



United States Department of Agriculture Farm Service Agency Aerial Photography Field Office



# NAIP Quality Samples

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# Introduction

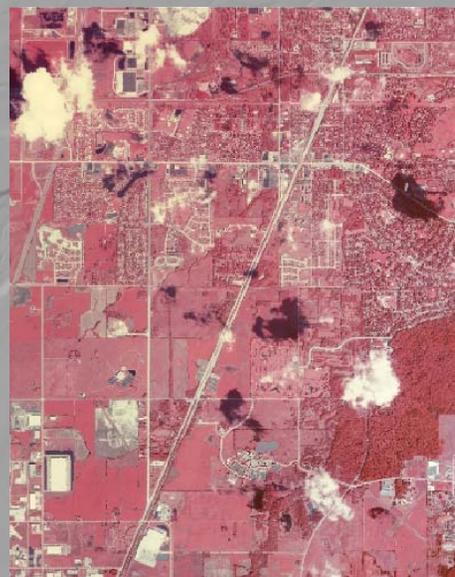
- Image quality has always been a qualitative analysis. APFO is providing this presentation as a guide that can assist users to have a clear understanding of quality expectations for NAIP. This presentation includes atmospheric conditions, radiometric evaluation and defect identification.

# Atmospheric Conditions - Cloud Cover



Acceptable Cloud Cover and Cloud Shadow.

Acceptance is determined by a quantitative measurement that the Cloud Cover is no more than Ten Percent. The Cloud Cover and Shadow in this image is Three Percent.



Unacceptable Cloud Cover and Cloud Shadow.

Rejection is determined by a quantitative measurement that the Cloud Cover and Shadow is more than Ten Percent. The Cloud Cover in this image is Thirteen Percent.

# Atmospheric Conditions - Cloud Shadows



Acceptable Cloud Shadows.

Acceptance is determined by a quantitative measurement that Cloud Shadows are not more than Ten Percent of the image. The percent of Cloud Shadow in this image is Ten Percent.



Unacceptable Cloud Shadows.

Rejection is determined by a quantitative measurement that Cloud Shadows are more than Ten Percent of the image. The percent of Cloud Shadow in this image is Forty Eight Percent.



# Atmospheric Conditions - Lighting Ratio



This image was captured by a large format digital aerial camera at 20,000+ feet above the average terrain. The color saturation and color separation is very good.



This image was captured by a large format digital aerial camera from the same camera manufacturer at 30,000+ feet above the average terrain. The color saturation and color separation is not as good as the image captured at 20,000+ feet. The loss of color is due to the reduced lighting ratio at the higher altitude.



# Atmospheric Conditions - Haze



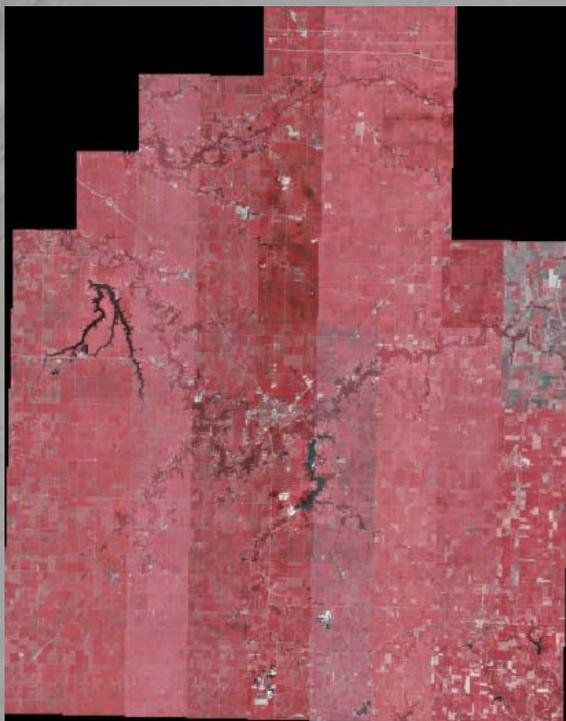
This NAIP04 DOQQ is 3109163\_nw from Wilkinson County, Mississippi. The image lacks Contrast and Color due to the effects of haze.



