

FAA's William J. Hughes Technical Center

In 1938, the Civil Aeronautics Act transferred the Federal civil aviation responsibilities from the Commerce Department to a new independent agency, the Civil Aeronautics Authority. The legislation also expanded the government's role by giving the Authority the power to regulate airline fares and to determine the routes that air carriers would serve. In 1940, President Franklin Roosevelt split the Authority into two agencies, the Civil Aeronautics Administration (CAA) and the Civil Aeronautics Board (CAB). The CAA became responsible for air traffic control, airmen and aircraft certification, safety enforcement, and airway development. The President entrusted the CAB with safety rulemaking, accident investigation, and economic regulation of the airlines. Both organizations reported to the Department of Commerce.

As part of a reorganization effort, the CAA consolidated its technical development facilities at Indianapolis, Indiana, at a site acquired through a long-term arrangement with the city. On May 29, 1939, Robert Hinckley, Chairman of the CAA, dedicated the Indianapolis Experimental Station (later called the Technical Development and Evaluation Center), which he established to develop and evaluate "new ideas, devices and techniques for improving safety and regularity in flight."¹ Located next to the municipal airport, the facility included a landing area, hangar, laboratory, and shop building. Even with such limited facilities, the early work at Indianapolis focused primarily on the instrument landing system, very-high-frequency radio ranges, transmitters and receivers, and airport lighting methods, all critical to ensuring aviation safety. Some of the early research reports completed at the Center included: *Study of*

safety of aircraft having single dual-gear power plant; The effects of oxygen deprivation, high altitude, on the human organism; The development adjustment, and application of the Z-marker; The radiotelemeter and its importance to aviation; An ultra-high frequency aircraft receiver; Tests with ultra-high-frequency radio transmitting and receiving equipment for itinerant aircraft communication; and Preliminary investigation of the effects of wave polarization and site determination with the portable ultra-high-frequency visual radio range.

Despite its ongoing achievements, because of limited resources, the facility's projects often took longer than desired. For this reason, the CAA's research and development (R&D) achievements often went unheralded and the agency received continued criticism for its lackluster program. In July 1956, nearly 20 years after the Technical Development and Evaluation Center's establishment, Milton Arnold, a representative from the Air Traffic Association, surveyed the Center's diverse efforts and had little good to report. In the critical areas of airways modernization and traffic control automation, Arnold maintained the Center was "geared by funds and facilities to the requirement of aviation in 1938, at best. There are some excellent . . . personnel in that division of CAA, but the overall concept of the . . . development program . . . is approximately 10 to 15 years behind in money, facilities, and staffing."²

During the 1950s, the Air Force and CAA debated who owned the airspace, and which navigation aids would be best to control air traffic. In 1957, President Dwight D. Eisenhower created the Airways Modernization Board to coordinate civil-military

¹ John R. Wilson, *Turbulence Aloft: The Civil Aeronautics Administration Amid Wars and Rumors of Wars, 1938-1953* (Washington, DC: GPO, 1979): 247.

² Stuart I. Rochester, *Take Off at Mid-Century: Federal Civil Aviation Policy in the Eisenhower Years, 1953-1961* (Washington, DC: GPO, 1976): 161.

avionics activities. That and the space race sparked national interest in aviation research and development. With a more clearly defined mandate and sufficient funding to undertake an expanded aviation R&D program, the Board decided to establish its own R&D center. The mission of the new facility was “to develop, modify, test, and evaluate systems, procedures, facilities and devices to meet the needs for safe and efficient air traffic control of all civil and military aviation.”³

In July 1958, the Board selected a site near Atlantic City site from among more than 1,800 proposed sites to establish its National Aviation Facilities Experimental Center (NAFEC). Several factors contributed to the selection. The Navy was vacating its Pomona Naval Air Station and the opportunity for immediate occupancy and the use of existing facilities would save millions of dollars and months of time. Atlantic City also afforded test engineers a wide range of flying conditions and the proximity to both New York's high-density area and the open space over the Atlantic Ocean permitted testing both in a complex operational environment and in an open airspace environment. In addition, Atlantic City's proximity to McGuire AFB, a principal air defense center and site of a SAGE (semiautomatic ground environment) installation used for the identification and radar surveillance of air traffic for air defense made it easy to coordinate efforts with the military.⁴

When the new Federal Aviation Agency (FAA) superseded the CAA in December 1958, NAFEC became the technical arm of the new organization's Bureau of Research and Development, which closed the Technical Development and Evaluation Center in

³ FAA, *A History of the National Aviation Facilities Experimental Center, 1958-1970* (NJ: NAFEC, n.d.: v.

