

Digital NOTAM Originators
Safety Risk Management Document (SRMD)



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EXECUTIVE SUMMARY

The Federal Aviation Administration (FAA) Safety Management System (SMS) and Acquisition Management System (AMS) Guidance Document (the Safety Risk Management Guidance for System Acquisitions (SRMGSA)), outlines policy and guidance to be used by the Air Traffic Organization (ATO) on conducting Safety Risk Management (SRM) assessments for all systems acquired by the FAA. The policy and guidelines set forth in this document require a thorough safety analysis and documentation as a prerequisite for introducing a new system or a new process into the National Airspace System (NAS). This SRM document (SRMD) provides the required evidence to support the safety of the changes proposed by the Aeronautical Information Management (AIM) Program Office for originators to directly enter digital Notices to Airmen (NOTAMs) to the United States NOTAM System (USNS).

NOTAMs are alerts issued to pilots and other users of the National Airspace System which warn them about changes that may impact whether and how they travel through the NAS. Accurate and timely distribution of NOTAMs is essential to the safety and efficiency of the NAS. The current legacy NOTAM system has changed little over the last 50 years in that NOTAMs are still issued in all capital letters (which make them difficult to read) and contain hundreds of contractions which are difficult to remember and thus interpret.

Giving NOTAM originators the ability to directly enter *digital*¹ NOTAMs via a new software tool or system interface is a key component of the FAA's AIM Modernization Plan and directly supports the Next Generation Air Transportation System commonly referred to as NextGen². This software tool: NOTAM Manager – a Web-based software application to be used by most of the NOTAM originators – is currently being used by 10-12 airports with continuously operating air traffic control towers.³

NOTAM Manager is a tool which uses a series of drop-down menus, templates and scenarios to create and cancel quality digital NOTAMs. Quality is assured because the menus, templates and

¹ Digital NOTAM as used in this document refers to a NOTAM which is created according to the Aeronautical Information Exchange Model (AIXM) format.

² NextGen is an umbrella term for the ongoing, wide-ranging transformation of the National Airspace System (NAS). At its most basic level, NextGen represents an evolution from a ground-based system of air traffic control to a satellite-based system of air traffic management. This evolution is vital to meeting future demand, and to avoiding gridlock in the sky and at our nation's airports.

³ A Safety case (SRMD) covering these airports was issued on August 26, 2009.

scenarios are based upon the requirements of the NOTAM Manual (JO 7930.2) currently used by Flight Service and/or the United States NOTAM Office to ensure that quality NOTAMs are produced. Just as the conversion from analog to digital in the broadcast television world has opened up a vast array of new options and capabilities in broadcasting (more stations, better displays, more options for the users) “digitizing” aeronautical information will provide more accurate and timely information about hazards to pilots and other users in the NAS. Digitalizing NOTAMs make them easier to be displayed in a graphical format and “pushed” to the cockpit for a near real-time display to pilots. This will also ensure that all users of the NAS have a common operating picture for their flights.

Some NOTAM originators who already have extensive software systems (a NOTAM Manager-like tool) will only need a machine to machine connection to the Federal NOTAM System – called a system interface.

Because NOTAM Manager is Web-based, it is unlikely that originators will have to purchase any new hardware or software. Originators will instead use equipment which is currently available – their own personal computers with an Internet connection and browser. NOTAM Manager and the Federal NOTAM System will be maintained by the FAA AIM Program Office (AJV-2) on AIM servers.

The Safety Risk Management Panel (SRMP) consisted of key stakeholders, subject matter experts and users of NOTAMs. Key stakeholders affected by this SRMD include personnel from all four lines of business within the FAA as well as users of the NAS such as pilots and the flying public. This SRMD will address each individual group of NOTAM originators and the hazards associated with a direct-entry NOTAM system for all NOTAM originators.

The SRM Panel members identified six hazards that were then evaluated by the Panel. Those hazards are:

1. Data corruption due to humans
2. Data corruption due to machines
3. System unavailability due to loss of power, connection, system latency
4. Lack of synchronization between the new system and the legacy system
5. Data entry error by the originators
6. Failure to notify the affected ATC facility

The SRMP defined, assessed and analyzed the listed hazards in terms of their severity and likelihood of occurrence to the system in accordance with the SRMGSA. Each hazard was evaluated by the Panel for each NOTAM originator. Finally, each hazard was then reanalyzed

with the appropriate hazard mitigations (recommended controls) in place. In two cases the initial hazards were identified as medium, but with mitigations all hazards were identified as LOW. Figure A below shows that all of the Predicted Residual Risks were identified as LOW and thus in the green. The SRM Panel and AIM Program Office identified several proposed tracking and monitoring controls to ensure the accuracy of the hazard determinations. Detailed hazards risk analysis is documented in Section 7 of this SRMD and in Appendix A. Tracking and monitoring controls are detailed in Section 9 of this SRMD.

This SRMD was reviewed by the Panel members and all comments received were addressed.

This SRMD may be updated or changed as required.

Figure A shows that all of the predicted residual risks are identified as LOW hazards and in the green range.

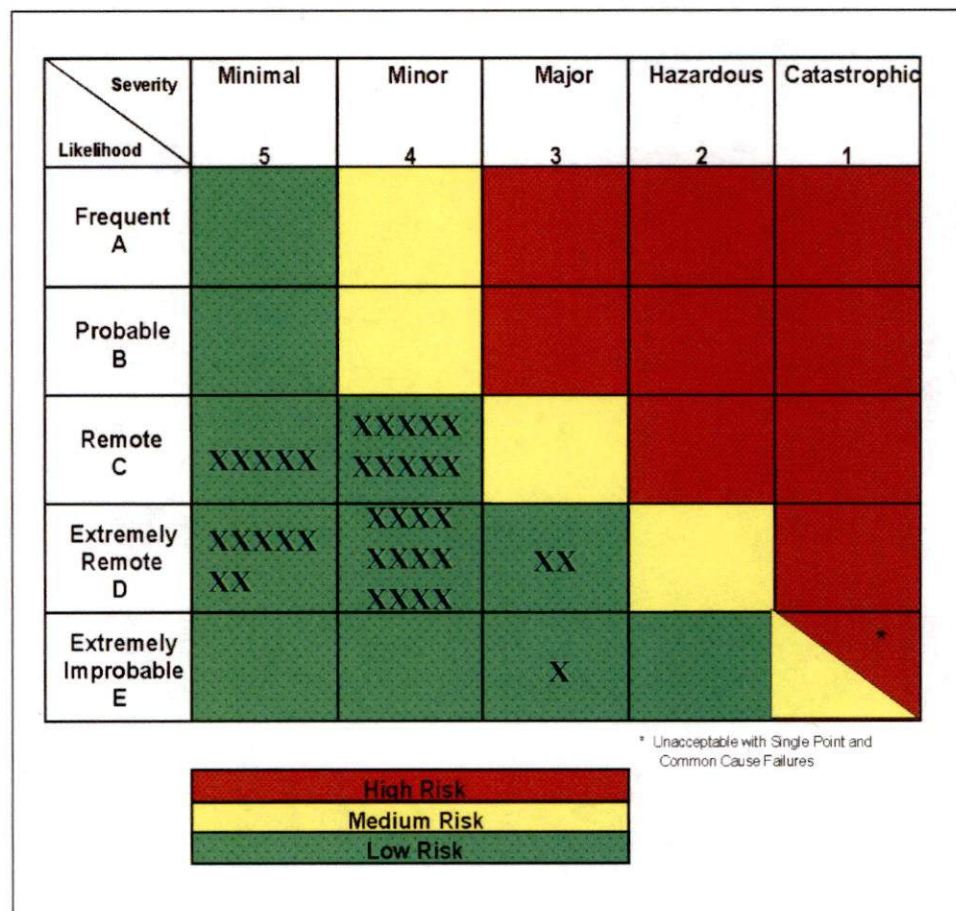


Figure A – All Predicted Residual Risks are identified as LOW hazards for ALL NOTAM originators. The “x’s” represent a summary display of all of the risks associated with each NOTAM originator referred to in this document.

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Introduction

Accurate and timely distribution of aeronautical information is essential to the safety and efficiency of the National Airspace System (NAS) and the public which travels through it. Just like the weather, aeronautical information can change quickly. Thus, information that directly affects safety must be distributed in near real time since any delay may result in increased risk. Notices to Airmen (NOTAMs) are issued to inform aviation professionals including pilots, air traffic controllers and dispatchers of temporary changes that may impact air travel, such as runway closures for snow removal, outages in navigation aids or airspace restrictions due to military flights or Presidential movements.

The existing complex legacy NOTAM system is based on out-of-date teletype technology. The result is NOTAMs that are difficult to read (because they are in all capital letters) and interpret (because they contain countless abbreviations). Also, they take too long to input into the system because too many people in multiple locations are required to input the information and check it to ensure its quality. Delays and inefficiencies in the existing legacy NOTAM origination process can result in contradictory NOTAM information as the system cannot keep up with fast-paced changes such as snow conditions on runways. This not only leads to user frustrations, but also reduces safety when important NOTAMs are delayed, overlooked or misinterpreted. Users of the NOTAM system have requested that all NOTAMs be collected, reviewed, and approved by a single system. In other words, they want “one-stop shopping.” This has been a consistent theme in numerous studies, interviews and industry surveys including human factor studies performed for the Federal Aviation Administration (FAA) by American Institutes for Research (AIR).

To enhance the ability of both United States and international stakeholders to use NOTAM data more efficiently and safely, the FAA implemented an initiative to modernize the NOTAM system. Begun in 2007, Phase 1 brought former local NOTAMs (L NOTAMs) into the United States NOTAM System (USNS), by reclassifying them as D NOTAMs (Distant NOTAMs) – now combined which shall be referred to as Domestic NOTAMs in this document. This made all NOTAM information available to all users through a single source. The Safety Risk Management Document for the Phase 1 NOTAM Realignment was completed on October 4, 2007.

The next phase (Phase 2) of NOTAM modernization is the new Federal NOTAM System (FNS). It will be the centerpiece of the FAA’s AIM Modernization plan going forward which will get NOTAMs into the system faster and more accurately. Just as broadcast television has moved from analog signals to digital, so too will the FAA’s NOTAM system. The FNS will create NOTAMs that are digital by using the internationally accepted Aeronautical Information Exchange Model (AIXM) format. This change will help NOTAMs meet the FAA’s NextGen

goal for System Wide Information Management (SWIM). Digital NOTAMs are much more versatile than today's text NOTAMs. They can be converted into graphical form and uplinked to pilots in the cockpit, displayed in plain language rather than in multiple confusing contractions and distributed and used by a variety of different organizations and users much faster.⁴ All of these NOTAM modernization efforts will improve the dissemination of aeronautical information leading to increased safety in the NAS.

Phase 2 includes a complete redesign of how NOTAMs get into the system, including updating the NOTAM processes, policies and technologies. The Federal NOTAM System will allow all the originators (such as airports, obstruction tower light operators, navigation equipment technicians, technical operation procedure specialists, etc.) to directly enter NOTAMs to the US NOTAM System rather than go through a third party such as Flight Service. The NOTAM originators will either directly enter digital NOTAMs via the NOTAM Manager software tool or via a system interface. The system interface connects the NOTAM originator's own software tool directly to the Federal NOTAM System.

This document is the Safety Risk Management Document (SRMD) for this national change to the NOTAM entry process. However, in order to test and prove the concept prior to the FAA's final investment decision, the AIM Program Office tested the direct-entry of digital NOTAMs at multiple airports with continuously operating air traffic control towers - allowing them to directly enter all Airport Surface Area NOTAMs. That Safety Risk Management Document was completed on August 26, 2009.

Following the 2009 Direct-entry Digital NOTAM System Test for Large Airports with Continuously Operating Air Traffic Control Towers SRMD (referred to above), up to twelve airports⁵ have been approved to issue and take responsibility for their own NOTAMs using the new NOTAM Manager software tool.

As with all Safety cases, tracking and monitoring has been used to check the validity of the hazards identified in the 2009 Safety case and their levels. No additional risks have been identified since the deployment at the airports and there have been no changes in hazard levels during the monitoring phase. The previous SRMD was shared with the Panel members of this safety case and was used as a model for this SRMD.

⁴ Digital NOTAMs can also be displayed in the international format required by the International Civil Aviation Organization (ICAO).

⁵ These airports include: Atlantic City, NJ, Ft. Wayne, IN, Fairbanks, AK, Denver, CO, Norfolk, VA, Richmond, VA, National Airport, Washington, DC, Midway in Chicago, IL, Memphis, TN, Dulles in Washington, DC, Baltimore-Washington Marshall Airport, MD, and O'Hare in Chicago, IL.

This national NOTAM originators safety case will replace and expand the August 26, 2009 safety case and cover all originators of NOTAMs. However, this SRMD may be updated or modified as more information becomes available regarding the proposed deployment of NOTAM Manager or system interface to NOTAM originators.

This Safety case will include the following originators of NOTAMs:

- Airports with operating air traffic control towers
- Airports without operating air traffic control towers
- Obstruction Tower Light Operators
- Technical Operations equipment and facility operators
- Airspace NOTAM originators
- GPS NOTAM originators
- FDC NOTAM originators

The FAA will provide each of the above categories of originators with either a new Web-based software tool to enter their NOTAMs or the requirements for them to create their own tool and then a system interface. In each case, the software will be based upon the requirements found in the NOTAM Manual (FAA JO 7930.2) to ensure quality control.

Thus, depending on the circumstances of their specific NOTAM origination process, each originator will either be provided with a new, direct-entry NOTAM tool like that currently being used by the airports (called NOTAM Manager) or the requirements for them to develop a system interface⁶ to connect directly to FNS. In either case, the NOTAM Manager tool or the system interface will connect with FNS and thus enter new NOTAMs and NOTAM cancellations into the USNS.

By providing the NOTAM originators with the ability to create and cancel their own NOTAMs using tools which ensure quality control, the need for intermediaries (such as Flight Service) in between the NOTAM originators and NOTAM processors and users is eliminated.

Responsibility for the accuracy of NOTAMs will remain with the NOTAM originators as it is today. And this new system will not change the responsibility of the United States NOTAM

⁶ The system interface does not require a NOTAM Manager- like tool to be created by the FAA because the NOTAM originator already has a tool which includes most of the information required by their NOTAMs and thus their tool can be more easily modified according to the FAA requirements and then connected directly to the FNS.

Office (USNOF) to monitor all NOTAMs for compliance with NOTAM format as outlined in the NOTAM Manual.

As a back-up, the existing legacy submission process will remain in place and will also be used as a fall-back for any NOTAMs which cannot be created using the NOTAM Manager tool or the system interface or when those systems are not operating properly.

NOTAM Manager is Web-based; hence it is unlikely any new hardware or software will be installed at the originator's location. Instead, NOTAM Manager and FNS will interface with the USNS through connections with NAS Aeronautical Information Management Enterprise System (NAIMES). All NOTAM Manager software and FNS will run on AIM servers.

This document summarizes the conclusions of the NOTAM Originators Safety Risk Management Panel (SRMP) that evaluated the safety risks associated with providing NOTAM originators the ability to submit candidate NOTAMs directly to the US NOTAM System.

It is anticipated that prior to deployment the AIM Program Office will conduct at least one human factor's study on each originator's new software tool to ensure it is compliant with FAA human factor's guidelines and thus is user friendly.

The two Figures that follow provide an overview on how NOTAMs currently get into the system and how future NOTAMs will enter the system following the deployment of the new NOTAM Manager software tool or system interface.

Figure 1 describes the current system for NOTAM entry into USNS and ATC notification.

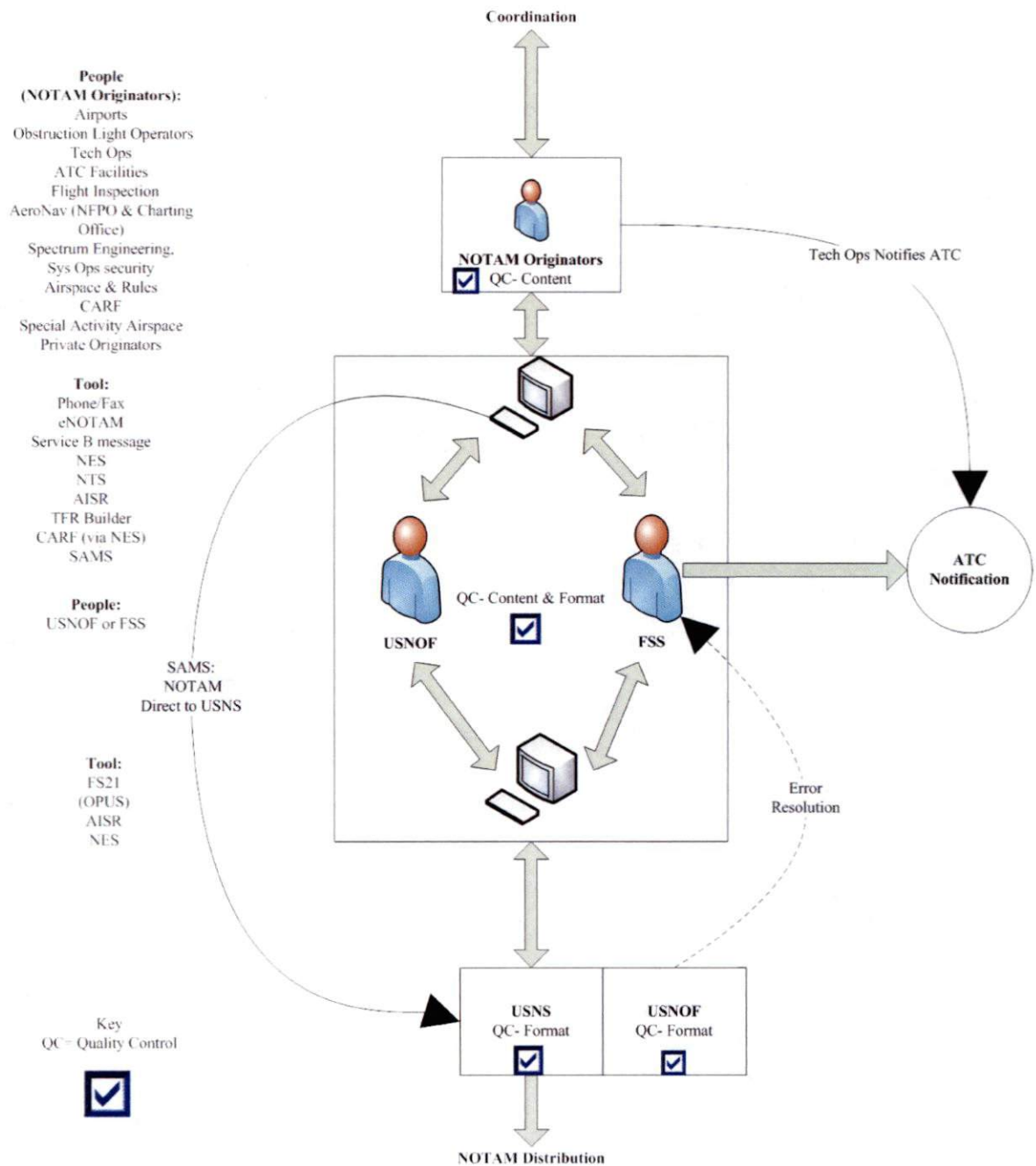


Figure 1 – Current NOTAM process

Figure 2 describes the proposed future system for NOTAM entry into USNS and ATC notification

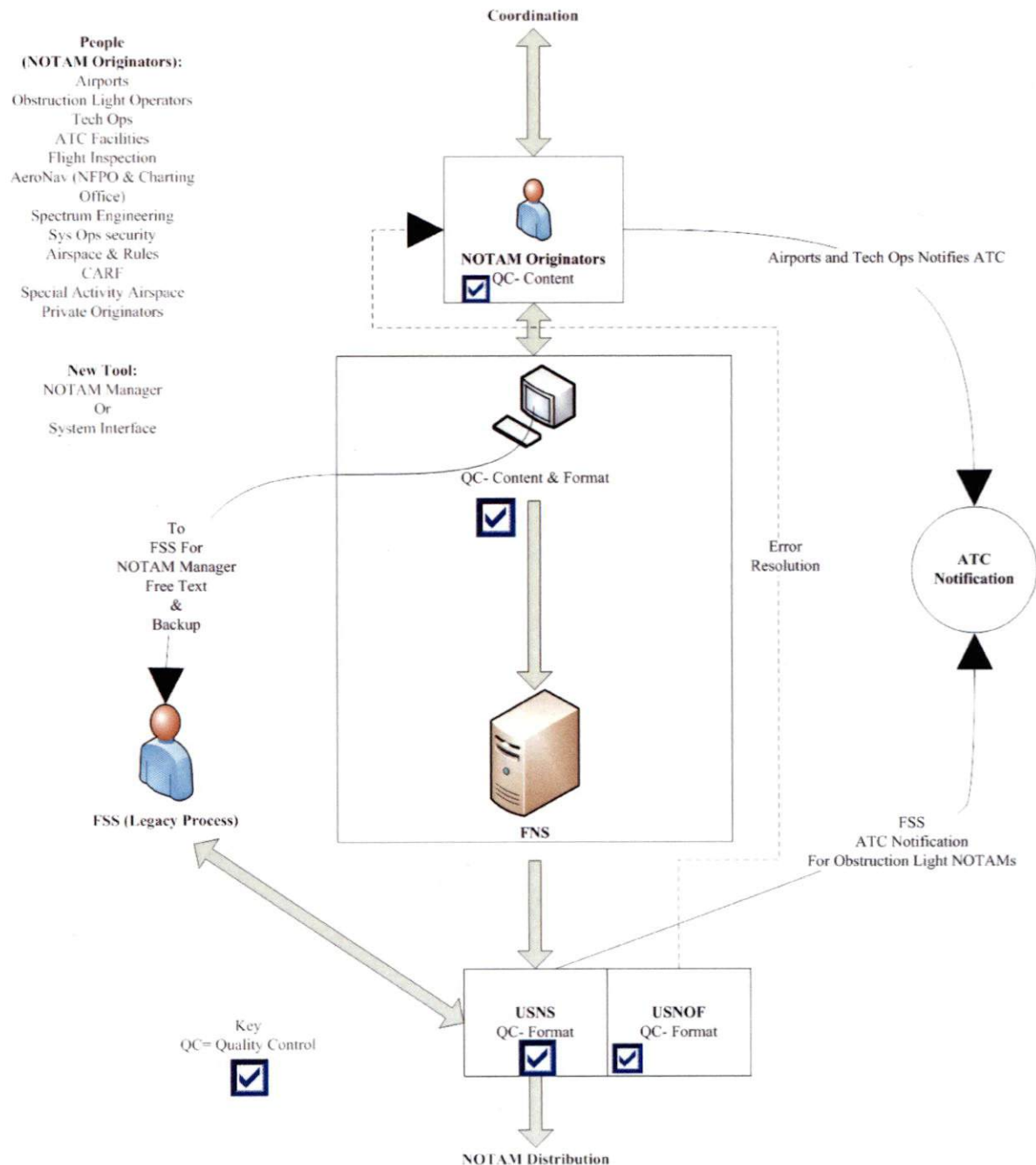


Figure 2 – Future NOTAM process

Section 1- Current System (System Baseline)

Current Configuration Management (CM) Baseline. At the present time there is no operational single software system that performs the function that the NOTAM Manager tool and the FNS system will perform. Therefore, there will be no change to the current Configuration Management baseline. Further, the NOTAM Manager tool and FNS system is a Web-based software system located on the Aeronautical Information Management's servers. All future FNS tools and system interfaces will also be Web-based and thus will not change the current Configuration Management baseline.

