DELAYS, TECHNICAL PROBLEMS, AND COST ESCALATION IN THE FEDERAL AVIATION ADMINISTRATION'S ADVANCED AUTOMATION SYSTEM (103-8): HEARING. HOUSE OF REPRESENTATIVES, 103 CONGRESS, 1ST SESSION, MARCH 10, 1993

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ADDITION TO THE RECORD

HOUSE OF REPRESENTATIVES,
COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION,
Washington, DC, March 5, 1993.

To: Members of the Subcommittee on Aviation.
From: Committee's Aviation Staff.
Re Summary of subject matter for Aviation Subcommittee hearing on Delays, Technical Problems, and Cost Escalation in Federal Aviation Administration's Advanced Automation System Program on Wednesday, March 10, 1993 at 10:00 a.m.

The Subcommittee will receive testimony on problems encountered in development of the Federal Aviation Administration's Advanced Automation System (AAS) program and steps being undertaken to rectify those problems. The AAS program is the centerpiece of the FAA air traffic control modernization program. The AAS program's purpose is to replace and upgrade the computers, software and air traffic controller workstations and displays used to control and separate air traffic.

I. AIR TRAFFIC CONTROL MODERNIZATION

Further detail on AAS will be provided later in the Summary, but first, in order to provide some context for the AAS program, a general description of the air traffic control modernization effort will be provided.

The air traffic control system is a complex web of radars, computers, weather detection systems, navigation beacons, control towers, enroute centers and people, tied together through a network of telecommunications links.

Approximately 550 airports have FAA air traffic control towers which control aircraft in the vicinity of airports. Of these airports, 289 use radar to control aircraft on their approaches and departures. There are also 21 Air Route Traffic Control Centers or enroute centers which control aircraft at higher altitudes between airports.

In addition, there are approximately 1,325 navigation beacons of different types around the country that transmit radio signals enabling pilots to determine where they are. There are also 759 airports equipped with FAA instrument landing systems which enable pilots to make precision approaches to runways in less than optimum weather conditions. The FAA also has a wide variety of facilities and equipment for collecting and making available to pilots weather data, including the Flight Service Station system used by general aviation pilots.

This air traffic control system is designed and expected to operate constantly around-the-clock with a very high level of reliability.

In 1981, the Federal Aviation Administration proposed a National Airspace System Plan (NAS Plan) to replace or upgrade all of the equipment used in the air traffic control system over a 10–

20 year period. The NAS Plan consisted of approximately 90 independent modernization projects that when completed, will be linked in an overall integrated system.

The 90 projects include replacing aging telecommunications equipment and switches, radars, radio equipment, landing systems, weather detection systems, data processing equipment, navigation beacons, and equipment used to display air traffic.

The NAS Plan was needed because most of the facilities and equipment in the air traffic control system were antiquated in a technological sense. In many key equipment areas this remains the case. For instance, the computer generated radar displays used by air traffic controllers to separate air traffic were designed in the late 1960s and were deployed in the early 1970s. In some cases, the communications equipment being used is of an even earlier vintage. Some navigation equipment even bears the insignia of the FAA's pre-1958 predecessor the Civil Aeronautics Administration. By contemporary standards, much of the technology used in air traffic control has become increasingly costly to maintain and technologically inflexible.

Overall, the modernization effort has been to build a new air traffic control system that is more reliable, less costly to maintain, requires fewer people to operate, and provides improved operating efficiencies to the airlines and the traveling public.

In 1982, the Congress enacted the Airport and Airway Improvement Act which authorized funding to carry out the Plan through 1987, and in 1987, Congress again authorized funding to implement the NAS Plan through FY 1990. In 1990, Congress reauthorized funding to implement the Plan and expanded the scope of the Plan beyond the original 90 projects to take in additional and newly identified capital development needs. Much of these new needs were of a "low-tech" nature such as building replacement, repairs or upgrades. This plan was renamed the Capital Investment Plan (CIP) to reflect the broader scope and purpose of the modernization effort.

Through 1993, approximately $16 billion has been appropriated for air traffic control modernization. Through the early part of the next century, the FAA has identified another $15.5 billion that will be needed to meet its F&E capital development needs. The FY 1993 budget spends a total of $2.4 billion. It is anticipated that an annual level of comparable spending or a little higher will be needed for the balance of the century to sustain the modernization effort.

The FAA estimates that the approximate $31.5 billion to be spent on modernization between 1982 and the year 2000 will result in substantial financial benefits to aviation users and cost savings to the FAA throughout enhanced productivity and efficiency. However, because of program delays, virtually none of these benefits have yet been realized.

When measured in terms of 1991 dollars, the FAA estimates that modernization projects implemented, underway or planned will bring a total of $257.9 billion in benefits to aviation users and the agency over the life of equipment being modernized. For the most part, the benefits will be realized between 1995 and the years 2015–2020.

