New Run Road Sensor Evaluation /Demonstration Mission

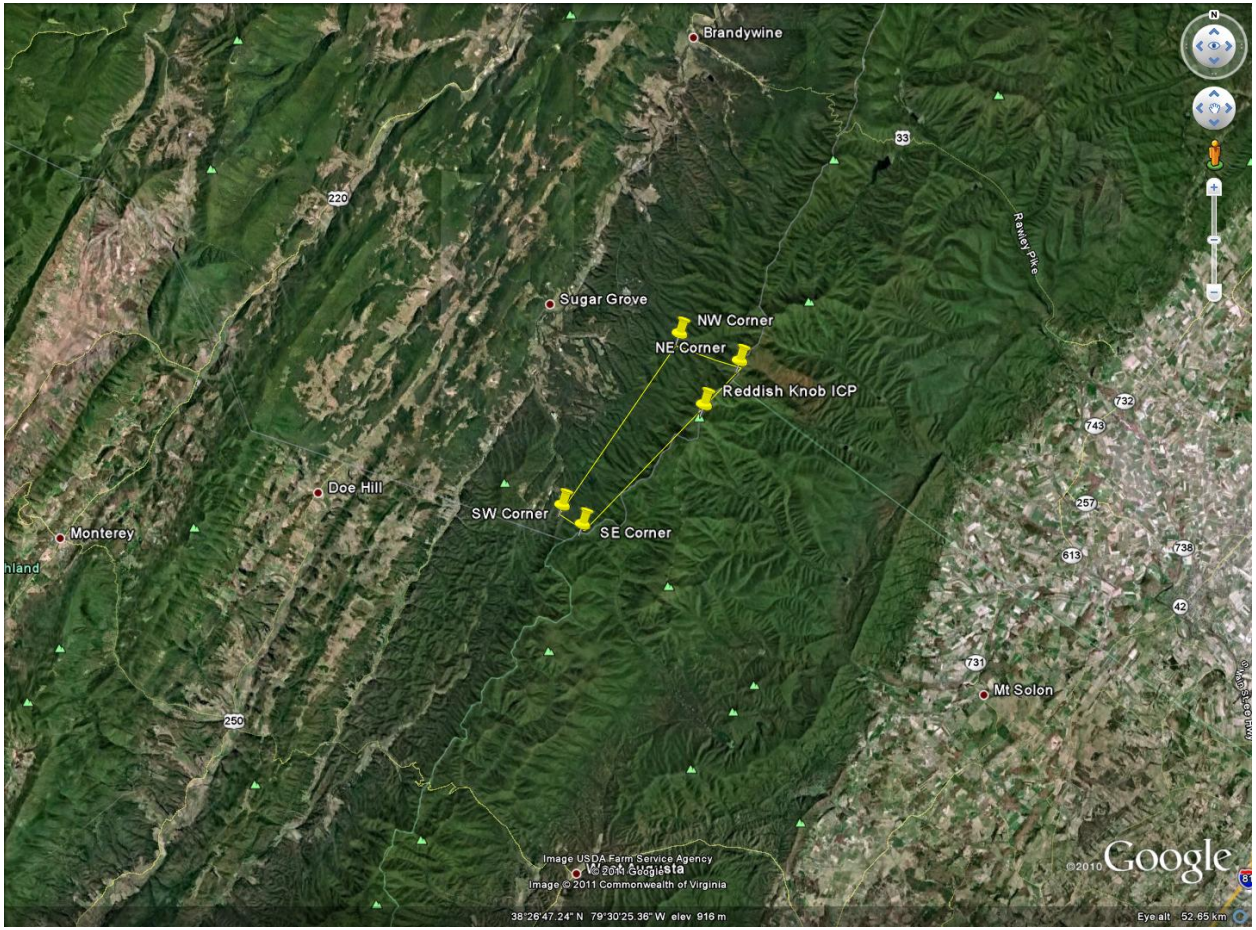
DRAFT

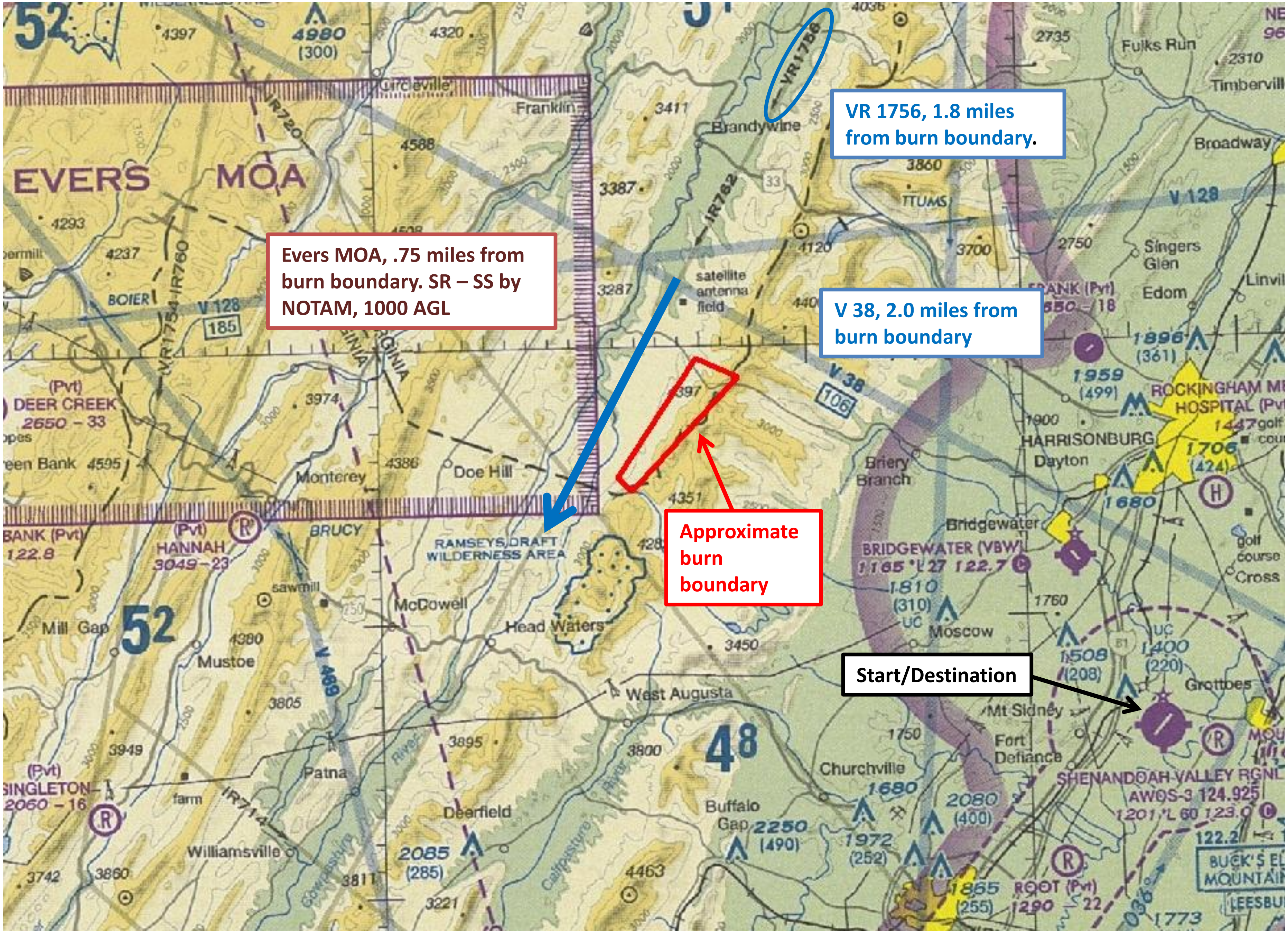
March 6, 2012

Pre-Mission Tasks

- Mission planning and equipment preparation/install for the mission
  - Coordinate with R2 and R8 aviation personnel and provide necessary support to install approved cameras, antennas, and related equipment on the aircraft that's necessary to complete the mission.
  - Coordinate mission planning and related-activities with R2 and R8 aviation, local Forest Service, and/or RSAC personnel.