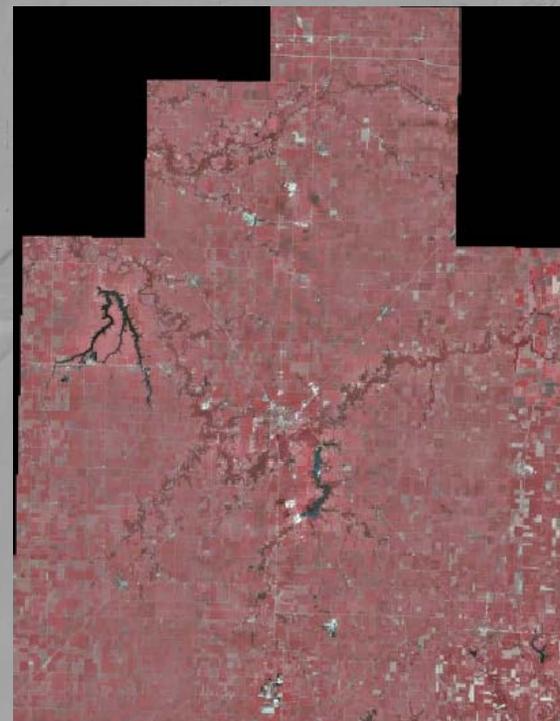
This NAIP04 DOQQ is 3209001\_ne from Sharkey County, Mississippi. The image also lacks Contrast and Color due to the effects of haze. Also, smoke is visible in the lower left of the image.



# Radiometric Evaluation – Tonal Balance Across Multiple Images



This NAIP04 CCM from Christiansen County, Illinois lacks Tonal Balance across multiple flight lines and is too Magenta in color.



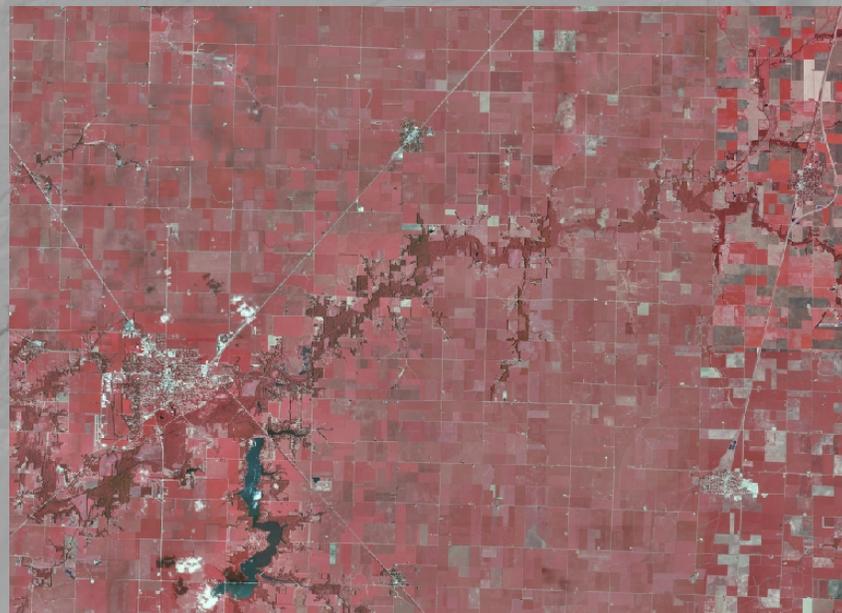
This NAIP04 CCM from Christiansen County, Illinois was produced at APFO from the NAIP04 DOQQ's and has better Tonal Balance across flight lines and better Color Balance.



