Region 3 RAP
Aerial Monitoring System (AMS)

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Aerial Monitoring Systems

- Nellis Air force Base RSL west- Las Vegas Nevada
- Andrews Air force Base RSL east-Washington DC
- Savannah River Site Region 3 RAP- Aiken South Carolina
- Others
  - EPA, NOAA, Los Angeles Sheriff Department, and Chicago Public Safety

Why Aerial Monitoring – Historic Event

Operation Morning Light – 1978

Russian Nuclear Powered Satellite crashes into Canada.

Canada requested United States to assist with locating radioactive debris along the 20 mile wide 400 mile long crash corridor.

US teams performed aerial surveys locating discrete pieces of radioactive debris from the reactor on board Comos954.

Why Aerial Monitoring – Now and Future

- Terrorism
  - Improvised nuclear device
  - Radiological dispersal device
  - Lost or stolen sources/radioactive material
- Nuclear power facility accident
  - Chernobyl
  - Three mile island
- Nuclear Proliferation, Military
- Geophysical, snow pack,

Region 3 AMS Gamma Detection System

- Manufactured by Radiation Solutions Inc
  - RS-701 data acquisition console
  - RSX series gamma detectors
    - 4”x4”x16” NaI
    - 2”x4”x16” NaI
    - 3”x3” NaI
  - Trimble GPS (integrated)
  - Computer XFR D630
  - RadAssist acquisition software
    - GIS software integrated for real-time mapping of radiation data
- Iridium satellite modem
- Dual element AeroAntenna (GPS and Iridium)
Region 3 Aerial Platform

- Currently both fixed wing and helicopter are available
  - Customs Border Patrol (CBP) out of Jacksonville Florida and Corpus Christi Texas, utilize the P3 Orion a four engine turbo prop aircraft supporting a crew of 18. The P3 provides 12 hours of air time between fueling. Each P3 had a Dual element antenna installed for operation of the AMS GPS and iridium.
  - Wackenhut Security Inc (WSI) out of the Savannah River Site utilizes the BK-117 helicopter. WSI provides aerial support for the southeast US.
Gamma Detection Sensitivity

- Factors Affecting Gamma Detection
  - Geometry
    - Distance from radioactive material
    - Attenuating media between detector and radioactive material
    - Detector
    - Source geometry
  - Aircraft
    - Velocity
    - Altitude
  - Operational
    - Search pattern – parallel line offset distance
    - Communications with pilots

Flight Operations - Communication

Communications with the flight crew for altitude, heading, and ground speed is important.

Gamma Detection-Spatial Contribution

Collided photon exposure rate profiles
Observation point 1000ft above source axis

Gamma Detection – Gamma Contribution

Detector
Viewing Angle 8 approx 45 degrees
Altitude
Radius
BK-117 Helicopter 100 feet above the ground, 40 mph ground speed.

Large Area Source.

RS-701 configured with single 4"x4"x16" NaI detector.

Spectral Shape With Altitude Change - 12 keV to 40 keV

Spectral Shape With Altitude Change - 450 keV to 700 keV