New Run Road Flight Area




VR 1756, 1.8 miles from burn boundary.
Evers MOA, .75 miles from burn boundary. SR – SS by NOTAM, 1000 AGL
V 38, 2.0 miles from burn boundary
Approximate burn boundary
Start/Destination
EVERS MOA
RAMSEYS DRAFT WILDERNESS AREA
Franklin
Brandywine
Circleville
Monterey
Doe Hill
McDowell
Head Waters
West Augusta
Mustoe
Mill Gap
Patna
Deerfield
Williamsville
Buffalo Gap
Churchville
Moscow
Briery Branch
Bridgewater
HARRISONBURG
Dayton
Mt Sidney
Fort Defiance
Grottoes
Fulks Run
Timberville
Broadway
Singers Glen
Edom
BRIDGEWATER (VBW)
SHENANDOAH VALLEY RGNL
AWOS-3 124.925
ROCKINGHAM MEMORIAL HOSPITAL
DEER CREEK
HANNAH
SINGLETON
ROOT (Pvt)
V 128
V 38
V 469
IR762
IR720
IR714
satellite antenna field

Aerial Image Operations
Pre-Fire

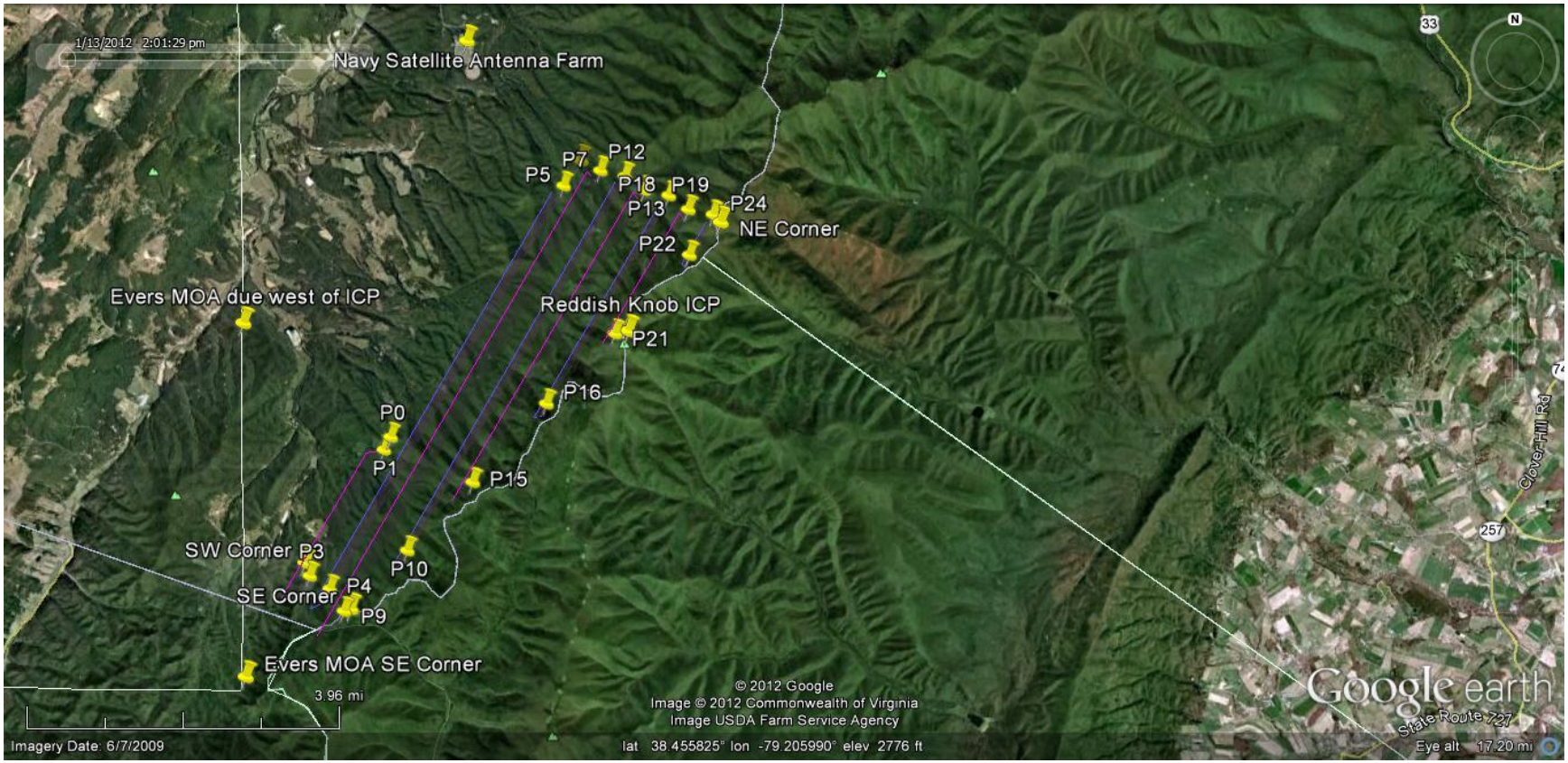
R2 C206 N126Z

3K ft AGL

Ground

Not to Scale

Flight Line Locations Pre/Post



Aerial Imaging Operations

- Use Nikon NADIR camera to image fire area completely at 1 foot ground sample distance before the fire started. Image 1000 feet away from black line.
- Utilize acquired Nikon NADIR imagery for the fire area to generate a pre-fire image mosaic product.
  - After conducting flight, land and download acquired imagery.
  - Generate 1-foot image mosaic of the designated area orthorectified to ground coordinates using the 2d3 TacitView software.
  - Produce image mosaic within 120 minutes of landing.

Burn Initiation

R2 C206 N126Z

3K ft AGL

> 1 NM

Helicopter

Ground

Not to Scale

Burn Initiation