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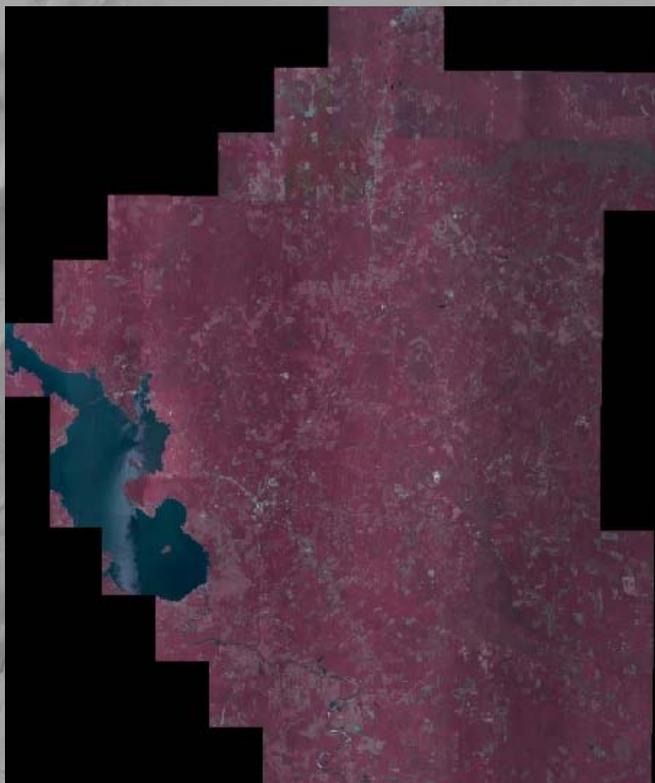
# Radiometric Evaluation – Tonal Balance Across Multiple Images



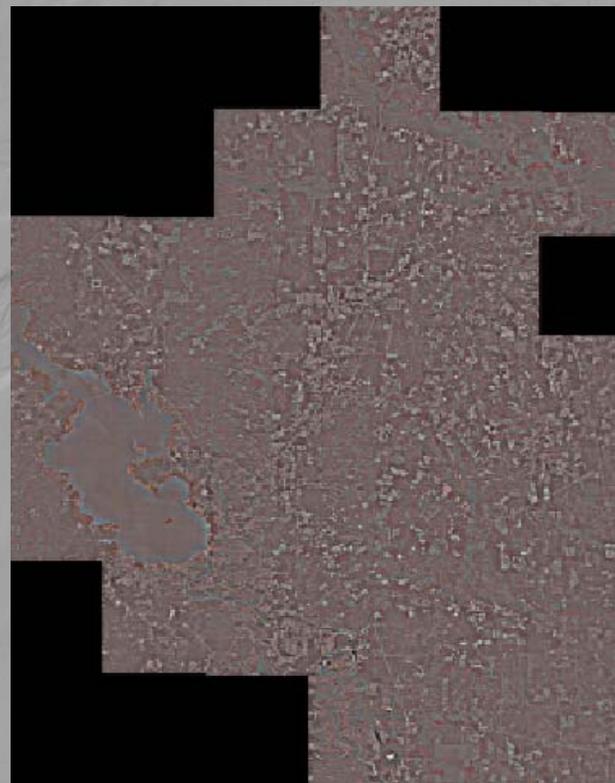
This slide shows an enlarged view of the previous slide. The contractor's image is on the left and the APFO image is on the right.



# Radiometric Evaluation – Tonal Balance Across Multiple Images



This NAIP04 CCM is Polk County, Texas and the imagery was acquired with a large format digital camera as an CIR image. The image is dark and Magenta/Blue in color.



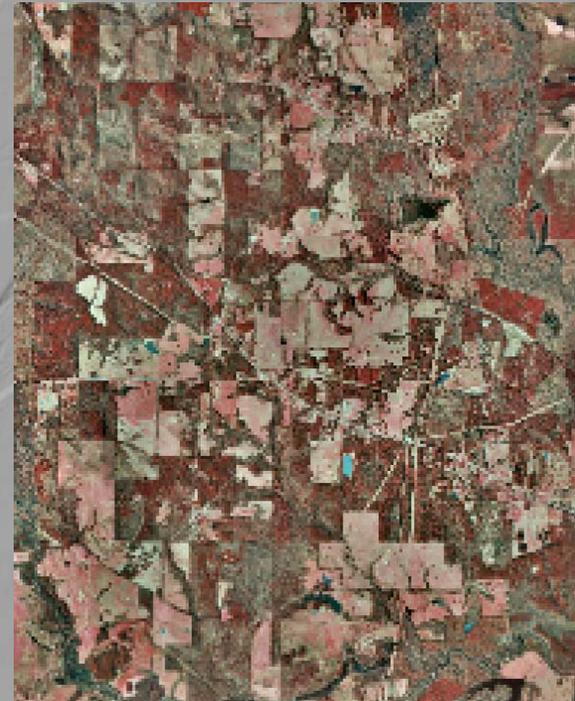
This image is the MDOQ CCM produced from NDOP DOQ's and is the Service center base layer. This image has better Tonal Balance and Color Balance.



