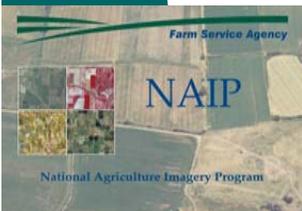


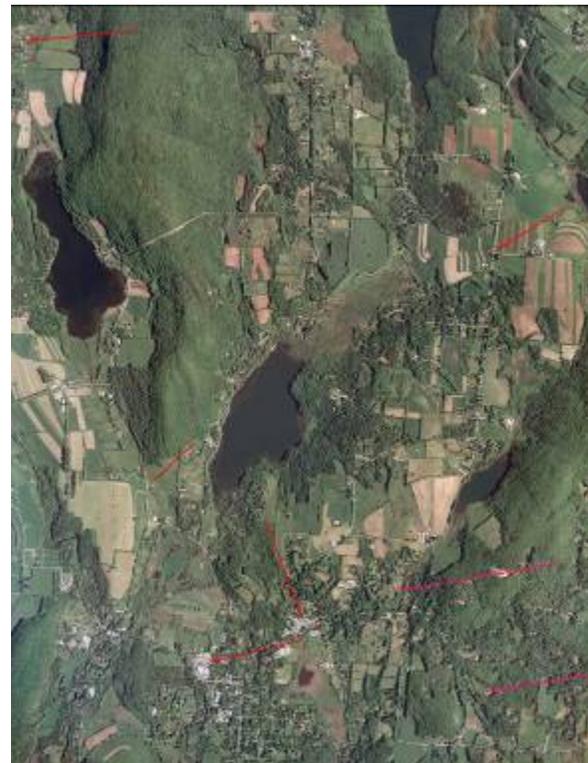
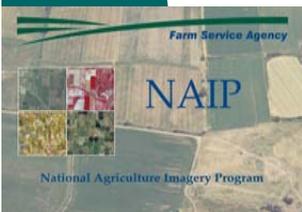
Quality Management



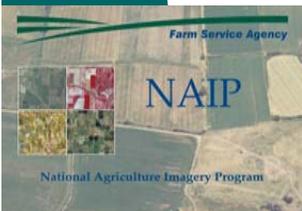
- Quality Improvement
- Imagery Continuity (Pre-Production Process)
- Imagery Data Management
- Research and Development



Quality Improvement (Accuracy and stability)



Imagery Continuity (Pre-production Sample)



- Contractor must submit sample image
- A team of individuals within APFO evaluates the image within 3 business days
- Sample image will be evaluated against the contract radiometric specifications



Imagery Data Management

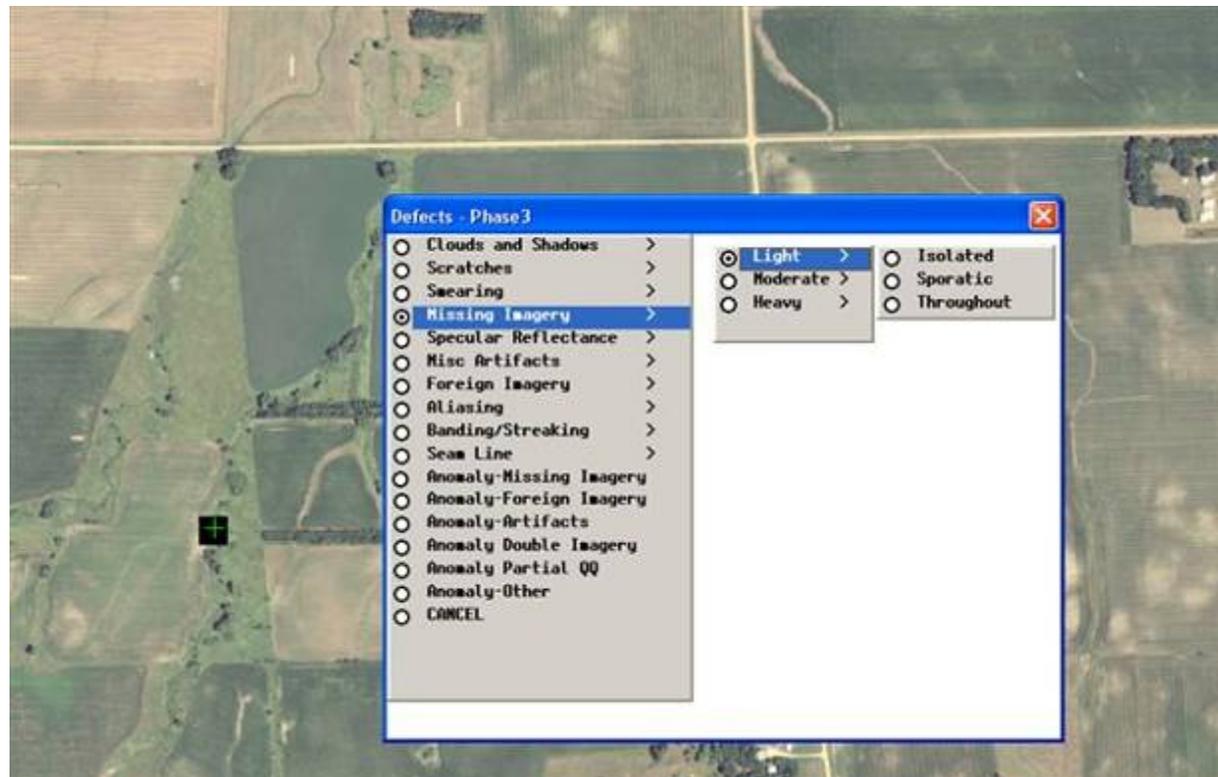
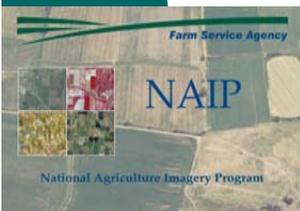
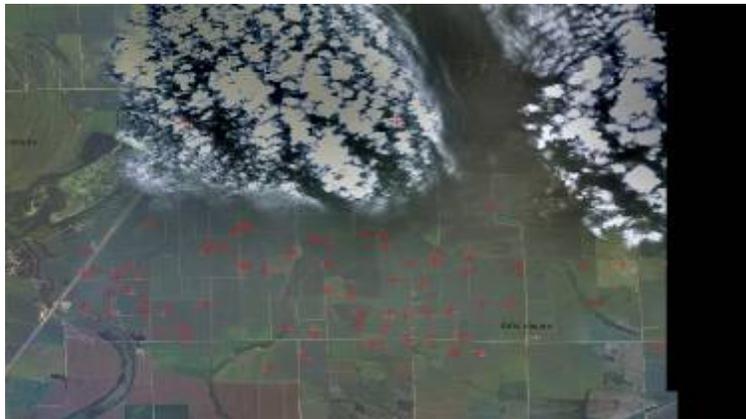