⁴ Rochester, footnote, 162; “Pomona Airport Seen Becoming Largest in US,” *The Daily Journal* (June 1, 1959): 3.

Indianapolis. Upon taking over as the first administrator of the new agency, Elwood “Pete” Quesada freely admitted that the CAA had been weak in the R&D area. “It was to be expected since they were not a research-and-development-conscious group,” he explained. Despite his desire to create a first-class aviation R&D center, Quesada had difficulty attracting capable R&D personnel to the FAA. Closure of the facility in Indianapolis and transfer of its personnel to NAFEC brought a one-time influx of scientific and engineering talent into the new agency, but it faced continuing competition for engineers from the newly created National Aeronautics and Space Administration and the Atomic Energy Commission.⁵

The Center’s small footprint grew tremendously in 1959, when the FAA bought the Pomona Airport from Atlantic City for \$55,000. The city retained ownership of 80 acres and a passenger terminal to accommodate some private air traffic, especially those planes too large or noisy to fly into Bader Field. A condition of the sale was that the city could still use the runways, but the federal government would pay to maintain them.⁶

Now located on 5,059 acres, NAFEC boasted an all-weather airport and 184 structures, most of them temporary buildings dating from World War II. The facilities lacked modernity and new equipment, making it difficult to undertake a wide variety of experiments. According to an interview with former building program manager Thomas Brennan, in those early years “studies showed we were losing 100 man-years per year because of people just traveling among these buildings.” As Bob Yanetti added in the same interview, “the old buildings leaked, were cold in winter and hot in summer,” and most could not support cutting-edge research. For example, NAFEC engineers used a

⁵ Rochester, 227.

⁶ “Pomona Airport Seen Becoming Largest in US,” 3.

reconfigured warehouse for the facilities first computer lab. Yanetti explained that every time researchers set up a new piece of equipment in that lab, they “would ask . . . Will the floor hold up? Is there enough a/c [air conditioning] in the building? Can we generate enough power?”⁷

Despite a shortage of personnel, NAFEC engineers quickly went to work on a variety of projects, such as the refinement of the VORTAC navigation system, new techniques for fire detection and prevention, runway illumination, materials for airport surface markings, and continued work on aircraft conspicuity and collision-avoidance and proximity-warning devices. A sampling of early technical reports issued by the Bureau of Research and Development suggests the scope of the Center’s R&D activities: *High Speed Communications Equipment; A Study of the ATC Radar Beacon System Characteristics; Airport Runway and Taxiway Design; Analysis of Meteorological Requirements; Dynamic Simulation Tests and Systems Study of IFR Operations in Los Angeles Area; Runway Touchdown Zone Lighting for Dulles International Airport; and Operations Analyses of Air Traffic Demands and Delays in New York ARTCC.*

The poor state of the facilities, led the Aircraft Owners and Pilots Association in mid-1963 to begin a lobbying effort to close NAFEC, because of what it termed the Center’s lack of productivity. New Jersey Governor Richard Hughes quickly stepped in to oppose AOPA’s suggestion. He told reporters NAFEC performed a vital service to air research and did not lack in productivity.⁸ The FAA agreed with him, and its second administrator, Najeeb Halaby, approved in principle a three-phased building program to improve and modernize the Center’s facilities. In 1964, Halaby funded Phase I of the

⁷ “Getting Ready for Tomorrow: FAA’s ‘New’ Technical Center,” *FAA World* (September 1980): 4.

project – construction of a modern aircraft maintenance facility, fire/crash stations, and central utility plant. The agency completed phase I construction in 1968, but did not have sufficient funding to undertake the other two construction phases.⁹

In 1965, in a FAA reorganization, Administrator William McKee separated NAFEC from the Systems Research and Development Service (SRDS), making it for the first time a direct report to the Administrator on par with the regional directorates. The new organization encompassed all local elements formerly at the Technical Center under SRDS, together with the Management and General Training Schools, Contracts Office, and Aircraft Services Facility, co-located activities that had previously reported to other Washington Headquarters units.¹⁰ In 1967, the Federal Aviation Agency became the Federal Aviation Administration as one of the modes in the newly created Department of Transportation.

Despite aging facilities, the NAFEC community remained dedicated to its R&D mission. To reflect its growing capabilities, in 1967 NAFEC adopted a new mission statement, replacing the one first introduced in 1958. NAFEC shall:

- Operate and administer a national test center providing laboratories, facilities, skills and services responsive to the research and development programs of the FAA.
- Conduct technical and operational test and evaluation of aviation concepts, procedures and equipment.
- As requested by the appropriate developmental office or service, assist in research, development and implementation of aviation concepts, procedures and equipment.

