May 28, 1992
1256 Lake Drive
Newport News,

Virginia 23602
Ms. Jeannette B. Petrolia
Director of Development
Virginia Air & Space Center
P.O. Box 1883
Hampton, Virginia 23669
Dear Ms. Petrolia

I finally had the opportunity to briefly tour our new museum and was pleasantly impressed. The IMAX Theater and the air and space displays, which were of most interest to me as an aerospace engineer at NACA/NASA since 1942, were outstanding. In my first visit, I did not have sufficient time to review everything so I may have missed a very important area of effort at NACA that appears to have been overlooked. If it, in fact, is not covered, I respectfully suggest consideration be given to its inclusion as you continue to develop the displays.

The area to which I refer is airfoil development. Attention is given to the Variable Density Wind Tunnel (VDT), now a National Historic Landmark, in which the first systematic development of airfoils was accomplished on so-called NACA 4- and 5-digit airfoils. I saw nothing, however, on the Low-Turbulence Pressure Tunnel (LTPT), originally designated as the Two-Dimensional Tunnel (TDT). Eastman Jacobs, who is pictured in photos of the VDT, recognized the shortcomings of the data obtained in the VDT due to its high stream turbulence level and conceived a low-turbulence wind tunnel, the TDT, which had the lowest turbulence level of any wind tunnel in the world (and still may). This is very important because aircraft operate in an atmosphere with very low turbulence. Jacobs also brilliantly conceived a design approach for airfoils with more laminar flow, and therefore lower drag, than attainable on the turbulent-flow airfoils developed in the VDT. The systematic development of a family of so-called laminar-flow airfoils or NACA 6-series airfoils, along with high-lift and control devices, was one of the most significant contributions of NACA to the development of aviation and was a principal reason for NACA's worldwide reputation in aeronautics. Although these airfoils did not, at that time, attain much laminar flow in flight under the severe operating conditions of low altitude and high subsonic speed at which the military aircraft of those days operated, the aerodynamic characteristics at high subsonic speeds were so much superior to the older airfoils that most American and many foreign military and commercial high-speed aircraft used the 6-series airfoils or manufacturer modifications of them for many years. The report (or associated book) on these airfoils is still considered to be the "Bible" of airfoil characteristics. It appears to me that the names (or photos) of Ira H. Abbott and Edward E. von Doenhoff, prime movers in the development of these airfoils, should somehow be recognized. It was also in the Low-Turbulence Pressure Tunnel that the first experimental proof at near full-scale flight conditions was made of the concept of active laminar-flow control through continuous suction of a small amount of air through the airfoil surfaces.

The VDT and the LTPT were also used until the mid 1960's as high-pressure storage tanks or vacuum tanks for a complex of important wind tunnels from transonic to hypersonic speeds. These included the 26-inch Transonic Blowdown Tunnel (TBT), the 9x12-inch Supersonic Tunnel, the 20-inch Variable Supersonic Tunnel, and the 15-inch Mach 10 Hypersonic Flow Apparatus (HFA). In the TBT, flutter-free wings for most military fighter airplanes were developed. The HFA was one of the first hypersonic facilities and was used in the initial aerodynamic developments of reentry space vehicles. I have photographs of the LTPT, most of the other tunnels mentioned, a smoke-flow photo of the airflow over an airfoil taken in the Langley Smoke Tunnel in the 1930's, and a photo of a 1930's Boundary Layer Diffuser Tunnel. I would be happy to show you these for possible addition to the wind-tunnel photo wall. I also have a couple of sections of actual airfoil models tested in the VDT that I could contribute to the cabinet display of memorabilia. In addition, if you ever increase the number of audio-visual presentations, I suggest that you consider one on NACA's airfoil developments.

I hope you don't think it presumptuous of me to make these suggestions at this late date, but I know that museums are continuously improved. If any of these possibilities are of interest to you, please let me know.

Sincerely,

Albert L. Braslow