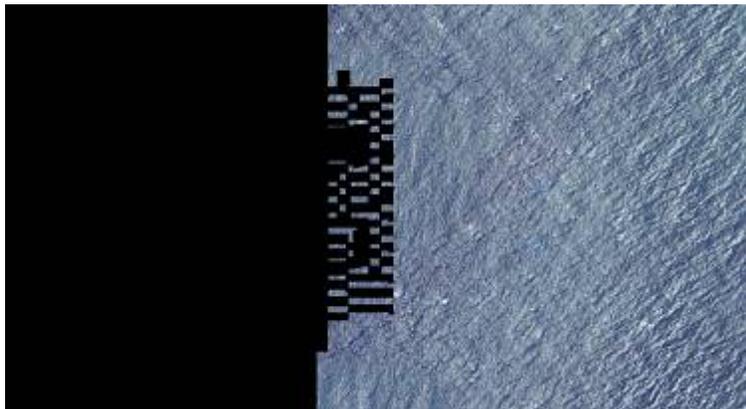
Image Defect Examples



Clouds Anomaly



Offsets Anomaly



Missing Imagery Anomaly



Artifacts Anomaly

NAIP 2008 CCM Comparison



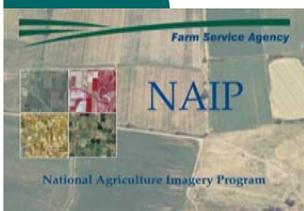
Appomattox, VA (51011)
(.jp2 compression)



Lamoyille, VT (50015)
(.jp2 compression)



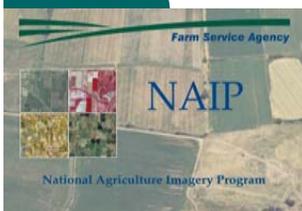
Cloud, KS (20029)
(.jp2 compression)



Point System

- Clouds Light-Isolated= .1
- Clouds Light-Sporadic= .2
- Clouds Light-Throughout = .3
- Clouds Moderate-Isolated = .4
- Clouds Moderate – Sporadic = .5
- Clouds Moderate-Throughout= .6
- Clouds Heavy-Isolated= .7
- Clouds Heavy-Sporadic= .8
- Clouds Heavy-Throughout= .9
- Cloud Cover + 10%= 1.0

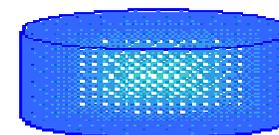
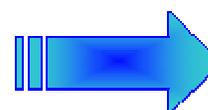


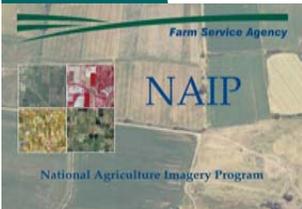


Data Management

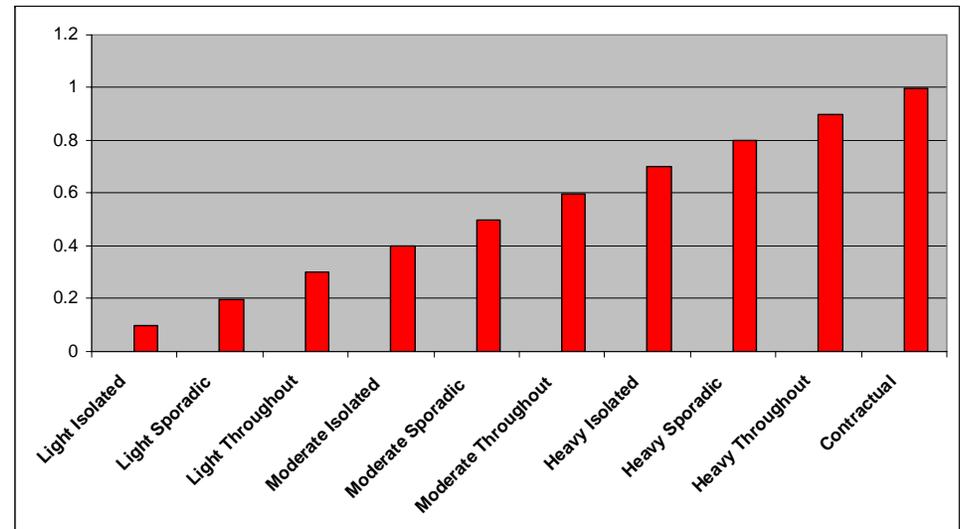
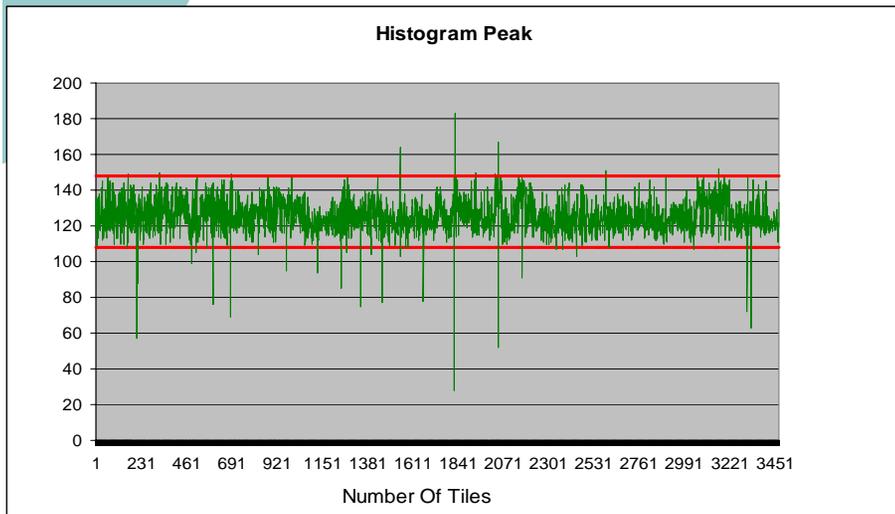
Microsoft Excel - OK_08_NAIPDEFVIEW.xls

