodak QuickSolve Browser, go to the Qbrowser folder and launch QBROWSER.EXE. Access the Help menu within Qbrowser for a detailed listing of topics.

-- continued --

Figure 4-10. READ1st File Included on the CD-ROM.

System Requirements

- x86-based personal computer (486DX minimum, Pentium or Pentium Pro recommended), CD-ROM drive, 8-bit SVGA graphic card
- Microsoft Windows 3.1, Microsoft Windows for Workgroups, Microsoft Windows 95, Microsoft Windows NT3.51 or 4.0
- 8 MB application RAM
- 5 MB hard disk space, plus 7 MB additional temporary disk space available during installation
- True Color (32-bit) display and 2 MB video ram recommended for optimal viewing
- For viewing PDF files inside of a Web browser: Netscape Navigator 3.0 or later (3.0.1 or later recommended) or Microsoft Internet Explorer 3.0 or later. Netscape Navigator 2.0.2 can also be used with limitations; e.g. it will not allow you to submit a PDF form. You may also be able to use other Web browsers that fully support the Netscape APIs.

Other Information related to this CD

This CD-ROM contains Acrobat Reader 3.0 and Kodak QuickSolve Browser (QBROWSER) software. Acrobat Reader 3.0 or later must be installed prior to viewing any provided PDF format file. Qbrowser software can be accessed directly from the CD. It is not necessary to install QuickSolve Browser on your hard drive. Additional software related issues are addressed in the folder-specific README files provided by the software vendors.

In order to view the contents of this CD; launch any of the Adobe Acrobat files by double clicking any .PDF extension file. Photographic images can be accessed via the Kodak QuickSolve Browser: go to the Qbrowser folder and launch QBROWSER.EXE. Additional project-specific contents and access information can be viewed by opening the file titled CDINFO.PDF.

This CD was created by Air Resource Specialists, Inc. for the IMPROVE Program under contract to the National Park Service (NPS), Air Resources Division. The National Park Service is the copyright owner of all provided images. Any commercial use or duplication of this material without prior approval or licensing is forbidden. Use of the provided images should reference the IMPROVE Program. Additional information regarding the IMPROVE and NPS Air Quality Programs can be obtained by accessing the NPS AIRWeb site at <http://www.aqd.nps.gov/natnet/ard/>.

Prepared by Air Resource Specialists, Inc.
for the IMPROVE Program
1998

Project Title: Canyonlands National Park
 Date Submitted: 3/17/98 Date Reviewed: 3/27/98
 Quantity: Original + 10 copies
 Date Complete: _____

ARS PO# 6853
 ARS Project: IMPROVE3
 Due Date: _____
 ADI Computer Outfitter Invoice #: 27073CD

Writable CD File		ARS files to include (in order of appearance)								
Name	Type	File	Orntn	#	File	Orntn	#	File	Orntn	#
CDINFO	PDF	cdinfo.pdf	P/2							
READ1st	PDF	read1st.pdf	P/2							
READ1st	TXT	Read1st.txt	P/2							
CONTENTS	PDF	Canycont.pdf	L/2							
HISTDATA	PDF	Canytitl.pdf	L/1		Canyspec.pdf	L/1		Canyfreq.pdf	P/1	
										↓ thumbnail layout

Images: 51 Photo CD #: 7314-3252-1468
 # Non-Cataloged Images (grayscale): 2 (#53+52) Image Density Adjustment: Y N
 CD Contents Reference File: canycont.pdf Excel CD Reference File: canycont.xls (sheet #1)

OBrowser Labeling (limit 25 char. @ 6pt, 17 char. @ 8pt)	Order of Appearance (limit 4 lines)
Project: <u>Canyonlands National Park</u>	# 1
Series #: <u>full description</u>	# 2
Truncated Series Name: <u>see excel series value</u>	# 3
Category - Date/Time: <u>7/2/91, 9:00 7899</u>	# 4
Catalog #: <u>comment field enter for all</u>	
Image ID: <u>however only display for # 4 only for 49, 50, + 51</u>	
Data Field #1:	
Data Field #2:	
Notes: <u>Archive greyscales, but do not include in CD contents or catalog</u> <u>ARS Greyscales 32 step #9, 24 step #10</u>	

Figure 4-11. Example Organization of Compiled Archive Materials.