- A. FAA Order JO 7930.2, Notices to Airmen (NOTAM).** This FAA Order prescribes the procedures used to obtain, format and disseminate information on unanticipated or temporary changes to components of, or hazards in, the National Airspace System (NAS) until the associated aeronautical charts and related publications are amended. Any changes to this order due to the NOTAM Manager tool and FNS system described herein are fully described in Letters of Agreement such as the sample attached to this document as Appendix E.
- B. Advisory Circular (AC) 150/5200-28D, Notices to Airmen (NOTAMs) for Airport Operators.** This advisory circular "NOTAMs for Airport Operators" provides guidance on using the NOTAM system for airport condition reporting. It is intended primarily for airport operators, or their agents, who monitor and manage the day-to-day operation of the airport and who may also have operational responsibility for certain airport-related facilities. The NOTAM Manager tool and FNS system described in this document will change the roles and responsibilities of the Airport or FAA facilities by eliminating their requirement to coordinate NOTAMs through Flight Service.
- C. FAA Order 8260.19, Flight Procedures and Airspace.** Flight Standards Service (AFS) is responsible for the use of air navigation facilities, equipment and systems by aircraft operating in established environments and the National Airspace System (NAS). Flight Procedures and Airspace Program is vested in the Flight Technologies and Procedures Division (AFS-400) of AFS. This Order is primarily concerned with those offices having direct responsibility for the accomplishment of the Flight Procedures and Airspace Program. The NOTAM Manager tool and FNS system described in this document will not change any roles and responsibilities of AFS-400 as described in this Order.
- D. Advisory Circular (AC) 70/7460-1K, Obstruction Marking and Lighting.** This advisory circular "Obstruction Marking and Lighting" provides guidance for proper obstruction lighting procedures. It states when the Federal Communications Commission (FCC) and FAA should be notified of new obstruction construction and it outlines the Notice to Airmen (NOTAM) procedures for inoperative obstruction lights.
- E. Advisory Circular (AC) 150/5345-43, Specification for Obstruction Lighting Equipment.** This advisory circular "Specification for Obstruction Lighting Equipment" provides guidance on proper illumination for obstructions and the requirement for the

automated monitoring of the operation of obstruction lights. The NOTAM Manager tool and system interface described in this document will not change any roles and responsibilities as described in this Advisory Circular

F. FAA Order JO 7210.3, Facility Operation and Administration. This order provides direction and guidance for the day-to-day operation of facilities and offices under the administrative jurisdiction of the Federal Aviation Administration's Air Traffic Organization. Any changes to this order due to the NOTAM Manager tool and system interface described herein are described in Letters of Agreement such as the sample attached to this document as Appendix E.

G. FAA Order 6000.15, General Maintenance Handbook for NAS Facilities. This order establishes the Air Traffic Organization (ATO) maintenance program for the Technical Operation Services. The NOTAM Manager tool and system interface described in this document will not change any roles and responsibilities of ATO-W as described in this Order.

H. FAA Order 8200.1, US Standard Flight Inspection Manual. This order establishes standardized procedures for flight inspection of air navigation services. The NOTAM Manager tool and system interface described in this document will not change any roles and responsibilities as described in this Order.

Current System

The Notice to Airmen (NOTAM) system provides mission-essential information to personnel concerned with flight and airport operations. NOTAMs provide timely information on unanticipated or temporary changes to components of, or hazards in, the National Airspace System (NAS). Component changes may pertain to facilities, services, procedures or hazards in the NAS. All air traffic employees, regardless of position, are required to report any situation or condition considered hazardous to flight to an air traffic facility for appropriate action. Once an unsafe condition is identified, the process of getting the information into the NOTAM system is dependent upon who has both the physical capability and regulatory authority to enter the information.

Each NOTAM category is created and processed through at least one group of individuals and at least one computer tool to ensure both the substantive and format quality of the NOTAM before the NOTAM is sent to the United States NOTAM system (USNS) and distributed to the users of the NAS.

According to the NOTAM Manual (JO 7930.2), NOTAMs are classified into four groups:

- 1) D NOTAMs⁷ In this document we have renamed all these D NOTAMs as Domestic NOTAMs to ease in comprehension. These Domestic NOTAMs include information

⁷ D NOTAMs were formerly known as Distant NOTAMs when the FAA also used local NOTAMs. Both Distant and Local civil NOTAMs were combined in 2008 and are called Domestic NOTAMs in this document

pertaining to mostly public use airports listed in the Airport Facility Directory, facilities, and services as well as navigation aids and communication services. Domestic NOTAMs are subdivided into groups and listed under the keywords: Runway (RWY), Taxiway (TWY), Apron (APRON), Ramp (RAMP), Aerodrome (AD), Obstruction (OBST), Navigation aids (NAV), Communication aids (COM), Service (SVC), AIRSPACE, Other (O) and Unverified (U).

Graphic Departure Procedure, Standard Instrument Departure (SID) and Standard Terminal Arrival (STAR) NOTAMs are currently Domestic AIRSPACE NOTAMs as well as Central Altitude Reservation Function (CARF) and Special Activity Airspace (SAA) or sometimes called Special Use Airspace (SUA)) NOTAMs. SAA NOTAMs are created and sent via the Special Activity Management System (SAMS), a NOTAM entry tool.

- 2) FDC NOTAMs include flight information that is regulatory in nature including changes to IFR charts, procedures and airspace usage such as Temporary Flight Restrictions (TFR). These NOTAMs are created and sent via TFR Builder, the NOTAM Entry System (NES), NOTAM Tracking System (NTS), phone or fax to the US NOTAM Office (USNOF) and then into the USNS.
- 3) Pointer NOTAMs highlight or point out another NOTAM such as an FDC or Domestic NOTAM and are created by Flight Service mainly for briefing purposes.
- 4) Military NOTAMs pertain to navigation aids or airports that are used by the US military within the National Airspace System. These NOTAMs are created in the Defense Internet NOTAM Service (DINS) tool by US military personnel and are then transmitted into the USNS.

All of the above NOTAMs are published in the United States NOTAM System (USNS) and disseminated via several systems including Weather Message Switching Center Replacement (WMSCR), National Airspace Data Interchange Network (NADIN), Aeronautical Information System Replacement (AISR), En Route Information Display System (ERIDS) and other distribution systems.

I. DOMESTIC NOTAMs

Domestic NOTAMs are originated by several NAS stakeholders including airports, obstruction tower light operators⁸, FAA Technical Operations Services, FAA Air Traffic Control (ATC) facilities and other state or local authorities that operate, monitor, and maintain aviation equipment or facilities. In most of these cases, the originator of the NOTAM forwards NOTAM information via phone, fax or Internet (eNOTAM) to Flight Service for NOTAM creation.

According to the NOTAM Manual (JO 7930.2), Flight Service Station (FSS) specialists are responsible for the quality of the NOTAM including classification, accuracy, format, dissemination, and cancellation of NOTAM information. The FSS then sends the proposed

⁸ The definition of obstruction light operators is highlighted below in section B.

NOTAM to the USNS. The USNS performs an automated validation check which verifies the accountability, location, key word, and date-time references of the proposed NOTAM. If the proposed NOTAM passes this check, the proposed NOTAM receives a specific code and is published and disseminated to the users. NOTAMs which do not pass this check are not numbered and the USNS sends a message back to the FSS indicating that the NOTAM failed the validation check and was not published.

After publication the NOTAM goes into a queue where it can be reviewed by the US NOTAM Office (USNOF) personnel for another quality check to determine if there are any formatting errors. The USNOF is responsible for ensuring the proper format such as the proper use of contractions for each NOTAM. USNOF personnel can either pass the NOTAM along without any changes or if a formatting error is found, correct it so long as the intent of the NOTAM is not changed. Although USNOF has the ability to change NOTAMs without cancelling and reissuing the NOTAM, doing so may result in a NOTAM with the same number being issued with two different meanings. Thus, USNOF is only permitted to make formatting changes to the NOTAM when the error is obvious and the intent of the NOTAM is not in doubt. If USNOF detects a formatting error and does not edit the NOTAM, they must contact Flight Service and request that the NOTAM be cancelled and reissued after the error has been corrected.

During NOTAM processing, the USNS not only gives the NOTAM a number, it also gives it a specific error code. A 00 code indicates the NOTAM likely has no errors, while a 07 code indicates that the NOTAM may have an error. The 07 coded NOTAMs are given closer scrutiny by the USNOF to make sure they contain no formatting errors according to FAA NOTAM policy found in the NOTAM Manual. If errors are found, the NOTAM is either edited by USNOF personnel or they send a message back to Flight Service indicating that the NOTAM should be cancelled and replaced by a proper NOTAM.

Examples of situations that would require the origination of a Domestic NOTAM include an airport closing a taxiway for construction, a tower obstruction light operator reporting a light which is out of service, a technician reporting an Instrument Landing System (ILS) equipment that is out of service, a specialist reporting the use of airspace by the military or a state or local airport authority reporting an outage of their fuel services.

DOMESTIC NOTAM ORIGINATOR TYPES

A. Airports

Airport management responsibilities are outlined under 14 Code of Federal Regulations Parts 139 and 157 and in FAA Advisory Circular AC 150/5200-28. These regulations and guidance provide that the management of a public use airport is expected to make known, as soon as practical, any condition on or in the vicinity of the airport, existing or anticipated, that will prevent, restrict, or present a hazard during the arrival or departure of aircraft. Airport management is also responsible for observing and reporting the condition of airport movement areas. The FAA's Office of Airport Safety and Standards enforces these regulations.

Airport NOTAMs include: 1) movement area NOTAMs under the keywords of RWY, TWY, APRON, and RAMP, 2) aerodrome (AD) NOTAMs such as a beacon light which is out of service, 3) NOTAMs concerning any service operated by the airport or aviation equipment owned or maintained by the airport and 4) obstructions (OBST) on the airport such as temporary cranes.

NOTAMs related to the outage of FAA navigation and communication aids or equipment on or near an airport are the responsibility of the FAA's Technical Operations Service and listed separately below in Section C.

Airport management is responsible for observing and reporting the condition of obstruction light outages on and near airports as defined in section 12 of Advisory Circular 150/5200-28D. Specifically, these lights would include those within airport boundaries such as lights on temporary cranes. It is the responsibility of persons or organizations that operate obstructions to report the improper functioning of obstruction lights to Flight Service. NOTAM responsibilities of obstruction tower light operators, such as cell phone tower or broadcast tower operators are listed separately below in Section B.

Under the current system (excluding the 10-12 airports where the FAA has deployed its NOTAM Manager tool) any temporary condition or hazard which requires an airport NOTAM is reported by the airport to Flight Service (FSS) by phone, fax or Internet service (eNOTAM system). FSS also performs the notification function required by NOTAM policy, by contacting the affected Air Traffic Control (ATC) facilities and alerting them to the NOTAM.

B. Obstruction Tower Light Operators

14 Code of Federal Regulations Part 77 establishes the standards and notifications requirements for objects affecting navigable airspace. If an object meets the criteria outlined in Part 77, the obstruction is required to be lit. These obstructions include cell phone towers, radio and TV broadcast towers, other antennas, buildings, cranes, stacks, etc. Every obstruction which is required to be lit must be registered with the FAA and is given an Aeronautical Study Number (ASN). Antenna towers requiring registration with the Federal Communication Commission (FCC) are also identified by their Antenna Structure Registration (ASR) Number. Any outage of an obstruction light lasting longer than 30 minutes must be reported as a NOTAM.

Obstruction lights out NOTAMs are important because pilots must have all available information when planning a safe altitude for a flight. These NOTAMs are especially important to helicopter traffic because they fly at low altitudes. When creating Obstruction light out NOTAMs the particular obstruction is identified by its FAA/ASN number, its FCC/ASR number or Latitude/Longitude, cardinal direction and distance from the nearest airport for those obstructions not registered with the FCC.

The Obstruction lights out NOTAM process begins when an obstruction light is either out of service or not operating properly and the obstruction operator becomes aware of a light out condition. Light out conditions are detected either by inspections occurring at least once every 24 hours or by means of a continuously operated monitoring system.

Once a light out condition is known, the operator must contact Flight Service (FSS) via phone, fax or eNOTAM and report the light out condition. The information received from the operator is then formatted into a NOTAM which is sent to the US NOTAM System (USNS) by Flight Service. Just like airport NOTAMs identified above, FSS performs the notification function required by NOTAM policy, by contacting the affected ATC facilities and alerting them to the NOTAM.

When a NOTAM is created for a tower registered with the FCC it is generally set to automatically expire after 15 days. This auto-expiration process is done to ensure the FCC knows that someone is working to fix the obstruction light and it has not been abandoned.

Once the light is repaired, the obstruction tower light operator is required to contact FSS and cancel the NOTAM. If the obstruction light cannot be repaired before the end of the 15 day period, the obstruction light operator must contact FSS to extend the NOTAM. FSS will cancel the original NOTAM and issue a new NOTAM that will be valid for another 15 days. This process is repeated as necessary.

In those cases where the obstruction tower light NOTAM is not cancelled or extended by FSS and thus the NOTAM automatically expires, it is presumed that the obstruction light is not being monitored correctly and thus the FCC is contacted by FSS. The FCC is generally contacted by fax. The FCC is then required to investigate the expired NOTAM by contacting the owner/operator of the tower with the expired NOTAM.

C. Technical Operations - Equipment & Facilities (AJW) (Operational Control Centers & Service Operations Centers)

Pilots and air traffic controllers rely heavily on air navigation facilities to safely operate in the National Airspace System. These facilities or equipment include any facility used in, available for use in, or designed for use in, aid of air navigation. These facilities include: landing areas, lights, any apparatus or equipment for disseminating weather information, for signaling, for radio-directional finding, or for radio or other electrical communication, and any other structure

or mechanism having a similar purpose for guiding or controlling flight in the air or the landing and take-off of aircraft.

In addition to the federal facilities and equipment, Technical Operations coordinate efforts/requests from non-federal facilities that are included in the Facilities, Services, and Equipment Profile (FSEP). These are included because they require inspection by the FAA and thus are part of Tech Ops coordination obligations which include the request and documentation of a NOTAM when needed.

When these facilities or equipment are not functioning properly or need to be shut down for maintenance, a NOTAM must be created and disseminated to NAS users and the affected air traffic control facilities must be notified. These NOTAMs are found mainly under the keywords NAV or COM. However, those affecting surface movement areas such as approach lighting systems may be found under the keyword Runway (RWY) and those affecting other services such as Runway Visual Range (RVR) may be found under the keyword Service (SVC).

Technical Operations is responsible for initiating NOTAM information for shutdown, restoration, or any condition that affects the operations of Navigational Aids (NAVAIDs), communication frequencies (COM), or other electronic aids that affect safety of flight. A NAVAID is any visual or electronic device airborne or on the surface which provides point-to-point guidance information or position data to aircraft in flight. Coordination with the appropriate air traffic control facilities is required prior to NAVAID maintenance that may adversely affect the services provided by that NAVAID. Maintenance personnel must immediately report any interruption or change to the equipment that would adversely affect service to a control center for possible NOTAM creation. The facilities that issue NOTAMs and coordinate equipment maintenance are called Operational Control Centers (OCCs) and Service Operations Centers (SOCs). When an OCC or a SOC needs to issue a NOTAM they contact Flight Service (FSS) for the creation of a NOTAM which is sent to the USNS for distribution.

All NAVAIDs in the NAS have automatic monitoring and shutdown features. If the personnel responsible for monitoring the equipment have lost aural and visual monitoring capabilities and cannot observe the status of the equipment, but all indications or reports are that the equipment is operating normally, a NOTAM is issued placing the equipment in an unmonitored status. Air traffic facilities originate NOTAMs for NAVAIDs they monitor or control by relaying the information to an OCC or SOC. The workflow procedures includes: notification of the appropriate ATC facility, the appropriate FSS and Technical Operations personnel, as well as the issuance of a NOTAM.

Federal NAVAID and COM NOTAMs such as lighted landing aids, radio aids to navigation, communication equipment, weather detection or reporting equipment and radar equipment all originate from FAA Technical Operations. These types of NOTAMs cover many different pieces of equipment all across the country. There are a few different organizations who feed NOTAM information to Technical Operations for NOTAM creation. For example, a pilot may report an equipment outage to Air Traffic Control (ATC) who calls Technical Operations for the issuance of a NOTAM. Other personnel that input NOTAM data through Technical Operations

are FAA and contractor service technicians, FAA facility personnel in charge of monitoring navigation and communication equipment, and AJW-33 Flight Inspection personnel.

Flight Inspection (AJW-33) personnel use aircraft to inspect the National Airspace System. When they need to issue a NOTAM about a navigation facility they contact an OCC or an SOC and the NOTAM is issued from there. If flight inspection personnel discover an unsafe condition that requires an immediate NOTAM, they can radio Flight Service Station (FSS) in the air to issue a NOTAM on the status of a navigation facility.

When Technical Operations (OCCs and SOCs) receives a call about the operational status of equipment, they enter the information into an Event Manager tool known as the Remote Monitoring and Logging System (RMLS). They then contact Flight Service (FSS) to issue a NOTAM if one is required by phone or using eNOTAM. After a NOTAM is issued, OCC or SOC personnel call the affected ATC facilities to notify them and dispatch repair workers to service the equipment. After the equipment is repaired Tech Ops contacts FSS to cancel the NOTAM and updates RMLS. Tech Ops performs the same notification process for scheduled maintenance except they coordinate the outage with the affected Air Traffic Control facilities prior to taking the equipment out of service. Both Technical Operations and FSS appear to be performing ATC notifications for NAVAID and COM NOTAMs.

C. 1. GPS

Global Positioning System (GPS) NOTAMs communicate service volume availability. They are Domestic NOTAMs with a keyword of NAV. There are two kinds of GPS NOTAMs: GPS outages or Pseudo Random Noise (PRN) and GPS testing/jamming. GPS PRN NOTAM information is faxed to USNOF for manual entry into the NOTAM Entry System (NES). GPS testing/jamming NOTAMs are originated by Spectrum Engineering. They use the GPS Automated Test Recorder (GATR) to determine airspace volumes with GPS service unavailability for specific operations and give a paper copy of this information to USNOF personnel for storage in a logbook. When the specific GPS testing/jamming operation is about to occur a field engineer calls USNOF and notifies them of the job number. USNOF looks up the paper copy from Spectrum Engineering in the logbook and creates a NOTAM using the NOTAM Entry System (NES). Spectrum Engineering notifies Flight Service Station (FSS) of the new NOTAM when issued.

D. Domestic Airspace NOTAMs

Chapter 6 of the NOTAM Manual (FAA Order 7930.2) details the categories of Airspace NOTAMS and those organizations responsible for their creation. For the purposes of this document the sub-categories of Airspace NOTAMs include:

1. Departure Procedures (Graphical ODPs), Standard Instrument Departure Procedures (SIDs)
2. Standard Terminal Arrival Routes (STARs)
3. Special Activity Airspace (SAA) ,
4. Other Airspace, and

5. Central Altitude Reservation Function (CARF).

D. 1. Departure Procedure (Graphical ODP) and Standard Instrument Departure (SID)

Although scheduled to be changed to FDC NOTAMs in the next update to the NOTAM Manual (JO 7930.2), Graphical Departure Procedure (ODP), Standard Instrument Departure (SID) and Standard Terminal Arrival (STAR) NOTAMs are currently classified as Domestic NOTAMs.

Graphic ODP and SID NOTAMs are issued by AeroNav Products (AJV-3) by use of the NOTAM Tracking System (NTS) which sends the NOTAM to the US NOTAM Office (USNOF) via the NOTAM Entry System (NES). USNOF personnel enter the NOTAM into the US NOTAM System (USNS). AeroNav Products may fax the new NOTAMs they create to the affected Air Traffic Control Center (ARTCC or ATC Center) and this notification procedure will not be affected by this safety case. The NTS is AIXM compliant and can be designed to send AIXM digital NOTAMs to the Federal NOTAM System (FNS).

D. 2. Standard Terminal Arrival Routes (STAR) NOTAMs

The appropriate Air Route Traffic Control Center (ARTCC or ATC Center) is responsible for initiating, tracking and canceling STAR NOTAMs. The ATC Center enters NOTAM information into either the Aeronautical Information System Replacement (AISR) or the NOTAM Entry System (NES) and the candidate NOTAM is sent to the US NOTAM Office. AISR allows the person entering the NOTAM to create templates for a NOTAM for each STAR within the ATC Center's jurisdiction which can then be used quickly to issue the NOTAM if required. However, it also requires the user to be familiar with exactly what the content of the STAR NOTAM should include. In the alternative, the ATC Center personnel can use the NOTAM Entry System (NES) to create the NOTAM which includes a number of templates to fill out to complete the STAR NOTAM. US NOTAM Office personnel ensure that the NOTAM is formatted correctly via either system and then publish it in the USNS.

D.3. Special Activity Airspace NOTAMs

Special Activity Airspace (SAA) incorporates Special Use Airspace (SUA) (prohibited, restricted, warning, alert and military operations areas), aerial refueling tracks/anchors, and military training routes. NOTAMs are issued for airspace activations of SAA in accordance with existing NOTAM provisions. These provisions include the published times of designation, times of use legal descriptions, or Letters of Agreement(s) established for these areas.

NOTAMs for SAA are originated after coordination between ATC or designated controlling facilities and the scheduling agency. NOTAMs for SAA are generated via the SUA Management System (SAMS) and the SAA operational data repository. After coordination between the ATC or controlling facility and the scheduling agency, the SAMS tool sends a NOTAM for SAA directly to the USNS. USNOF is not involved with SAMS-generated NOTAMs. The SAMS tool creates digital SAA status and notification messages in an AIXM-compliant format.⁶

Not all NOTAMs for SAA are created using SAMS. If an ATC Center needs to issue a NOTAMs for SAA and it is too late to submit it through SAMS, it may be sent via a service B message directly into the USNS or to the USNOF for publication. ATC Centers are responsible for forwarding NOTAMs for SAA to the terminal ATC facilities under their responsibility. This safety case will not change this notification responsibility.