	A1	FIPS_CODE					
	A	B	C	D	E	F	G
1	FIPS_CODE	TILE	DEFECT	CODE	PTS	INS	YR
2	40001	3509402SE	Clouds Light-Isolated	101	0.1	DJC	8
3	40001	3509403SE	Clouds Light-Isolated	101	0.1	DJC	8
4	40001	3509411NE	Clouds Light-Isolated	101	0.1	DJC	8
5	40003	3609804NE	Banding/Streaking Light-Isolated	152	0.1	JMB	8
6	40003	3609804NE	Seam Line Light-Throughout	169	0.3	JMB	8
7	40003	3609812NE	Banding/Streaking Light-Isolated	152	0.1	JMB	8
8	40003	3609812NE	Seam Line Light-Sporadic	165	0.2	JMB	8
9	40003	3609820NE	Clouds Light-Isolated	101	0.1	JMB	8
10	40003	3609820NE	Seam Line Light-Sporadic	165	0.2	JMB	8
11	40003	3609820SE	Banding/Streaking Moderate-Isolated	153	0.4	JMB	8
12	40003	3609821NW	Seam Line Light-Sporadic	165	0.2	JMB	8
13	40005	3409647SE	Histogram_Contrast	41	1	RGB	8
14	40007	3610001NE	Histogram_Peak	43	1	RGB	8
15	40007	3610006NE	Color_Balance	44	1	JMB	8
16	40007	3610006SV	Banding/Streaking Moderate-Isolated	153	0.4	JMB	8
17	40007	3610013NE	Misc Artifacts Light-Isolated	165	0.1	JMB	8
18	40007	3610015SE	Misc Artifacts Moderate-Sporadic	189	0.5	JMB	8
19	40007	3610017SE	Misc Artifacts Light-Sporadic	188	0.2	JMB	8
20	40007	3610018NE	Misc Artifacts Light-Sporadic	188	0.2	JMB	8

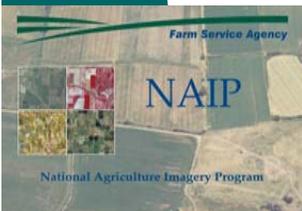




Track and Trend Data



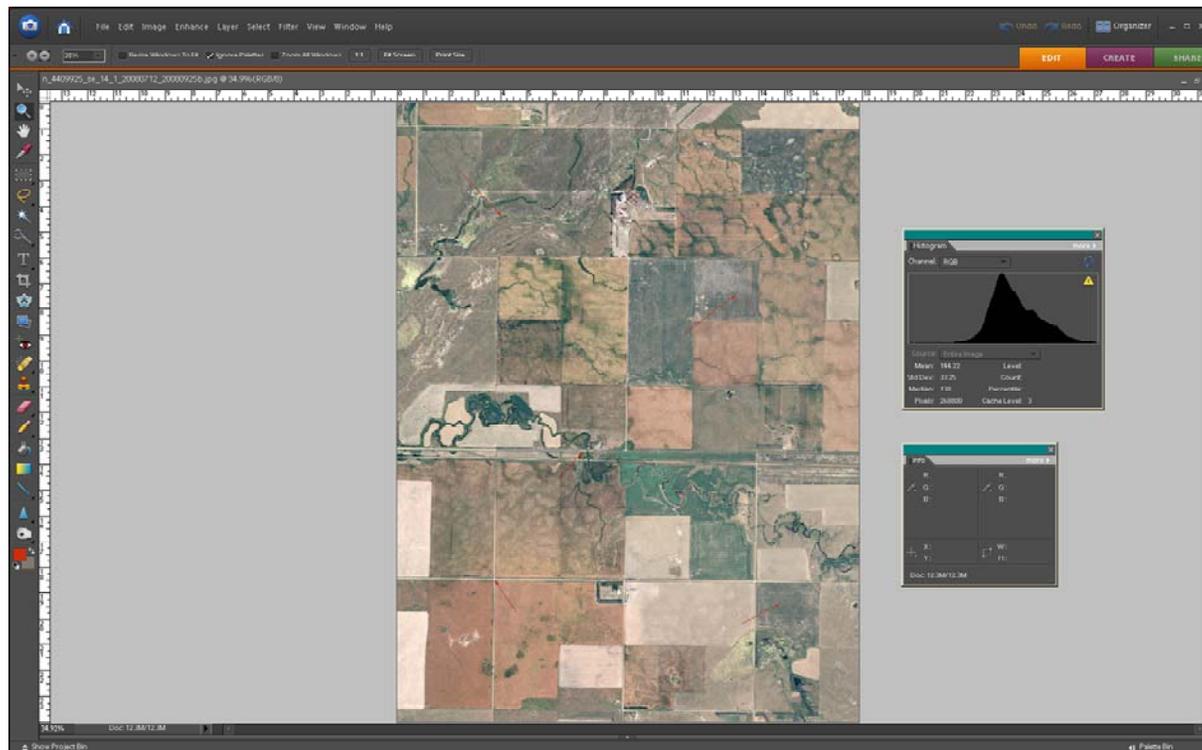
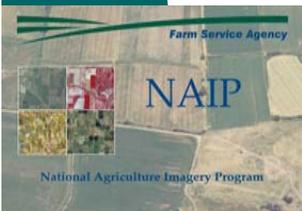
Project Finalization



