FAA'S IMPLEMENTATION OF RUNWAY STATUS LIGHTS

Federal Aviation Administration

Report Number: AV-2008-021

Date Issued: January 14, 2008

Memorandum

U.S. Department of Transportation
Office of the Secretary
of Transportation
Office of Inspector General

Subject: ACTION: FAA's Implementation of Runway Status Lights
Federal Aviation Administration
Report Number AV-2008-021

Date: January 14, 2008

From: David A. Dobbs
Principal Assistant Inspector General
for Auditing and Evaluation

Reply to Attn. of: JA-1

To: Acting Federal Aviation Administrator

This report provides the results of our review of the Federal Aviation Administration's (FAA) implementation of Runway Status Lights (RWSL). We conducted this review as part of our ongoing efforts to assess FAA's actions to reduce runway incursions. The objectives of our audit were to (1) determine RWSL's viability for reducing runway incursions and (2) assess FAA's progress in implementing the system. Our review was conducted between June and January of 2008 and included site visits to Dallas/Fort Worth International Airport (DFW) and FAA Headquarters. Exhibit A details our scope and methodology.

BACKGROUND

Most runway incursions (potential collisions on a runway) are caused by a lack of situational awareness, and over half of all runway incursions are the result of pilot deviations. However, there is currently no automated technology in place to directly warn pilots of potential runway conflicts. Reducing runway incursions has been on the National Transportation Safety Board's (NTSB) Most Wanted List of Safety Improvements since the list's inception in 1990. However, NTSB considers FAA's response to this safety improvement to be unacceptable because it has not yet implemented a technology that gives immediate warnings of probable runway incursions directly to flight crews in the cockpit.

During our recent audit of FAA's efforts to reduce runway incursions, we met with a safety team from the Air Line Pilots Association, International (ALPA) to discuss runway incursion mitigation. ALPA officials told us that RWSL, a

technology that FAA is evaluating, could be an effective tool for reducing runway incursions.

RWSL was first developed and demonstrated at Boston Logan International Airport in the early 1990s, but the surveillance systems available at that time needed improvements before the technology could be viable. In 2003, a prototype system was installed at DFW. A second prototype system was also installed at San Diego International Airport in 2005. Testing of these systems continues at both locations.

What Is RWSL?

RWSL technology uses automated, surveillance-driven lights that work as an independent, direct warning system to alert pilots in departing or crossing aircraft that the runway is occupied. The lights are installed at runway/taxiway intersections and at departure points along the runways. Lights illuminate red when it is unsafe to cross or depart from a runway, thus serving to increase the crew's situational awareness and decrease the potential for a runway incursion.

What Are Its Components?

RWSL consists of both runway entrance lights and take-off hold lights. Runway entrance lights illuminate red when a runway is unsafe to enter or cross (see figure 1). Runway entrance lights are visible to aircraft from taxiways holding short of runway intersections.

Figure 1. Diagram of Entrance Lights

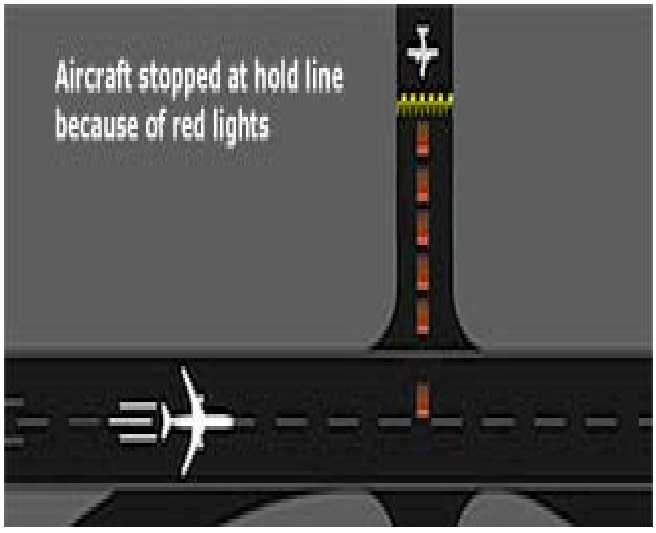
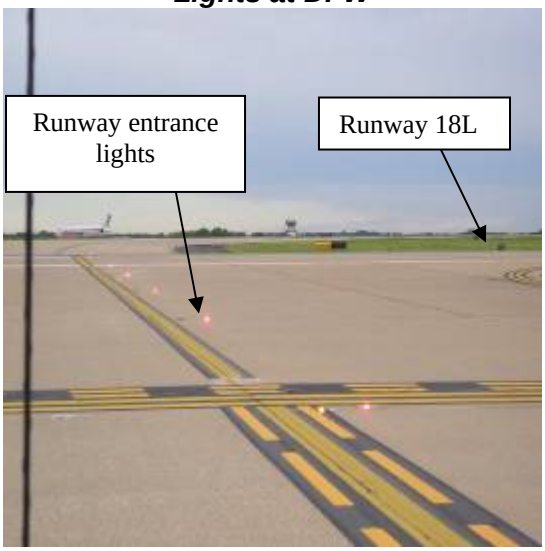