- Use EO/SWIR TASE 2 to image fire activity. Coordinate with fire team to ensure that you begin imaging as the fire is being lit. Image the fire perimeter, and image the fire to provide so that the same area covered in Task 1. Switch between EO and SWIR as directed. Coordinate with fire team and or RSAC personnel for dynamic retasking of specific targets including but not limited to fire behavior, rate of spread, and containment activities. Land as directed to switch payloads if time permits
- Concurrently fly communications relay payload. Coordinate radio frequencies with fire team before flight.

Patrol Operations

R2 C206 N126Z

1.5K – 4K ft AGL

> 1 NM

Helicopter

Ground

Not to Scale

Patrol Operations

- Use EO/SWIR TASE 2 to image fire activity. Coordinate with fire team to ensure that you begin imaging as the fire is being lit. Image the fire perimeter, and image the fire to provide so that the same area covered in Task 1. Switch between EO and SWIR as directed. Coordinate with fire team and or RSAC personnel for dynamic retasking of specific targets including but not limited to fire behavior, rate of spread, and containment activities. Land as directed to switch payloads if time permits
- Use IR TASE to image fire activity. Image the fire perimeter, and image the fire to provide so that the same area covered in Task 1. Coordinate with fire team and or RSAC personnel for dynamic retasking of specific targets including but not limited to fire behavior, rate of spread, and containment activities.
- Concurrently fly communications relay payload. Coordinate radio frequencies with fire team before flight.