- Inspectors generate and check a series of reports to cross check database accuracy.
- The reports include:
 - CCM and DOQQ Defects
 - CCM and DOQQ RMS Points
 - DOQQ summary report



Manual Approach To Color Management (Accomplished 2008)



Contrast (Accomplished 2008)



CONTRAST 120



CONTRAST 130



CONTRAST 140



CONTRAST 150



CONTRAST 160



CONTRAST 170



CONTRAST 180



CONTRAST 190

CONTRAST LEVEL COMPARISON

Source Imagery: NAIP 2007
DOQQ: 4109317NE

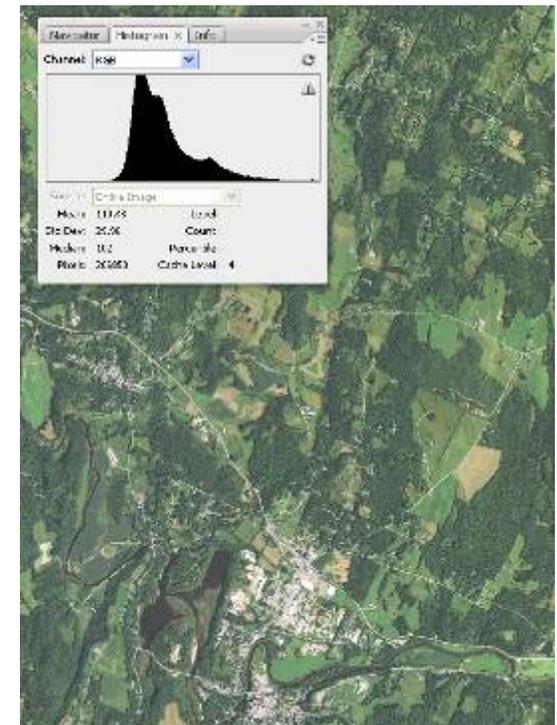
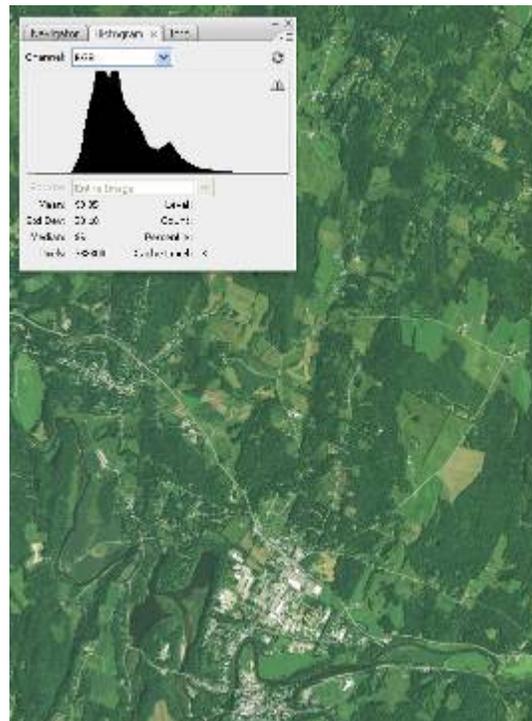
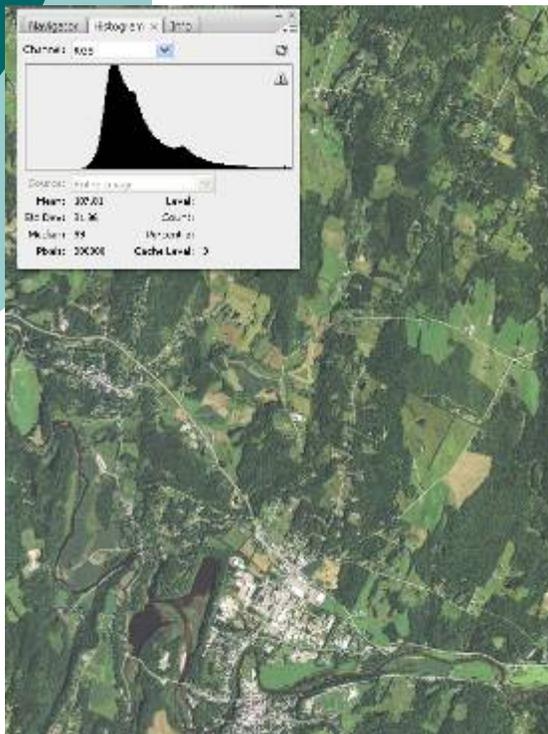
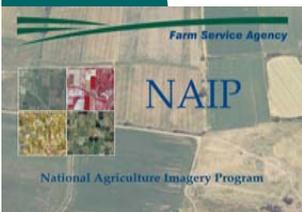
County: Dallas, Iowa (19049)