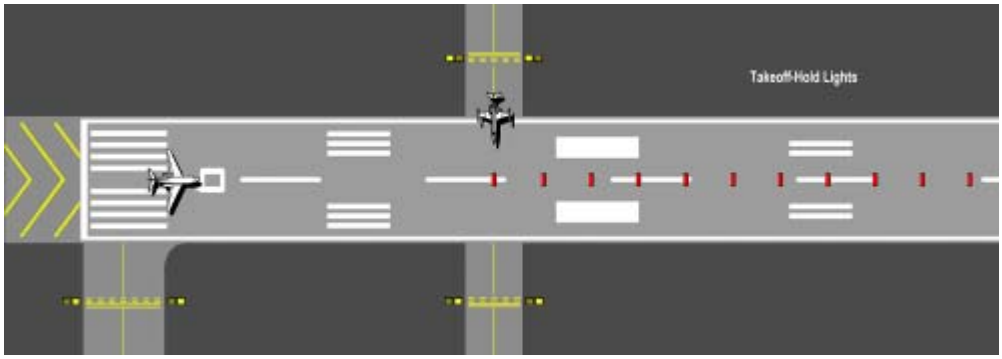
Figure 2. OIG Photo of Entrance Lights at DFW



The audit team observed DFW runway entrance lights illuminate red on taxiway B when runway 18L was unsafe to enter due to an aircraft taking off (see figure 2).

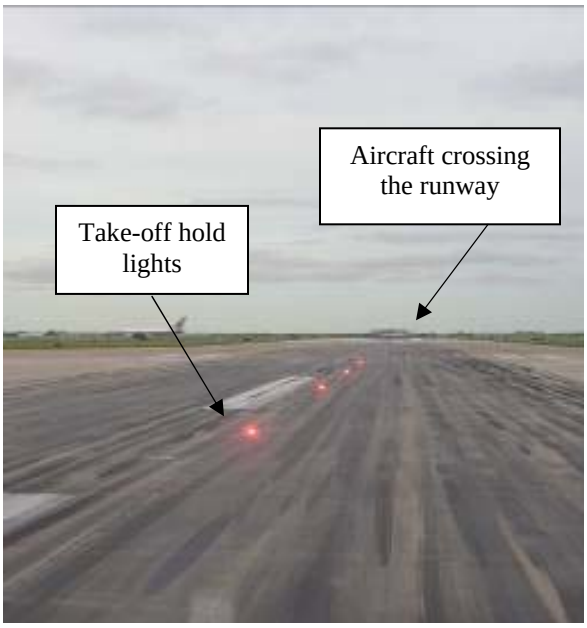
Take-off hold lights illuminate red to indicate an unsafe condition when an aircraft is in position for take-off and another aircraft or vehicle is either on or about to enter the runway in front of it (see figure 3). Take-off hold lights are visible from the take-off hold position.

Figure 3. Diagram of Take-Off Hold Lights



The audit team observed take-off hold lights illuminate red on runway 18L at DFW when the runway was unsafe to depart due to an aircraft crossing the runway in the distance (see figure 4).

Figure 4. OIG Photo of Take-Off Hold Lights at DFW



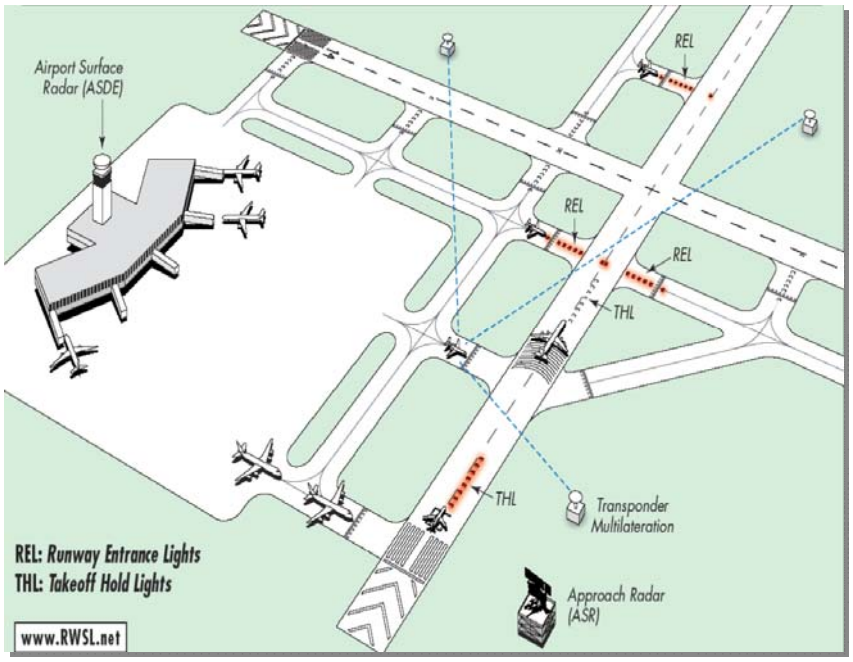
FAA is also developing a third type of runway status lights, runway intersection lights. These lights are designed to warn pilots on a runway when another aircraft is departing from or landing on an intersecting runway. FAA plans to begin testing these lights at Chicago O'Hare International Airport in 2008.