Mission Execution Tasks (TASE 2)

- Apply Cloud Cap Technology electro-optical (EO)/thermal infrared (IR) TASE 2 camera to image fire activity in the burn area as per the following specifications:
  - Coordinate with fire team to ensure that imaging begins as the fire is being lit.
  - Image the fire perimeter, and image the fire area covering the same area specified in Task #1 of the section “Mission Execution Tasks (Nikon NADIR Mapping Camera)”.
  - Switch between EO and IR camera as directed by local Forest Service personnel and/or RSAC (both will be present on site).
  - Retask EO and IR camera to specific targets (including but not limited to fire behavior, rate of spread, and containment activities) as directed by local Forest Service personnel and/or RSAC personnel.
  - Land plane as directed to switch payloads if time permits.
- Utilize acquired vertical imagery for designated target areas within the burn area specified in Task #1 to generate a near-real time EO and IR image mosaic products.
  - Generate EO and IR image mosaic of target areas orthorectified to ground coordinates using the 2d3 TacitView application.
  - Produce EO and IR image mosaics as imagery is acquired and relayed to the ground control center.

Mission Tasks (TASE 2)

- Use thermal infrared (IR) capabilities of the TASE camera to image fire activity in the burn area.
  - Image the fire perimeter, and image the fire area covering the same area specified in Task #1.
  - Retask IR sensor to specific targets (including but not limited to fire behavior, rate of spread, and containment activities) as directed by local Forest Service personnel and/or RSAC personnel.
- Utilize acquired vertical imagery for designated target areas within the burn area specified in Task #1 to generate a near-real time IR image mosaic products.
  - Generate IR image mosaic of target areas orthorectified to ground coordinates using the 2d3 TacitView application.
  - Produce IR image mosaics as imagery is acquired and relayed to the ground control center.

Mission Execution Tasks (HD Video)

- Use HD video payload camera to image pre-fire conditions of the burn area specified in Task #1 of the section “Mission Execution Tasks (Nikon NADIR Mapping Camera)”.
  - Image completely at 1-foot ground sample distance (GSD) before fire ignition.
  - Collect imagery 1,000 feet away from the established black line.
- Utilize acquired HD video payload camera imagery for the fire area to generate a pre-fire image mosaic product of the entire burn area.
  - After conducting flight, land and download acquired imagery.
  - Generate 1-foot image mosaic of the designated area orthorectified to ground coordinates using the 2d3 TacitView application.
  - Produce image mosaic within 120 minutes of landing.

Mission Tasks (HD Video)

- Apply HD video payload camera to image post-fire conditions of the burn area specified in Task #1 of the section “Mission Execution Tasks (Nikon NADIR Mapping Camera)”.
  - Image completely at 1-foot GSD after the fire is extinguished or as directed by local Forest Service personnel and/or RSAC.
  - Collect imagery 1,000 feet away from established black line.
- Utilize acquired HD video payload camera imagery for the fire area to generate a post-fire image mosaic product of the entire burned area.
  - After conducting flight, land and download acquired imagery.
  - Generate 1-foot image mosaic of the designated area orthorectified to ground coordinates using the 2d3 TacitView application.
  - Produce image mosaic within 120 minutes of landing.

Mission Execution Tasks (Communications Payload)

- Concurrent to flights conducted to complete mission execution tasks for the Nikon NADIR mapping camera, TASE 2 camera and HD video camera, evaluate communications relay payload capabilities.
  - Coordinate radio frequencies with local Forest Service personnel team before flight.
  - Test and document the range of ground based radio communications facilitated by airborne communications relay link.

Mission Execution Tasks (General)

- Produce other geospatial imagery products from 2d3 TacitView as directed by local Forest Service personnel and/or RSAC personnel.