# Radiometric Evaluation – Color Balance between Different Methods and Years of Capture.



This NAIP04 DOQQ is 3209413\_se from Marion County, Texas. The image is very Magenta and Blue in color. The image also lacks Contrast. This is a Digital Capture using a large format digital camera.



This is the base DOQ image c\_m\_3209413\_15\_1995 from NAPP/NDOP program. This image has Contrast and is Color Balanced. This third generation Digital Image was generated from an E-6 diapositive made from a Color Infrared Positive Film.



# Radiometric Evaluation - Color Balance

RED



MAGENTA



Color Balanced



YELLOW



BLUE



GREEN



CYAN



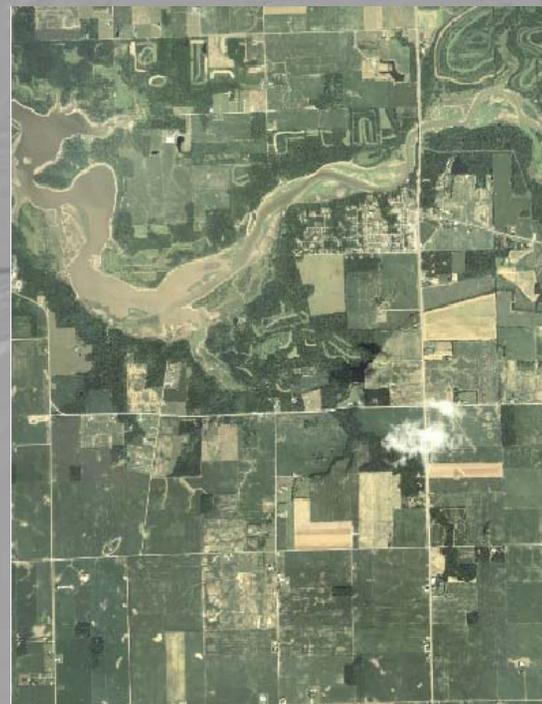
NAIP Color Wheel



# Radiometric Evaluation - Color Balance



This NAIP03 DOQQ is 4008518\_sw from Indiana. The Color Balance is good because the primary colors (RGB) are balanced with the secondary colors (CYM).



This NAIP04 DOQQ is the same image. The Color Balance is not good because the Green and Magenta colors are not balanced. This image needs to have more Magenta added to it.

# Radiometric Evaluation - Color Balance



This NAIP04 DOQQ is n\_4309312\_sw from Freeborn County, Minnesota This image is yellow in the highlights.



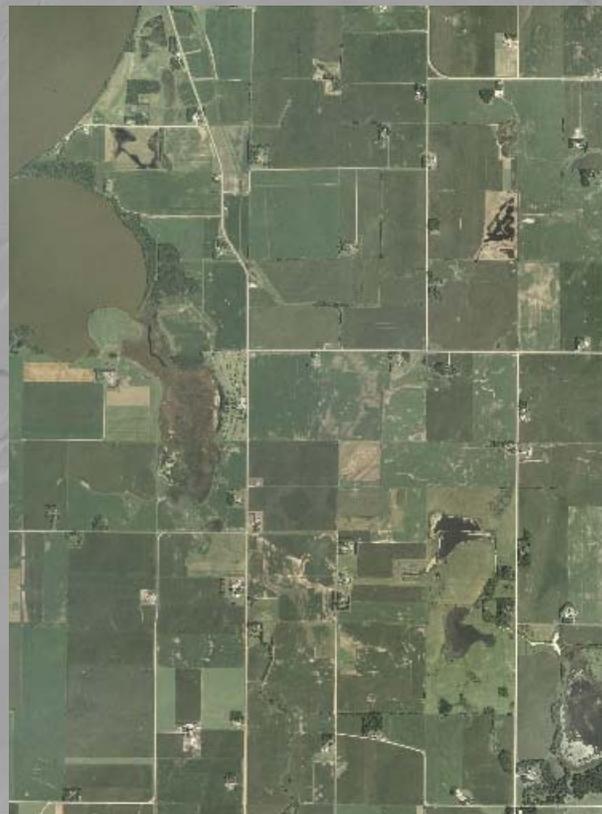
This is the same DOQQ that is on the left side of the slide. Blue has been added to this image that gives the image balance between blue and yellow.