New Contrast Standard Range: 140 to 160 / 150 Aim Point
New Color Balance Standard Range: +/- 5 RGB Triplet

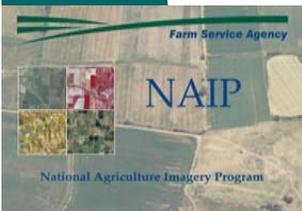
Luminosity

Medium, Peak, Mean

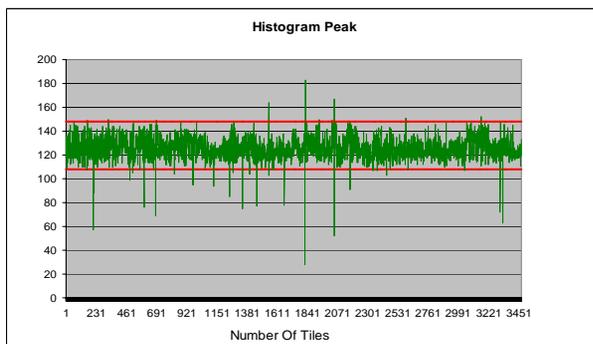
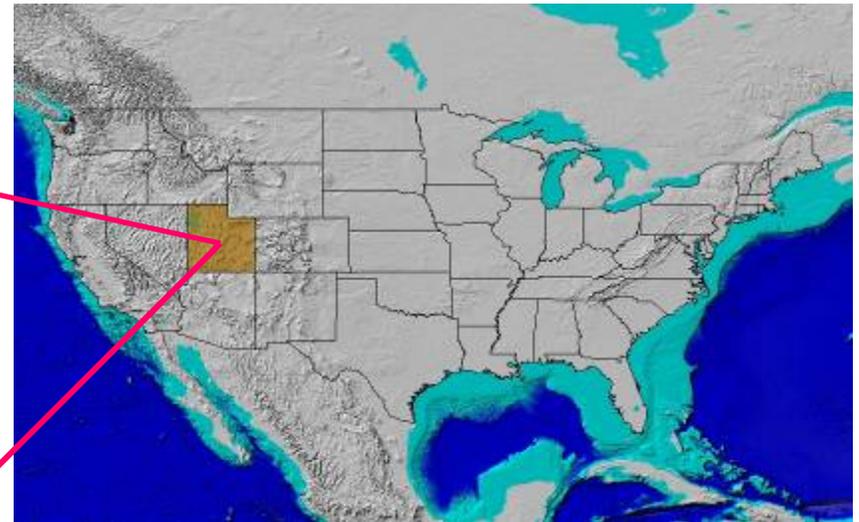
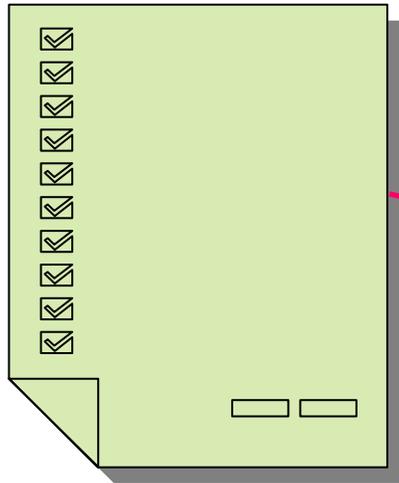
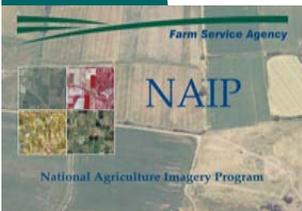
(future project 2009)



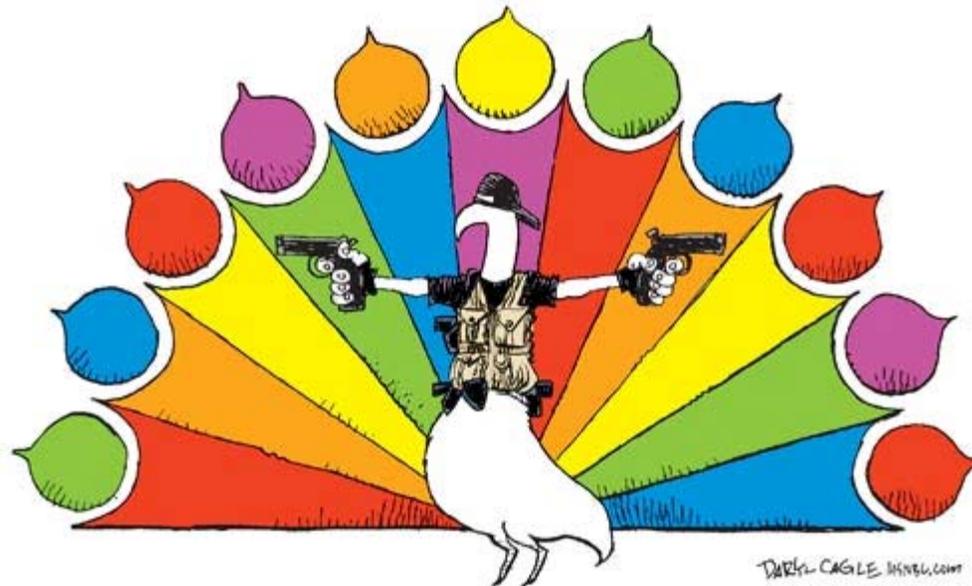
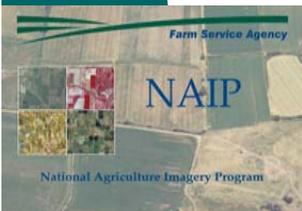
Natural Color and NCIR Study (on-going Project 2009+)



