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From: Dr. William K. Krebs, Vertical Flight Human Factors Program Manager  
To: Vertical Flight TCRG

Subj: VERTICAL FLIGHT HUMAN FACTORS THIRD QUARTER '02 REPORT

Ref: Vertical Flight TCRG meeting, Feb 25<sup>th</sup> 2002

- 1) Per reference the requirements identified in the Vertical Flight TCRG meeting, the third quarter report for each project is listed below.
  - a) NVG lighting requirement. Several representatives from the Naval Aviation Warfare Center Aircraft Division, Air Force Research Laboratory Crew Systems Interface, Air Force Research Laboratory Warfighter Training Research, FAA WJHTC, FAA ASW, and AAR-100 met on June 18<sup>th</sup> at FAA headquarters to review the AAR-100 Vertical Flight program entitled "Alternative Night Vision Imaging System (NVIS) Lighting Compatibility Field Assessment." The purpose of the meeting was to review methods and procedures that will allow a non-night vision goggle user to measure night vision goggle compatibility of a modified cockpit at low cost and to have a *reasonable assurance that the measurement was accurate*. The accepted military practice to determine whether a lighting system is night vision goggle (NVG) compatible is to compare visual acuity through the NVGs with and without the lighting activated. This military procedure requires expensive illumination sources and radiometric measurement equipment that costs in excess of \$100K. Although the military procedure is common practice, it has not been validated nor determined to be reliable. The RTCA SC-196 committee proposed an alternative method to measure NVIS, however the method needs to be tested. AAR-100 co-funded Air Force Research Laboratory Crew Systems Interface, Wright Patterson Air Force Base, Dayton, Ohio to test and evaluate alternative NVIS field evaluations that are accurate and repeatable. The June 18<sup>th</sup> meeting afforded Navy and Air Force night vision goggle researchers to exchange alternative NVIS field evaluation ideas, to discuss technical approaches, and to review what has been accomplished on the project in the various Department of Defense laboratories.

The researcher submitted the first milestone report entitled "FAA Milestone 1 Report for Inter-Agency Agreement DTFA01-02-X-02017 Calibrated Lighting

Simulator for NVIS Assessment.” The purpose of this report was to describe and document the lighting simulator that has been developed to serve as the primary tool to investigate night vision imaging system (NVIS) lighting compatibility with night vision goggles (NVGs). If you want a copy of the report, please notify me.

Task 2 will evaluate the theoretically workable methodologies for determining: 1) that the light environment for the testing is sufficiently dark to achieve valid test results, 2) that the resolution target radiance is appropriate to provide optimum NVG operation, 3) that visual acuity assessment can be made as reliably as the military method. These will be written documents, which will be delivered to the FAA no later than August 31, 2002.

*All indications indicate that this project is on track to complete year 1 milestones as planned.*

- b) NVG resolution requirement. The researcher should receive grant funds by September 2002. Unfortunately, the funds transfer to the institution has exceeded eight months due to FAA contract office. The researcher has invested some effort into the project by reviewing literature, initiated programming of the model, and obtained night vision goggle tube characteristics for the model input parameters.

*Indications are that there are minor risks to the activity being completed as planned, however these delays were due to fund transfer problems not technical problems. The researcher intends to complete the project six months after receipt of funds.*

- c) Simultaneous Non-interfering Operations - Quantify VFR Navigation Performance. The researcher's grant proposal was funded in Quarter three 2002. The researcher will be responsible for behavioral measurement while Satellite Technology Implementation will be responsible for flight data coordination, data collection, and analysis. The researcher has begun to address the following tasks:
- i. Initial construction of simulation environment
  - ii. Coordinate with TBD group who will be responsible for developing test plan and collecting helicopter flight data. We will provide eye tracker requirements and obtain information about the test location.
  - iii. Build eye tracker for helicopter data collection

*Indications are that there are minor risks to the activity being completed as planned, however these delays were due to fund transfer problems not technical problems. All indications indicate that this project is on track to complete year 1 milestones as planned.*

- d) Rotocraft Precision Visual Flight Rules Simultaneous Non-Interfering Human Factors Project. Satellite Technology Implementation (STI) was selected to be contractor based on the FAA market survey announcement solicitation/contract number 2461 posted between May 8-23, 2002. The FAA contract officer has

requested STI to submit a SIR for legal review. Given the slowness of this contract award, I anticipate STI to begin work in October 2002.

Mr. Ken Knopp (AAR-432) and AAR-100 will cost-share this contract due to similar research requirements imposed by AFS-410.

The four-year contract will require STI to provide quality technical, engineering, analytical, planning, and administrative support to AAR-100 and AAR-432 mission. The contractor shall furnish and make available all personnel, supplies, equipment, aircraft, materials, data, facilities, and services necessary to assist AAR-100 and AAR-432 in accomplishing its mission. As directed by the FAA, the contractor may also be required to interface with system integration contractors, equipment manufactures, airport personnel, and various FAA and United States Government organizations.

The first tasks to be completed under the contract will be as follows:

- i. STI shall identify test site, evaluate test site, survey site, and coordinate test site with AFS-400 and air traffic services.
- ii. STI shall write a helicopter flight test that contains a non-precision GPS approach into a PVFR route. The primary measure collected will be [Tse = Nse + Fte] of GPS navigation during IFR flight.
  - Two test plans will be written to encompass AAR-432 and AAR-100 needs.
- iii. STI shall coordinate with the Naval Postgraduate School, Monterey CA. and NASA Ames, Moffet Field, CA who will conduct behavioral tests related to the SNI project.

*A program review will be held to ensure that AFS-400, AAR-432, and AAR-100's requirements are met. The program review will be held shortly after the contract is released.*