# Radiometric Evaluation - Color Balance



This NAIP04 DOQQ is n\_4309320\_ne from Carroll County, Iowa. This image is yellow in the highlights.



This is the same DOQQ that is on the left side of the slide. Blue has been added to this image that gives the image balance between blue and yellow.

# Radiometric Evaluation – Highlight Detail



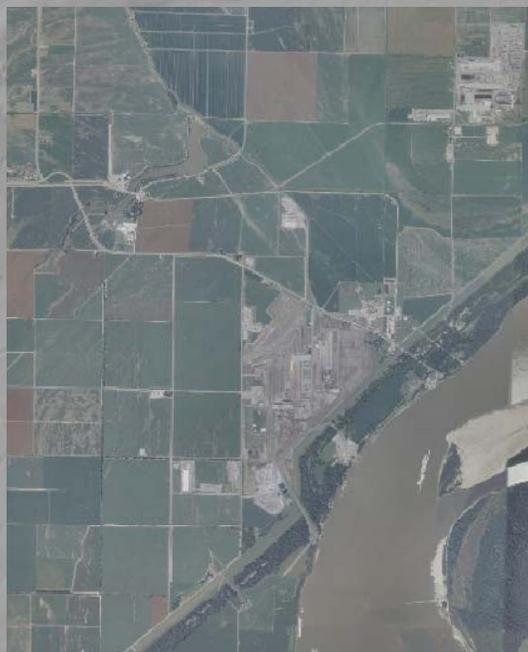
This NAIP03 image is from Indiana. The highlight detail can be seen in the strip mall as well as the housing development to the left of the strip mall.



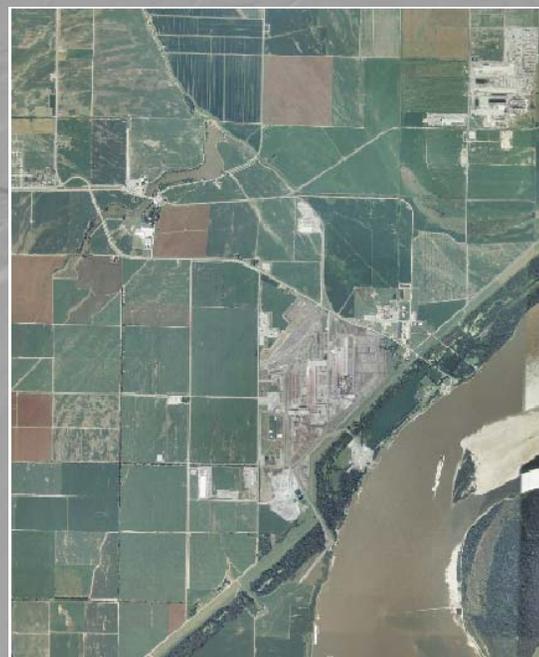
This same image from NAIP04 lacks detail in the same areas as the NAIP03 image. Detail is lost in the strip mall and housing development.