Specifically, FAA estimates that approximately $148 billion will be realized in the value of time saved, by airline passengers through reductions in delays; $63 billion in reductions in aircraft direct operating costs; and $9.5 billion in safety benefits. The savings to the operating expenses of the FAA have been identified as $31.9 billion, mostly in the form of improved controller and maintenance productivity.

Beyond these calculable economic benefits, the modernization program is expected to provide a technological system that is much more sophisticated and more adaptable, flexible and receptive to new technological innovation than what it is replacing. Hence, it is expected to be more responsive to future aviation user needs as they develop.

Also aside from quantifiable benefits, there is simply no choice but to replace much of the equipment if the system is to operate in the safe and efficient manner the public expects. For a number of systems, spare parts availability has become a problem due to cessation of manufacturing; in some cases, maintenance must be accomplished through cannibalization. In short, obsolete equipment will only become more so if upgrades are not made. The effect of not modernizing the system will be inadequate and shrinking capacity and unfulfilled demand.

Over the past 10 years, the air traffic control modernization effort has been a mixed bag of accomplishments and frustrations. For the most part, the frustration has far outweighed the sense of progress and accomplishment. Like most large government programs involving development and procurement of complex, technological systems, the modernization program has been plagued with delays, cost escalation, and, sometimes, failures to meet technical specifications.

The problems encountered during the 1980s have been largely attributed to the FAA, early on, grossly underestimating the complexity and difficulty of the modernization task. In the early 1980s, it was largely assumed that much of the modernization plan would be implemented with off-the-shelf technology, with little need for modification. It was anticipated that where modification was needed it would be minimal and understandable. This assumption has proved fallacious. Practically all systems in the NAS Plan involved substantial research, development, and new design, and because of this, the initial schedules, for completion of projects were extremely optimistic. Delays from the original optimistic schedules quickly became a matter of years.

Also, the FAA has established very high technical specifications particularly with regard to equipment reliability. Meeting these specifications has proved difficult and unpredictably time consuming for the companies with which the FAA contracted to develop and implement the technology.

Another problem has been the failure of contractors to deliver what was specified in the contract. For instance, in one of the major acquisitions, the contractor outright failed to deliver the systems and was eventually terminated by the FAA and found in default, at a high level of cost and delay to the government.

All of these problems have led to changes in the way the FAA goes about designing and procuring new air traffic control systems.

Some of these are the result of hearings and legislation developed by the Subcommittee on Aviation.

Among the changes brought about by legislation and internal agency changes were elimination of redundant reviews of procurement decisions by the Department of Transportation; an increase in acquisition-related staffing; a better system of defining technical needs and requirement for systems to be acquired; more realistic assessments of development and acquisition schedules; movement away from parallel or concurrent development of technology and acquisition of it; and a greater reliance on a process of testing and evaluation equipment before final procurement decisions are made ("fly before you buy"). Also, some specific project program managers are organizationally more accountable to the top management of the FAA for progress or problems than before.

While these changes are widely viewed as important positive steps it is also widely viewed that the organization that is being subjected to these changes has a deeply imbedded bureaucracy that is naturally resistant to change of the type described above. The full effects of the changes in the procurement of new technology will come over time.

It is also important to note that much of these changes have to do with actions taken during development of systems prior to a procurement decision. The problems that have developed in the AAS program have come after the procurement decision but prior to actual delivery and deployment.

(For a more detailed reference on the overall air traffic modernization effort see Subcommittee hearings held on March 3, 1992, Committee Publication #102–52)

II. ADVANCED AUTOMATION SYSTEM

The Advanced Automation System will be the centerpiece of the air traffic control modernization effort. Its purpose is to replace the computer hardware, software displays that controllers use to observe and separate air traffic, and other related equipment.

The radar displays and work stations used by controllers were designed in the late 1960s and deployed in the early 1970s. The main enroute center computer, called the Host computer, is relatively modern IBM equipment. It was deployed at the enroute centers in the mid-1980s, and it will become integrated into the Advanced Automation System. The software that processes the air traffic data and converts that data into information displayed before the controllers is largely old software (early 1970s vintage) that has received numerous updates, changes, and fixes over the years and is generally viewed as a patchwork that is difficult to maintain and not easy to modify.

AAS will deliver new software and new workstations and displays that incorporate modern, contemporary computer capabilities. The mainframe IMB Host computers in place at the centers will be kept in place, but will be augmented with additional processing power and capability at the individual workstations.

The Advanced Automation System is actually a series of separate systems and other future software upgrades. (Let us provide you with a little warning at the outset. Most everyone involved with air traffic control modernization and the Advanced Automation System