QUESTION 6: STATEMENT OF RESEARCH PROJECT
University of Wyoming Department of Atmospheric Science
Atmospheric Research Aircraft Beech King Air N2UW

Summary:
The University of Wyoming (UW) has instrumented and operated aircraft for atmospheric research since the 1960's. As an advanced degree-granting institution, there have been and continue to be unique opportunities for students to learn about the principles of observational atmospheric research. Students obtain hands-on experience with aircraft instrumentation, calibrating sensors, and participating in airborne scientific planning, flight direction, and data collection. Unique opportunities for students to participate in observational field projects and in the planning and operational aspects of those projects exist as well. The UW King Air (N2UW) has operated as a National Science Foundation (NSF) lower atmospheric observing facility (NSF/LAOF) since 1988 under cooperative agreements between UW and NSF, supporting numerous scientists and projects in Wyoming, nationally and internationally. The current cooperative agreement award number is 0832637.

One of the unique characteristics of using N2UW to conduct airborne research is that a flight scientist (often the project PI) can sit in the right seat of the cockpit and easily interact directly with the pilot and system scientist during flight. A large real-time display in the right seat allows for direct feedback to the flight scientist for making real-time flight decisions to better conduct research missions.

Research Missions:
Over the last 30 years, N2UW has been part of a wide variety of atmospheric research missions. Typical research applications include:

- Boundary-layer, turbulence/flux studies
- Mesoscale dynamics
- Oceanographic investigations
- Air-sea interaction studies
- Cloud physics studies
- Tropospheric profiling
- Radiometric measurements, satellite ground truth
- Atmospheric chemistry studies
- Aerosol studies
- Airborne remote sensing

Availability:
The University of Wyoming (UW) King Air (UWKA) and the Wyoming Cloud Radar (WCR) are available to the scientific community. They are funded partially by the National Science Foundation (NSF) under cooperative agreements with UW since 1988 as one of the multi-user national facilities through NSF's Lower Atmospheric Observing Facilities (LAOF) Program which supports the geosciences community. While the program management resides within the NSF, the UWKA and WCR are owned and managed by UW.

Scientific Measurement Capabilities:
N2UW is a "mission ready" aircraft. The Department of Atmospheric Science maintains a suite of instruments that are available upon request of the aircraft. In addition, considerable freedom is permitted for mounting user-supplied instruments. UW personnel will supervise the installation of such equipment and can assist all

users in the design and fabrication of user-supplied equipment to ensure that this equipment meets size, weight, and structural integrity requirements established by the department and flight facility.
Standard Measurements:

- Instrumentation for measurement of atmospheric state parameters (temperature, pressure, humidity)
- GPS for location and velocity correction.
- Air motion (wind) measurements with inertial reference unit and gust probe
- Turbulent flux measurements of momentum, moisture, and carbon dioxide
- Radiometers (shortwave, longwave)
- Radiometers for remote surface temperature measurements
- Cloud physics instrumentation (water content, particle concentration and size)
- Video photography and audio equipment

Special Measurements:
Other instruments that are not part of the standard package at the present time may be available. Each has a designated principal investigator who should be contacted directly for information about how to obtain support. Additional funding may be needed to support deployment of these instruments:

- Trace gas sampling
- Cloud condensation nucleus CCN counter
- Aerosol instruments

Remote Sensing Measurements:
The Wyoming Cloud Radar is part of the King Air National Facility and as such is available for "standard" deployment on the King Air.

Aircraft/Mission Capabilities:

- Certification: FAA Part 91, restricted category
- 28,000 ft (RVSM restriction)
- Research flight speeds ~85 m s-1
- Mission duration 4 to 4.5 hours
- Single pilot operations typical
- 3-4 scientific crew
- Certified for operations in known icing conditions