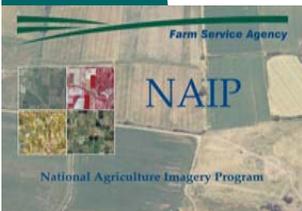
Geo-spatially oriented Survey and Trend Analysis (future project 2009+)



Automation Approach to Color Management (future project in a far away galaxy)



Quality Management



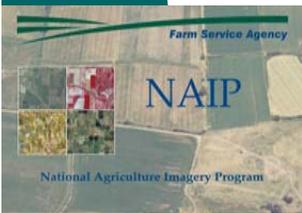
- **Quality Improvement**
 - Accuracy Stability

- **Imagery Continuity (Pre-Production Process)**
 - Indicator of quality
 - Involve customer observations

- **Imagery Data Management**
 - Point System
 - Data Management
 - Trend Analysis
 - Reports



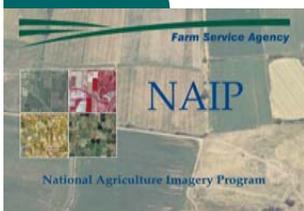
Quality Management



Research and Development

- Refined color variance from 10 to 5 (2008)
- Refined contrast (2008)
- Luminosity (2009)
- Ortho standards verification (2009+)
- NCIR study....NCIR standards (2009+)
- Geo-spatially oriented Surveys and Trends Analysis (2009+)
- Automated color management (long term project)





Contact information

Brenda Simpson

Quality Assurance Branch Chief

Voice: (801) 844-2960

Email: brenda.l.simpson@slc.usda.gov

David Wheeler

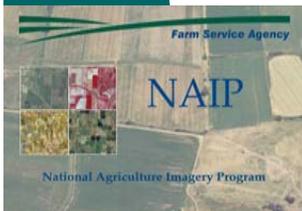
Ortho Imagery Inspection Supervisor

Voice: (801) 844-2963

Email: david.wheeler@slc.usda.gov



Color Management



1 21

FSA MONITOR TEST CHART

Color Palette

24-bit depth

16-bit depth

8-bit depth

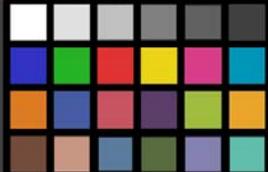


Calibration Tool

 Step 1: Adjust the monitor brightness until you can barely see a difference between the black values in the three circles to the left.

 Step 2: Adjust the monitor contrast until you can barely see a difference between the white values in the three circles to the left.

The grayscale image on top should show evenly spaced tones from true white to true black. The grays in the image should be neutral and not have any color cast.



Mr. Mike Sullivan

Observations on Current Viewing Setups

- Large variation in lighting levels and set-up
- Monitors set at factory defaults which are not optimum for viewing imagery
 - 9300K Color Temperature
 - Lower resolution and/or 60 Hz refresh rate
 - No calibration software
- Monitor responses are not consistent and so the users may see the imagery differently than APFO QA or Vendor QA (or each other)