What Drives the System?

RWSL is driven by fused multi-sensor surveillance system information. Using Airport Surface Detection Equipment-Model X (ASDE-X), external surveillance information is taken from three sources that provide position and other information for aircraft and vehicles on or near the airport surface. RWSL safety logic processes the surveillance information and commands the field lighting system to turn the runway status lights on and off in accordance with the motion of the detected traffic. The diagram of RWSL below (figure 5) depicts the use of

three sources of surveillance input to provide position of aircraft and vehicles on the airport surface.

Figure 5. Diagram of RWSL Surveillance Sources



At DFW, RWSL uses input from the ASDE-X prototype system, which uses three sources of surveillance: (1) Terminal Radar—Airport Surveillance Radar (ASR), (2) Airport Surface Radar—Airport Surface Detection Equipment-Model 3 (ASDE-3), and (3) Transponder Multilateration System.

RESULTS IN BRIEF

We found that RWSL is a viable technology for preventing runway incursions. While FAA has made progress in developing RWSL, this technology is still in the early stages of implementation; much work remains for FAA to achieve full deployment. Essential attributes of RWSL include the following:

- Timely warnings of potential conflicts—RWSL promptly and clearly indicates to pilots and vehicle operators when it is unsafe for aircraft to enter or cross a runway or to commence take-off.

- Automated information—RWSL provides this information at all times without human input.

- No interference with Air Traffic operations—RWSL acts as an independent safety enhancement. It does not increase controller workload and does not

interfere with the normal flow of airport traffic or rhythm of controller movement of traffic.

- Lights indicate status only—RWSL indicates runway status and does not convey an Air Traffic Control clearance. Clearance is still provided by Air Traffic Control.

- Illuminated lights warn pilots of potential runway conflicts and prompt them to notify the tower before proceeding if a contradicting clearance has been issued; therefore, the system may also help to identify potential controller operational errors.

During operational evaluations and subsequent modifications at DFW for runway entrance lights and take-off hold lights, RWSL met or exceeded all performance criteria specified in the RWSL Research Management Plan. In addition, all system users we met with at DFW agreed that RWSL works as intended and has no known negative impact on capacity, communication, or safety.

Further, runway incursions on the test runway at DFW (runway 18L/36R) have decreased by 70 percent: during the 29 months before testing (October 1, 2002, through February 28, 2005), 10 runway incursions occurred at DFW; during the 29 months after testing (March 1, 2005, through July 31, 2007), only 3 occurred.

While RWSL at DFW has performed extremely well thus far, we identified several challenges that FAA must address to ensure the effective and timely implementation of this important safety technology. For example,

- RWSL depends on ASDE-X, and the interface between the two systems will need to be modified to address the differences between the ASDE-X prototype system used at DFW for RWSL and the version of ASDE-X being deployed nationally at other airports.

- Some of the airports where FAA plans to deploy RWSL are undergoing or will undergo airfield improvements. It will be important for the RWSL program office to work with FAA's Airports line of business to identify those airports and coordinate the deployment of RWSL in-ground infrastructure concurrently with airfield construction. This will help to save investment dollars by avoiding duplicative construction and ensure timely implementation of both infrastructure improvements and RWSL.

- Part of the early success of RWSL testing has been immediate input and corrective actions taken by the research and development (R&D) staff (including the federally funded research contractor that created the system) when problems were identified. A key factor for maintaining project

momentum will be ensuring that similar "hands-on" knowledge is retained during the transition from R&D to the acquisition phases of the RWSL life cycle.

Meeting these challenges in the early phases of RWSL implementation will be critical for keeping it on track.

FAA has made progress in developing RWSL thus far. FAA successfully conducted R&D and live operational testing at DFW, and FAA's Joint Resource Council (JRC) approved the RWSL initial investment decision in July 2007. The initial investment decision document included recommendations that FAA finalize (definitize) its acquisition strategy and return it to the JRC for the final investment decision (which sets the stage for system-wide implementation) no later than November 2007.