⁸ “Hughes Supports Pomona Air Center,” *The Millville Daily* (July 31, 1963): 10; “Hughes Says Case, Rocky Could End Housing Bias,” *The Central New Jersey Home News* (July 31, 1963): 32.

⁹ “Getting Ready for Tomorrow,” 4-7.

¹⁰ *A History of the National Aviation Facilities Experimental Center*, 14.

- Perform other program and support functions as assigned by the Administrator.¹¹

NAFEC's short tenure as a direct report to the Administrator ended in May 1970 when FAA Administrator John Shaffer established the Office of the Associate Administrator for Engineering and Development. The new Associate Administrator had executive direction over the National Airspace System Program Office (NASPO), the Systems Research and Development Service, and the National Aviation Facilities Experimental Center. The reorganization changed reporting lines only, NAFEC's mission and function remained the same.¹²

Although no longer a direct report, NAFEC stayed on the minds of subsequent administrators. In 1973, the expense and inconvenience of continuing to work in dilapidated buildings, led new Administrator Alexander Butterfield to consider seriously closing the Technical Center. Butterfield strongly believed that both modernization and cost reduction could be achieved by combining NAFEC with the FAA's Aeronautical Center, the agency's large technical and training facility in Oklahoma City. Butterfield appointed a review team to study the question. In their 1974 report, that team concluded that moving NAFEC to Oklahoma would save \$66 million over 10 years compared to continuing at the present site.¹³

Local citizens quickly responded to the threatened closing, arguing that such a move would be a serious blow to a region that already suffered from chronic unemployment. The "Save NAFEC Committee," supported by a former Atlantic City

¹¹ Ibid., 14, 19.

¹² FAA, *FAA Historical Fact Book: A Chronology, 1926-1971* (Washington, DC: GPO, 1974): 212.

¹³ Edmund Preston, *Troubled Passage: The Federal Aviation Administration During the Nixon-Ford Term, 1973-1977* (Washington, DC: GPO, 1987): 114-116.

mayor and NAFEC's first director, William Cowart, and others such as freshman Congressman William J. Hughes (D-NJ), proposed creating a construction and lease agreement between the city and the FAA. Once this committee had the FAA's attention, the Atlantic County Improvement Authority (ACIA), an organization of unsalaried citizens empowered to follow-up on the recommendations of the "Save NAFEC" group, entered into the discussions.¹⁴

Despite the protests and the work of local groups to keep NAFEC open, Butterfield remained convinced closing the Center represented the best option. He reported to Secretary of Transportation Claude Brinegar the potential savings and operational advantages of consolidation of NAFEC and the Aeronautical Center in Oklahoma outweighed any of the cons. Brinegar, however, delayed his decision, and the issues remained unresolved until both Butterfield and Brinegar had left office.¹⁵

Despite Butterfield's recommendation, ACIA continued work to save NAFEC. With the help of investment advisors, ACIA secured financing for a new building complex through the Irving Trust Company and Prudential Insurance Company of America. With financing in place, ACIA coordinated with an architect, construction manager, interior designer, Egg Harbor Township officials, and the federal government to bring the project to fruition.¹⁶

While turmoil surrounded them, NAFEC's engineers maintained a steady course of aviation safety and air traffic control research and development from their aging labs and facilities. In the early 1970s, for example, FAA's researchers published a wide

¹⁴ "Getting Ready for Tomorrow," 7; FAA Brochure, "Twenty Years of Progress, 1958-1978: A Review of the First Twenty Years of the National Aviation Facilities Experimental Center," c. 1978.

¹⁵ Preston, 116.

¹⁶ "Getting Ready for Tomorrow," 7.

variety of research results, including *Flight Safety Aspects of Radar Techniques in Bird/Aircraft Collision Avoidance*; *Oceanic Surveillance and Navigation Analysis*; *ATC/CAS Interface Simulation – Exploratory Phase*; *Vortex Sensing Tests at NAFEC*; and *Collision Avoidance System Analysis*.