D. 4. Other Airspace NOTAMs

These Airspace NOTAMs warn of hazards such as rocket launches, balloons, parachute jumping, unmanned aircraft, glider activity, air shows which do not require a Temporary Flight Restriction (TFR), changes in hours of airspace class, tethered balloon warnings, unmanned aerial vehicle warnings, parasail warnings, aerobatic areas and others which are under the authority of an Air Route Traffic Control Centers (ARTCC or ATC Centers).

Most of these Airspace NOTAMs are originated through Flight Service (FSS). Air Traffic Control facilities, persons or organizations with waivers and in some cases other people call Flight Service (FSS) to originate these NOTAMs. FSS formats the NOTAM, sends it to the USNS, and notifies the affected Air Traffic Control facility.

ATC Centers originate airspace NOTAMs through various entry systems. They have access to SAMS, NES and AISR. How they use these systems to enter their NOTAMs varies from Center to Center with no consistent pattern. Some send NOTAMs to the USNOF for entry into the USNS via Service B messages. Some send NOTAMs directly into the USNS via Service B messages. Some use NES and some use AISR. Some use all the systems at various times and some send candidate NOTAMs to the USNOF by e-mail and fax.

D. 5. CARF NOTAMs

Most Central Altitude Reservation Function (CARF) NOTAMs are issued by the CARF Office in the Air Traffic Control System Command Center (ATCSCC). The main initiators of altitude reservation CARF NOTAMs are United States military units, Department of Defense contractors, and the National Aeronautics and Space Administration (NASA). Altitude reservation requests are sent to the CARF office via fax, email or phone. The CARF office confirms that there are no conflicts with the airspace and follows procedures to coordinate the use of airspace.

The workflow for the creation of CARF NOTAMs involves coordination between the altitude reservation requestor, the CARF Office at the FAA Command Center and the ATC Centers regarding a change in the activation of the reserved airspace. Military Operations Specialists (MOS) are sometimes used at Air Route Traffic Control Centers to coordinate with the military. After the altitude reservation is generated, CARF Specialists copy the text of the NOTAM into the NES and send it to the USNOF. The USNOF then enters the CARF NOTAM into the USNS.

II. FDC NOTAMs

Flight Data Center (FDC) NOTAMs are issued through the US NOTAM Office (USNOF) and are primarily used to disseminate safety of flight information relating to regulatory material. The NOTAM Manual (FAA Order 7930.2), Chapter 7 describes the different types of FDC NOTAMs and the workflow process for their publication.

The types and originators of FDC NOTAMs include:

- 1) Temporary Flight Restriction (TFR) NOTAMs issued by Airspace, Regulations, and ATC Procedures Group, (AJV-11) for air shows and major sporting events,
- 2) Other security NOTAMs issued by System Operations Security (AJR-2) such as Special Security Instructions,
- 3) TFRs issued by ARC Centers around forest fires, natural disaster/emergency areas, space flights, etc.
- 4) Instrument Procedure NOTAMs originated by AeroNav Products (other than SIDs and STARs),
- 5) Airway changes originated by AeroNav Products,
- 6) NOTAMs for snow conditions affecting glide slope operation from Technical Operation issued through AeroNav Products,
- 7) Special Data NOTAMs issued by the USNOF,
- 8) NOTAMs for changes to charts originated by Aeronav Products,
- 9) Laser Light NOTAMs originated by the ATC Service Area Office where the laser activity will occur, and
- 10) Others - (including 14 CFR Part 139 certificated airport condition changes, air defense emergencies and emergency flight rules).

The US Forest Service or Bureau of Land Management via the Air Route Traffic Control Centers (ATC Centers) and the organizations listed above provide USNOF with data for FDC NOTAMs via tools such as phone, fax, e-mail, TFR Builder, the NOTAM Entry System (NES) and the NOTAM Tracking System (NTS). The originator verifies that the correct FDC NOTAM is published after it receives a number and is distributed. Flight Service is not involved in the creation or notification of FDC NOTAMs.

Any procedures that are in place to ensure that all affected ATC facilities are notified by the FDC NOTAM originator will remain in place and will not be changed by this safety case. ATC Center facilities are responsible for forwarding FDC NOTAM information to the affected terminal ATC facilities once the NOTAM goes into the USNS. This forwarding of NOTAM data is called "notification" in this document. ATC Center facilities are sent the NOTAM in a variety of ways including NADIN, the NOTAM Distribution System (NDS) to En Route Information Display System (ERIDS) and other electronic means from USNS.

The next sections outline how these originators enter FDC NOTAMs.

A. System Operations Security (AJR-2) & Airspace, Regulations, and ATC Procedures Group (AJV-11)

Temporary Flight Restrictions (TFRs) define airspace that is temporarily restricted to pilots except under limited circumstances. TFR Builder is a software tool that System Operations Security (AJR-2) and Airspace, Regulations, and ATC Procedures Group (AJV-11) use at FAA headquarters to define TFR NOTAMs and send them to USNOF for distribution. TFR Builder is not a Web-based tool. It is a proprietary, personal computer-based software tool which the FAA has purchased a limited number of licenses to use.

Airspace, Regulations, and ATC Procedures Group (AJV-11) issues TFR NOTAMs for air shows. The show sponsor or air boss coordinates air show TFR requests with the local ATC facility responsible for the airspace where the air show will take place and the appropriate Air Traffic Organization (ATO) Service Center Operations Support Group (OSG). After coordinating the request, the service center OSG forwards vetted air show TFR requests to the Airspace, Regulations, and ATC Procedures Group detailing the air show TFR details. Airspace, Regulations, and ATC Procedures Group establishes the TFR using the TFR Builder tool and the candidate NOTAM is sent to the USNOF who enters it into the USNS.

Other TFR NOTAMs are issued by System Operations Security (AJR-2) supporting Presidential, Special Security Instructions, Emergency Air Traffic Rules, Special Flight Rules Area (SFRA), or Air Defense Identification Zone (ADIZ) security requirements. These are sent to the USNOF via the TFR Builder tool, NES, phone or fax and then USNOF personnel enter them into the USNS.

Presidential, Special Security Instructions, and Emergency Air Traffic Rules TFRs have special procedures to ensure that all Flight Service Specialists know about them for pilot briefing purposes and to ensure that all affected ATC facilities receive immediate notification when these TFRs are issued. This notification process will not change as a result of this safety case.

B. ATC Facilities

Air Traffic Control (ATC) facilities originate Temporary Flight Rule (TFR) NOTAMs with information generated internally or from other parties such as the US Forest Service and the Bureau of Land Management who request TFRs around forest fires. The US Forest Service and the Bureau of Land Management enters TFRs into the NES and the TFR NOTAMs are then sent to the ATC Center or appropriate ATC facility for review. After the ATC Center approves the TFR it is then sent to USNOF via NES. Faxes remain as a backup for the NES. Systems Operations Support Center (SOSC) through the respective ATC Service Centers is now performing TFR notifications to ATC facilities.

ATC Centers (ARTCCs) also originate disaster area NOTAMs. They forward the NOTAM information directly to the USNOF for publication and to Flight Service Station (FSS) for notification purposes.

ATC Centers have a variety of different ways they can originate FDC NOTAMs. In each case, NOTAM information is sent via some method to the US NOTAM Office (USNOF) where the FDC NOTAM is entered into the USNS by USNOF personnel. These transfer methods include NES, AISR (Service B messages), e-mails or faxes.

C. AeroNav Products (AJV-3), Flight Inspection (AJW-33) and Technical Operations

AeroNav Products (AJV-3) is the originator for FDC procedure NOTAMs for Instrument Approach Procedures (IAPs), textual Departure Procedures (DPs) and airways or key worded Route NOTAMs. They operate a 24 hour call center for procedure NOTAMs which is located in Oklahoma City, OK. They receive information about navigation equipment outages from Technical Operations and they receive information about procedures and navigation restrictions from Flight Inspection (AJW-33). AeroNav Products uses this information to create NOTAMs for procedures and airways. Candidate NOTAMs are entered into the NOTAM Tracking System (NTS) and sent to the US NOTAM Office (USNOF) for format checking and entry into the US NOTAM System (USNS). NTS interfaces with the NOTAM Entry System (NES) so that USNOF personnel can enter the NOTAM into the USNS. The NES is the backup to the NTS for NOTAM entry.

AeroNav Products has another office in Silver Spring, MD. This office used to be called the National Aeronautical Charting Office (NACO) and it originates chart change NOTAMs and airway NOTAMs. They use the NOTAM Entry System (NES) to send candidate NOTAMs to the USNOF. The USNOF then enters the NOTAMs into the USNS after format checking.

Since Flight Service (FSS) personnel are not used for the creation of FDC NOTAMs, the ATC notification process used by AeroNav Products to alert the Air Route Traffic Control Centers (ARTCCs) will not change as a result of this safety case.

Flight Inspection (AJW-33) is involved in the creation of FDC procedure NOTAMs. If they find that a navigational facility affecting a procedure or a procedure itself is inoperative or needs modification, personnel call AeroNav Products. AeroNav Products then issues the NOTAM for that procedure using the process described above. If Flight Inspection needs to issue a NOTAM in the air they can call or radio Flight Service to create a NOTAM.

D. US NOTAM Office (USNOF)

When time permits, special data NOTAMs (e.g., Department of State information, special air traffic programs, etc.) are issued under the affected location of "ZZZ" by the USNOF. These NOTAMs remain in the US NOTAM System (USNS) until published in hard copy in the Notice to Airmen Publication (NTAP). The publication process occurs after the USNOF forwards a copy of the NOTAM to Aeronautical Information Management. Once the information is published in the NTAP, the USNOF cancels the FDC NOTAM in the USNS.

E. Service Area Office (Service Center)

Laser light FDC NOTAMs are originated by the ATC Service Center, Operations Support Group where the light activity will occur. However, the Service Center may delegate this function to the appropriate FSS or terminal facility. They notify the USNOF via email or fax within 7 days of the event and the USNOF will issue the NOTAM. USNOF has requested that the Service Centers begin using the NES to create these NOTAMs. However, to date the use of NES by the Service Area Office has been "minimal" according to the USNOF.

The Service Center Office also coordinates FDC NOTAMs with ATC facilities via phone, fax or email.

F. Third Party FDC NOTAM Originators

A few private companies such as GE Aviation (formerly Naverus) and Jeppesen (part of Boeing) originate NOTAMs on procedures that they created and maintain. They send NOTAM information to USNOF via the NES and USNOF personnel enter the NOTAM into the USNS.

III. POINTER NOTAMs

Pointer NOTAMs are issued by Flight Service Stations to highlight or point out other NOTAMs. Pointer NOTAMs are mainly issued for pilot briefing purposes to assist users in cross-referencing important information that may not be found under an airport or NAVAID identifier such as FDC NOTAMs. An example of a Pointer NOTAM is:

!HEF 01/020 HEF AIRSPACE TFR SEE FDC 1/1155 0/8326 ZDC 99.7.

IV. MILITARY

To date the military has not determined how it will interface with the Federal NOTAM system. Therefore, this Safety case specifically excludes all safety issues regarding military NOTAMs. However, since there are many joint use facilities (public airports also used by the military such as National Guard) the military will have an opportunity to review and comment on this Safety case.

Section 2 – Proposed Change

The current United States NOTAM System (USNS) and nearly all of the tools or systems which input NOTAM data into the USNS are analog. In order to be able to make the changes required to meet the needs of NextGen, the future data systems must be *digital* or AIXM compliant. Therefore, future entry tools or system interfaces must input digital NOTAM data into the Federal NOTAM System (FNS) based upon an AIXM format.

Currently the FAA has a few digital systems in place to enter various types of Notices to Airmen. One is NOTAM Manager, or the direct-entry digital NOTAM tool, that is being used by 10-12 airports to directly enter digital NOTAMs into FNS. Quality control is built into the system since it was designed according to the requirements contained in the NOTAM Manual. These are the same requirements used by Flight Service and the US NOTAM Office when creating or quality checking the content and format of NOTAMs under the legacy system.

The FAA has recently deployed an upgrade to the Special Use Airspace Management System (SAMS) for the issuance of Special Activity Airspace NOTAMs. SAMS is capable of sending digital NOTAMs but the NOTAMs it sends to the USNS now are not digital. A system to system interface between SAMS and the FNS is required to get these digital NOTAMs into the Federal NOTAM System.

The FAA's AeroNav Products (AJV-3) organization is using the NOTAM Tracking System (NTS) to issue procedure NOTAMs. The NTS currently has some AIXM capability. The NOTAMs produced by AeroNav Products include Instrument Approach Procedures (IAPs), Standard Instrument Departures (SIDs), Departure Procedures, and Airway NOTAMs. The NTS currently interfaces with the NOTAM Entry System (NES) so that the US NOTAM Office can review candidate NOTAMs and enter them into the US NOTAM System. The NTS currently sends analog NOTAMs to the USNS because the USNS cannot accept digital NOTAMs. The NTS may have the capability to interface with the FNS and send digital NOTAMs to the FNS or a NOTAM Manager tool may be developed for AeroNav Products.

CARF currently has AIXM capabilities and will interface with the FNS to enter digital NOTAMs.

Unfortunately, these groups of NOTAM originators represent only a small number of NOTAMs. Therefore, all the rest of the NOTAM originators must also receive some kind of tool or system interface to create and send digital, AIXM compliant NOTAMs to the Federal NOTAM System (FNS).

To accomplish the FAA Flight Plan goal of converting all NOTAMs to a digital, AIXM format, each of the NOTAM originators listed under the current system in Section 1 above will receive:

- 1) either a NOTAM Manager-like tool with specific features required for entering their NOTAMs which includes drop-down menus, scenarios and templates to ensure the quality of NOTAMs – like that which is currently being used by the initial 10-12 airports with operating ATC towers; or
- 2) a system to system interface allowing the originator to integrate their own AIXM compliant system with the FAA's Federal NOTAM System by following FAA policy requirements to ensure NOTAM quality. A specific example of this will be that used by the Obstruction Tower Light Operators.

In each case, the new tool or system interface will allow all NOTAM originators to directly enter NOTAMs into the Federal NOTAM System which sends the information directly to the USNS. Thus, candidate NOTAMs sent by originators will bypass Flight Service Station (FSS) and the US NOTAM Office and be published directly. This will reduce the time it takes to publish NOTAMs and NOTAM cancellations. This will be possible because the quality control function is built into the Web-based software tool or the tool which feeds the system interface. Initially, the US NOTAM Office will still be able to review the NOTAMs for a final quality control check.

NOTAM originators using the NOTAM Manager tool will log on to the system via the Internet using a secure username and password. The NOTAM Manager tool provides the user with a series of menus, scenarios and templates which are created based upon the requirements outlined in the NOTAM Manual (JO 7930.2). Also the scenarios and templates will be facility specific and thus many data entry mistakes caused by human error will be avoided. This will improve quality control over the legacy system because the USNS currently cannot check NOTAMs for items like correct runway numbers at specific airports. The NOTAM Manager tool will also quality check for proper formatting of the proposed NOTAM before sending it through FNS to USNS.

Whether a NOTAM originator will receive a NOTAM Manager-like tool or a system interface will be a joint decision between the Program Office: Aeronautical Information Management (AJV-2) and the NOTAM originator.

At this point it is anticipated that additional airports will receive NOTAM Manager, as will Technical Operations (AJW-3) for equipment and facilities.⁹ The Obstruction Tower Light Operators on the other hand will use a system interface. The method used by the remainder of the NOTAM originators is yet to be determined. However, each originator will receive a tool with the specific NOTAM features they require which will enable them to create accurate, quality digital NOTAMs and input them directly into the FNS and USNS without going through a third party.

It is important to note that the coordination that occurs prior to or concurrently with NOTAM origination among those parties affected by the new NOTAM Manager tool or system interface

⁹ Large airports which use airport support software may use a system to system interface rather than NOTAM Manager.

will not change. Thus for example, airport personnel will continue to coordinate with their respective ATC facility personnel before a runway closure, Tech Ops personnel will coordinate with ATC personnel before performing maintenance work on NAS equipment and ATC Center personnel will continue to coordinate with US Forest Service personnel for the creation of forest fighting TFRs.

The new NOTAM Manager tool and system interface will ensure that properly formatted NOTAMs are delivered to FNS and thus the USNS. Initially, the USNOF will still have the ability to check NOTAMS for the proper format, but it is a system requirement of this Safety case that at least 95 percent of the NOTAMs created by the tool or system interface will be error-free and thus will not require reviewing by USNOF personnel. (NOTE: see Assumption 1 in Section 4 regarding the system requirement.)

The main focus of Flight Service, the US NOTAM Office and perhaps a future NOTAM helpdesk will be to serve as a backup for those NOTAMs that cannot be created because:

- 1) The correct scenario or template does not exist in the software or
- 2) The tool or system is not operating properly or
- 3) The NOTAM originator cannot use a NOTAM Manager or system interface tool.

It is an FAA goal to reduce the need for this process to less than five percent (5%) of the time.

As with the current NOTAM system, the originators of NOTAMs using the new NOTAM Manager tool or system interface will accept responsibility for NOTAM accuracy; however most of the quality control function will be built into the NOTAM Manager tool or system interface by following the requirements found in the NOTAM Manual and required by the FAA in order to deploy the system to the user. NOTAM originators will continue to be responsible to see that their proposed NOTAM receives a NOTAM number and is published correctly. This ensures that any proposed NOTAMs that are rejected by FNS or USNS can be modified and submitted again.

NOTAMs which cannot be created using the scenarios and templates of NOTAM Manager may be created and submitted in a free form format. However, these NOTAMs are sent to FSS and are treated like a proposed NOTAM submission to FSS under the current legacy system. Thus, a Flight Service Specialist will ensure the quality control function as well as perform the ATC notification when a free form NOTAM is submitted using NOTAM Manager. Also, the current legacy NOTAM submission process will remain in place as a backup to NOTAM Manager and the systems interface tools.

NOTAMs that cannot be created using the system interface will be created using the legacy process as well which is outlined in Section 1 above.

Where the current NOTAM process includes a notification requirement, notification will also be completed under the proposed system. Under the new process all notification of the affected ATC facilities currently conducted by FSS will be conducted by the originator of the NOTAM except for Obstruction Tower lights out NOTAMs. These will continue to be the responsibility of FSS. FSS will receive an Obstruction Tower Light-out NOTAM from the Federal NOTAM System (FNS) via the eNOTAM system with a note indicating that the NOTAM has already been issued and thus FSS will only need to notify the affected ATC facilities. This process is needed since the Obstruction Tower Light Operators would not have the information to determine which ATC facility(ies) are affected by the light outage.

All airports that issue NOTAMs using the NOTAM Manager tool (except for free form NOTAMs) will follow the notification process outlined in a Letter of Agreement a sample of which is attached to this SRMD as Appendix E. These Letters of Agreements will be required until Terminal and En Route Air Traffic Control facilities receive a notification system which provides assured delivery of NOTAMs. FDC and SUA/SAA notification will not change under the proposed system since it is currently completed by the ATC Centers. When the ATC Centers receive new FDC and SUA/SAA NOTAMs from the USNS, they notify the affected terminal (approach and tower) facilities.

All other notification procedures for any other NOTAMs under the proposed system will not change since they are currently performed by the originator of the NOTAM or via NADIN or other NOTAM distribution system. This would apply to Presidential TFRs, coordination for NAVAID maintenance, etc.

The distribution system for NOTAMs from the USNS will also not change under the proposed system.

The FAA's Aeronautical Information Management (AIM) group (AJV-2) is currently working on the CARF system used for altitude reservations. This work is expected to eventually lead to the CARF system creating digital NOTAMs that will be sent to the Federal NOTAM System (FNS) via a system interface.

Below are Tables which compare the current system with the proposed system for origination and Air Traffic Control notification of NOTAMs.

Table 1 – Current and Proposed Process for Airports with Operating ATC Towers¹⁰	
Current System	Proposed Change
Coordination occurs between airport operations personnel and personnel in the Airport Traffic	No change.

¹⁰ A few airports use airport support software (O'Hare & Midway) – these airports may receive a system to system interface rather than NOTAM Manager however this will not result in any additional hazards or an increase in the hazard severity or likelihood levels.