Obtaining approval from the JRC for the final investment decision is a key milestone because FAA cannot issue a contract for RWSL implementation until the program office obtains that approval. However, the target date for the final investment decision is currently set for July 2008. The RWSL program officials stated that the final investment decision milestone was established to provide sufficient time to prepare the acquisition package, which is required to award a contract.

Expediting the RWSL acquisition is important since the JRC directed the program office, during the initial investment decision, to review alternatives to accelerate the RWSL deployment schedule. In our opinion, setting the target date for the final investment decision 1 year after the approval of the initial investment decision to complete the acquisition package does not meet that direction. Accordingly, we believe that the program office needs to expedite preparation of the acquisition package and establish a new target date for the final investment decision milestone to accelerate RWSL deployment.

Our recommendations focus on the actions FAA needs to take now to ensure that the system remains a viable tool for reducing runway incursions and that future deployment remains on schedule. Our full recommendations are listed on page 13.

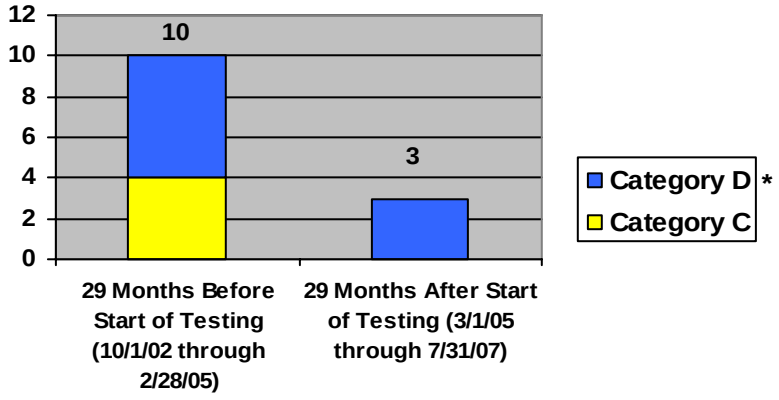
FINDINGS

We found that RWSL is a viable and important technology for reducing runway incursions and that FAA has made progress in developing it. RWSL has gained widespread support among user groups. Pilots, pilot union officials, Air Traffic management, and the airport operator at DFW all agreed that RWSL works as intended and has no known negative impact on capacity, communication, or safety. NTSB officials stated that RWSL is a promising technology for addressing its longstanding recommendation to provide direct warnings to pilots of potential runway conflicts. Further, the local National Air Traffic Controllers Association representative stated that RWSL has no impact on air traffic controllers' duties and responsibilities. While RWSL is only one of many efforts to improve runway safety, FAA recognizes the need to expedite technologies that increase cockpit crews' situational awareness and thus potentially reduce runway incursions. Several challenges need to be addressed, however, before the system can be effectively deployed.

RWSL Is a Viable Technology for Reducing Runway Incursions

RWSL promptly and clearly indicates to pilots and vehicle operators when it is unsafe for aircraft to enter or cross a runway or to commence take-off. RWSL provides this information automatically at all times without human input. As shown in figure 6, runway incursions have significantly decreased on the RWSL test runway at DFW—from 10 to 3 (70 percent) for the periods compared.

Figure 6. Number of Runway Incursions at DFW's Runway 18L/36R Where RWSL Is Installed



*** Runway incursions are graded by severity of the incident (A through D). Category A is the most severe, and Category D is the least severe.**

Source: OIG analysis of FAA data

Of the three runway incursions that occurred after testing began, one was caused by a pilot, one by a vehicle operator, and one by a controller.

We observed RWSL in operation at DFW from the vantage points of the airport surface and the control tower. We observed that RWSL acts as an independent safety enhancement. It does not increase controller workload and does not interfere with the normal flow of airport traffic or rhythm of controller movement of traffic. Further, RWSL *only* indicates runway status—it does not convey Air Traffic Control clearance to pilots. Clearance is still provided by Air Traffic Control.

RWSL may provide additional safety benefits as it has shown the capability to prevent runway incursions caused by air traffic controllers (operational errors). In a documented example at DFW, RWSL prevented an operational error and a runway incursion. The error playback showed that the pilot of a taxiing aircraft questioned a runway crossing clearance given by the ground controller when runway status lights were illuminated red, indicating the runway was not clear. In response, the controller cancelled the runway crossing clearance and another aircraft's landing clearance, thus avoiding both an operational error and a runway incursion.

FAA Has Made Progress in Developing RWSL but Needs To Address Several Challenges To Effectively Deploy the System

We found that FAA has made progress in developing RWSL thus far. During operational evaluations and subsequent modifications for runway entrance lights and take-off hold lights at DFW, RWSL met or exceeded performance criteria specified in the RWSL Research Management Plan. Most of the anomalies identified during initial tests have been mitigated. In addition, stakeholders and users at DFW reported that the FAA contractor was responsive to feedback and took quick and effective actions when system anomalies were identified. FAA successfully conducted R&D and live operational testing at DFW, and FAA's Joint Resource Council approved the RWSL initial investment decision in July 2007.