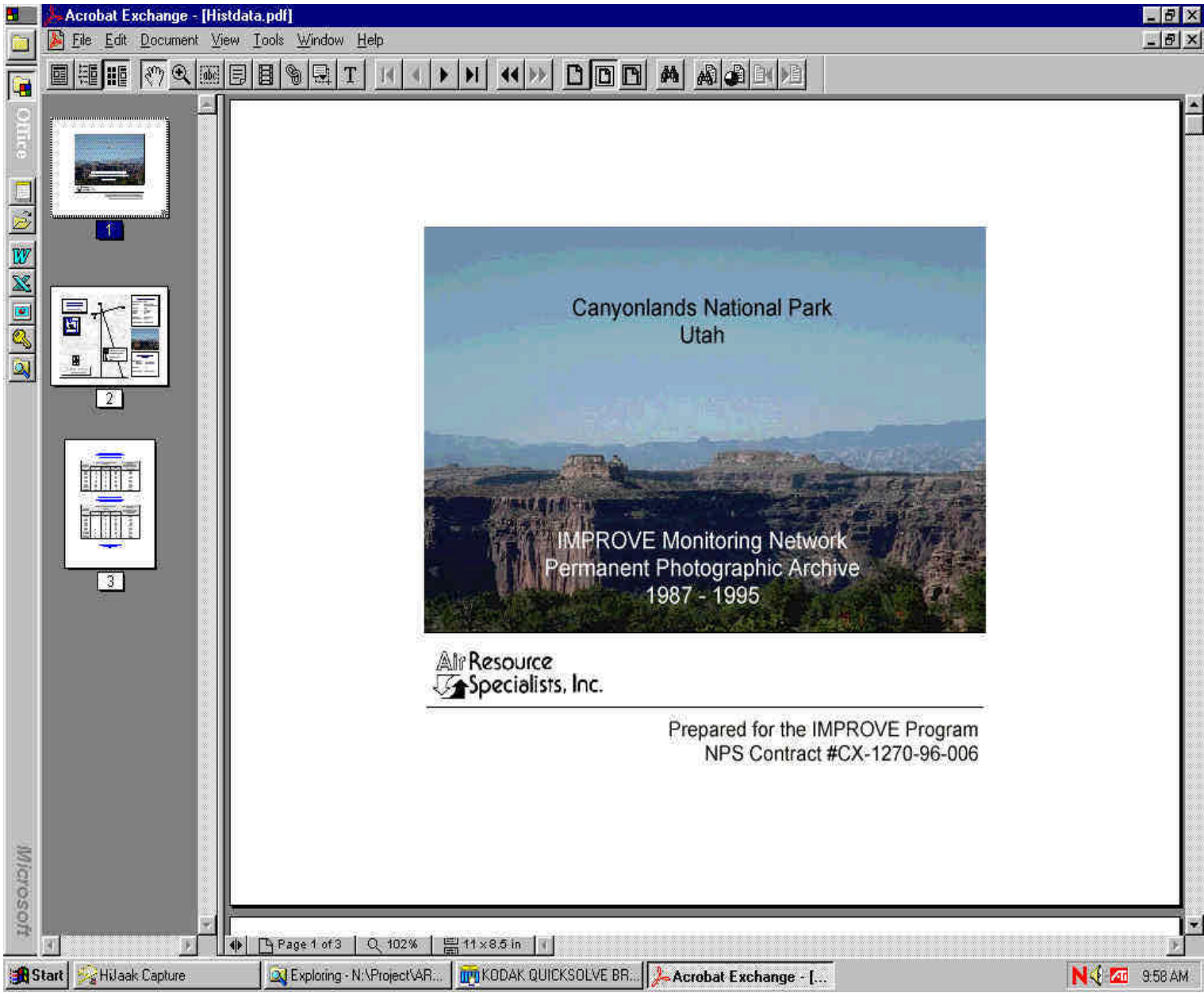


Figure 4-12. Layout of HISTDATA Acrobat File.