Control Tower (ATCT) as required by ATC & the airports operating procedures.	
Airport operations personnel send NOTAM information to Flight Service Station (FSS) via phone, fax or eNOTAM.	Airport operations personnel enter NOTAM information into NOTAM Manager software and send the proposed NOTAM to the USNS via the Federal NOTAM System. The software is designed using FAA requirements found in the NOTAM Manual (7930.2), the same reference used by Flight Service and US NOTAM Office personnel. Airport personnel will rarely have to revert to using the legacy system (contacting FSS) unless NOTAM Manager system is unavailable or does not accommodate the NOTAM which needs to be created.
Flight Service Station (FSS) personnel put the information into the proper NOTAM format and send the proposed NOTAM to the USNS. FSS personnel are responsible for the classification, accuracy, format, dissemination and cancellation of the NOTAM based upon the requirements of the NOTAM Manual.	FSS is eliminated from the process, except in the case when the system is unavailable or a NOTAM is created using free form text. The airport operator remains responsible for the accuracy of the information in the NOTAM. AIM is responsible for creating menus, templates and scenarios in the NOTAM Manager software that allows the airport to create at least 95% of NOTAMs for their airport. NOTAM Manager software is airport specific in that, for example, it only includes the runways at that specific airport. Thus, many human data entry errors will no longer be possible.
The USNS automatically checks the format of the incoming proposed NOTAM (parsing) and rejects it if it does not have the required information such as the right airport identifier	No change except it is very unlikely USNS will reject any digital NOTAMs because NOTAM Manager will alert the user to any format problems before the NOTAM can be

code. The rejected NOTAM is returned to FSS for correction and no NOTAM number is given to it. If the proposed NOTAM passes the USNS parsing test it is numbered and given a code (00 for no problems and 07 for potential problems). It is also published, distributed to the stakeholders and sent to the US NOTAM Office (USNOF) for a final quality review check.	sent to USNS. If any NOTAMs are not processed by USNS, this will be obvious to the originator because s/he will not see the published NOTAM within seconds of submission.
The numbered NOTAM is then available for review by the USNOF. While in the review queue one of three things can happen. 1) The USNOF specialist can review the proposed NOTAM and find it acceptable. 2) The USNOF specialist can contact FSS to cancel and re-issue the NOTAM due to formatting problems. 3) The USNOF specialist can edit the numbered NOTAM and then re-issue the edited NOTAM. In this case the edited NOTAM has the same number as the original version.	While USNOF will still have the ability to review NOTAMs from NOTAM Manager, it is unlikely this will be necessary since all the quality control functions will be built into the software. 1-USNOF will be given read-only access to the NOTAM Manager tool so they can see the name & phone number of the NOTAM originator if they need to contact them 2- All NOTAMs created using NOTAM Manager will move from FNS to USNS and then immediately to the distribution system. 3- USNOF' specialists can edit the numbered NOTAM, however they will be encouraged to contact AIM or the originator to correct any errors.
The NOTAM is distributed to all stakeholders via existing systems. The airport operator confirms correct NOTAM publication by verifying the NOTAM number and content.	No change.
After the NOTAM is numbered and published by the US NOTAM System, Flight Service notifies the affected Air Traffic Control (ATC) facilities as required by 7930.2	Airport operations personnel perform the notification function according to the specific Letter of Agreement signed between the airport and the affected ATC facilities.
Replacement or cancellation of NOTAMs	No change.

follows the same process as outlined above.	
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Table 2 – Current and Proposed Process for Airports without Operating ATC Towers	
Current System	Proposed Change
Coordination occurs between airport operations personnel and their ATC facility as needed.	No change.
Airport operations personnel send NOTAM information to Flight Service Station (FSS) via phone, fax or eNOTAM.	Airport operations personnel enter NOTAM information into NOTAM Manager software and send the proposed NOTAM to the USNS via the Federal NOTAM System. The software is designed using FAA requirements found in the NOTAM Manual (7930.2) Airport personnel will rarely have to revert to using the legacy system (contacting FSS) unless NOTAM Manager system is unavailable or does not accommodate the NOTAM which needs to be created.
Flight Service Station (FSS) personnel put the information into the proper NOTAM format and send the proposed NOTAM to the USNS. FSS is responsible for the classification, accuracy, format, dissemination and cancellation of the NOTAM based upon the requirements of the NOTAM Manual.	FSS is eliminated from the process, except in the case when the system is unavailable or a NOTAM is created using free form text. The airport operator remains responsible for the accuracy of the information in the NOTAM. AIM is responsible for creating menus, templates and scenarios in the NOTAM Manager software that allows the airport to create at least 95% of NOTAMs for their airport. NOTAM Manager software is airport specific (for example, it only includes the runways at that specific airport). As a result, many data entry mistakes will no longer be possible.
The USNS automatically checks the format of the incoming proposed NOTAM (parsing) and rejects it if it does not have the required	No change except it is very unlikely USNS will reject any digital NOTAMs because NOTAM Manager or system interface will

information such as the right airport identifier code. The rejected NOTAM is returned to FSS for correction and no NOTAM number is given to it. If the proposed NOTAM passes the USNS parsing test it is numbered and given a code (00 for no problems and 07 for potential problems). It is also published, distributed to stakeholders and sent to the US NOTAM Office (USNOF) for a final quality review check.	alert the user to any format problems before the NOTAM can be sent to USNS. If any NOTAMs are not processed by USNS, this will be obvious to the originator because s/he will not see the published NOTAM within seconds of submission.
The numbered NOTAM is then available for review by the USNOF. While in the review queue one of three things can happen. 1) The USNOF specialist can review the proposed NOTAM and find it acceptable. 2) The USNOF specialist can contact FSS to cancel and re-issue the NOTAM due to formatting problems. 3) The USNOF specialist can edit the numbered NOTAM and then re-issue the edited NOTAM. In this case the edited NOTAM has the same number as the original version.	While USNOF will still have the ability to review NOTAMs from NOTAM Manager, it is unlikely this will be necessary since all the quality control functions will be built into the software. 1-USNOF will be given read-only access to the NOTAM Manager tool so they can see the name & phone number of the NOTAM originator if they need to contact them 2- All NOTAMs created using NOTAM Manager will move directly from FNS to USNS and then immediately to the distribution system. 3- USNOF specialists can edit the numbered NOTAM, however they will be encouraged to contact AIM or the originator to correct any errors.
The NOTAM is distributed to all stakeholders via existing systems. The airport operator confirms correct NOTAM publication by verifying the NOTAM number and content.	No change.
The NOTAM number is sent back to FSS and they notify the affected Air Traffic Control (ATC) facilities as required by 7930.2	Airport operations personnel will perform the notification function according to a specific Letter of Agreement signed between the airport and their affected ATC facility.

Replacement or cancellation of NOTAMs follows the same process as outlined above.	No change.
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Table 3 – Current and Proposed Process for Obstruction Tower Light Operators (TLO)	
Current System	Proposed Change
Coordination occurs between an obstruction tower light operator (TLO) and their light out detection process. This process can be automatic or manual, visual or electronic. The majority of obstruction lights are remotely monitored automatically by companies who maintain numerous obstruction lights. A NOTAM is required when a light cannot be fixed within 30 minutes.	No change.
An obstruction light operator sends NOTAM information to Flight Service Station (FSS) via phone, fax or eNOTAM.	The larger companies responsible for many obstruction tower lights will create their own NOTAM Manager-like software tool used to generate an obstruction tower light out NOTAM. AIM will provide the Tower Light Operators (TLO) with the requirements needed to ensure that a quality NOTAM is created. These requirements will be based upon the requirements found in the NOTAM Manual. AIM will provide the necessary connection by system interface between the TLO software and the Federal NOTAM System for input into the USNS. Obstruction Tower Light Operators without this system interface will continue using the legacy system initially. The FSS will remain as a backup to the system interface.
Flight Service Station (FSS) personnel put the information into the proper NOTAM format and send the proposed NOTAM to the USNS. FSS is responsible for the classification,	FSS no longer creates the NOTAM, but they are involved in the notification process. The obstruction light operator is responsible

accuracy, format, dissemination and cancellation of the NOTAM based upon the requirements of the NOTAM Manual.	for the accuracy of the information in the NOTAM.
The USNS automatically checks the format of the incoming proposed NOTAM (parsing) and rejects it if it does not have the required information such as the right airport identifier code. The rejected NOTAM is returned to FSS for correction and no NOTAM number is given to it. If the proposed NOTAM passes the USNS parsing test it is numbered and given a code (00 for no problems and 07 for potential problems). It is also published, distributed to stakeholders and sent to the US NOTAM Office (USNOF) for a final quality review check.	No change except it is very unlikely USNS will reject any digital NOTAMs because the NOTAM Manager or system interface will alert the user to any format problems before the NOTAM can be sent to USNS. If any NOTAMs are not processed by USNS, this will be obvious to the originator because s/he will not see the published NOTAM within seconds of submission.
The numbered NOTAM is then available for review by the USNOF. While in the review queue one of three things can happen. 1) The USNOF specialist can review the proposed NOTAM and find it acceptable. 2) The USNOF specialist can contact FSS to cancel and re-issue the NOTAM due to formatting problems. 3) The USNOF specialist can edit the numbered NOTAM and then re-issue the edited NOTAM. In this case the edited NOTAM has the same number as the original version	While USNOF will still have the ability to review NOTAMs from NOTAM Manager or system interface, it is unlikely this will be necessary since all the quality control functions will be built into the software. 1-USNOF will be given read-only access to the NOTAM Manager tool so they can see the name & phone number of the NOTAM originator if they need to contact them 2- All NOTAMs created using NOTAM Manager will move directly from FNS to USNS and then immediately to the distribution system. 3- USNOF specialists can edit the numbered NOTAM, however they will be encouraged to contact AIM or the originator to correct any errors.
The NOTAM is distributed to all stakeholders via existing systems. The obstruction tower	No change.

light operator confirms correct NOTAM publication by verifying the NOTAM number and content.	
The NOTAM number is sent back to FSS and Flight Service personnel notify the affected Air Traffic Control (ATC) facilities of the NOTAM.	FNS will automatically populate an eNOTAM template with the NOTAM information and number and this will be sent to FSS to alert them to notify the affected ATC facilities. The message will also alert them not to create a duplicate NOTAM.
Obstruction Light NOTAMs are automatically set to expire 15 days after their creation. It is the responsibility of the obstruction tower light operator to cancel/re-issue a NOTAM with FSS if 15 days is not enough time to perform the repair.	Cancellation & re-issue will be done by the TL Operators following the same workflow as above so that the NOTAMs will not expire.
If the tower light out NOTAM expires, Flight Service Station (FSS) faxes the Federal Communications Commission (FCC).	If the NOTAM does expire, FNS will send an e-mail alert to the Federal Communications Commission (FCC) with the NOTAM information.
When the light is working properly, an obstruction light operator calls Flight Service Station (FSS) to cancel the NOTAM. FSS sends the cancellation to the USNS and notifies the appropriate ATC facilities.	When the light is working properly, the Obstruction Tower Light Operator will cancel the NOTAM and an eNOTAM message will be sent to FSS to alert them to perform the notification process. Flight Service Station (FSS) then notifies the affected ATC facilities.

Table 4 – Current and Proposed Process for Technical Operations (AJW) (Operating Control Centers)

Current System	Proposed Change
Coordination occurs between FAA Technical Operations personnel located at an Operational Control Center (OCC) or Service Operations Center (SOC) and various contacts such as Flight Inspection (AJW-33)*, maintenance workers in the field, Air Traffic Control (ATC) facilities, and personnel responsible for monitoring communication or navigation facilities and any other personnel who input NOTAM information.	No change.
Technical Operations personnel “open a ticket” to service the equipment by entering information into their Remote Monitoring and Logging System (RMLS) and send NOTAM information to Flight Service Station (FSS) via phone, fax or eNOTAM. Technical Operations personnel also notify ATC facilities affected by the NOTAM.	A NOTAM Manager-like tool will be created to collect all the information needed to create a valid, quality NOTAM for all Tech Ops equipment, facilities, etc. This tool will be designed by following the same quality control requirements found in the NOTAM Manual and used by FSS and USNOF to create quality NOTAMs in the proper format.
Flight Service Station (FSS) personnel put the information into the proper NOTAM format and send the proposed NOTAM to the USNS. FSS is responsible for the classification, accuracy, format, dissemination and cancellation of the NOTAM based upon the requirements of the NOTAM Manual.	FSS is eliminated from the process, except in the case when the system is unavailable. AIM is responsible for creating menus, templates and scenarios in the NOTAM Manager-like software that allows Tech Ops to create at least 95% of NOTAMs for their equipment. Technical Operations is responsible for the accuracy of the information in the NOTAM.
The USNS automatically checks the format of	No change except it is very unlikely USNS

the incoming proposed NOTAM (parsing) and rejects it if it does not have the required information such as the right airport identifier code. The rejected NOTAM is returned to FSS for correction and no NOTAM number is given to it. If the proposed NOTAM passes the USNS parsing test it is numbered and given a code (00 for no problems and 07 for potential problems). It is also published, distributed to stakeholders and sent to the US NOTAM Office (USNOF) for a final quality review check.	will reject any digital NOTAMs because NOTAM Manager or system interface will alert the user to any format problems before the NOTAM can be sent to USNS. If any NOTAMs are not processed by USNS, this will be obvious to the originator because s/he will not see the published NOTAM within seconds of submission.
The numbered NOTAM is then available for review by the USNOF. While in the review queue one of three things can happen. 1) The USNOF specialist can review the proposed NOTAM and find it acceptable. 2) The USNOF specialist can contact FSS to cancel and re-issue the NOTAM due to formatting problems. 3) The USNOF specialist can edit the numbered NOTAM and then re-issue the edited NOTAM. In this case the edited NOTAM has the same number as the original version	While USNOF will still have the ability to review NOTAMs from NOTAM Manager or system interface, it is unlikely this will be necessary since all the quality control functions will be built into the software. 1-USNOF will be given read-only access to the NOTAM Manager tool so they can see the name & phone number of the NOTAM originator if they need to contact them 2- All NOTAMs created using NOTAM Manager will move directly from FNS to USNS and then immediately to the distribution system. 3- USNOF specialists can edit the numbered NOTAM, however they will be encouraged to contact AIM or the originator to correct any errors.
The NOTAM is distributed to all stakeholders via existing systems. Technical Operations confirms correct NOTAM publication by verifying the NOTAM number and content.	No change.
The NOTAM number is sent back to FSS and Flight Service Station personnel notify the	Technical Operations personnel already notify the affected ATC facilities. The FSS would be

affected Air Traffic Control (ATC) facilities of the NOTAM.	relieved of this duplicate function.
Replacement or cancellation of NOTAMs follows the same process as outlined above.	No change

*Flight Inspection (AJW-33) can also originate Domestic NOTAMs for navigational equipment in the air by contacting Flight Service Station (FSS) over the radio. In this case Flight Service Station will enter the NOTAM into the USNS and notify the affected ATC facilities.

Table 5 – Current and Proposed Process for Airspace NOTAMs	
Current System	Proposed Change
The information that will make up an Airspace NOTAM is communicated between the personnel who have the information and those who will originate the NOTAM. In some cases this may be the same person or organization but not always.	No change.
1-Special Activity Airspace (SAA) - The originators of SAA Domestic Airspace NOTAMs is supposed to use Special Use Airspace Management System (SAMS) to create their NOTAMs. A safety case for an update to this system was completed on September 1, 2009 (#090109). 2-Central Altitude Reservation Function (CARF) sends candidate NOTAMs to the USNOF via the NES and USNOF specialists input the NOTAMs into the USNS. 3- Other Domestic Airspace NOTAMs. These are mostly originated by Flight Service Station specialists who receive NOTAM information and format NOTAMs which they send to the USNS. 4- Departure Procedure NOTAM and SIDs are currently entered by AeroNav Products via the NTS. 5- STAR NOTAMs are sent to the USNOF via AISR or the NES by the ATC Centers.	1-A system interface will be developed to transfer digital SAA Domestic Airspace NOTAMs from SAMS to FNS and then on to the USNS. 2- A tool similar to the SAMS tool will be developed to issue CARF Airspace NOTAMs. CARF NOTAMs will be sent directly to the USNS via FNS as well. 3-A NOTAM Manager-like tool will be developed for the origination of the remainder of the Domestic Airspace NOTAMs. This tool will be deployed to the appropriate facilities. 4- Departure Procedure NOTAMs and SIDs will be FDC NOTAMs in the future. AeroNav Products will continue to enter them via the NTS and a system interface will be used to connect NTS to FNS and then on to the USNS. 5- A NOTAM Manager-like tool will be developed and given to the ATC Centers for direct entry of digital STAR NOTAMs. The current legacy system will remain as a back-up for all Domestic Airspace NOTAMs.

The USNS automatically checks the format of the incoming proposed NOTAM (parsing) and rejects it if it does not have the required information such as the right airport identifier code. The rejected NOTAM is returned to FSS for correction and no NOTAM number is given to it. If the proposed NOTAM passes the USNS parsing test it is numbered and given a code (00 for no problems and 07 for potential problems). It is also published, distributed to stakeholders and sent to the US NOTAM Office (USNOF) for a final quality review check.	No change except it is very unlikely USNS will reject any digital NOTAMs because NOTAM Manager or system interface will alert the user to any format problems before the NOTAM can be sent to USNS. If any NOTAMs are not processed by USNS, this will be obvious to the originator because s/he will not see the published NOTAM within seconds of submission.
The numbered NOTAM is then available for review by the USNOF. While in the review queue one of three things can happen. 1) The USNOF specialist can review the proposed NOTAM and find it acceptable. 2) The USNOF specialist can contact FSS to cancel and re-issue the NOTAM due to formatting problems. 3) The USNOF specialist can edit the numbered NOTAM and then re-issue the edited NOTAM. In this case the edited NOTAM has the same number as the original version	While USNOF will still have the ability to review NOTAMs from NOTAM Manager or system interface, it is unlikely this will be necessary since all the quality control functions will be built into the software. 1-USNOF will be given read-only access to the NOTAM Manager tool so they can see the name & phone number of the NOTAM originator if they need to contact them 2- All NOTAMs created using NOTAM Manager will move directly from FNS to USNS and then immediately to the distribution system. 3- USNOF specialists can edit the numbered NOTAM, however they will be encouraged to contact AIM or the originator to correct any errors.
The NOTAM is published in the USNS and receives a number. The NOTAM is now distributed to all stakeholders via existing systems. The originator confirms correct NOTAM publication by verifying the NOTAM	No change.

number and content.	
The SAA NOTAMs are sent to the appropriate ATC Center (ARTCC) and Air Traffic personnel notify the affected terminal Air Traffic Control (ATC) facilities of the NOTAM.	No change.
Flight Service Station (FSS) notifies the affected Air Traffic Control (ATC) facilities for airspace NOTAM that they send to the USNS.	1-The notification process for SUA/SAA NOTAMs will not change 2-The notification process for CARF NOTAMs will not change 3-ATC Centers will perform the notification process for any NOTAMs they originate replacing FSS notification process
Replacement or cancellation of NOTAMs follows the same process as outlined above.	No change.

Table 6 – Current and Proposed Process for GPS NOTAMs

Current System	Proposed Change
The information that will make up a GPS NOTAM is communicated between Spectrum Engineering, personnel located at the Air Traffic Control System Command Center, the USNOF, engineers in the field who conduct testing and jamming operations, ATO Service centers and AJR-2 (System Operations Services, Security). Spectrum Engineering uses a tool to determine GPS outage volumes for specific operations and gives a paper copy of this information to USNOF personnel for storage in a logbook.	AIM will either create a system interface between the outage volume tool and FNS or provide a NOTAM Manager-like tool to create digital GPS NOTAMs. The new tool will be designed to use FAA requirements to create a GPS NOTAM in the proper format.
The engineer in the field calls the USNOF when a specific testing or jamming operation is about to begin. The USNOF personnel uses the paper copy of the GPS outage volume in the logbook to create a candidate NOTAM based on the information contained in the logbook about specific GPS service unavailability volumes.	The engineer in the field will call Spectrum Engineering at the Command Center. Spectrum Engineering will use the new tool to create and activate the GPS NOTAM sending it to FNS and on to USNS. Spectrum Engineering personnel are not available 24 hours a day seven days a week so the use of the USNOF or a future NOTAM helpdesk may be necessary for some NOTAM submissions. The existing current system will remain as a backup.
USNOF personnel input the candidate NOTAM into the USNS.	USNOF personnel or future NOTAM help desk personnel may input candidate NOTAMs when Spectrum Engineering personnel are not available.
The numbered NOTAM is then available for review by the USNOF. While in the review queue one of three things can happen. 1) The USNOF specialist can review the	While USNOF will still have the ability to review NOTAMs from NOTAM Manager or system interface, it is unlikely this will be necessary since all the quality control functions will be built into the software.

proposed NOTAM and find it acceptable. 2) The USNOF specialist can contact FSS to cancel and re-issue the NOTAM due to formatting problems. 3) The USNOF specialist can edit the numbered NOTAM and then re-issue the edited NOTAM. In this case the edited NOTAM has the same number as the original version	1-USNOF will be given read-only access to the NOTAM Manager tool so they can see the name & phone number of the NOTAM originator if they need to contact them 2- All NOTAMs created using NOTAM Manager will move directly from FNS to USNS and then immediately to the distribution system. 3- USNOF specialists can edit the numbered NOTAM, however they will be encouraged to contact AIM or the originator to correct any errors.
The NOTAM is distributed to all stakeholders via existing systems. The NOTAM originator confirms correct NOTAM publication by verifying the NOTAM number and content.	No change.
Any notification procedures for GPS NOTAMs occur at this time.	No change.
Replacement or cancellation of NOTAMs follows the same process as outlined above.	No change.

Table 7 – Current and Proposed Process for FDC NOTAMs	
Current System	Proposed Change
Coordination occurs between the originators of FDC NOTAMs and the ATC Facilities involved.	No change.
The originators of FDC NOTAMs include AeroNav Products, Flight Inspection, Airspace, Regulations, and ATC Procedures Group, ATC facilities, System Operations Security, Service Centers, and the Bureau of Land Management/ US Forest Service. Personnel in these organizations send NOTAM data to the USNOF via the NOTAM Entry System (NES) - Service B Messages, the NOTAM Tracking System (NTS) and TFR Builder. Originators may also send NOTAM data to USNOF via phone, fax or email.	A new NOTAM Manager-like tool will be created for the originators who create and submit FDC NOTAMs replacing TFR Builder, NES, and Service B Messages – although these tools will be maintained as back-ups initially. A new system interface will be created to process NOTAMs created using the NTS. AIM is responsible for creating the new tool and system interface and ensuring they will create accurate NOTAMs according to the requirements of the NOTAM Manual. All originators will receive a new tool or system interface which meets or exceeds the capabilities of their current systems.
USNOF personnel put the information into the proper NOTAM format (if it is not already in the proper format) and send the proposed NOTAM to the USNS.	The originators of these NOTAMs will be responsible for the accuracy of their NOTAMs. The existing current system will remain as a backup.
The USNS automatically checks the format of the incoming proposed NOTAM (parsing) and rejects it if it does not have the required information such as the right airport identifier code. The rejected NOTAM is returned to the originator for correction and no NOTAM number is given to it. If the proposed NOTAM passes the USNS parsing test it is numbered and given a code (00 for no problems and 07 for potential problems). It is also published,	While USNOF will still have the ability to review NOTAMs from NOTAM Manager or system interface, it is unlikely this will be necessary since all the quality control functions will be built into the software.

distributed to stakeholders and sent to the US NOTAM Office (USNOF) for a final quality review check.	
The numbered NOTAM is then available for review by the USNOF. While in the review queue one of three things can happen. 1) The USNOF specialist can review the proposed NOTAM and find it acceptable. 2) The USNOF specialist can contact the originator to cancel and re-issue the NOTAM due to formatting problems. 3) The USNOF specialist can edit the numbered NOTAM and then re-issue the edited NOTAM. In this case the edited NOTAM has the same number as the original version.	While USNOF will still have the ability to review NOTAMs from NOTAM Manager or system interface, it is unlikely this will be necessary since all the quality control functions will be built into the software. 1-USNOF will be given read-only access to the NOTAM Manager tool so they can see the name & phone number of the NOTAM originator if they need to contact them. 2- All NOTAMs created using NOTAM Manager will move directly from FNS to USNS and then on to the distribution system. 3- USNOF specialists can edit the numbered NOTAM, however they will be encouraged to contact AIM or the originator to correct any errors.
The NOTAM is published in the USNS and receives a number. The NOTAM is now distributed to all stakeholders via existing systems. The originator confirms correct NOTAM publication by verifying the NOTAM number and content.	No change.
ATC Centers are responsible for forwarding FDC NOTAMs to the appropriate terminal Air Traffic Control (ATC) facilities.	No change.
Replacement or cancellation of NOTAMs follows the same process as outlined above.	No change.

Section 3 – Safety Risk Management Planning and Impacted Organizations

The Safety Risk Management Panel (SRMP) for this NOTAM originator's Safety Risk Management Document followed the SMS process as defined in the Safety Management System Manual version 2.1.

In preparation for this SRMD, the Program Office, Aeronautical Information Management, AJV-2, worked with each of the stakeholders identified below to fully understand their work-flow process and how it would change under the proposed new NOTAM direct-entry tool and system interface.