RWSL appears to be a viable technology, and FAA is moving toward implementation; however, the Agency will need to address several challenges that may impede the timely and effective deployment of the system. These include: (1) modifying the interface between RWSL and ASDE-X to address the differences in the ASDE-X prototype system at DFW and ASDE-X systems being deployed at other airports, (2) coordinating with airports that are undergoing runway improvements and planning to deploy RWSL in-ground infrastructure concurrently with airfield construction, (3) ensuring that "hands-on" RWSL expertise is maintained during the transition from R&D to the acquisition phase; (4) equipping vehicles with transponders; and (5) mitigating delays in implementing ASDE-X.

Modifying RWSL To Address Differences Between the ASDE-X Prototype System at DFW and the National ASDE-X System

Before RWSL can be deployed system-wide, FAA will need to modify RWSL to address differences between the ASDE-X prototype system at DFW and the ASDE-X system it is deploying at other airports. The ASDE-X system used to test RWSL at DFW was purchased by the Airport Authority in 2001 and is not part of FAA's current, national ASDE-X program. The ASDE-X prototype system at DFW differs in that it does not include the fusion of ASDE-3 surface radar and ASR-9 approach radar.

The national ASDE-X system has undergone additional changes since 2001. As a result, there are differences that could affect how RWSL software needs to be programmed so that it works as effectively at other locations as it has at DFW. For example, the ASDE-X prototype system at DFW has not received any of the hardware upgrades installed on the ASDE-X systems being deployed under the national program.

We also found that the ASDE-X prototype fusion process at DFW for RWSL differs from the process used for the national ASDE-X system. This is the process that ASDE-X uses to estimate the location of aircraft and vehicles on the airport surface. It does this by gathering inputs from the three different surveillance mechanisms. For example, for RWSL, ground radar data are transmitted to the RWSL processor separate from other surveillance inputs. By doing so, RWSL has been able to operate effectively during rain because the RWSL safety logic is able to turn off radar data and use multilateration data (from local transponders) only, thus eliminating the impact of rain-induced radar clutter. However, the fusion process used by the national ASDE-X system fuses all three surveillance inputs into one data output. Consequently, an alternative method for filtering rain-induced clutter will have to be implemented and tested to ensure continued reliable RWSL operation. FAA needs to modify RWSL software to address the differences between these systems during early RWSL implementation to limit risks of delays or impaired effectiveness.

Coordinating With Airports To Deploy RWSL In-Ground Infrastructure Concurrently With Airfield Construction

FAA will also need to coordinate with airports that are undergoing airfield construction to ensure that RWSL is installed concurrently to limit unnecessary construction efforts and costs. Although RWSL has progressed through the initial investment decision process, it is not yet a certified system. Therefore, airports cannot use FAA funds (i.e., grants from the Airport Improvement Program) for early installation of RWSL lighting. Nevertheless, several airports, including Los Angeles and Chicago O'Hare International Airports, have expressed interest in installing RWSL early and bearing some of the costs.

Timing the installation of RWSL in-ground infrastructure is critical for these airports as they are both undergoing major runway construction projects. By installing RWSL sites during airfield construction, airports and FAA (after system certification) could save time and money. Lighting standards for RWSL have already been established, and site preparation for the lighting portion of RWSL could be initiated in advance. FAA is working with airport authorities at both Los Angeles and Chicago to determine if this is a feasible effort.

The RWSL program office needs to work with FAA's Airports line of business to identify other airports that are scheduled to receive RWSL and have ongoing or planned runway improvements. This is important to ensure that RWSL in-ground infrastructure is deployed concurrently with the airfield construction to avoid duplicative construction efforts and costs.

Retaining RWSL Program Expertise When Transitioning From R&D to Acquisition

At DFW, the airport operator, FAA management officials, and pilots praised the efforts of the FAA Surface Safety group and its contractor during R&D testing for RWSL. They also commended the group's responsiveness and efficiency in site adaptation of the system. FAA's Surface Safety group and its federally funded R&D contractor (MIT Lincoln Laboratory) have led the R&D process for RWSL since 2001 and are very familiar with the project. Mitigating individual site anomalies is vital to successfully implementing RWSL, and other planned sites could benefit from the "lessons learned" at DFW.

FAA should take advantage of lessons learned during the past 5 years of the RWSL research and development phase at DFW. FAA's own risk assessment indicated that the RWSL safety logic must be designed so that it can adapt to any airport. To address this issue, the risk assessment team recommended that FAA ensure that lessons learned during R&D be passed on to the software designer of RWSL. FAA needs to ensure that the RWSL acquisition program office benefits from the DFW group's RWSL expertise.