Calibrated



User Monitor 1



User Monitor 2

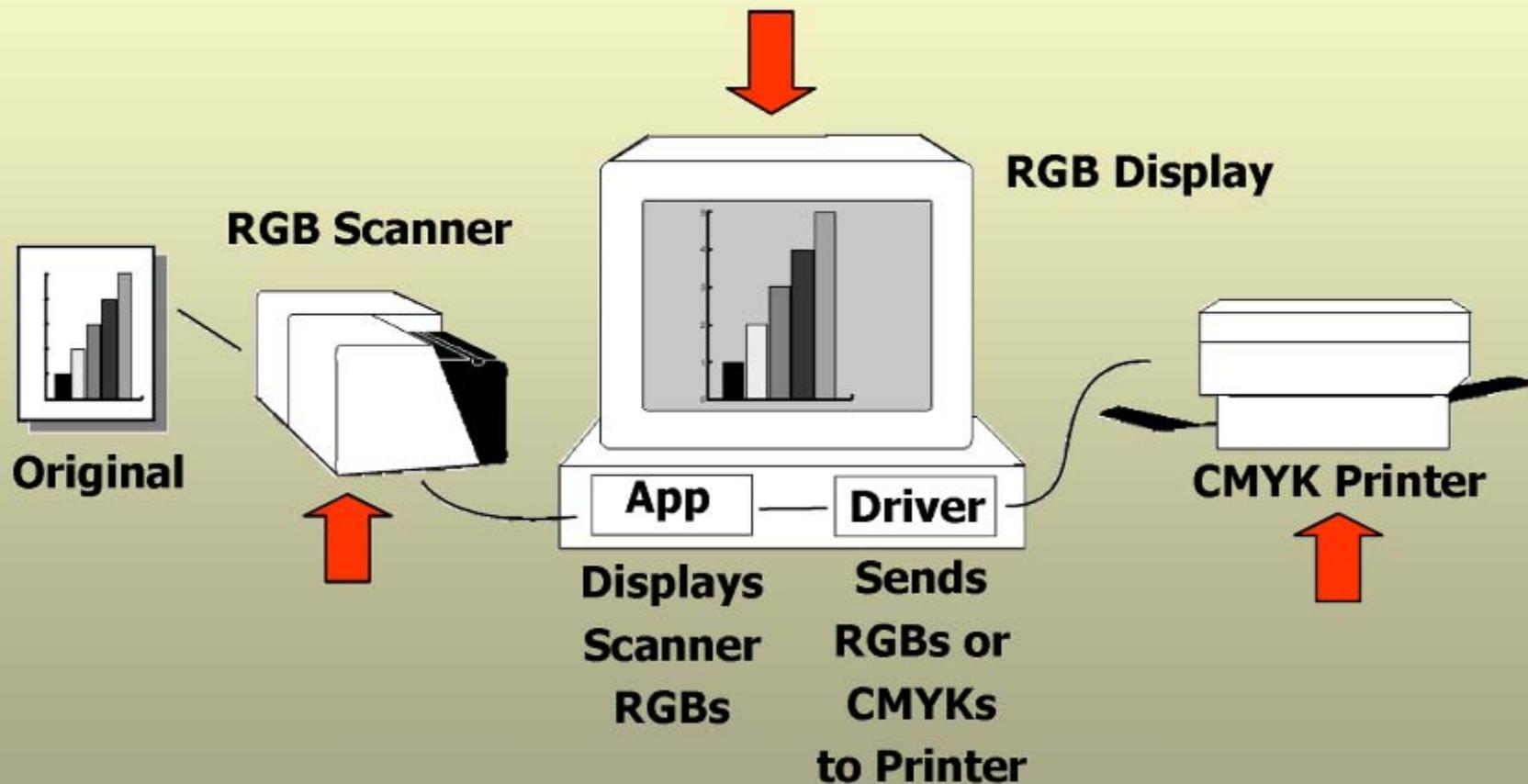
ICC Colour Management

- **What is the ICC?**
- Why Colour Management?
- ICC Profiles and the PCS
- Future Directions of the ICC

The International Color Consortium (ICC)

- An industry consortium
- Established in 1993 by eight industry vendors
- Now approximately 70 members
- Goal: Create, promote and encourage evolution of an open, vendor-neutral, cross-platform colour management system architecture and components

"Colour" Workflow



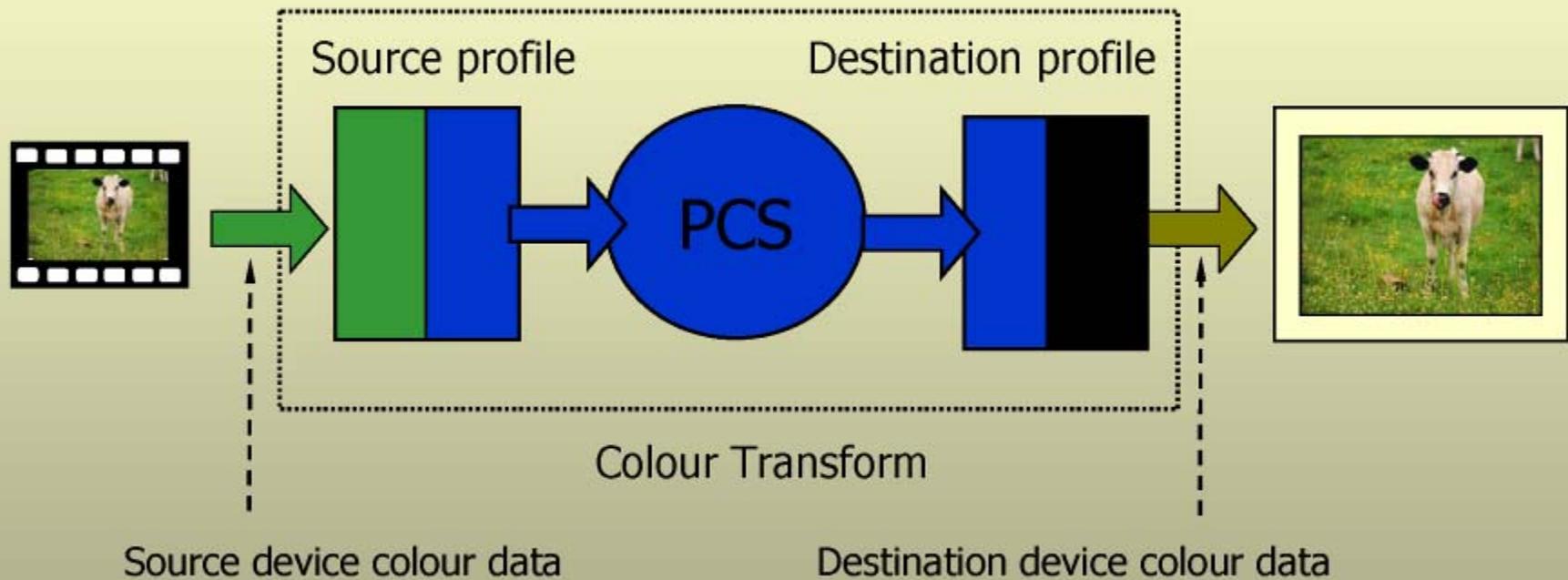
Everyday problems...

- *The same document looks different when*
 - printed on different printers
 - viewed on different monitors
 - printed on a printer and viewed on a monitor
 - viewed in a light booth and under office lighting

Why ?

- Devices, drivers, operating systems, and applications can all interpret and reproduce colours differently.
- Input --
Scanners, digital cameras often have different spectral responses
- Output --
Printing: offset, gravure, inkjet, laser
Display: CRT, LCD, PMP, DMD, video projectors...

ICC Workflow



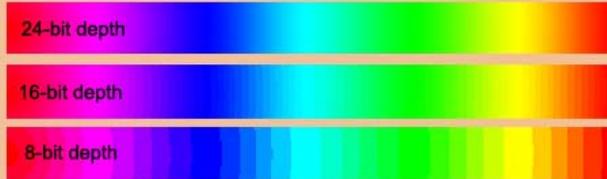
Reference Viewing Condition and Medium

- Perceptual PCS (in v4.0 spec.) defines:
 - Viewing environment of D50 at 500 lux with a 20% reflectance surround
 - Reference medium of 89% reflectance for white and approximately 0.31% for black
- The use of a reference medium with a well defined dynamic range and viewing condition ensures less ambiguity in gamut mapping.