In addition, the Program Office met with AIM - Engineering Services (AJV-25) who is responsible for ensuring that the SMS process is followed to:

- 1) identify the list of stakeholders,
- 2) determine who was responsible for inviting panel members,
- 3) determine the list of reviewers,
- 4) agree on the proposed timeline, and
- 5) determine possible subject matter experts.

The roles and responsibilities of the SRM Panel members and those responsible for ensuring that the safety process was followed were also discussed. It was agreed that the SMS process experts (Sys Ops Safety) would explain the SMS process to the Panel on the first day of the Panel and the Program Office would explain the NOTAM Manager tool and FNS system to the Panel members. The AIM group agreed the goal was for the Panel to meet in September to identify the hazards and analyze risks with the first draft of the SRMD going to the Panel for review.

Unfortunately, the failure of several stakeholders to attend the September Panel meeting or provide comments on the draft SRMD, as well as the difficulty of the Program Office in finding subject matter experts from various NOTAM originators resulted in repeated delays to the completion of this document.

Given the proposed changes to the current system, the Aeronautical Information Management (AIM) Program Office decided to hold a SRMP with the internal stakeholders and involve the various external stakeholders in a review capacity for the Safety Risk Management Document (SRMD).

The following organizations were invited as SMS Panel members along with their new routing codes after the October 1, 2010 reorganization:

- AIM Program Office (AJR-32), now AJV-22
- AIM Engineering Services (AJR-32), now AJV-25
- **AIM Obstruction Evaluation, AJR-322, now AJV-15**
- System Operations Safety Office (AJR-C),
- US NOTAM Office,

- **Central Altitude Reservation Function Office,**
- Airspace, Regulations, and ATC Procedures Group, now AJV-11,
- System Operations Security,
- Flight Service/Lockheed Martin,
- **ATO Terminal,**
- **ATO En Route,**
- Technical Operations Services, AJW-0,
- **Aviation System Standards (AJW-3),**
- Flight Procedure Standards Branch (AFS-420),
- Airports,
- **National Air Traffic Controllers Association (NATCA), and**
- Professional Aviation Safety Specialists (PASS).

Those organizations in **bold *did not*** attend. Membership of the SRMP and the external stakeholders are listed in Appendix C. Appendix C also lists the persons who attended the Panel meeting and their affiliation.

The Safety Panel met for three days in Washington, DC beginning on September 21st, 2010.

All organizations which were invited but did not attend were also given an opportunity to identify subject matter experts and Panel members as well as schedule follow-up meetings with the Program Office for briefings and demonstrations of the current operating NOTAM Manager software and then to contribute to the analysis of the hazards. None of the stakeholders pursued this opportunity.

9. FSS will be relieved of policy requirements to notify affected ATC facilities of NOTAMs issued or cancelled through the NOTAM Manager tool or system interface for all originators except those created by FSS and obstruction tower light NOTAMs.
10. FSS will continue to provide ATC notifications for the issuances and cancellations of Obstruction Tower Light NOTAMs.
11. Until assured delivery of NOTAMs is fully operational via other FNS or ATC systems, Airport Operators will be responsible for notifying the affected ATC facilities when issuing or canceling NOTAMs according to the contents of the Letter of Agreement between the airport and affected ATC facilities. An example of this LoA can be found in Appendix E.
12. Technical Operations personnel will continue to be responsible for notifying the affected ATC facilities when issuing or canceling NOTAMs.
13. ATC and FSS personnel responsible for Airspace and FDC NOTAMs will continue to be responsible for notifying the affected ATC facilities when issuing or cancelling NOTAMs.
14. All current coordination activities which occur between NOTAM originators and other affected parties prior to or concurrent with the creation of a NOTAM will not change when the NOTAM Manager tool or system interface is deployed.
15. The AIM Program Office will provide a User Manual for the NOTAM Manager tool to provide information about how to use NOTAM Manager to users.
16. The NOTAM Manager tool and system interface are additional user systems connected to Federal NOTAM System which is connected to USNS and will not change any of the distribution of NOTAMs by NAS Aeronautical Information Management Enterprise Systems (NAIMES) operations and procedures including the existing NOTAM validation process by the USNS.
17. The implementation of the NOTAM Manager tool and system interface will be fully coordinated with all stakeholders affected by the operational change and any changes to FAA Orders will be documented in agreements between the parties which describe the roles and responsibilities of the parties. A sample copy is attached as Appendix F to this SRMD.
18. US NOTAM Office personnel and Flight Service Station specialist will continue to function and perform their responsibilities until at least 2012. This will ensure that the issuance and cancellation of NOTAMs that cannot be processed by the new digital tools will still be able to be processed 24 hours a day and seven days a week. Periodically the staffing needs and workload requirements of these offices will be reassessed.
19. Security considerations and requirements for the FNS NOTAM Manager tool and system interface will be handled by the Security Certification and Authorization Package

Section 4 – Assumptions

It is assumed that:

1. The NOTAM Manager tool or system interface will not be deployed to any NOTAM originator unless they can originate in digital format (AIXM) at least ninety-five percent (95%) of the NOTAMs required by that originator. This will be confirmed by tabulating the prior year's NOTAMs and then ensuring the tool has the required menus, scenarios and templates to create at least 95% of the NOTAMs for that year.
2. The NOTAM Manager tool and system interface will be sufficient to ensure that all the requirements of the NOTAM Manual (JO 7930.2) are met and that the requirements contained in the Manual are followed for NOTAMs.
3. Each NOTAM Manager tool and system interface will follow industry development standards for quality assurance. The FAA's Human Factors Design Standard must be followed in the requirements development, design, and testing phases to ensure high quality products at lower overall costs.
4. If any NOTAM cannot be created using the NOTAM Manager tool or system interface, the legacy system and procedures will remain as a backup for the short term (including calling FSS or other creators to prepare NOTAMs). These instances will be tracked and recorded to test and improve the NOTAM Manager tool by creating additional templates/scenarios to ensure that all NOTAMs can be digitally created in AIXM format. See Section 9 for control and tracking requirements.
5. Originators of NOTAMs will continue to be responsible for the accuracy of their own NOTAM information. Thus, NOTAM originators will continue to check that their NOTAMs are published in the USNS correctly.
6. FSS will be relieved of responsibility for the content of those NOTAMs they do not create or submit to the USNS.
7. The proposed NOTAMs will be formatted according to FAA requirements as outlined in the NOTAM Manual and checked for most errors prior to submission to the USNS. The USNS and USNOF will still have validation and review capabilities respectively, although the need to perform this function will be largely obsolete due to the use of the menus, templates and scenarios of the NOTAM Manager or system interface system.
8. All NOTAM originators who use the NOTAM Manager tool or system interface will be relieved of any policy requirements to notify Flight Service Station (FSS) of their NOTAMs since all the NOTAMs they create will appear in the USNS.¹¹

¹¹ FDC NOTAM originators and natural disaster TFR NOTAM originators currently do not use FSS for notification of ATC facilities.

(SCAP) process. No deployments of NOTAM Manager or system interface will occur without a valid SCAP when required.

20. The AIM Program Office will provide the Obstruction Tower Light Operators with the requirements which must be met to enable the creation of a quality Obstruction Tower Lights out NOTAMs processed through a system interface. The FAA and the Operators will follow a test program to ensure no deployment of the system interface occurs prior to comprehensive testing of the Tower Light Operators system and the FAA's system interface.

Section 5 – System Description

The NOTAM Manager tool and the system interface will greatly reduce the human typing errors in NOTAMs with drop down menus and templates and greatly increase the speed with which NOTAMs are activated in the US NOTAM System by cutting out a human processing function.

The NOTAM Manager tool provides the originators with preformed menus which contain a variety of templates and scenarios rather than require the originator to type free form NOTAMs using hundreds of contractions. All of the menus, templates and scenarios are created according to the requirements found in the NOTAM Manual which is the same resource now used by Flight Service and the US NOTAM Office to create NOTAMs.

In addition, the NOTAM Manager tool will not be deployed until the originator can create at least 95% of the NOTAMs that the originator might need to issue. This validation process prior to deployment will be conducted by reviewing and analyzing the originator's prior year's NOTAMs. Thus, the originator is depending upon the quality controls of the menus, templates and scenarios which were built according to NOTAM Manual requirements, rather than depending upon the quality control of FSS or USNOF. As a result much of the need for error-checking will be moved to the creation stage rather than performing it at the end of the process.

In the rare instances when a specific template has not been included within NOTAM Manager, the originator can create a NOTAM using a free-form format. These free-form text NOTAMs will be sent to the FSS and follow the current (legacy) system procedures for NOTAM publication and notification.

By using the NOTAM Manager tool and bypassing Flight Service, NOTAMs will be published much faster. NOTAM data will come directly from the originating source so human errors related to the relaying and transferring of NOTAM data will be virtually eliminated. Furthermore, NOTAM originators will have more control over the quality and accuracy of NOTAMs that they create and cancel.

The USNS/USNOF will still have validation and quality checking roles in theory but a large majority of the NOTAMs created under the proposed system will not need to be checked by a human because the system automatically formats and checks the NOTAMs at the source.

Under the current system when FSS originates D NOTAMs or Domestic NOTAMs, they also notify the affected ATC facility. In all cases except for Obstruction Tower Light Operators, or those Domestic NOTAMs which are created using the old legacy system, or where letters of agreement have been signed by the parties changing the process, the NOTAM originators will perform this duty.

For instance, airport operators will be responsible for notifying the affected ATC facilities of their respective NOTAMs per the Letter of Agreement. Technical Operations already notifies ATC facilities affected by new NOTAMs that they originate, so FSS will cease this duplicate

function. Domestic Airspace and FDC NOTAMs currently have coordination and notification procedures in effect to ensure all affected ATC facilities are informed of new NOTAMs. These will remain in place and will not change by the introduction of the NOTAM Manager tool or system interface. The affected Air Route Traffic Control Centers are responsible for notifying the affected terminal facilities (TRACON and ATCT) when they receive SUA and FDC NOTAMs.

As in the current (legacy) NOTAM system, NOTAMs created by the FNS system will be published in the United States NOTAM System (USNS) and disseminated via several systems including Weather Message Switching Center Replacement (WMSCR), National Airspace Data Interchange Network (NADIN), Aeronautical Information System Replacement (AISR), En Route Information Display System (ERIDS), and other distribution systems. The proposed new tool and system interface will not change this distribution system.

Using the 5M model from the SMS Manual 2.1, the NOTAM Manager tool and system interface description are as follows:

Mission:

The mission of the NOTAM Manager and system interface is to provide the ability for NOTAM originators to create and cancel their own NOTAMs digitally (in AIXM compliant format) and send them directly to the USNS, thus improving their timeliness and accuracy.

Media or Environment:

The first principle environmental change will be the use of the NOTAM Manager tool which allows originators to enter NOTAMs directly into the USNS. The NOTAM Manager tool uses menus/templates/scenarios designed according to the requirements of the NOTAM Manual (JO7930.2), thus significantly reducing human error. The NOTAM Manager tool is a component of the Federal NOTAM System (FNS) which will interface directly with the USNS.

The second change will be the use of the system interface which will allow originators of NOTAMs who are already inputting information required for a NOTAM into their own system to capture that information and send it via FNS to the USNS. This will allow the creation of a NOTAM by one system communicating with another system, rather than requiring a person to input the same information into two different systems which can lead to human errors.

The USNS includes automation for receiving NOTAMs from domestic and international sources, numbering them and distributing them to users through multiple distribution channels. The United States NOTAM Office (USNOF) performs a quality checking function insuring that the proper format is used on active NOTAMs. Since the NOTAMs created using the NOTAM Manager tool or the system interface will replace the NOTAMs currently created by FSS or USNOF, there will be no increase in the number of NOTAMs received by the USNS or USNOF.

The current legacy system will remain available to originate NOTAMs any time the NOTAM Manager tool or system interface is not available.

Man/Person:

All of the NOTAM originators including Airport Operations personnel, Obstruction Tower Light Operator's personnel, Technical Operation's personnel, etc. will be impacted by the use of the NOTAM Manager tool or system interface. They will have to learn how to use the new menus/scenarios/templates provided by the tool when creating NOTAMs. In most cases except for Obstruction Tower Light Operators, the originator's personnel will also be assuming responsibility to notify the affected ATC facilities. Since the NOTAM Manager tool creating NOTAMs will be received by the USNS from FNS, nothing "downstream" from the USNS connection will change. The USNS will still perform its automated functions and the USNOF personnel will still be able to perform their role of quality checking the format of NOTAMs. However, since all NOTAMs created using the NOTAM Manager tool and system interface will be created based upon the requirements of the NOTAM Manual, it is not anticipated that any of these NOTAMs will have to be modified, edited or rejected.

Any adverse impacts associated with the use of the new tool or system interface by the originators are expected to be only temporary until the users become familiar with the software menus/templates/scenarios and their notification responsibilities. The FAA is collaborating with a human factors contractor to periodically review and suggest changes to the NOTAM Manager tool to make it as safe and user-friendly as possible. All NOTAM originators will receive a User Manual and training prior to their use of the tool. The originators that will use a system interface will receive a requirements document from the FAA detailing what is required to produce quality NOTAMs via a system interface. Any potential adverse impacts relating to human interaction with the NOTAM Manager tool and system interface are identified as a hazard and evaluated in this document. The consumers of NOTAMs will be impacted in a positive way by the implementation of the NOTAM Manager tool and system interface due to the increased accuracy and timeliness of NOTAMs coming from all the originators using the new tools. In addition, Flight Service and the USNOF will see a sizeable reduction in the number of NOTAMs they will need to review or process.

Management:

The NOTAM Manager tool and system interface was created and tested by the FAA's Aeronautical Information Management (AIM) Group and their contractors. As the Program Office for this new direct-entry system, it was the responsibility of the AIM Group to provide the scope of this SRMD to the panel members and reviewers who would be affected by the process change. The AIM Group and their contractors will be responsible for future tracking and monitoring according to the requirements listed in Section 9.

Documents that may be affected by this NOTAM Manager tool or system interface include:

1. **FAA Order JO 7930.2**, Notices to Airmen (NOTAM)
2. **Advisory Circular (AC) 150/5200-28D**, Notices to Airmen (NOTAMs) for Airport Operators
3. **FAA Order 8260.19**, Flight Procedures and Airspace
4. **Advisory Circular (AC) 70/7460-1K**, Obstruction Marking and Lighting
5. **Advisory Circular (AC) 150/5345-43**, Specification for Obstruction Lighting Equipment
6. **FAA Order JO 7210.3**, Facility Operation and Administration
7. **FAA Order 6000.15**, General Maintenance Handbook for NAS Facilities
8. **FAA 8200.1**, US Standard Flight Inspection Manual

Note: At the present time there are conflicts which exist between the requirements of the NOTAM Manual and FAA Advisory Circular 150/5200-28 "Notices to Airmen for Airport Operators." These conflicts are currently being addressed by the FAA's Takeoff/Landing Performance Assessment Aviation Rulemaking Committee (TALPA-ARC). Airports using the NOTAM Manager tool will have to work through the conflicts today just as they have had to work through the conflicts using the current legacy system.

Machine:

The NOTAM Manager tool or system interface will run on existing personal computers of the originators and their Internet browser software to access the NOTAM Manager tool or the system interface. Each operator must provide an adequate bandwidth connection to access and use the NOTAM Manager and system interface. Since nearly all originators currently have access to the Internet, they will not be required to install any new hardware or software at their facility. The NOTAM Manager tool and system interface will be located on AIM servers.

Any tool required to process Obstruction Tower Light (TL) NOTAMs which will connect with the Federal NOTAM system via a system to system interface will be the responsibility of the TL Operators. However, the FAA will provide them with the requirements necessary to produce quality Obstruction Tower light NOTAMs.

Section 6 – Identified Hazards

The Safety Risk Management Panel (SRMP) members identified the hazards listed below by comparing the existing procedures used as identified in Section 1 to those in the proposed procedures as identified in Section 2 of this document. The method for analyzing and assessing risks associated with the hazards was a combination of quantifiable data analysis, expert judgment, and “what if” scenarios conducted by experienced subject matter experts.

The panel identified up to six hazards and applied those hazards to each NOTAM category for their relevance to the different originators. In some cases not all six hazards applied, but in no case were there any unique hazards identified by only one originator. Appendix A provides a list of the Hazard and Risk Analysis for each NOTAM originator category.

Hazard Number: NO-001

Hazard Description: Data corruption caused by humans

Hazard Number: NO-002

Hazard Description: Data corruption caused by machine

Hazard Number: NO-003

Hazard Description: NOTAM Manager tool or system interface unavailable

Hazard Number: NO-004

Hazard Description: Lack of synchronization of the NOTAM Manager tool or system interface and the current legacy system used by Flight Service

Hazard Number: NO-005

Hazard Description: User input error

Hazard Number: NO-006

Hazard description: Lapse of Air Traffic Control notification about a new NOTAM or NOTAM cancellation

Section 7 –Risk Analysis and Risks Assessed

According to the FAA National Airspace System Requirements Specification (NAS SR-1000)¹², NOTAM information and NOTAM systems are classified as mission essential systems, not mission critical. NOTAMs provide safety essential alerts of temporary changes to aeronautical information that are used by pilots and controllers to conduct safe flight operations and ensure the safe conduct of flights during take-off, landing, enroute and ground movement phases of flight.

As a consequence of the mission essential role of NOTAMs within ATC operations, the specifications (NAS SR-1000) indicate that the consequence of NOTAM loss, delay or corruption cannot exceed a hazard level of Major. (See Table 8) In other words, NOTAMs may contribute to higher level hazards, but they cannot be the primary cause of a catastrophic hazard. As a result, a NOTAM hazard classified as “hazardous or catastrophic” is not credible. The SRMP used the “NAS wide” ranking from Table 9 when deciding on the likelihood of a particular hazard since this SRMD applies to all NOTAM originators across the NAS.

The SRMP members were identified by the AIM Program Office based upon the scope of the operational change. The SRMP analyzed each hazard identified in Section 6 using expert judgment and classifications in Tables 8 and 9. Of the six hazards, all but two were initially identified as LOW risk. The hazards identified in Section 6 were discussed and addressed by the SRMP during the September Panel meeting.

The severity and likelihood rationales, descriptions of existing controls, and resultant current risks are in the Hazard Analysis Worksheets in Appendix A.

¹² Section 4.5 of the NAS SR-1000, Rev. B identifies the Reliability, Maintainability & Availability (RMA) requirements for NAS services and capabilities including the service levels – critical, essential & routine. Section 6.6 of the RMA handbook 006A identifies NAS Status updates as an essential service. NAS status updates are NOTAMs.

Table 8 – Severity Definitions

Effect on ↓	Hazard Severity Classification				
	Minimal 5	Minor 4	Major 3	Hazardous 2	Catastrophic 1
Air Traffic Control Services	Conditions resulting in a minimal reduction in ARC services, or a loss of separation resulting in a Category D runway incursion, ¹³ or a proximity event.	Conditions resulting in a slight reduction in ATC services, or a loss of separation resulting in a Category C RI, ¹³ or Operational Error(OE) ¹⁴	Conditions resulting in a partial loss of ATC services, or a loss of separation resulting in a Category B RI, ¹³ or OE ¹⁴	Conditions resulting in a total loss of ATC services, (ATC Zero) or a loss of separation resulting in a Category A RI ¹³ or OE ¹⁴	Conditions resulting in a collision between aircraft, obstacles or terrain
Flight Crew	--Flight crew receives TCAS Traffic Advisory (TA) informing of nearby traffic, or, -- Pilot Deviation where loss of airborne separation falls within the same parameters of Category D OE¹⁴ or proximity Event --Minimal effect on operation of aircraft	--Potential for Pilot Deviation(PD) due to TCAS Preventive Resolution Advisory (PRA) advising crew not to deviate from present vertical profile, or, --PD where loss of airborne separation falls within the same parameters of Category C OE¹⁴ or --Reduction of functional capability of aircraft but does not impact overall safety e.g. normal procedures as per AFM (Aircraft Flight Manual	--PD due to response to TCAS Corrective Resolution (CRA) issued advising crew to take vertical action to avoid developing conflict with traffic, or --PD where loss of airborne separation falls within the same parameters of a Category B OE¹⁴, or-- Reduction in safety margin or functional capability of the aircraft, requiring crew to follow abnormal procedures as per AFM	--Near mid-air collision results due to proximity of less than 500 feet from another aircraft or a report is filled by pilot or flight crew member that a collision hazard existed between two or more aircraft, or, --Reduction in safety margin and functional capability of the aircraft requiring crew to follow emergency procedures as per AFM	--Condition resulting in a med-air collision or impact with obstacle or terrain resulting in hull loss, multiple fatalities, or fatal injury

¹³ As defined in 2005 Runway Safety Report

¹⁴ As defined in FAA Order 7210.56 – Air Traffic Quality Assurance

Table 8 – Severity Definitions (cont.)

Effect on ↓	Hazard Severity Classification				
	Minimal 5	Minor 4	Major 3	Hazardous 2	Catastrophic 1
Flying Public	--Minimal injury or discomfort to passenger(s)	--Physical discomfort to passenger(s) (e.g. extreme braking action; clear air turbulence causing unexpected movement of aircraft causing injuries to one or two passengers out of their seats) --Minor ¹⁵ injury to greater than zero to less or equal to 10% of passengers	--Physical distress on passengers (e.g. abrupt evasive action; severe turbulence causing unexpected aircraft movements) -- Minor ¹⁵ injury to greater than 10% of passengers	Serious ¹⁶ injury to passengers	Fatalities or fatal ¹⁷ injury to passenger(s)

¹⁵ Minor injury – any injury that is neither fatal nor serious

¹⁶ Serious injury – any injury which: 1) requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; 2) results in a fracture of any bone (except simple fractures of fingers, toes or nose); 3) causes severe hemorrhages, nerve, muscle, or tendon damage; 4) involves any internal organ; or 5) involves second-or third-degree burns, or any burns affecting more than 5 percent of the body surface.