Equipping Vehicles With Transponders so They Can Be Detected by RWSL

RWSL works with ASDE-X, which is designed to reduce the risks of ground collisions caused by vehicle operators by providing positive identification of vehicles operating on the airport surface. However, this safety feature will be limited unless airport vehicles are equipped with transponders. If airports equip their vehicles with transponders, they could reduce the risks of these types of runway incursions since RWSL could then track those movements under all conditions.

In addition, during rain, RWSL safety logic filters out ground radar data and uses only multilateration, which requires a transponder. Without transponders, vehicles that enter a runway will not trigger the RWSL to "turn on"; therefore, pilots may not get the warning they need to avoid potential runway incursions caused by vehicle deviations. It is important for FAA to encourage airport officials to equip vehicles with transponders since about 16 percent of all runway incursions are caused by vehicle operators; these types of incursions can pose serious safety risks.

In our October 2007 report on ASDE-X,[1] we recommended that FAA encourage airport officials to equip vehicles with transponders so that ASDE-X can provide positive identification of vehicles. Those actions are equally important for RWSL to work effectively.

Mitigating Delays in FAA's Master Schedule To Limit Adverse Impacts on RWSL Deployment

RWSL operates with ASDE-X and cannot be commissioned at a specific airport until ASDE-X is commissioned at that airport. The initial investment decision for RWSL identifies 19 airports for planned RWSL implementation and includes a proposed deployment master schedule with November 2009 for the first operational site and March 2014 for the final site.

FAA research and development officials told us that they built a 1-year buffer into FAA's proposed RWSL waterfall to compensate for potential delays in the ASDE-X national deployment. The RWSL program office subsequently informed us that it plans to implement RWSL concurrently with the ASDE-X schedule to expedite RWSL deployment, completing all sites by the end of 2011. Therefore, it is imperative that ASDE-X remains on schedule since any delays in its implementation would trigger cascading delays in RWSL implementation.

Our October report stated that FAA had not met its deadlines for installing ASDE–X equipment. During FY 2006, FAA only commissioned four of the seven planned ASDE-X systems. We reported that these schedule delays occurred because of FAA's failure to establish a realistic master schedule through ASDE-X completion that outlines when all activities associated with commissioning each site for operational use will be completed. In response to our draft report, FAA provided us with an updated waterfall schedule. However, the schedule was incomplete and did not address the intent of our recommendation that system deployment should not be considered complete until all planned capabilities are fully tested and in place. We requested that FAA provide us with updated

[1] OIG Report Number AV-2008-004, "FAA Needs To Improve ASDE-X Management Controls To Address Cost Growth, Schedule Delays, and Safety Risks," October 31, 2007. OIG reports can be found on our website: www.dot.oig.gov.

information regarding this issue. It will be important that FAA keep ASDE-X on schedule to avoid delays in both RWSL and ASDE-X implementation.

Expediting RWSL Implementation

FAA has made progress in developing RWSL thus far. FAA successfully conducted R&D and live operational testing at DFW, and FAA's Joint Resource Council approved the RWSL initial investment decision in July 2007. The initial investment decision document included recommendations that FAA finalize (definitize) its acquisition strategy and return it to the JRC for the final investment decision (which sets the stage for system-wide implementation) no later than November 2007.

Obtaining approval from the JRC for the final investment decision is a key milestone because FAA cannot issue a contract for RWSL implementation until the program office obtains that approval. However, the target date for the final investment decision is currently set for July 2008. The RWSL program officials stated that the final investment decision milestone was established to provide sufficient time to prepare the acquisition package, which is required to award a contract.

Expediting the RWSL acquisition is important since the JRC directed the program office, during the initial investment decision, to review alternatives to accelerate the RWSL deployment schedule. In our opinion, setting the target date for the final investment decision 1 year after the approval of the initial investment decision to complete the acquisition package does not meet that direction. Accordingly, we believe that the program office needs to expedite preparation of the acquisition package and establish a new target date for the final investment decision milestone in order to accelerate RWSL deployment.

There is also significant congressional support for expediting RWSL deployment. In the FY 2008 House Appropriations Bill,[2] the Committee provided $20 million for RWSL, an increase of $14.7 million over the budget request.

[2] H. Rep. No. 110-238, "Departments of Transportation and Housing and Urban Development and Related Agencies Appropriations Bill, 2008," (July 18, 2007).

RECOMMENDATIONS

To limit any potential risks that could impact the successful and timely implementation of RWSL, we recommend that FAA:

1. Modify the RWSL software design to address the differences between the ASDE-X prototype system used at DFW for RWSL and the national ASDE-X system being deployed at other airports.

2. Ensure that the RWSL program office (a) coordinates with FAA's Airports line of business to identify locations that are scheduled to receive RWSL and have ongoing or planned runway improvements and (b) secures agreements with those airports to deploy RWSL in-ground infrastructure concurrently with airfield construction to avoid duplicative construction efforts and costs.