Unlike his predecessor, Acting FAA Administrator James Dow believed the Aeronautical Center and NAFEC could pursue their differing missions more effectively in separate locations. He doubted that the cost savings the agency would achieve by the move would outweigh the disruption and possible loss of efficiency. Agreeing with Dow's views, in May 1975, Secretary of Transportation William Coleman announced that NAFEC would remain in New Jersey.¹⁷

On September 20, 1978, President Jimmy Carter broke ground for the new \$50 million Technical and Administrative Headquarters building. The Atlantic County Improvement Authority constructed the building and leased it to the FAA for 20 years at an annual rent of \$5.8 million. That day, President Carter told the assembled crowd, "Throughout its 20 years of existence and service, this facility has led the way in development of new technologies for civilian air flight, which have given our nation the safest possible record in the air of all modes of transportation."¹⁸ Phase II of the construction envisioned by Najeeb Halaby in 1963 had finally begun.

To the 2,000 FAA employees who had been working at NAFEC in World War II-vintage buildings, the groundbreaking ceremony marked the beginning of a two-year construction project that signaled the permanence of NAFEC in New Jersey. As construction began, NAFEC was celebrating its twentieth anniversary. The construction

¹⁷ Preston, 175-176.

¹⁸ *FAA World*, "The President Launches the New NAFEC" (reprint, December 1978).

brought renewed hope and vigor to the Center. As a NAFEC brochure stated in 1978, “the 20th birthday starts a new era of permanency. Gone forever are the continual recurring rumors that the Center will be shut down and moved elsewhere, damaging employee morale and creating uncertainty in the community.” The commemorative pamphlet not only proclaimed a new era for NAFEC, but also proudly announced, “As the FAA’s test center, NAFEC will continue to grow in importance and will play” an even greater role “in the safety and progress of aviation.”¹⁹

On May 29, 1980, Vice President Walter Mondale, New Jersey Governor, Brendan Byrne, and FAA Administrator Langhorne Bond dedicated the new building. During the ceremony, in a testimony to the local communities efforts to save NAFEC, Mondale called the new building a “symbol of cooperation and of Government doing things right.”²⁰ That same day, Bond formally changed the name of the facility from the National Aviation Facilities Experimental Center to simply the FAA Technical Center. The day before the ceremony, the FAA had dedicated a new heliport at the facility, and, on June 20, had dedicated a new fire research building.²¹ The Technical Center had finally come of age.

As predicted in 1978, with new facilities and invigorated funding, the Technical Center now had sufficient resources to make an even larger impact on the aviation community. Throughout the 1980s, the Center expanded its R&D efforts in safety and air traffic control technologies. At any one given time, Center employees had more than 150 active projects underway, including test and evaluation in air traffic control, communications, navigation, airports, aircraft safety and security. Activities involved

¹⁹ “Twenty Years of Progress.”

²⁰ “Getting Ready or Tomorrow,” 7.

long-range development of innovative systems and concepts, development of new equipment and software, and in-service modification of existing systems and procedures. In particular, the Center became a critical tool as the agency began an air traffic modernization program, because of its ability to conduct total system testing and integration. Technical Reports published in the early 1980s indicate the scope of that work: *Software System – Probability of Detection for ARTS (Automated Radar Terminal System) III*; *TCAS I Design Guidelines*; *FAA Weather Surveillance Requirements in the Context of NEXRAD*; and *L Band DME Multipath Environment in the Microwave Landing System (MLS) Approach and Landing Region*.

As the Technical Center expanded the scope and range of its activities, it built the infrastructure necessary to remain the national scientific test base for FAA research, development and acquisition programs. By the early 1990s, Center facilities included a human factors laboratory, which provides an advanced, strictly controlled human performance research environment. There, researchers investigated variables affecting all aspects of the human element in current and future aviation systems. The laboratory could simulate air traffic control and airway facilities systems and operations.

In the new air traffic simulation facility, researchers simulated air traffic operations for any place in the world on its radar displays using computer-generated simulated aircraft in place of real airplanes. The modern facility allowed engineers to solve complex air traffic control problems efficiently and safely in the laboratory rather than in flight. The en route, terminal and oceanic laboratories, engineers could test all new automated air traffic control equipment and computer programs prior to installing them in FAA field facilities.

²¹ *FAA Intercom*, “Everything’s Up-To-Date in Atlantic City” (June 23, 1980): 3.

The Technical Center also became the lead agency for all government research in the area of explosives and weapons detection. There, a staff of multi-disciplined experts from government, industry, and academia evaluated the development and enhancement of technologies to counter or detect various security threats to the aviation industry. Some of those efforts included new technologies to detect explosives and non-metallic weapons, an airport demonstration program involving a computerized topography system at three major airports, and an aircraft hardening program that included efforts to reduce aircraft vulnerability to bombs, blast loading, and damage assessment. The Center's new Aviation Security Laboratory opened in November 1992. (Under a government reorganization, the security research program moved to the Department of Homeland Security in 2002.)