¹⁷ Fatal injury – any injury that results in death within 30 days of the accident

Table 9: Likelihood Definitions

	NAS Systems & ATC Operational	NAS Systems		ATC Operational		Flight Procedures
	Quantitative	Qualitative				
		Individual Item/System	ATC Service/NAS Level System	Per Facility	NAS-Wide	
Frequent A	Probability of occurrence per operation/operational hour is equal to or greater than 1×10^{-3}	Expected to occur about once every 3 months for an item	Continuously experienced in the system	Expected to occur more than once per week	Expected to occur more than 1-2 days	Probability if occurrence per operation/operational hour is equal to or greater than 1×10^{-5}
Probable B	Probability of occurrence per operation/operational hour is less than 1×10^{-3} but equal to or greater than 1×10^{-5}	Expected to occur about once per year for an item	Expected to occur frequently in the system	Expected to occur about once every month	Expected to occur about several times per month	
Remote C	Probability of occurrence per operation/operational hour is less than 1×10^{-5} but equal to or greater than 1×10^{-7}	Expected to occur several times in the life cycle of an item	Expected to occur numerous times in the system life cycle	Expected to occur about once every year	Expected to occur about once every few months	Probability of occurrence per operation/operational hour is less than 1×10^{-5} but equal to or greater than 1×10^{-7}
Extremely Remote D	Probability of occurrence per operation/operational hour is less than 1×10^{-7} but equal to or greater than 1×10^{-9}	Unlikely to occur, but possible in an item's life cycle	Expected to occur several times in the system life cycle	Expected to occur about once every 10-100 years	Expected to occur about once every 3 years	Probability of occurrence per operation/operational hour is less than 1×10^{-7} but equal to or greater than 1×10^{-9}
Extremely Improbable E	Probability of occurrence per operation/operational hour is less than 1×10^{-9}	So unlikely that it can be assumed that it will not occur in an item's life cycle	Unlikely to occur, but possible in the system life cycle	Expected to occur less than once every 100 years	Expected to occur less than once every 30 years	Probability of occurrence per operation/operational hour is less than 1×10^{-9}

The following is the narrative of the hazards, existing controls, possible effects and risk assessment identified for all the NOTAM originators.

AIRPORTS WITH OPERATING ATC TOWERS

Hazard Number: TWR-D001

Hazard: Data corruption to FNS caused by humans

Existing Controls:

- 1) Airport Operations must coordinate all NOTAM activities with the ATC Tower prior to the action being taken and the NOTAM being issued. The NOTAM only represents the confirmation of proposed and coordinated agreements on closures, movements, etc. between Airport Ops and the ATC Tower.
- 2) Per JO 7210.3, ATC Tower must be aware of all NOTAMs under their jurisdiction via IDS or other NOTAM dissemination procedures. Thus, ATC would recognize unauthorized, inconsistent NOTAMs and respond accordingly.
- 3) USNS performs validation checks on NOTAMs and USNOF performs quality control checks on all incoming NOTAMs.
- 4) Code of Federal Regulations §91.113 & AIM 555 & 558 requires pilots to see and avoid all hazards in the air and on the ground and pilots must secure ATC authorization to move on controlled airport surface areas.
- 5) JO 7110.65, 2-9 & JO7210.3, 10-4 requires Automatic Terminal Information Service (ATIS) alerts be broadcast over airport radio frequency to alert pilots on active runways, new or canceled NOTAMs – thus pilots would be alerted to any conflict between ATIS info and NOTAM.
- 6) ARP-Part 139, 303 and 327 require Airport Ops to provide training on NOTAMs to their staff.
- 7) FSS reviews all NOTAMs as part of pilot briefings and thus could identify conflicting NOTAMs.
- 8) Legacy NOTAM system is complete back-up if NOTAM Manager or Federal NOTAM System is unavailable.
- 9) Physical barriers and warnings on the airport surface warn pilots when a runway or taxiway is closed.

Possible effects:

- 1) Cancellation of valid NOTAM;
- 2) Issuance of inaccurate NOTAM;
- 3) Delay in resolution of conflict between actual conditions and NOTAM reported or
- 4) Issuance of conflicting NOTAMs

Risk Assessment: The SRMP evaluated the different ranges of potential severity of Hazard for TWR-D001 and concluded the level would be **Minor**. Their rationale for this conclusion was based upon all the existing controls which regulate movement on the airport. Since ATC Tower and Airport Ops make their decisions about movement of aircraft on their prior coordination, not upon the NOTAMs, the Panel concluded the worst credible outcome would be a slight reduction in ATC services, loss of separation resulting in a Category C runway incursion or Operational Error. In addition, they felt the likelihood of human interference is **Extremely Remote**. The basis for this determination is the effectiveness of existing controls, such as strict physical access employed by the Airport Operations to get into their facility where NOTAMs will be created.

Current/Initial Risk: 4D

Hazard Number: TWR-D002

Hazard: Data corruption caused by machine

Existing Controls:

- 1) See all existing controls listed in TWR-D001 above.
- 2) NOTAM Manager is designed following the same requirements used by the current creators of NOTAMs – the NOTAM Manual.
- 3) NOTAM Manager software is created under specific FAA software guidelines for systems which are mission essential.
- 4) All software tested prior to deployment of original airport NOTAM Manager and each update of software prior to use.
- 5) Proven effective software feedback form (JIRA) used to report, track and fix bugs or problems with the software.
- 6) NOTAM Manager tool allows the user to see any problems almost immediately thus allowing the user to switch to the legacy system as a complete back-up.

Possible effects:

- 1) Corrupted NOTAM causing delay in issuance of real NOTAM due to time needed to recognize valid NOTAM not issued
- 2) Inaccurate information in the NAS.

Risk Assessment: The SRMP evaluated the different ranges of potential hazards and determined that the severity of Hazard TWR-D002 would be **Minor**. Their rationale for this determination was based upon 1) all the existing controls listed in TWR-D001 and 002 above and 2) the fact that the legacy system at Denver takes, on average, 8 minutes from when Denver sends the NOTAM information to FSS and when the NOTAM is published. With NOTAM

Manager the time will likely be less than one minute when the system is operating normally; thus Airport Ops would recognize the problem immediately and be able to respond accordingly by either re-entering the NOTAM into the NOTAM Manager or using the legacy system as a back-up. The SRMP evaluated the likelihood of this hazard as **Extremely Remote** based upon the lack of experience with NOTAMs being corrupted over the years under the current legacy system and that the new system will be processed through the same USNS.

Current/Initial Risk: 4D

Hazard Number: TWR-D003

Hazard: NOTAM Manager or FNS is not available

Existing Controls:

- 1) NOTAM Manager shows visual computer alert if network connectivity is lost.
- 2) Given speed of system in processing NOTAMs – failure to publish within 1-2 minutes would alert Airport Ops to investigate or publish via legacy system
- 3) Many Airports have redundant back-up power systems.
- 4) Legacy NOTAM system is complete back-up.

Possible effects: Delayed NOTAM issuance

Risk Assessment: The SRMP evaluated the different ranges of potential severity of Hazard TWR-D003 and concluded it would be **Minimal**. The rationale for the decision was based upon the immediate access to the legacy system and the time needed to recognize that a problem has occurred and then return to the processing the NOTAM through the legacy system. The SRMP concluded the likelihood of this happening was **Remote** based upon Denver's quantitative analysis of a loss of access to the Internet 5 times over the last 15 months for a total of 17 documented hours. This value is not directly related to the number of days or hours of loss in power because the possible effect is the delay in the issuance of the NOTAM. Since the legacy system would be available for use, the loss of access may influence the likelihood value, but it does not directly determine it.

Current/Initial Risk: 5C

Hazard Number: TWR-D004

Hazard: Lack of synchronization of NOTAM Manager/FNS and the current legacy system used by Flight Service.

Existing Controls:

- 1) See those under TWR-D003 above
- 2) Airport Ops can check FAA PilotWeb site for NOTAM number and then cancel through FSS

Possible effects: Delay in cancellation of NOTAM if created NOTAM in NOTAM Manager, it then becomes unavailable and then the Airport must cancel using the legacy system.

Risk Assessment: If Airport Ops uses NOTAM Manager to create a NOTAM and then tries to cancel it with Flight Service due to lack of availability of NOTAM Manager, there may be a delay because Airport Ops will be required to use the telephone to cancel the NOTAM via FSS. This is due to the lack of synchronization between the two systems. Airport Ops will not be able to cancel the NOTAM using the eNOTAM system because the NOTAM was not created using it. The SRMP evaluated the different ranges of potential severity of Hazard TWR-D004 and determined it was **Minimal**. The rationale was based upon the fact that a delay in the cancellation of a NOTAM would have minimal reduction in ATC services. The SRMP evaluated the likelihood of this hazard as **Extremely Remote**. The basis for this level is based upon the very infrequent times when Airport Ops would be creating a NOTAM under the new system, the system would then not be available, and then Airport Ops would have to use the telephone to cancel the NOTAM.

Current/Initial Risk: 5D

Hazard Number: TWR-D005

Hazard: User input error

Existing Controls:

- 1) NOTAM Manager provides menus, templates and scenarios to support quality and reduce human errors.
- 2) NOTAM Manager menus and templates are airport specific so that only AD, RWY, TWY, APRON, RAMP, SVC, OBST which exist at each specific Airport will be provided for use by Airport Ops personnel. This will eliminate some errors which occur today, but cannot be eliminated by FSS or USNOF.
- 3) NOTAM Manager was created using same requirements from the NOTAM Manual used by FSS and USNOF when creating or quality checking NOTAMs.
- 4) NOTAM Manager also includes rules which exclude the creation of duplicate NOTAMs, creating NOTAMs with expired dates or times, publishing NOTAMs too far in advance, etc. further reducing errors.

- 5) NOTAM Manager performs quality checks initially so it alerts the user to any problems with NOTAM quality prior to publication.
- 6) Current training of Airport Ops personnel required prior to issuing NOTAMs under legacy system.
- 7) Part 139 airports are required to train their staff on NOTAMs.
- 8) Use of free form text NOTAMs by Airport Ops will be done through the legacy system.
- 9) NOTAM Manager displays NOTAM in plain language so Airport Ops can see in plain language if NOTAM is correct prior to publication.
- 10) USNS and USNOF will continue to perform their validation and quality checking process as under the current legacy system.

Possible effect: Incorrect NOTAM published or delay in NOTAM issuance

Risk Assessment: The current legacy system produces an error rate of between 20-40% and thus it is not unusual for imperfect NOTAMs to be issued or for a NOTAM to have to be edited or cancelled and reissued. Today, all legacy NOTAMs are created using only free form text. It is unknown what percentage of NOTAM errors are the responsibilities of Flight Service or the US NOTAM Office because there is no way to measure the two. For example, the legacy system also produced an average delay from creation by Denver Airport Operations to issuance by USNS of 8 minutes with times varying from 2 minutes to 27 minutes during a 3 month period in the spring of 2009. During snow events, it is difficult for the legacy system to keep up when ground conditions and new NOTAMs change very fast. With NOTAM Manager it is anticipated that this delay and the inefficiency it causes will be eliminated.

NOTAM Manager and the system interface is a new system and thus the users will have to learn to use it. While FSS will no longer be performing the validation checks of the Airport NOTAMs using NOTAM Manager, the USNS and USNOF will still be able to perform their respective validations and format checks. Thus, because NOTAMs entered into NOTAM Manager will bypass Flight Service's checks, there continues to be the potential for NOTAMs arriving as the USNS with some errors. However, no system can be designed completely error free – since an airport could enter a NOTAM closing RWY 34L when they meant RWY 34R and no current system or proposed system could prevent that error.

The SRMP evaluated the different ranges of potential severity of Hazard TWR-D005 and concluded it would be **Minor**. Their rationale for this decision is based upon the existing controls identified above and the continued review and validations performed by USNS and USNOF. The SRMP evaluated the likelihood of this hazard as **Remote**. The basis for the likelihood is the pre-formatted templates of the NOTAM Manager which will be used by Airport Ops that will eliminate a variety of human errors, plus the effectiveness of existing controls identified above.

Current/Initial Risk: 4C

Hazard Number: TWR-D006

Hazard: Failure of Airport Operation's personnel to notify affected ATC facility.

Existing Controls:

- 1) See existing controls under TWR-D001 above.
- 2) ATC Traffic Flow Management Units in ATC Tower, TRACON and ATC Centers coordinate traffic flow and thus related NOTAM information which affects flow.

Possible effects: Delayed of NOTAM while clarify inconsistency of NOTAM vs. current operations

Risk Assessment: Airport Ops personnel will be taking over from Flight Service their responsibility for notifying their ATC facility affected by the NOTAM, however Airport Ops and ATC Tower personnel already coordinate all changes to movement areas and the NOTAMs are just a back-up to this coordination. The SRMP evaluated the different ranges of severity of Hazard TWR-D006 and concluded it would be **Minor**. Their rationale for this determination is supported by all the existing coordination which exists between Airport Ops and their ATC Tower. Thus, the current notification from FSS after the publication of a NOTAM is viewed as "after the fact" and redundant. Further, that notification is not relied upon by ATCT; rather it is the direct coordination between Airport Ops and the ATC Tower which is the primary source of information for decision-making about the movement of aircraft. The SRMP evaluated the likelihood of this hazard as **Remote**. The basis for the likelihood is the effectiveness of existing controls, the coordination between ATC traffic flow personnel in ATC Tower, TRACON and ATC Center and coordination between Airport Ops and local FAA facilities.

Current/Initial Risk: 4C

The initial risk totals are plotted in Figure 3. **There were no hazards evaluated as Initial High or Medium Risks.** All of the hazards were evaluated as initial **LOW** risks.

Severity \ Likelihood	Minimal	Minor	Major	Hazardous	Catastrophic
	5	4	3	2	1
Frequent A					
Probable B					
Remote C	3	5 & 6			
Extremely Remote D	4	1 & 2			
Extremely Improbable E					*

High Risk

Medium Risk

Low Risk

* Unacceptable with Single Point and Common Cause Failures

Figure 3 - Initial Risk Matrix for Airports with Operating ATC towers

AIRPORTS WITHOUT OPERATING ATC TOWERS

Hazard Number: NTWR-D001

Hazard: Data corruption to FNS caused by humans

Existing Controls:

- 1) For all Part 139 Airports, Airport Operations must coordinate all NOTAM activities with their controlling ATC facility prior to the action being taken and the NOTAM being issued. The NOTAM only represents the confirmation of proposed and coordinated agreements on closures, movements, etc. between Airport Ops and the ATC facility.
- 2) JO 7210.3, 6-3-2 requires ATC Center Managers to coordinate with other ATC facilities in their area to ensure that adequate procedures are established for receipt and distribution of NOTAMs.
- 3) TRACON may have IDS to display NOTAMs and thus would be alerted to unauthorized or inconsistent NOTAMs and respond accordingly.
- 4) ATC Centers have ERIDS that provides new NOTAMs every 5 minutes.
- 5) USNS performs validation checks on NOTAMs and USNOF performs quality control checks on all incoming NOTAMs.
- 6) Code of Federal Regulations §91.113 & AIM 555 & 558 requires pilots to see and avoid all hazards in the air and on the ground.
- 7) JO 7110.65, 2-9 & JO7210.3, 10-4 requires the Automatic Terminal Information System (ATIS) to broadcast alerts to pilots on local frequency for active runways, new or canceled NOTAMs at towered airports (even if towers may not be open)– thus pilots would be alerted to any conflict between ATIS info and NOTAM.
- 8) ARP-Part 139, 303 and 327 require Airport Ops to provide training on NOTAMs to their staff.
- 9) FSS reviews all NOTAMs as part of pilot briefings and thus might identify conflicting NOTAMs.
- 10) Legacy NOTAM system is complete back-up if NOTAM Manager or system interface is unavailable.

Possible effects:

- 1) Cancellation of valid NOTAM;
- 2) Issuance of inaccurate NOTAM;
- 3) Delay in resolution of conflict between actual conditions and NOTAM reported
- 4) Issuance of conflicting NOTAMs

Risk Assessment: The SRMP evaluated the different ranges of potential severity of Hazard for NTWR-D001 and concluded the level would be **Major**. The Panel concluding that even with existing controls, since there is no operating control tower, the severity would be greater than

identified above with operating ATC towers. However, they felt the likelihood of human interference is **Extremely Remote**. The basis for the Extremely Remote likelihood is the effectiveness of existing controls, such as strict physical access employed by the Airport Operations to get where NOTAMs will be created.

Current/Initial Risk: 3D

Hazard Number: NTWR-D002

Hazard: Data corruption caused by machine

Existing Controls:

- 1) See all existing controls listed in NTWR-D001 above.
- 2) NOTAM Manager is designed following the same requirements used by the current creators of NOTAMs – the NOTAM Manual.
- 3) NOTAM Manager software is created under specific FAA software guidelines for systems which are mission essential.
- 4) Comprehensive software test plan followed for original airport NOTAM Manager and each update of software prior to use.
- 5) Proven effective software feedback form (JIRA) used to report, track and fix bugs or problems with the software.
- 6) NOTAM Manager tool allows the user to see any problems almost immediately thus allowing the user to switch to the legacy system as a complete back-up.

Possible effects:

- 1) Corrupted NOTAM causing delay in issuance of real NOTAM due to time needed to recognize valid NOTAM not issued.
- 2) Inaccurate information in the NAS.

Risk Assessment: The SRMP evaluated the different ranges of potential hazards and determined that the severity of Hazard NRWT-D002 would be **Minor**. Their rationale for this determination was based upon 1) all the existing controls listed in NTWR-D001 above and 2) the fact that the current system at Denver takes, on average, 8 minutes from when Denver sends the NOTAM information to FSS and when the NOTAM is published. With NOTAM Manager the time will likely be less than one minute when the system is operating normally; thus Airport Ops would recognize the problem immediately and be able to respond accordingly by either re-entering the NOTAM in NOTAM Manager or using the legacy system as a back-up. The SRMP

evaluated the likelihood of this hazard as **Extremely Remote** based upon the lack of experience with NOTAMs being corrupted over the years under the current legacy system and that the new system will be processed through the same USNS.

Current/Initial Risk: 4D

Hazard Number: NTWR-D003

Hazard: NOTAM Manager or FNS is not available

Existing Controls:

- 1) NOTAM Manager shows visual computer alert if network connectivity is lost.
- 2) Given speed of system in processing NOTAMs – failure to publish within 1-2 minutes would alert Airport Ops to investigate or process via legacy system.
- 3) Airport Ops may have redundant back-up power system.
- 4) Legacy NOTAM system is complete back-up.

Possible effects: Delayed NOTAM issuance

Risk Assessment: The SRMP evaluated the different ranges of potential severity of Hazard NTWR-D003 and concluded it would be **Minimal**. The rationale for the decision was based upon the immediate access to the legacy system and the time needed to recognize that a problem has occurred and then return to the processing the NOTAM through the legacy system. The SRMP concluded the likelihood of this happening was **Remote** based upon Denver's quantitative analysis of a loss of access to the Internet 5 times over the last 15 months for a total of 17 documented hours. This value is not directly related to the number of days or hours of loss in power because the possible effect is the delay in the issuance of the NOTAM. Since the legacy system would be available for use, the loss of access may influence the likelihood value, but it does not directly determine it.

Current/Initial Risk: 5C

Hazard Number: NTWR-D004

Hazard: Lack of synchronization of NOTAM Manager/FNS and the current legacy system used by Flight Service.

Existing Controls:

- 1) See those under NTWR-D003 above

- 2) Airport Ops can check FAA PilotWeb site for NOTAM number and then cancel through FSS

Possible effects: Delay in cancellation of NOTAM if created NOTAM in NOTAM Manager, it becomes unavailable and then the Airport must cancel using the legacy system.

Risk Assessment: If Airport Ops uses NOTAM Manager to create a NOTAM and then tries to cancel it with Flight Service due to lack of availability of NOTAM Manager, there may be a delay because Airport Ops will be required to use the telephone to cancel the NOTAM via FSS. This is due to the lack of synchronization between the two systems. Neither Airport Ops nor FSS will be able to cancel the NOTAM using the eNOTAM system because the NOTAM was not created using it. The SRMP evaluated the different ranges of potential severity of Hazard NTWR-D004 and determined it was **Minimal**. The rationale was based upon the fact that a delay in the cancellation of a NOTAM would have minimal reduction in ATC services. The SRMP evaluated the likelihood of this hazard as **Extremely Remote**. The basis for this level is based upon very infrequent times when Airport Ops would be creating a NOTAM under the new system, the system would then not be available, and then Airport Ops would have to use the telephone to cancel the NOTAM.

Current/Initial Risk: 5D

Hazard Number: NTWR-D005

Hazard: User input error

Existing Controls:

- 1) NOTAM Manager provides menus, templates and scenarios to support quality and reduce human errors.
- 2) NOTAM Manager menus and templates are airport specific so that only AD, RWY, TWY, APRON, RAMP, SVC, OBST which exist at each specific Airport will be provided for use by Airport Ops personnel. This will eliminate some errors which occur today but cannot be eliminated by FSS or USNOF.
- 3) NOTAM Manager was created using same requirements from the NOTAM Manual used by FSS and USNOF when creating or quality checking NOTAMs.
- 4) NOTAM Manager also includes rules which exclude the creation of duplicate NOTAMs, creating NOTAMs with expired dates or times, publishing NOTAMs too far in advance, etc. further reducing errors.
- 5) NOTAM Manager and FNS perform quality checks initially so the user is alerted to any problems with NOTAM quality prior to publication.

- 6) Current training of Airport Ops personnel required prior to issuing NOTAMs under legacy system.
- 7) Use of free form text by Airport Ops will be done through the legacy system.
- 8) NOTAM Manager displays NOTAM in plain language so Airport Ops can see in plain language if NOTAM is correct prior to publication.
- 9) USNS and USNOF will continue to perform their quality checking process as under the current legacy system.

Possible effect: Incorrect NOTAM published or delay in NOTAM issuance

Risk Assessment: The current legacy system produces an error rate of between 20-40% and thus it is not unusual for imperfect NOTAMs to be issued or for a NOTAM to have to be edited or cancelled and reissued. Today, all legacy NOTAMs are created using only free form text. It is unknown what percentage of NOTAM errors are the responsibilities of Flight Service or the US NOTAM Office because there is no way to measure this. The legacy system also produced an average delay from creation by Denver Airport Operations to issuance by USNS of 8 minutes with times varying from 2 minutes to 27 minutes during a 3 month period in the spring of 2009. During snow events, it is difficult for the legacy system to keep up when ground conditions and new NOTAMs change very fast. With NOTAM Manager it is anticipated that this delay and the inefficiency it causes will be eliminated.

NOTAM Manager is a new software tool and thus the users will have to learn to use the templates. While FSS will no longer be performing the validation checks of the Airport NOTAMs using the templates, the USNS and USNOF will still be performing their respective validation and format checks. Thus, because NOTAMs entered into NOTAM Manager will bypass Flight Service's checks, there continues to be the potential for NOTAMs arriving at the USNS with some errors. However, no system can be designed completely error free – since an airport could enter a NOTAM closing RWY 34L when they meant RWY 34R.

The SRMP evaluated the different ranges of potential severity of Hazard NTWR-D005 and concluded it would be **Minor**. Their rationale for this decision is based upon the existing controls identified above and the continued review and validations performed by USNS and USNOF. The SRMP evaluated the likelihood of this hazard as **Probable**. The Panel felt that despite the pre-formatted templates of the NOTAM Manager which will be used by Airport Ops that will eliminate a variety of human errors and the effectiveness of existing controls identified above, the new users will have to learn the system and will make mistakes during that learning process.

Current/Initial Risk: 4B.

Hazard Number: NTWR-D006

Hazard: Failure of Airport Operation's personnel to notify affected ATC facility.