3. Ensure that existing RWSL program expertise is retained during the system's transition from R&D to the acquisition phase to capitalize on lessons learned at DFW in addressing system and site-specific anomalies.

4. Expedite preparation of the acquisition package to make the final investment decision earlier than the current July 2008 milestone to accelerate RWSL deployment as directed by Congress and the JRC.

AGENCY COMMENTS AND OFFICE OF INSPECTOR GENERAL RESPONSE

We provided FAA with a draft of this report on November 20, 2007, and received FAA's reply on December 20, 2007. FAA concurred with each of our recommendations and provided appropriate planned actions and target dates.

- **Recommendation 1:** FAA stated that the RWSL program office is developing the requirements for the needed ASDE-X interfaces and will implement the software by September 30, 2009.

- **Recommendation 2:** FAA stated that the RWSL program office is in the process of coordinating with the Airports line of business and is working towards securing agreements with specific airports by September 30, 2008.

- **Recommendation 3:** FAA stated that the RWSL program office has been coordinating with the R&D office and MIT Lincoln Laboratory to create a transition plan and ensure an efficient transfer of technology and lessons learned. FAA stated that these actions will be completed by March 31, 2008.

- **Recommendation 4:** FAA stated that the RWSL program office is exploring different options to expedite the acquisition and will issue a Request for Offer by February 2008.

FAA also provided several general comments, such as referring to the ASDE-X system at DFW as a prototype system. We incorporated FAA's suggested changes as appropriate. FAA's response is included in the appendix to this report.

ACTIONS REQUIRED

FAA's response and planned actions address the intent of our recommendations. Therefore, we consider these recommendations resolved.

We appreciate the courtesies and cooperation of FAA representatives during this audit. If you have any questions concerning this report, please contact Lou Dixon Assistant Inspector General for Aviation and Special Program Audits, at (202) 366-0500 or Dan Raville, Program Director, at (202) 366-1405.

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cc: FAA Acting Deputy Administrator
Anthony Williams, ABU-100

EXHIBIT A. SCOPE AND METHODOLOGY

We conducted this performance audit in accordance with generally accepted Government Auditing Standards prescribed by the Comptroller General of the United States. As required by those standards, we obtained evidence that we believe provides a reasonable basis for our findings and conclusions based on our audit objectives. We conducted this review between June 2007 and November 2007 using the following methodology.

To evaluate the viability of RWSL and FAA's progress in implementing this technology, we:

- reviewed RWSL research and development documents, including operational concept, operational evaluation (live testing) reports, pilot survey results, and the research management plan.

- interviewed FAA Air Traffic Organization officials from the Technology Development—Surface Systems Group; Financial Services, Capital Expenditures—F&E Requirements NAS Baseline Management Group; and FAA Airport Safety and Standards representatives.

- conducted a site visit to DFW airport where RWSL is being tested and observed RWSL in operation from the air traffic tower and airport surface.

- interviewed DFW's local FAA Air Traffic Management officials, National Air Traffic Controllers Association representative, airport operator, airline pilot union and safety officials (Allied Pilots Association and ALPA), and contractor representatives from MIT Lincoln Laboratory.

- met with ALPA headquarters officials to discuss their concerns.

We did not rely on information contained in data bases maintained by the Agency as part of this review. Therefore we did not conduct a data reliability assessment.

EXHIBIT B. MAJOR CONTRIBUTORS TO THIS REPORT

THE FOLLOWING INDIVIDUALS CONTRIBUTED TO THIS REPORT.

Daniel Raville	Program Director
Mary (Liz) Hanson	Project Manager
Annie Glenn Bungo	Senior Analyst
Benjamin Huddle	Analyst
Tasha Thomas	Analyst
Andrea Nossaman	Writer-Editor

APPENDIX. AGENCY COMMENTS

Federal Aviation Administration

Memorandum

Date: December 20, 2007

To: Robin Hunt, Acting Assistant Inspector General for Aviation and Special Program Audits

From: Ramesh K. Punwani, Assistant Administrator for Financial Services/CFO

Prepared by: Anthony Williams, x79000

Subject: OIG Draft Report: FAA's Implementation of Runway Status Lights (RWSL) Federal Aviation Administration

Thank you for providing us the opportunity to review and comment on your draft report entitled: "FAA's Implementation of Runway Status Lights Federal Aviation Administration", dated November 20.

Below is the agency's response to each of the recommendations cited in your report. While the FAA concurs with all the recommendations, we are of the opinion that various areas of the report will require additional clarification before the final report is released. Following the response to the recommendations, we have provided comments addressing our concerns to statements made in the body of the report.