# Radiometric Evaluation – Low Contrast

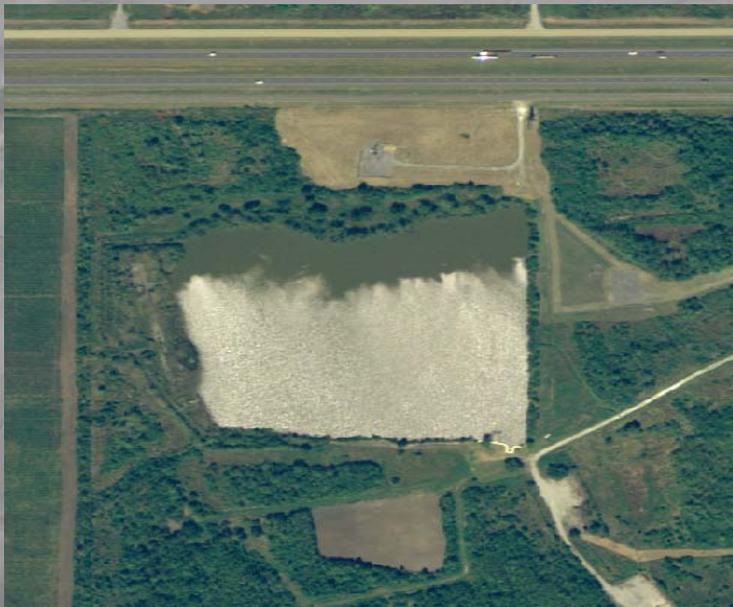


This NAIP DOQQ lacks Contrast.  
The entire image is on the straight line portion of the RGB Histograms.

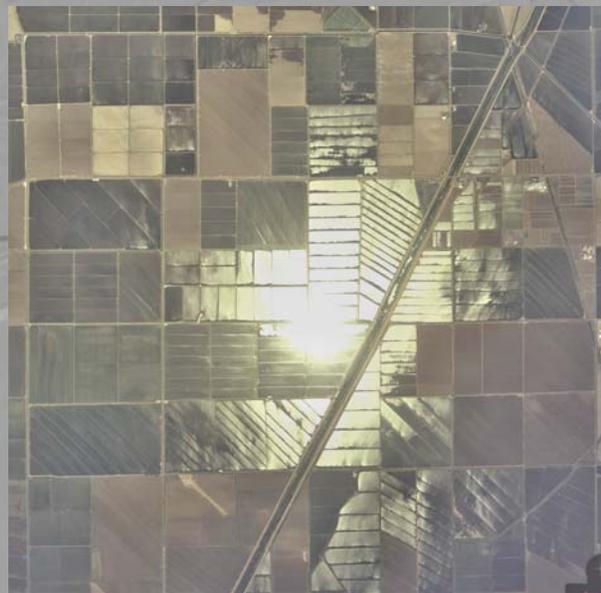


This same NAIP DOQQ has been radiometrically corrected by creating a shoulder and a toe for the RGB Histograms that increased the contrast in the image.

# Radiometric Evaluation – Specular Reflection



This NAIP04 image shows Specular Reflection in water. This is acceptable because the Specular Reflection does not bleed over into terrain features.



This NAIP03 image is unacceptable because the Specular Reflection interferes with terrain features.



# Defect Evaluation - Artifacts



This NAIP04 image has an artifact that appears white in the image.

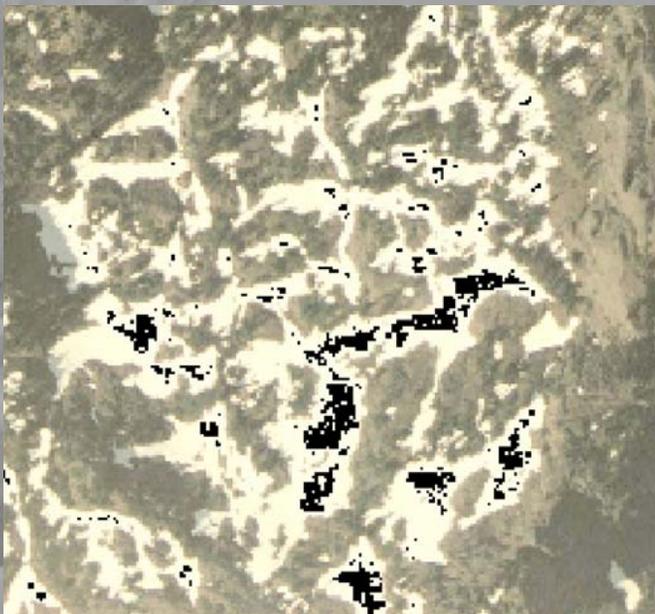


# Defect Evaluation - Smearing



This NAIP04 image from the State of Washington has Smearing in an area with elevation change.

# Defect Evaluation – Missing Pixels



These NAIP04 images from the State of Washington has missing pixels in Specular Highlights and appear black in the image.



# Contacts

Please feel free to contact APFO with your thoughts, ideas or comments.

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