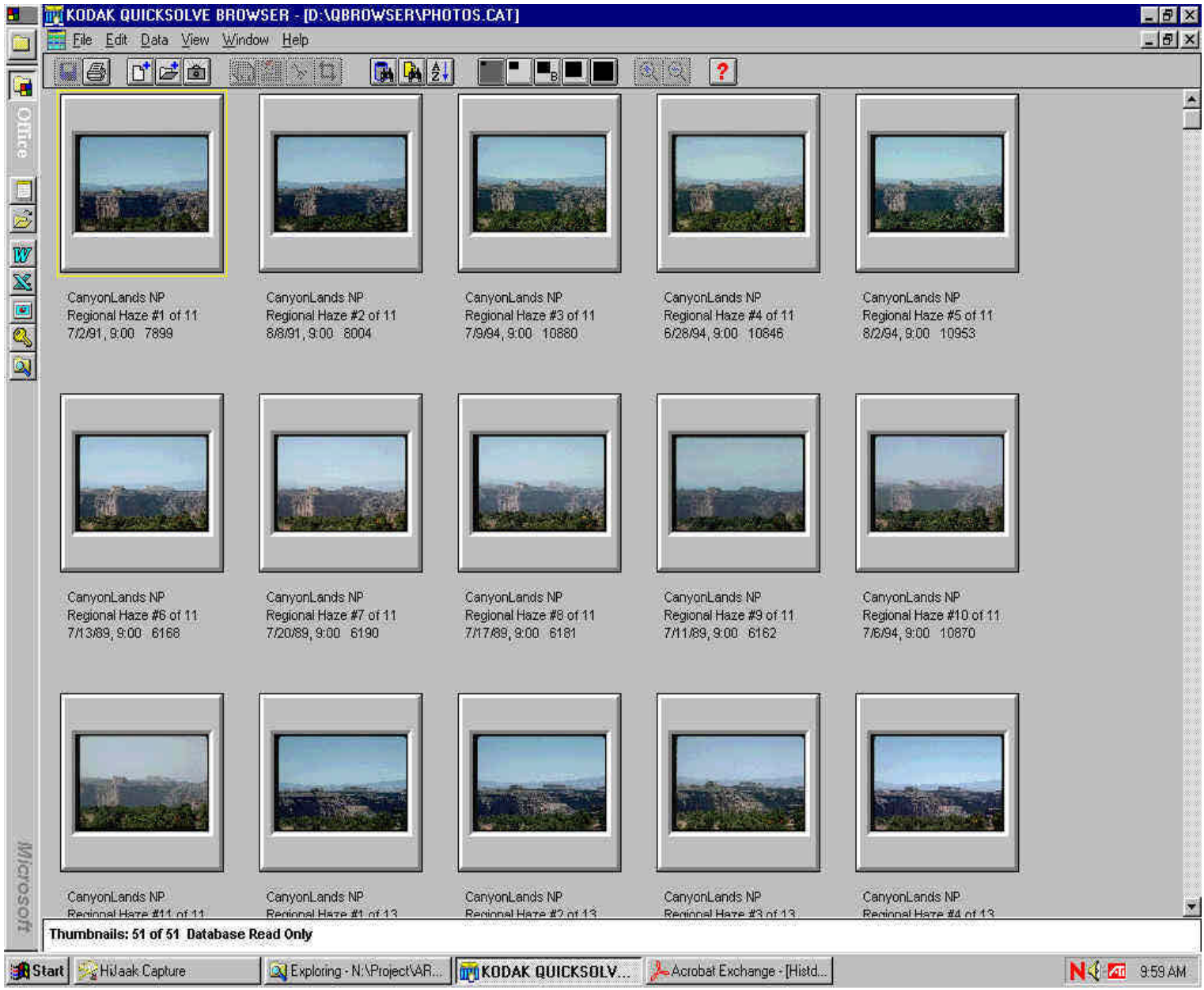


Figure 4-13. Layout of Kodak Qbrowser Catalog File (photos.cat).

One master copy of the final CD-ROM archive is prepared and reviewed. Figure 4-14 lists the file structure and contents that should be verified for each site-specific archive. Copies of the approved master are prepared and checked again. Each CD copy is labeled and fitted with the site-specific CD cover information described in Section 4.2.3. Be certain to identify the master copy separately.

