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HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY
INVESTIGATIONS AND OVERSIGHT SUBCOMMITTEE

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BEFORE THE

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"DP-2 PROGRAM"

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DP2 PROGRAM STATEMENT

Mr. Chairman and Members of the Subcommittee:

I would like to thank the House Science and Technology Subcommittee on Investigations and Oversight for providing me with the opportunity to testify here today.

The DP2 project objective is to develop the technology for a vertical take off transport aircraft that can be used in both military and civilian roles. The design concept of the DP2 aircraft, as proposed by the duPont Aerospace Company (DAC), is a transport aircraft asserted to be capable of carrying 52 passengers with a range of approximately 5,000 miles and a top speed of approximately 545 knots. The possible uses of the aircraft include sea based logistics support, search and rescue, as well as special operations for the military. In the commercial world the proposed aircraft could potentially provide high speed, long range passenger service to airports with short runways or small landing areas.

The DP-2 concept was originally laid out by DAC in 1972. It was formally studied in various forms by the Department of Defense (Air Force, Navy, and Advanced Research Projects Agency) at least four times between 1984 and 1991. Congress also authorized and/or appropriated funds for DP-2 demonstration in Fiscal Years 1988, 1991, 1993, and 1997. Most of these events centered around the suitability of the concept to meet the need for a long range special operations forces air exfiltration system. In 1996, DAC did conduct a funded full scale demonstration of its thrust vectoring system for the Defense Advanced Research Projects Agency.

Assessments of the DP-2 concept have highlighted several significant risks which could potentially require major design changes. These include engine failure during vertical takeoff, adverse induced flow in ground effect (suckdown), and hot gas ingestion. Other risks which could compromise utility include jet blast effects, radar signature, limited range/payload, composite material use in the exhaust hot section, control instability and cross coupling, low directional control power, and noise.

The current project was initiated in the Office of Naval Research in Fiscal Year 1997 with the goal of demonstrating the vertical take off system proposed by the duPont Aerospace Company. The development plan was first to fabricate two half scale composite demonstrator aircraft, with a substantial composite manufacturing subcontract to Raspet Laboratory of Mississippi State University. These aircraft, designated DP-1, would be used to perform unmanned ground tests to demonstrate the thrust vectoring characteristics of the DP-2 aircraft. Technical issues to be addressed included suitability of composite structure in the exhaust hot section, vertical takeoff performance, hover performance and handling, and suckdown and hot gas ingestion in ground effect. Test facilities were fabricated and installed at the contractor's facility in El Cajon, CA. Following vertical take-off and landing and hover tests, the DP-1 aircraft could be used to explore conventional flight, with emphasis on transition to and from vertical flight. The demonstrator aircraft have been designed for unmanned, automated flight control. This allows for an aggressive development and test approach without risk to a pilot.

Progress on the program has been very slow. This can be attributed to contractor inexperience, novelty of the design, insufficient funding to pursue parallel approaches to reduce risk, and working to short term goals as a result of year-to-year funding. Several significant setbacks have been encountered which required component redesign and demonstrator aircraft repair. In 2005 it was decided to assemble the best components available into a third generation configuration, designated DP-1C.

Recently some progress has been made in out-of-ground effect hover tests. Forty-nine hover attempts were conducted from July 19 to October 5, 2006. None of these attempts resulted in controlled hover for more than a few seconds. Data from these tests were analyzed and modifications to thrust control and tether configuration have been implemented. Hover testing is scheduled to resume later this month Due to the restrictive nature of tethered hover testing, there may not be sufficient freedom of maneuver in the existing test facility to achieve extended hover.

However, given the progress made in conduct of test operations, and the design improvements, longer hover durations are expected.

Tests have also been conducted with the aircraft on the ground to assess ground effects. These tests have resulted in engine stalls at relatively low power, indicating possible hot gas ingestion, pressure fluctuations at the inlet due to nose landing gear vortex shedding, or inlet cross coupling. Instrumentation and test plans have been developed to further investigate this phenomenon later this summer. At this time it seems unlikely that full thrust engine operations in ground effect are achievable with the current design. Additional data will help to identify design changes, if necessary.

A test fixture for measuring forces and moments generated by the thrust vectoring system at all retraction angles and all control combinations at up to full thrust has been designed and purchased. Installation at the El Cajon facility has begun and is planned for completion this summer. These data will provide valuable inputs for the manned flight simulator to begin evaluation of handling qualities in transition maneuvers between conventional and vertical flight.

Current program funding provides for development and test operations through December 31, 2007. This will allow for conduct of the test operations described above. If further funding becomes available, testing and design development will continue to focus on hover performance and handling and operations in ground effect. These can be continued until vertical takeoff and landing can be achieved from the ground, and the hover envelope can be expanded to explore wind and maneuver limitations. Flight operations beyond low altitude hover cannot be undertaken until risk reduction activities, such as wind tunnel and/or model testing have been conducted. In addition, the aircraft would have to be redesigned to provide sufficient capability and reliability to satisfy range safety requirements for the test site. This level of complexity would require a substantial increase in engineering experience , and a substantially increased level of funding.

Suitability of the DP-2 concept for either military or commercial applications has not yet been demonstrated. Data gathered to date do not allow for technical conclusions to be drawn, or for the previous assessments to be refuted or confirmed.