Aerial Image Operations
Post Fire

R2 C206 N126Z

3K ft AGL

Ground

Not to Scale

Aerial Imaging Operations

- Use Nikon NADIR camera to image fire area completely at 1 foot ground sample distance before the fire started. Image 1000 feet away from black line.
- Apply Nikon NADIR mapping camera to image post-fire conditions of the burn area.
  - Image completely at 1-foot GSD after the fire is extinguished or as directed by local Forest Service personnel and/or RSAC.
  - Collect imagery 1,000 feet away from established black line.
- Utilize acquired Nikon NADIR imagery for the fire area to generate a post-fire image mosaic product.
  - After conducting flight, land and download acquired imagery.
  - Generate 1-foot image mosaic of the designated area orthorectified to ground coordinates using the 2d3 TacitView software. Produce image mosaic within 120 minutes of landing.

Post Mission Tasks

R2 C206 N126Z

Ground

Not to Scale

Post-Mission Tasks

- Remove all installed equipment (cameras, antennas, related equipment, etc.) from the aircraft once the mission has been completed.
  - Coordinate with R2 and R8 aviation personnel and provide necessary support to remove cameras, antennas, and all associated equipment from the aircraft that were installed to conduct the mission.
  - Coordinate post-mission planning and related-activities with R2 and R8 aviation, local Forest Service, and/or RSAC personnel.

Deliverables to the FS

- **Mission report documentation addressing the following**
  - Pre-mission/mission planning activities and pre-mission equipment preparation and aircraft installation activities
  - Technology evaluation summaries including encountered issues during operational evaluation
    - Application and performance Nikon NADIR mapping camera
    - Application and performance of EO/IR TASE 2 camera
    - Application and performance HD Video Payload camera
    - Application and performance of communications relay payload
    - Application and performance of 2d3 TacitView to generate near real-time geospatial products from imagery acquired with the Nikon NADIR mapping camera, TASE 2 camera and HD video payload.
  - Post-mission equipment removal from aircraft
  - After Action Review/Lessons Learned

Deliverables Continued

- **Technical Support & Services**
  - Provide necessary technical support and consultation for pre-mission preparation and equipment configuration on Forest Service aircraft (installation of cameras, antennas, communications payload, wiring, and related equipment).
  - Provide necessary technical support and consultation for post-mission removal of equipment of Forest Service aircraft (removal of cameras, antennas, communications payload, wiring, and related equipment)

Deliverables Continued

Geospatial/Imagery Products

- **Nikon mapping camera pre-fire imagery from in the following formats**
  - GeoTiff or GeoJPEG orthorectifed image mosaic at 1-foot resolution
  - 1-foot resolution image mosaic in a Google Earth KMZ
- **EO/IRTASE 2 imagery in the following formats**
  - WMV video clips of streaming EO/IR video collection of fire activity and designated targets within the burn area (compatible with Windows Media Video 9)
  - EO/IR image mosaic of acquired vertical imagery of the burn area in Google Earth KMZ
- **IR TASE 2 imagery in the following formats**
  - WMV video clips of streaming IR video collection of fire activity and designated targets within the burn area (compatible with Windows Media Video 9)
  - IR image mosaic of acquired vertical imagery of the burn area in Google Earth KMZ mosaics
- **Nikon mapping camera post-fire imagery in the following formats**
  - GeoTiff or GeoJPEG orthorectifed image mosaic at 1-foot resolution
  - 1-foot resolution image mosaic in a Google Earth KMZ
- **HD video payload pre-fire imagery for the burn area in the following formats**
  - WMV video clips of streaming HD video collection (compatible with Windows Media Video 9)
  - GeoTiff or GeoJPEG orthorectifed image mosaic at 1-foot resolution
  - 1-foot resolution image mosaic in a Google Earth KMZ
- **HD video payload post-fire imagery for the burn area in the following formats**
  - WMV video clips of streaming video collection(compatible with Windows Media Video 9)
  - GeoTiff or GeoJPEG orthorectifed image mosaic at 1-foot resolution
  - 1-foot image mosaic in Google Earth KMZ