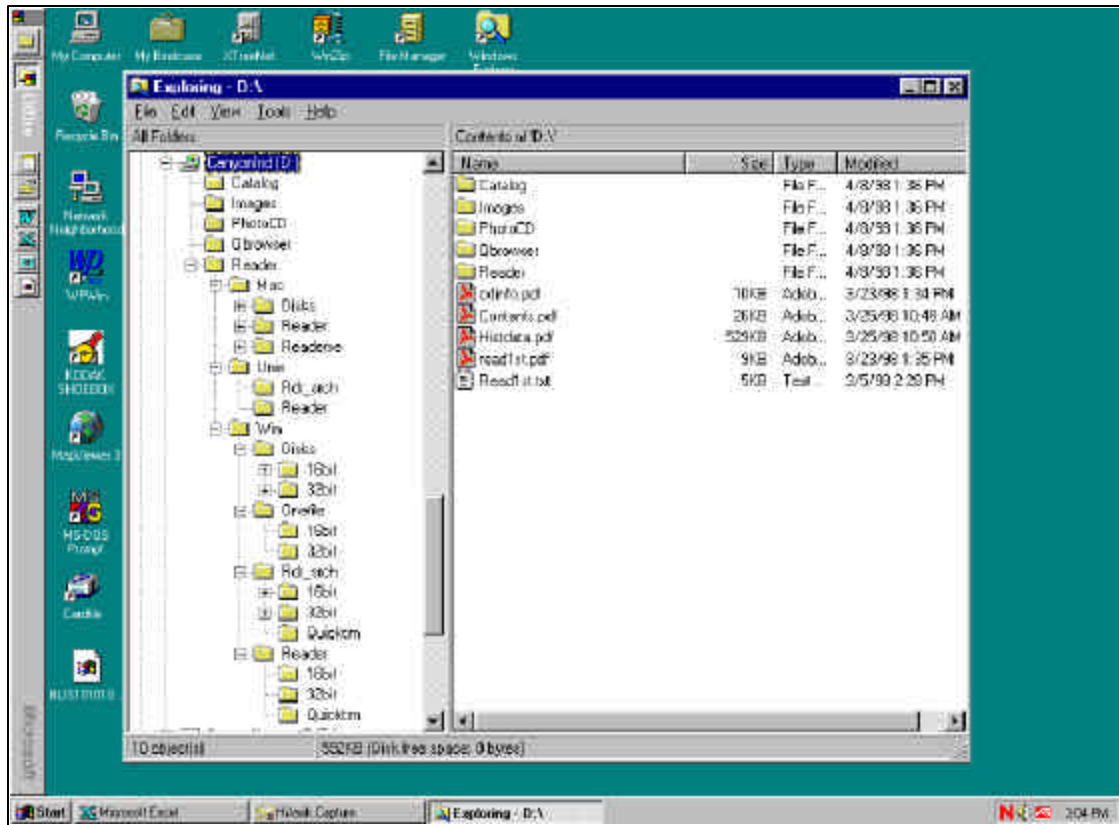


Figure 4-14. Example File Structure and Contents for Each Archive.

4.4 DISTRIBUTION

Final CD-ROM archive originals and copies are reviewed and approved by the project manager prior to preparation for distribution. When ready, ARS contacts the local project-specific COTR (e.g., Dee Morse, NPS Denver) for distribution requirements and provides the CD-ROM product(s) as directed. ARS' current distribution of NPS spectrum archives is:

Recipient	Agency	Number of Copies
Dee Morse	NPS, Air Resources Division (COTR)	5
Dr. William Malm	NPS, CIRA Division	1
Rich Damberg	EPA	1
Marc Pitchford	NOAA/EPA (IMPROVE Program Director)	1
ARS Archives		4

A letter detailing CD-ROM contents, file descriptors, access considerations, and product recipients must be prepared for shipment with the CD(s). Figure 4-15 shows an example letter used for the delivery of 6 completed CD-ROM archives. All items are packaged and shipped as directed.

4.5 ARCHIVING SPECTRUM MATERIALS

To maintain a long-term archive of the historical spectrum images and data presentation materials compiled, all materials should be organized and archived in an air-tight filing container. Materials included are organized as follows:

- Original 35 mm slide selections are stored in polyethylene slide protector sheets. Each slide is clearly marked with the slide archival number, date, and time the image was taken. At no time is an original slide permanently removed from the archival.
- Three sets of 35 mm slide duplicates are created from the original 35 mm Kodachrome slides. Each set is stored in polyethylene slide protector sheets and are labeled with the associated spectrum description, slide archival number, and date and time the image was taken. Included in the duplicate sets are copies of the gray scales used during the spectrum analysis process. These sets are created for future distribution purposes.
- One copy of all graphic and presentation materials included in the final CD-ROM archive are stored for reference in the air-tight container.
- One copy of the final CD-ROM archive is stored as the digital copy of all graphic presentation materials, and PCD and JPEG image archive. The master CD-ROM and original Photo CD are stored in the Historical Spectrum CD Archive located at ARS.