On May 6, 1996, the FAA rededicated the Technical Center as a means of honoring and acknowledging a long-time supporter and friend, former New Jersey Congressman, and U.S. Ambassador to Panama, William J. Hughes. At the rededication ceremony, Technical Center Director Guy Gardner remarked that while serving in Congress from 1974 to 1995, Hughes "was instrumental in the Center's growth and success as the nation's premier aviation research and development facility." The former Congressman, not only fought to keep the facility in Atlantic City in the 1970s, but also played a key role in obtaining the support necessary to expand and modernized the Center with a new headquarters building, a technical support facility, the advanced automation system laboratory, and the aviation security research and development laboratory.²²

²² *FAA Intercom*, "Friend and Supporter" (June 18, 1996): 1; FAA News Release, "FAA Technical Center Renamed for Ambassador William J. Hughes," APA-75-96, May 6, 1996.

Despite the renewed vigor and new name, the William J. Hughes Technical Center once again faced an uncertain future in 1997. In that year, Coopers and Lybrand, a consulting firm hired by the FAA, recommended that the agency could save money by consolidating the Technical Center's operations with the Mike Monroney Aeronautical Center in Oklahoma, or by contracting its services. The report's authors wrote, consolidation "appears to be reasonable and should be evaluated from a cost-benefit perspective."

As happened in the 1970s, the report elicited an immediate response from the local Atlantic City community. In particular, Senator Frank Lautenberg (D-NJ) and Representative Frank LoBiondo (R-NJ), went to bat for the Center. As Lautenberg explained, "we've been down this road before, but we've beaten back every threat, and we will do so again. Because the Technical Center, its facilities, and . . . the employees are the best in the world." LoBiondo echoed this sentiment, and added, "Keeping the Technical Center makes sense from a technical and economic perspective." As opposed to the earlier battle, the acting FAA Administrator, Linda Daschle, and the Center's new director, Anne Harlan, fully supported keeping the Technical Center in New Jersey and the crisis quickly calmed down.²³

On April 15, 1998, the FAA transferred operational control of the airport to the South Jersey Transportation Authority. The Authority had bought the airport terminal from Atlantic City in 1992. At the same time, the Center entered into a fifty-year lease with the Authority for approximately 2,200 acres – including all runways, taxiways, and commercial airport aprons, as well as development and environmental mitigation areas.

Now owned by a local authority, the airport sponsor could apply for airport improvement grants from the FAA for further airfield development and expansion.

The Center's R&D activities continued to expand in the 1990s and 2000s with new facilities, such as the National Airport Pavement Test Facility, which opened in 1999, and a new role as the testbed for the Next Generation Air Transportation System, or NextGen.

Throughout its history, the Center's reporting lines have changes, as with other FAA organizations, but its mission has remained the same. For example, in February 2004, the Tech Center became part of the new Air Traffic Organization and placed in the Office of the Vice President for Operations Planning, subsequently called the NextGen and Operations Planning office. With congressional approval, in 2011, FAA moved the NextGen office from the ATO to a new office reporting directly to the FAA deputy administrator. The ATO senior vice president for NextGen and operations planning became the assistant administrator for NextGen. The Tech Center became an office reporting directly to the assistant administrator.

Today, firmly ensconced in the Atlantic City, New Jersey, community, the dedicated professionals at the Technical Center continue their 60-year mission "to provide engineering and research expertise in an integrated laboratory environment for the development and support of a safe, secure, modern, and efficient global aviation system."

²³ "FAA center should close, study insists" (March 1, 1997): A1; *The Press of Atlantic City*; "Study recommends closing Hughes FAA Tech Center," *The Press of Atlantic City* (February 20, 1997): A1; "Area lawmakers join fight against tech-center closure," *The Press of Atlantic City* (February 25, 1997): A1.

For additional information on the William J. Hughes Technical Center, visit <http://www.tc.faa.gov/>.

Technical Center Directors

Shelley Yak	2016 -
Dr. Dennis Filler	2013-2015
Wilson Felder	2006-2012
Dr. Anne Harlan	1997-2006
Guy Gardner	1995-1996
Harvey Safeer	1990-1995
E. (Edward) T. Harris	1987-1990
Larry Williams	1984-1987
Dr. Edmund Koenke	1982-1984
Joseph Del Balzo	1979-1981
Robert Faith	1975-1979
Cecil Commander	1971-1974
Robert Cannon	1970-1971
Jack Webb	1965-1970
William Harrison	1962-1965
Alden Packard	1960-1961
William Cowart	1958-1960