Existing Controls:

- 1) See existing controls under NTWR-D001 above.
- 2) ATC Traffic Flow Management Units in ATC Tower, TRACON and ATC Centers coordinate traffic flow and thus related NOTAM information which affects flow.

Possible effects: Delayed NOTAM while clarify inconsistency of NOTAM vs. current operations

Risk Assessment: Airport Ops personnel will be taking over from Flight Service their responsibility for notifying their ATC facility affected by the NOTAM, however Airport Ops and ATC personnel already coordinate all changes to movement areas and the NOTAMs are just a back-up to this coordination. The SRMP evaluated the different ranges of severity of Hazard NTWR-D006 and concluded it would be **Minor**. The SMEs concluded this would only happen about once a year that lack of coordination would result in a partial loss of ATC services. The SRMP evaluated the likelihood of this hazard as **Remote**. The basis for the likelihood is the effectiveness of existing controls, the coordination between ATC traffic flow personnel and coordination between Airport Ops and local FAA facilities.

Current/Initial Risk: 4C

The initial risk totals are plotted in Figure 4.

Severity \ Likelihood	Minimal	Minor	Major	Hazardous	Catastrophic
	5	4	3	2	1
Frequent A					
Probable B		5			
Remote C	3	6			
Extremely Remote D	4	2	1		
Extremely Improbable E					*

High Risk

Medium Risk

Low Risk

* Unacceptable with Single Point and Common Cause Failures

Figure 4 - Initial Risk Matrix for Airports without an operating ATC Tower

OBSTRUCTION TOWER LIGHT OPERATORS

Hazard Number: TLO-D001

Hazard: Data corruption to FNS caused by humans

Not a hazard because system to system interface will not involve people – only computers

Hazard Number: TLO-D002

Hazard: Data corruption caused by machine

Existing controls:

- 1) System interface designed according to requirements of NOTAM Manual indicating required content and format of quality Tower Lights Out (TLO) NOTAM.
- 2) System interface will be thoroughly tested before deployment
- 3) Proven effective software feedback form (JIRA) used to report, track and fix bugs or problems with the software.
- 4) Pilots flying low level operations must be aware of all obstructions and maintain minimum safe altitudes as specified in §91.119 regardless of whether the structure is lit or unlit.

Possible effects:

- 1) Corrupted NOTAM causing delay in issuance of real NOTAM due to time needed to recognize valid NOTAM not issued.
- 2) Inaccurate info in the NAS

Risk Assessment:

The SMEs on the Panel concluded that there would be a reduction in the safety margin requiring the crew to follow abnormal procedures to avoid hitting a tower. The SRMP evaluated the different ranges of severity of Hazard TLO-D002 and concluded it would be **Major**. The SRMP evaluated the likelihood of this hazard as **Extremely Remote**. The basis for the likelihood is that computer system may crash, but they do not switch 0s and 1s. There has been no experience over the years of operations of the current system of NOTAMs being corrupted and published. Also, USNS does not permit garbage or nonsensical NOTAMs into the system due to its parsing – they are automatically rejected.

Current/Initial Risk: 3D

Hazard Number: TLO-D003

Hazard: System interface tool not available

Existing Controls:

- 1) Legacy NOTAM System is complete back-up
- 2) Normal system speed in processing (1-2 minutes) would alert originator if system interface did not process NOTAM within that time frame
- 3) FNS will have redundant servers and diverse locations for servers

Possible effects:

- 1) Delayed NOTAM
- 2) Delayed cancellation of NOTAM

Risk Assessment:

The SMEs of SRM Panel concluded the severity of this hazard as **Minor** due to the immediate access to the legacy system and thus only a minor delay in the NOTAM publication time. The Panel further concluded that the likelihood of this hazard occurring was **Extremely Remote**. The Panel felt that the Web-based feature of the system interface providing the capability of accessing the system from multiple locations, plus use of legacy system reduced the likelihood to more than once a year.

Current/Initial Risk: 4D

Hazard Number: TLO-D004

Hazard: Lack of synchronization

Existing Controls:

- 1) Obstruction Tower Light Operators can check official FAA current NOTAM list to confirm the system interface works and call to cancel the NOTAM via the legacy process as needed.

Possible Effects:

1) Delay in cancellation of a NOTAM

Risk Assessment:

The SMRs on the SRMP concluded the severity is **Minimal** due to the existing controls, while the likelihood is **Extremely Remote**. The Panel concluded it is very unlikely that a NOTAM would be created via the system interface, the system would then become unavailable and thus FSS would have to cancel the NOTAM.

Current/Initial Risk: 5D

Hazard Number: TLO-D005

Hazard: User input error

The SRMP concluded that this was not a Hazard due to the fact that it is a system to system interface and there is no human inputting data into the system.

Hazard number: TLO-D006

Hazard: Lapse of notification – failure of FSS to notify affected ATC facility

Existing controls:

- 1) FSS is already required to perform this notification function, only change is they receive eNOTAM which tells them to notify facilities. Code of Federal Regulations §91.103 requires pilots to obtain NOTAMs before flight.
- 2) Code of Federal Regulations §91.113 & AIM 555 & 558 requires pilots to see and avoid all hazards in the air and on the ground.
- 3) Pilots flying low level operations must be aware of all obstructions and maintain minimum safe altitudes as specified in §91.119 regardless of whether the structure is lit or unlit.

Possible effects:

ATC may be unaware of NOTAM.

Risk Assessment:

1) The SMEs of the SRM Panel concluded the severity of this hazard would be **Minor** due to existing controls/requirements on pilots and that Air Traffic controllers would be more focused

on directing traffic around an obstruction, rather than be concerned whether the obstruction is lit or not. Further, there is very little support to demonstrate that controllers receive and use the notifications they get from FSS. The Panel also concluded that the likelihood of this hazard was **Remote** because the eNOTAM system will automatically alert FSS of their requirement to call the affected ATC facilities. Thus the Panel concluded FSS may forget to perform the notification about once a year.

Current/Initial Risk: 4C

The initial risk totals are plotted in Figure 5.

Severity \ Likelihood	Minimal	Minor	Major	Hazardous	Catastrophic
	5	4	3	2	1
Frequent A					
Probable B					
Remote C		6			
Extremely Remote D	4	3	2		
Extremely Improbable E					

High Risk
Medium Risk
Low Risk

* Unacceptable with Single Point and Common Cause Failures

Figure 5 - Initial Risk Matrix for Obstruction Tower Light Operators

TECHNICAL OPERATIONS – EQUIPMENT/FACILITIES

Hazard number: Tech Ops-D001

Hazard: Data corruption caused by humans

Existing Controls:

- 1) Coordination between field and OCCs and SOC's
- 2) ATC facilities are alerted to NOTAM by phone or fax by Tech Ops due to Standard Operating Procedures between ATC facility and Tech Ops - both when out of service and when returned to service.
- 3) ATC Terminal facilities may have IDS which lists NOTAMs affecting the facility
- 4) ERIDs at Centers alerts them to new NOTAMs every 5 minutes, but no assured delivery
- 5) USNS validates and USNOF quality reviews all incoming NOTAMs
- 6) Originators can quality check NOTAMs using PilotWeb site
- 7) Legacy system is complete back-up.
- 8) Pilots have internal checks before they use navigational equipment and will report navigation troubles to ATC.

Possible effects:

- 1) Cancellation of valid NOTAM
- 2) Issuance of inaccurate NOTAM
- 3) Delay in resolution of conflict between actual conditions and NOTAM reported or lack thereof
- 4) Conflicting NOTAMs

Risk Assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minor** due to all the existing controls and thus only a slight loss in ATC services would result. The Panel rated the likelihood of this hazard as **Extremely Remote** due to the lack of unauthorized access to the NOTAM Manager tool and the secure access to the system.

Current/Initial Risk: 4D

Hazard number: Tech Ops –D002

Hazard: Data corruption caused by machine

Existing controls:

- 1) See those listed in Tech Ops –D001
- 2) NOTAM Manager tools are designed according to specific requirements of the NOTAM Manual which are the same as those used by FSS and USNOF to create and quality check NOTAMs today
- 3) Tool is created under specific software guidelines for mission essential tools
- 4) Tool is thoroughly tested before deployment
- 5) Software (JIRA) is used to track and fix bugs found in the system
- 6) General users do not have administrative rights and software is centrally managed

Possible effects:

- 1) Corrupted NOTAM causing delay in issuance of real NOTAM due to time needed to recognize valid NOTAM was not issued
- 2) Inaccurate information in the NAS

Risk assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minor** due to all the existing controls and thus only a slight loss in ATC services would result. The Panel rated the likelihood of this hazard as **Extremely Remote** because computer systems crash but they do not switch 0s and 1s. Also, AIM has had no experience over the years of operation of the current NOTAM system with NOTAMs becoming corrupted and published. Further, FNS and USNS do not permit garbage or nonsensical NOTAMs into the system – they are automatically rejected.

Current/Initial Risk: 4D

Hazard number: Tech Ops – D003

Hazard: Tool not available due to loss of connection or power failure

Existing controls:

- 1) NOTAM Manager-like tool will provide visual computer alert if network connectivity is lost
- 2) Normal NOTAM Manager speed in processing NOTAM request would alert originator if NOTAM not published within 1-2 minutes
- 3) Redundant servers, diverse locations and back-up generators for system
- 4) Originators may have back-up generators if power is lost and also contingency plans if lost connectivity
- 5) Legacy system is complete back-up

Possible effects:

1) Delayed NOTAM

Risk assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minor** due to all the existing controls and thus only a slight loss in ATC services would result. The Panel rated the likelihood of this hazard as **Extremely Remote** due to the existing controls and the availability of the legacy system as back-up.

Current/Initial Risk: 4D

Hazard number: Tech Ops – D004

Hazard: Lack of synchronization of NOTAM Manager and legacy system used by FSS

Existing controls:

- 1) Tech ops can check FAA PilotWeb site for NOTAM number and cancel NOTAM through FSS.

Possible effects: Delay in cancellation of NOTAM

Risk assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minimal** due to easy access to the legacy system and thus only a slight loss in ATC services would result. The Panel rated the likelihood of this hazard as **Extremely Remote** because it is very unlikely Tech Ops would issue a NOTAM and then have the system go down and thus need to cancel it through FSS.

Current/Initial Risk: 5D

Hazard number: Tech Ops – D005

Hazard: User input error

Existing controls:

- 1) NOTAM Manager-like tool provides menus, templates and scenarios to reduce human error

- 2) Tool is created using same requirements used by FSS and USNOF to create and check NOTAMs
- 3) Tool provides additional checks to eliminate duplicate NOTAMs, those with expired dates, etc.
- 4) Originators will have input into the requirements for the tool.
- 5) Tool performs quality checks before publication.
- 6) Tool displays NOTAM in plain language to help user see any mistakes.
- 7) Any NOTAM which cannot be created using menus, etc. will be done via legacy system.
- 8) Pilots have internal checks before they use navigational equipment and will report navigation troubles to ATC.

Possible effects:

- 1) Incorrect NOTAM
- 2) Delay in issuance of NOTAM

Risk assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minor** due to all the existing controls and continued validation and quality control functions of USNS and USNOF and thus only a slight loss in ATC services would result. The Panel rated the likelihood of this hazard as **Probable** since SME from Tech Ops felt technicians make mistakes in selecting the wrong piece of equipment several times a month.

Current/Initial Risk: 4B

Hazard number: Tech Ops – D006

Hazard: Lapse in notification

Existing controls:

- 1) Initial and final notification of ATC affected facilities is standard operating procedure for Tech Ops if equipment/facility is down for maintenance
- 2) If a failure of equipment occurs– then ATC notifies Tech Ops so ATC already knows – then Tech Ops notifies them when equipment/facility is back in service
- 3) ERIDS and IDS system alert ATC about NOTAMs
- 4) Pilot and ATC communicate about the status of navigation and communication equipment occurs.
- 5) Coordination and notification function is tracked on RMLS

- 6) Pilots cannot use equipment that is not operational – must use alternative way to navigate

Possible effects:

- 1) Lack of notification
- 2) ATC unaware of change to NAS

Risk assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minor** due to all the existing controls and thus only a slight loss in ATC services would result. The Panel rated the likelihood of this hazard as **Extremely Remote** due to the existing controls and the availability of the legacy system as back-up so they concluded this might happen only once every 3 years or more.

Current/Initial Risk: 4D

The initial risk totals are plotted in Figure 6.

Severity \ Likelihood	Minimal	Minor	Major	Hazardous	Catastrophic
Likelihood	5	4	3	2	1
Frequent A					
Probable B		5			
Remote C					
Extremely Remote D	4	1 & 2 3 & 6			
Extremely Improbable E					

High Risk
Medium Risk
Low Risk

* Unacceptable with Single Point and Common Cause Failures

Figure 6 - Initial Risk Matrix for Technical Operations – Facilities & Equipment

FDC ORIGINATORS

Hazard number: FDC-D001

Hazard: Data corruption caused by humans

Existing controls:

- 1) Coordination between requesting agency and originator, i.e. HQ, service area and field offices
- 2) ATC facilities are alerted to NOTAM by phone, fax or e-mail
- 3) ATC terminal facilities may have IDS and thus can review new FDC NOTAM
- 4) Center must forward FDC NOTAM lists to terminal facilities
- 5) USNS performs validation checks and USNOF does quality checking on FDC NOTAMs
- 6) All FDC NOTAMs require USNOF action to process FDC NOTAMs thru USNS
- 7) Pilots must get NOTAM info from FSS, Internet, etc. prior to every flight
- 8) Aeronav Products (OKC) uses direct-entry tool (NTS) which is AIXM compliant already
- 9) Charting office uses NES tool
- 10) Third party providers for instrument procedures use NES tool
- 11) Originators can quality check NOTAMs using PilotWeb site
- 12) Legacy system is complete back-up

Possible effects:

- 1) Cancellation of valid NOTAM
- 2) Issuance of inaccurate NOTAM
- 3) Delay in resolution of conflict between actual conditions and NOTAM reported
- 4) Conflicting NOTAMs
- 5) Inaccurate information in the NAS

Risk Assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minor** due to all the existing controls and thus only a slight loss in ATC services would result. The Panel rated the likelihood of this hazard as **Extremely Remote** due to the existing controls, such as strict physical access employed by FAA to get into their facilities where NOTAMs are created.

Current/Initial Risk: 4D

Hazard number: FDC-D002

Hazard: Data corruption caused by machines

Existing controls:

- 1) See all those listed in FDC-D001 above
- 2) NOTAM Manager-like tool is designed according to specific requirements of NOTAM Manual
- 3) NOTAM Manager tool will be thoroughly tested prior to deployment
- 4) Software (JIRA) used to track and fix bugs

Possible effects:

- 1) Corrupted NOTAM causing delay in issuance of real NOTAM due to time needed to recognize valid NOTAM not issued
- 2) Inaccurate information in the NAS

Risk Assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minor** due to all the existing controls thus only a slight loss in ATC services would result. The Panel rated the likelihood of this hazard as **Extremely Remote** because computer systems may crash but they don't switch 1s and 0s. Also, AIM has no experience over the years of operations of NOTAMs being corrupted and published. FNS and USNS do not allow garbage NOTAMs to be published – they are automatically rejected.

Current/Initial Risk: 4D

Hazard number: FDC-D003

Hazard: NOTAM Manager/FNS not available due to network latency or loss of power, etc.

Existing controls:

- 1) NOTAM Manger-like tool provides visual computer alert if network connectivity is lost
- 2) Normal processing speed of new system will alert user if NOTAM is not published within 1-2 minutes
- 3) Redundant servers, diverse locations and back-up generators
- 4) Legacy system available as complete back-up

Possible effects:

1) Delayed NOTAM

Risk Assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minor** due to immediate access to legacy system would result in minor loss in ATC services. The Panel rated the likelihood of this hazard as **Extremely Remote** because of all existing controls. Web-based feature provides access at other locations, and access to legacy system.

Current/Initial Risk: 4D

Hazard number: FDC-D004

Hazard: lack of synchronization between NOTAM Manager and legacy system

The Panel concluded this hazard would not exist with FDC NOTAMs since there is no outside eNOTAM system and administrator such as USNOF could cancel NOTAM if required.

Hazard number: FDC-D005

Hazard: User input error

Existing controls:

- 1) NOTAM Manager-like tool will provide menus, templates and scenarios to reduce human errors
- 2) Menus, templates and scenarios will be FDC specific
- 3) Originators will be able to have input into requirements and tool design
- 4) Tool created using rules of NOTAM Manual to exclude creation of duplicate NOTAMs or those with expired dates, etc.
- 5) Tool performs quality checks to alert user to problems before publication
- 6) FDC originators receive NOTAM training
- 7) Any NOTAMs which cannot be created using the new tool can be done with the legacy system
- 8) NOTAM Manager tool displays NOTAMs in plain language to help user see any mistakes.
- 9) FDC NOTAMs in shapes are displayed on maps to visualize NOTAM and make sure it is correct
- 10) USNS and USNOF will still perform validation and quality control checks on NOTAMs
- 11) NTS will use system interface and thus not need NOTAM Manager-like tool

- 12) Sys Ops Security has their own Standard Operating procedures to follow to ensure quality FDC NOTAMs

Possible effects:

- 1) Incorrect NOTAM
- 2) Delay in issuance of NOTAM
- 3) Inaccurate information in the NAS

Risk Assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minor** due to all the existing controls and thus only a slight loss in ATC services would result. The Panel rated the likelihood of this hazard as **Remote** due to the existing controls and use of preformatted templates in tool to reduce human error.

Current/Initial Risk: 4C

Hazard number: FDC-D006

Hazard: Lapse of notification

Existing controls:

- 1) AJR-2, SOPs requires notification of affected ATC facilities
- 2) AJV-11 now does not have notification requirement based upon all coordination which occurs prior to NOTAM being issued.
- 3) 8260.19 2023 AeroNav Products services requirement of notification

Possible effects:

Delayed NOTAM while clarify inconsistency of NOTAM vs. current operations

Risk Assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minor** due to all the existing controls and prior coordination, thus only a slight loss in ATC services would result. The Panel rated the likelihood of this hazard as **Extremely Remote** due to the existing controls.

Current/Initial Risk: 4D

The initial risk totals are plotted in Figure 7.

Severity \ Likelihood	Minimal	Minor	Major	Hazardous	Catastrophic
	5	4	3	2	1
Frequent A					
Probable B					
Remote C		5			
Extremely Remote D		1 & 2 3 & 6			
Extremely Improbable E					

* Unacceptable with Single Point and Common Cause Failures

High Risk
Medium Risk
Low Risk

Figure 7 - Initial Risk Matrix for FDC NOTAM Originators

AIRSPACE ORIGINATORS

Hazard number: AS-D001

Hazard: Data corruption caused by humans

Existing Controls:

- 1) Coordination prior to NOTAM Origination
- 2) Controllers recognizing and reporting erroneous NOTAMs
- 3) Pilot requirement to see and avoid traffic and obstacles
- 4) USNS validation

Possible effects:

- 1) Cancellation of a valid NOTAM
- 2) Issuance of an inaccurate NOTAM
- 3) Delay in recognizing true conditions
- 4) Conflicting NOTAMs

Risk Assessment:

This hazard was assessed as **Minor** because the most credible outcome was a slight reduction in ATC services. The likelihood was **Extremely Remote** due to the effectiveness of the existing controls.

Current/Initial Risk: 4D

Hazard number: AS-D002

Hazard: Data corruption caused by machine

Existing controls:

- 1) See the above AS-D001
- 2) System designed according to NOTAM Manual requirements
- 3) System designed under software guidelines
- 4) System tested prior to deployment and when updated
- 5) Software bugs are tracked (JIRA) and fixed
- 6) Originator can check to make sure the correct NOTAM is published
- 7) MOA and other hazardous airspace activity is stopped when there are non-compliant aircraft in the area
- 8) Pilot see and avoid requirement

Possible effects:

- 1) Corrupted NOTAM causing a delay of the real NOTAM
- 2) Inaccurate information in the NAS

Risk assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Major** due to the hazards associated with special activity airspace including military operations, parachute activity, and others. The Panel rated the likelihood of this hazard as **Extremely Remote** because of the reliability and testing required of the new software.

Current/Initial Risk: 3D

Hazard number: AS – D003

Hazard: Tool not available due to loss of connection or power failure

Existing controls:

- 1) Visual warning if system is unavailable
- 2) Processing speed would alert user to a problem
- 3) Legacy NOTAM system is a complete back-up

Possible effects:

- 1) Delayed NOTAM

Risk assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minimal** due to the immediate access to the backup system. The Panel rated the likelihood of this hazard as **Remote** because this is expected to occur less than once a year.

Current/Initial Risk: 5C

Hazard number: AS-D004

Hazard: Lack of synchronization of NOTAM Manager and legacy system used by FSS

Existing controls:

- 1) Legacy system available as back-up

Possible effects:

- 1) Delay in cancellation of the NOTAM

Risk assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minimal** because of easy access to FSS for cancellation. The Panel rated the likelihood of this hazard as **Extremely Remote** because of the existing controls and the availability of the FSS for cancellation.

Current/Initial Risk: 5D

Hazard number: AS-D005

Hazard: User input error

Existing controls:

- 1) Templates and drop down boxes for NOTAM Manager
- 2) Quality checking of NOTAM Manager
- 3) Training of originators
- 4) Plain language used by NOTAM Manager
- 5) USNS & USNOF validation & quality checking
- 6) Pilots see and avoid requirement
- 7) FSS checking the published NOTAM may catch errors

Possible effects:

- 1) Incorrect NOTAM
- 2) Delay of NOTAM

Risk assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minor** due to the existing controls and the quality checking of the USNOF. The Panel rated the likelihood of this hazard as **Remote** because the drop down boxes and templates and the training would reduce errors and the system interface would have less chance for errors as is currently accepted.

Current/Initial Risk: 4C

Hazard number: AS-D006

Hazard: Lapse in notification

Existing controls:

- 1) Coordination prior to NOTAM issuance
- 2) ATC facilities communication of data with initials of personnel
- 3) Other means of ATC for getting NOTAMs
- 4) SAA/SUA NOTAMs are distributed to the terminal facilities by the Centers independently of the notification process

Possible effects:

- 1) Delayed NOTAM and confusion while NOTAMs are clarified

Risk assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minor** due to the existing controls. The Panel rated the likelihood of this hazard as **Remote** because the notification process will continue as currently operating.

Current/Initial Risk: 4C

The initial risk totals are plotted in Figure 8.