All unused images are returned to their point of origin or the permanent 35 mm slide storage area. Copies of all correspondence, purchase orders, or in-house working notes are maintained in the project-specific contract files.

A 168 mm archive tape of all slide spectrum analysis scanning files is maintained on a bi-monthly basis. Should an image need to be rescanned or reviewed, the pertinent files should be obtained from these backup tapes located in ARS' computer room.

5.0 REFERENCES

- Air Resource Specialists, Inc., 1994, Preliminary Analysis of Uncertainty Associated With Extinction Estimates From 35mm Color Slide Densitometry of Natural Targets.
- Allard, D., and I. Tombach, 1981, The Effects of Non-Standard Conditions on Visibility Measurement, Atmospheric Environment, 15:1847-1857.
- Malm, W., 1979, Considerations in the Measurement of Visibility, APCA Journal, 29: 1042-1052.
- Middleton, W.E.K., 1958, Vision Through the Atmosphere, 2nd Ed. Toronto, Canada: University of Toronto Press.
- Molenaar, J. (Air Resource Specialists, Inc.), 1997, WinHaze – Level 1 Visual Air Quality Modeler.



December 4, 1998

Dee Morse
National Park Service, Air Resources Division
12795 W Alameda Parkway
Lakewood, CO 80228

1901 Sharp Point Drive
Suite E
Fort Collins, Colorado 80525
970-484-7941
FAX: 970-484-3423

Dear Dee,

In accordance with NPS Contract 1270-96-006, enclosed are five (5) copies of Visibility Slide Spectrum CDs for each of the following IMPROVE photographic monitoring sites:

Monitoring Location	Period Reviewed	# CD's Provided
Badlands National Park, SD	1987 - 1995	5
Chiricahua National Park, AZ (Hatchett Peak vista)	1986 - 1989	5
Chiricahua National Park, AZ (Mica Mountain vista)	1989 - 1995	5
Glacier National Park, MT	1985 - 1995	5
Rocky Mountain National Park, CO	1985 - 1995	5
Yellowstone National Park, WY	1986 - 1995	5

Please distribute these CDs to the parks, Tom Dotts (NPS), and any appropriate NPS Air Resources Division personnel at your earliest convenience. One (1) set of CDs has been shipped to Bill Malm (NPS/CIRA), Rich Damberg (EPA) c/o Vasu Kilaru, and Marc Pitchford (NOAA/EPA). Three (3) sets will remain here at Air Resource Specialists, Inc. with the original slide archives.

Digital images on each CD include: visibility condition spectrums (images selected to represent the range of visibility conditions at a site); regional haze, layered haze, and visibility episode examples; and scenic images. The number of spectrums and total number of slides selected for each spectrum vary for each site depending on the vista, the variability in visual air quality at the monitoring location, the period of monitoring, and the completeness of the slide database. Supporting documentation on each CD includes: site specifications and associated photographic monitoring history, slide spectrum visibility condition summaries (in units of $b_{ext}(Mm^{-1})$, VR, and dv), and representative cumulative frequency values of associated reconstructed extinction IMPROVE aerosol data (compiled 10/98).

Figure 4-15. Example Distribution Letter.

Dee Morse
December 4, 1998
Page 2

All images and documentation are self-contained on the provided CDs. Photographic images are provided in both JPEG (compressed 512 x 768) and high resolution PCD (2048 x 3072) format. All images are cataloged and accessible through the provided Kodak QuickSolve Browser. All graphics and documentation have been archived in portable digital format (PDF) for easy display, printing, and Internet application. Each CD also contains Acrobat Reader 3.0 and Kodak QuickSolve Browser software as well as a series of readme text (TXT) files. Acrobat Reader 3.0 must be installed prior to viewing any PDF file. The QuickSolve Browser software can be accessed directly from the CD, however optimal performance is obtained by installing it directly on your hard drive. Reference the files READ1st.TXT and CDINFO.PDF on the root directory of the provided CDs for more information.

We are excited about the numerous applications of these CDs and their use for ongoing photographic data requests of the National Park Service and IMPROVE Program. I appreciate your patience awaiting the delivery of final products. Please feel free to call me if you have any comments or problems accessing the data.

Sincerely,



Kristi Savig
Project Manager

KS:ks
Enclosure

cc: B. Malm (NPS), M. Pitchford (EPA/IMPROVE)
R. Damberg (EPA, c/o Vasu Kilaru)