Recommendation 1. Modify RWSL software design to address the differences between the ASDE-X system used at DFW for RWSL and the national ASDE-X system that FAA is deploying at other airports.

FAA Response: Concur. The RWSL program office is developing the requirements governing the interfaces to the Airport Surface Detection Equipment Model X (ASDE-X) as part of the RWSL acquisition process. The specification will state that the RWSL processor shall receive surveillance, status, and operational configuration data from the ASDE-X system in accordance with the latest version of the ASDE-X Interface Description Document. The RSWL software will be implemented by September 30, 2009.

Recommendation 2. Ensure that the RWSL program office (a) coordinates with FAA's Airports line of business to identify locations that are scheduled to receive RWSL and have ongoing or planned runway improvements and (b) secures agreements with those airports to deploy RWSL in-ground infrastructure concurrently with airfield construction to avoid duplicative construction efforts and costs.

FAA Response: Concur. The RWSL program office is coordinating with the Airports line of business and also plans to secure agreements with airports. The RWSL program office, based on the availability of funding and the alignment of schedules, will pursue concurrent airfield construction where possible. Planning dates will be coordinated with airfield construction dates. We anticipate this to occur by September 30, 2008.

Recommendation 3. Ensure that existing RWSL program expertise is retained during the system's transition from R&D to acquisition phase to capitalize on lessons learned at DFW in addressing system and site-specific anomalies.

FAA Response: Concur. The RWSL program office has been coordinating with the R&D offices. Several meetings have been held to gain a better understanding of the R&D activities, not only concerning the prototype RWSL system at Dallas/Ft. Worth, but also future R&D technology development activities related to runway incursions. As a result of these meetings a transition plan is being developed by the R&D office to ensure an efficient transfer of technology and lessons learned. The RWSL program office has also had meetings with Lincoln Laboratories, the developer of the prototype system software, to discuss the system, as well as lessons learned. RWSL program office personnel went to Dallas/Ft. Worth to view the prototype system and meet with individuals at the airport involved in the RWSL prototype operation. Meetings have been held with the R&D office, Lincoln Laboratories, and other functional organizations to further discuss and execute the technology transfer. Action will be considered complete in 2Q, FY08 (March 31, 2008) when the program office funds Lincoln Laboratories for technical support.

Recommendation 4. Expedite preparation of the acquisition package to make the final investment decision earlier than the current July 2008 milestone to accelerate RWSL deployment as directed by Congress and the JRC.

FAA Response: The FAA concurs with this recommendation and has been exploring different acquisition strategies for the acceleration of the schedule. RWSL Request for Offer (RFO) release is scheduled for February 2008.

Note: FAA's response also included minor general comments (e.g., suggested wording changes) that did not have any bearing on our report's findings and recommendations. We incorporated these suggestions as appropriate but did not include them in the appendix.

The following page contains textual versions of the graphs and charts found in this document. This page was not in the original document but has been added here to accommodate assistive technology.

FAA's Implementation of Runway Status Lights (RWSL)

508 Compliant Presentation

Figure 1. Diagram of Entrance Lights

Diagram shows aircraft stopped at hold line by red lights. This alerts the pilot to wait until runway is clear before entering.

Figure 2. OIG Photo of Runway Entrance Lights

At Dallas-Forth Worth International Airport, the audit team observed illuminated runway entrance lights signaling that an intersecting runway, Runway 18L, was not clear for entrance due to a departing aircraft on the runway.

Figure 3. Diagram of Take-Off Hold Lights

Diagram shows take-off hold lights illuminating red to alert a pilot waiting to take off that another aircraft or vehicle is either on or about to enter the runway in front of the aircraft.

Figure 4. OIG Photo of Take-Off Hold Lights

At Dallas-Forth Worth International Airport, the audit team observed take-off hold lights illuminate red on runway 18L. This alerted the pilot awaiting take-off that the runway was unsafe to depart due to an aircraft crossing the runway in the distance.

Figure 5. Diagram of RWSL Surveillance Sources

The diagram shows RWSL in use at an airport. It depicts the use of three sources of surveillance input to provide position of aircraft and vehicles on the airport surface so that the light technology can operate. The three sources depicted are: airport surface radar, transponder multilateration, and approach radar.

Figure 6. Number of Runway Incursions at Dallas-Forth Worth International Airport, Runway 18L/36R Where RWSL Is Installed (Note: Runway incursions are graded by severity of the incident [A through D]. Category A is the most severe, and Category D is the least severe.)

In the 29 months before RWSL testing started at Dallas-Fort Worth International Airport (October 1, 2002 through February 28, 2005), there were 10 runway incursions. Four of these were Category C incidents, and six were Category D incidents. In the 29 months after RWSL testing started at Dallas-Fort Worth International Airport (March 1, 2005 through July 31, 2007), there were three runway incursions. All three incursions were Category D incidents (least severe category).