FSA MONITOR TEST CHART

Color Palette



Calibration Tool

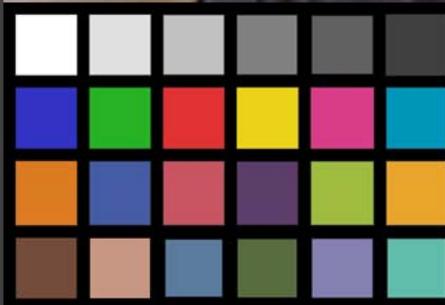


Step 1: Adjust the monitor brightness until you can barely see a difference between the black values in the three circles to the left



Step 2: Adjust the monitor contrast until you can barely see a difference between the white values in the three circles to the left.

The grayscale image on top should show evenly spaced tones from true white to true black. The grays in the image should be neutral and not have any color cast.

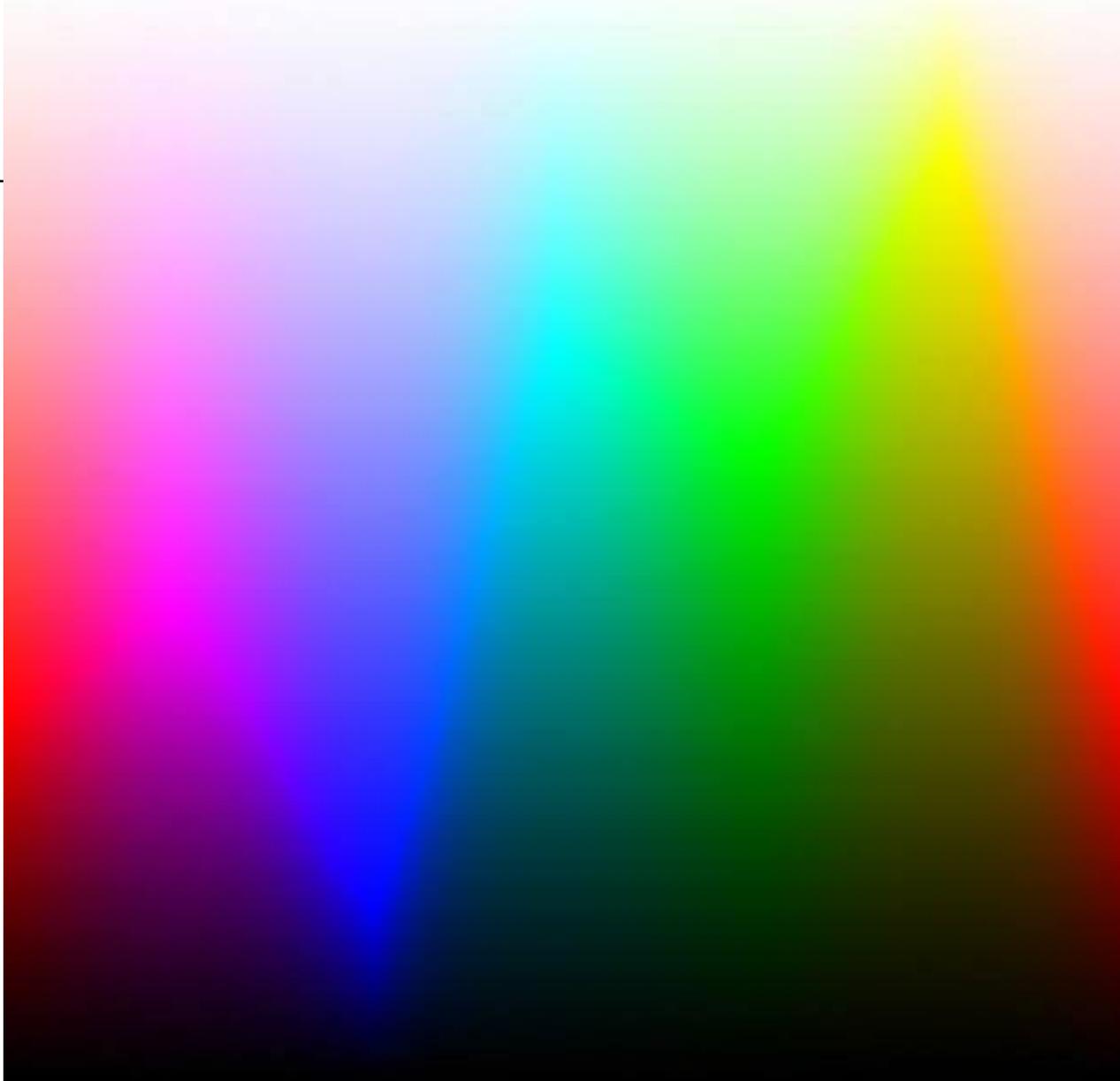
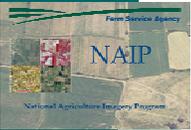


Monitor Gamma

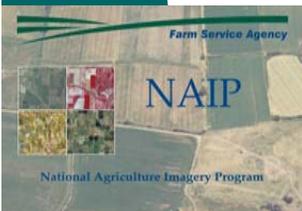
2.0 – 2.2







Contact Information



John Stadelman

Production Branch Chief

Voice: (801) 844-2940

Email: john.stadelman@slc.usda.gov

James Daniel

Production Supervisor

Voice: (801) 844-2950

Email: james.daniel@slc.usda.gov