Severity \ Likelihood	Minimal	Minor	Major	Hazardous	Catastrophic
	5	4	3	2	1
Frequent A					
Probable B					
Remote C	3	5 & 6			
Extremely Remote D	4	1	2		
Extremely Improbable E					

High Risk

Medium Risk

Low Risk

* Unacceptable with Single Point and Common Cause Failures

Figure 8 - Initial Risk Matrix for Airspace NOTAM Originators

GPS ORIGINATORS

Hazard number: GPS-D001

Hazard: Data corruption caused by humans

Existing Controls:

- 1) Coordination of NOTAMs prior to issuance
- 2) Validation checks on candidate NOTAMs by the USNS
- 3) Pilots required to have backup navigation to GPS

Possible effects:

- 1) Missing NOTAM
- 2) Wrong NOTAM
- 3) Conflicting NOTAMs

Risk Assessment:

This hazard was assessed as **Minimal** because pilots are trained to deal with navigation failures and they have backups. The likelihood was **Extremely Remote** due to the effectiveness of the existing controls.

Current/Initial Risk: 5D

Hazard number: GPS-D002

Hazard: Data corruption caused by machine

Existing controls:

- 1) See above (GPS-D001)
- 2) NOTAM Manager designed according to NOTAM Manual requirements
- 3) Software development and testing standards
- 4) Bugs are tracked (JIRA) and fixed
- 5) Software revisions are tested
- 6) Pilots must have backup to GPS navigation systems

Possible effects:

- 1) Delay of issuance or cancellation
- 2) Inaccurate information in the NAS

Risk assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minimal** due to availability of backup navigation equipment. The Panel rated the likelihood of this hazard as **Extremely Remote** because of the reliability and testing required of the new software.

Current/Initial Risk: 5D

Hazard number: GPS – D003

Hazard: Tool not available due to loss of connection or power failure

Existing controls:

- 1) See above GPS-D002

Possible effects:

- 1) Delayed NOTAM

Risk assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minimal** due to the immediate access to the backup system. The Panel rated the likelihood of this hazard as **Remote** because of the access to the legacy back-up system.

Current/Initial Risk: 5C

Hazard number: GPS–D004

Hazard: Lack of synchronization of NOTAM Manager and legacy system used by FSS

GPS does not have this hazard because the FSS does not issue GPS NOTAMs.

Hazard number: GPS–D005

Hazard: User input error

Existing controls:

- 1) Drop down menus and templates reduce errors
- 2) New system performs quality checks on NOTAMs
- 3) Plain language makes the system easy to use
- 4) USNS validates the format
- 5) Pilots must have backup navigation equipment

Possible effects:

- 1) Incorrect NOTAM
- 2) Delay in issuance of a NOTAM

Risk assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minimal** due to the existing control and the quality checking of the USNS. The Panel rated the likelihood of this hazard as **Remote** because the drop down menus and templates and the training would reduce errors and the system interface would have the same chance for errors as is accepted currently.

Current/Initial Risk: 5C

Hazard number: GPS-D006

Hazard: Lapse in notification

Existing controls:

This safety case does not change the notification of ATC by the field engineer.

Possible effects:

If the field engineer fails to notify ATC there may be confusion about the state of GPS availability.

Risk assessment:

The SMEs of the SRM Panel concluded the severity of this hazard was **Minor** due to the existing controls. The Panel rated the likelihood of this hazard as **Remote** because this was expected to happen less than once a year.

Current/Initial Risk: 4C

The initial risk totals are plotted in Figure 9.

Severity \ Likelihood	Minimal 5	Minor 4	Major 3	Hazardous 2	Catastrophic 1
Frequent A					
Probable B					
Remote C	3 & 5	6			
Extremely Remote D	1 & 2				
Extremely Improbable E					

High Risk

Medium Risk

Low Risk

* Unacceptable with Single Point and Common Cause Failures

Figure 9 - Initial Risk Matrix for GPS NOTAM Originators

Section 8 – Treatment of Risks / Mitigation of Hazards

The Safety Order of Precedence items described in Table 10 were considered by the SRMP in the establishment of controls and safety requirements for mitigation of the hazards identified in Section 6. Specific controls and predicted risks for each hazard are in the Hazard Analysis Worksheets in Appendix A.

D-001 for all users of NOTAM Manager

Hazard: Data corruption caused by humans

Mitigation:

1. Usernames and passwords required to access NOTAM Manager software tool.
Passwords set-up per FAA requirements for mission essential systems.

D-002 for all users of NOTAM Manager & system to system interface

Hazard: Data corruption cause by machines

Mitigation:

AIM will continue to track (via JIRA) and fix bugs identified by the users and others monitoring quality.

D-003 for all users of NOTAM Manager & system to system interface

Hazard: System is unavailable

Mitigation:

1. NOTAM Manager provides user with a visual alert if NOTAM Manger loses connectivity. Following this alert the user can either try to re-establish their connection or use the legacy system as a back-up.
2. Many originators will have back-up power systems

D-004 for all users of NOTAM Manager & system to system interface

Hazard: Lack of synchronization

Mitigation:

1. Legacy system is a complete back-up.

D-005 for all users of NOTAM Manager

Hazard: User input error

Mitigations:

1. All users will receive computer based training or on-the-job training prior to using NOTAM Manager.
2. Software tool provides drop-down menus, templates and scenarios for the user to select from rather than requiring the users to remember all the proper contractions for creating NOTAMs.
3. NOTAM Manager will provide user specific menus to prevent many current errors.
4. Each user will have access to a User Manual for guidance on how to use NOTAM Manager.
5. ATO/AIM will provide a 24/7 helpdesk to assist with administrative tasks such as unlock access to system.
6. Many NOTAM originators are required by the FAA to understand how to create valid, quality NOTAMs. (e.g. it is a requirement for Part 139 Airports)
7. Human factors testing will be done prior to the release of the software to make it more user- friendly.
8. Many NOTAM Manager users will have the opportunity to review and practice on the software tool prior to training and deployment.

D-006 for all users of NOTAM Manager & system to system interface

Hazard: Failure to notify affected ATC facility

All users of NOTAM Manager will continue their current communication with their respective ATC facilities prior to the issuance of any NOTAMs. That communication is what controls movements, not the NOTAM. Each originator whose procedure changes from the NOTAM Manual must document those changes in a letter of agreement between the parties. See Appendix E for a sample LoA.

Flight Service will continue to notify the affected ATC facilities when they receive a message via eNOTAM that a tower light out NOTAM was issued via a system to system interface. Since FSS already performs this notification function, no mitigation was anticipated.

The SRMP evaluated the recommended safety controls. Given that all except 2 of the Hazards were **Low** and no mitigation or safety requirements are mandated for **Low** hazards, the AIM

Program Office lists controls it determined were required in order to confirm the severity and likelihood levels of the Panel.

Only 2 Hazards were identified as **Medium** by the SRM Panel: both user input errors – 1) from airports without operating ATC towers and 2) from Tech Ops. The Panel concluded that with the addition of computer-based or on-the-job training on the new software tool plus its prior human factors testing would reduce the hazard level to **Low**.

The safety controls along with the associated hazards are contained in the Matrix in Appendix A. The Program Office will collect and analyze the controls and report to the System Operations Safety Office:

1. any new hazards
2. any hazards whose severity level increases from that determined by the Panel
3. any hazard whose likelihood increases to a higher level as determined by the Panel.

The predicted residual risk totals which changed after the addition of mitigations are plotted in Figure 10 & 11. The final result is that **all Hazards are Low Risk** since the 2 medium risks were adequately mitigated and **reduced from medium to low**. **Figure 12** shows all the final residual risks for all the hazards for all originators of NOTAMs.

Table 10 - Safety Order of Precedence

Description	Priority	Definition	Example
Design for minimum risk	1	Design the system (e.g., operation, procedure, or equipment) to eliminate risks. If the identified risk cannot be eliminated, reduce it to an acceptable level through selection of alternatives.	1. If a collision hazard exists because of a transition to a higher Minimum En route Altitude at a crossing point, moving the crossing point to another location would eliminate the risk 2. If "loss of power" is a hazard to a system, adding a second independent power source reduces the likelihood of the "loss of power" hazard
Incorporate safety devices	2	If identified risks cannot be eliminated through alternative selection, reduce the risk via the use of fixed, automatic, or other safety features or devices, and make provisions for periodic functional checks of safety devices.	1. An automatic "low altitude" detector in a surveillance system 2. Ground circuit in refueling nozzle 3. Automatic engine restart logic
Provide warning	3	When neither alternatives nor safety devices can effectively eliminate or adequately reduce risk, warning devices or procedures are used to detect the condition and to produce an adequate warning. The warning must be provided in time to avert the hazard effects. Warnings and their application are designed to minimize the likelihood of inappropriate human reaction and response.	1. A warning in an operators manual 2. "Engine Failure" light in a helicopter 3. Flashing warning on a radar screen
Develop procedures and training	4	Where it is impractical to eliminate risks through alternative selection, safety features, and warning devices: procedures and training are used. However, concurrence of management authority is required when procedures and training are solely applied to reduce risks of catastrophic or hazardous severity.	1. A missed approach procedure 2. Training in stall/spin recovery 3. Procedure to vector an aircraft above a Minimum Safe Altitude on a VHF Omni-directional Range (VOR) airway 4. Procedures for loss of communications

All Risk Matrices remain identical to those identified above (initial risk matrices = predicted residual risk matrices) except 2 which are listed below. In each case the Risk was reduced from Medium to Low following mitigations.

Figures 10 and 11 show the two initial medium risks that become low predicted residual risks after the recommended safety requirements are implemented.

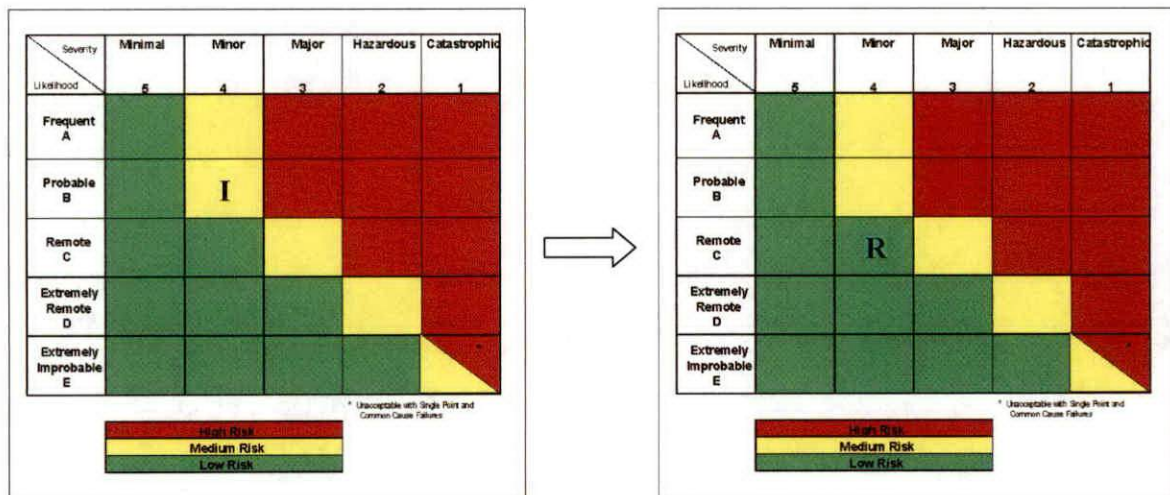


Figure 10 – shows the initial risk (I) for the Non-Towered user input error hazard (NTWR-D005) on the left and the predicted residual risk (R) for the same hazard on the right.

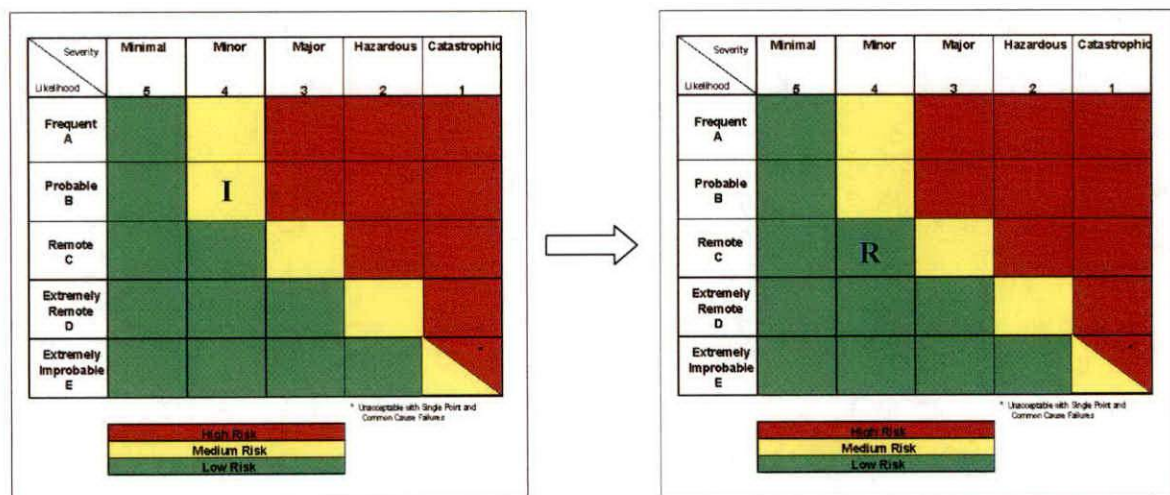
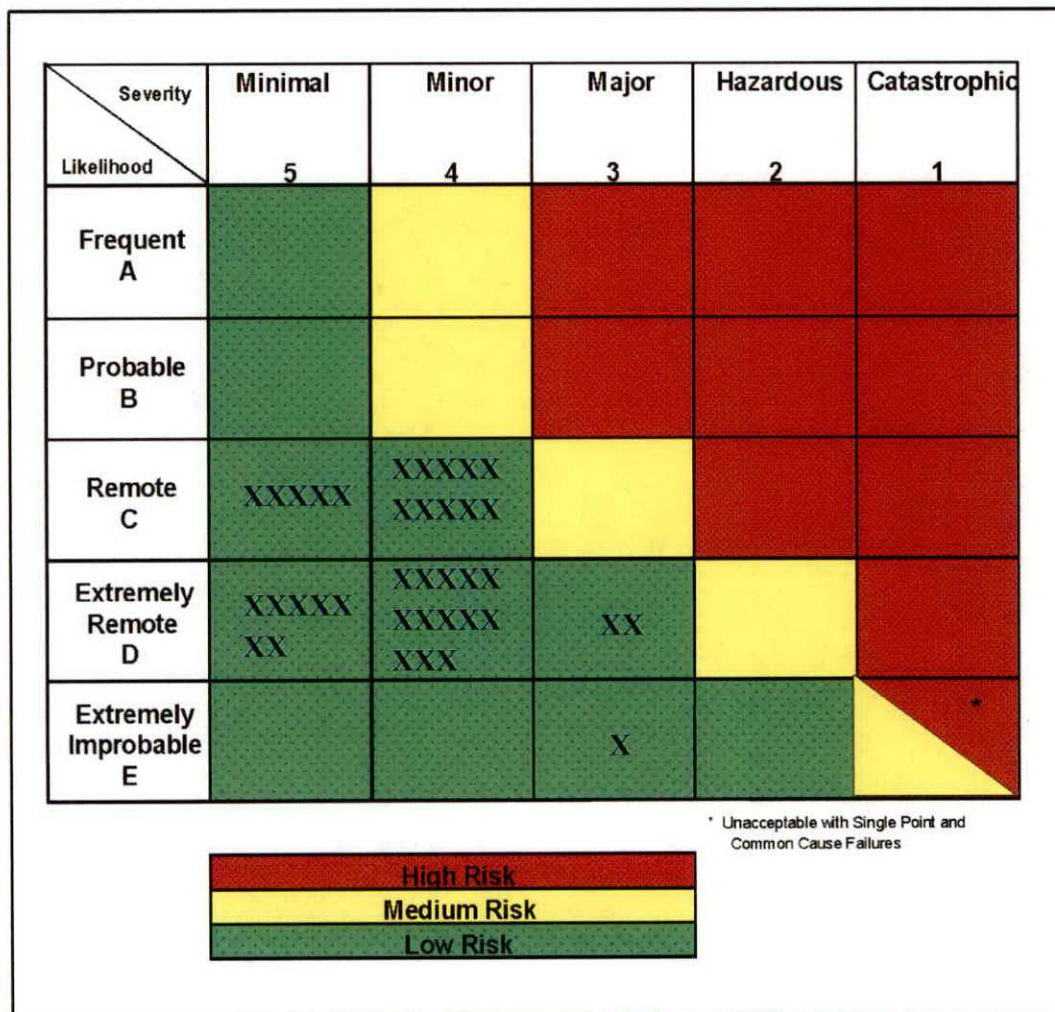


Figure 11 – shows the initial risk (I) for the Tech Ops user input error hazard (Tech Ops-D005) on the left and the predicted residual risk (R) for the same hazard on the right.

The predicted residual risk totals for all the originators of NOTAMs are plotted in Figure 12 below. All of the predicted residual risks were evaluated by the SRMP as **LOW** Risks. As noted above in Figures 10 and 11, two of the initial risks which were evaluated as medium were reduced after consideration of the proposed mitigations. All other risk values were not reduced by the safety controls mainly due to the low initial risk values and the conservative analysis of the Safety Panel.

Figure 12 shows that all of the predicted residual risks are identified as LOW hazards and in the green range.



Figures 12 – all of the predicted residual risks, represented above as X's, are LOW hazards and thus are located in the green range.

Section 9 – Tracking and Monitoring of Hazards

This SRMD details the hazards that may occur while using either the NOTAM Manager tool or a system interface with the Federal NOTAM System (FNS). These hazards could occur as a result of system failures, power outages, failures of personnel to follow correct procedures, and/or unauthorized users of the system.

The AIM Program Office (AJV-2) will collect data to track and monitor the hazards identified in this SRMD. How often AIM will collect and monitor data will be driven by safety. Safety is the number one concern of the AIM Program Office as it seeks to provide the NAS with digital NOTAMs in a faster and more efficient manner. Many stakeholders including USNOF personnel, NOTAM originators, software developers, FAA personnel and others have been consulted by the Program Office before, during, and after the creation of the new tools and procedures to ensure the necessary flows of NOTAM information are occurring in safe, reliable and acceptable ways.

This information, along with the data outlined in this section, will allow the Program Office to effectively evaluate and improve the NOTAM Manager tools and system interface after deployment. Data will be reviewed quarterly for a period of two years or until certain risks are determined to be effectively mitigated or demonstrated to be at or below the likelihood and severity predicted by the Safety Risk Management Panel (SRMP).

The Program Office will convene another SRMP if the likelihood of any of the hazards would increase the level from low to medium and no mitigations can be implemented to reduce the level as defined in the likelihood definitions of the FAA's Safety Management System.

The following controls and tracking and monitoring requirements are tabulated from their respective sections on each originator above.

Task	Responsible	Due Date/Frequency	Status
Implementation of Controls			
Use bug reporting & tracking software (JIRA) to fix bugs.	AIM – AJV-2	Continuous.	
Human factors consultants will be used to test and review NOTAM Manager tools during and prior to deployment. Best efforts will be employed to make the software as “user friendly” as possible prior to	AIM-AJV-2	Before deployment of new tool for each stakeholder group and periodically thereafter if needed as determined by	

or within 2 years of deployment		AIM and each stakeholder	
User Manual for each NOTAM Manager tool	AIM-AJV-2	Prior to training before deployment	
Demonstration software to enable users to practice using software prior to deployment	AIM-AJV-2	Prior to training before deployment	
Live or computer-based training for stakeholders prior to deployment of new software	AIM-AJV-2	Before deployment	
Letter of Agreement between airport authority and all “affected” ATC facilities that documents how notification process will work for each type of NOTAM issued by airport	AIM-AJV-2 will provide sample LoA, airports and ATC facilities affected must sign LoA	Prior to deployment	
Memorandum of Agreement between AIM-AJV-2 and each NOTAM originator describing roles and responsibilities of each party during deployment	AIM-AJV-2 will provide sample MoA	Prior to each deployment	
Test messaging system which alerts FSS that an Obstruction Tower Light out NOTAM has been issued via system interface and FSS needs to notify the “affected” ATC facilities.	AIM-AJV-2 & FSS	Prior to deployment of system interface for obstruction tower light operators	
Provide 24/7/365 Help desk for unlocking user accounts or other similar administrative functions	AIM-AJV-2	Prior to deployment	
Memorandum of Agreement that documents roles and responsibilities for notification process for Tower	AIM-AJV-2 and FSS	Prior to deployment of system interface for obstruction	

Lights out NOTAMs		tower light operators	
Evaluate linking of Tech Ops facility & equipment tool to new NOTAM Manager tool	AIM-AJV-2 & Tech Ops, AJW	Prior to and during development of NOTAM Manager tool for Tech Ops	
Evaluate need for additional training for Tech Ops personnel on their need to notify affected ATC facilities from Tech Ops facilities & equipment outages	AIM-AJV-2 & Tech Ops, AJW	During development and prior to deployment of NOTAM Manager for Tech Ops.	
Tracking & Monitoring			
Collect the number of FNS system outages which result in digital NOTAMs not being processed, regardless of cause. E.g. due to loss of power, system not available, etc.	AIM-AJV-2	Report quarterly for the first 2 years	
Track the number of digital NOTAMs and the number of legacy NOTAMs issued by keyword or originator group (airports, tech ops, etc.)	AIM-AJV-3	Report quarterly until digital NOTAM percentage is 95%.	
Track the number of digital NOTAMs and the number of legacy NOTAMs and the percentage of each.	AIM-AJV-3	Report quarterly until digital NOTAM percentage is 95%.	
Track the number of times a digital NOTAM is issued, but the legacy system must be used to cancel the digital NOTAM	AIM-AJV-3	Report quarterly for the first 2 years	
Track the number of times NOTAMs are reported to AIM as not complying with the requirements of the NOTAM	AIM-AJV-3 & USNOF	Report quarterly for the first 2 years	

Manual according to USNOF			
Track each time a lapse in the notification process occurs (when the originator fails to notify the affected ATC facility) by NOTAM type and facility	AIM, AJV-2 will ask for and collect self reporting by originators	Report quarterly for the first 2 years or until assured delivery system of NOTAMs to Terminal & En Route is fully operational.	

Appendix A – Hazard Analysis and Risk Matrix

Airports with Operating ATC Towers

Hazard # (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current / Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
TWR-D001	Data corruption caused by humans	Unauthorized use or access	All NAS operations including periods of maximum NOTAM generation, such as large snow and ice storms.	Airport Ops must coordinate all NOTAM activities with the ATCT prior to the action being taken and the NOTAM being issued. The NOTAM only represents the confirmation of proposed and coordinated agreements on closures, movements, etc. between Airport Ops and the ATCT. (Part 139 (303 and 327 training)) Per 7210.3, ATCT must be cognizant of all NOTAMs under their NOTAMs on IDS and thus would recognize unauthorized, inconsistent NOTAM and respond accordingly. USNS and USNOF perform validation checks on all	Cancellation of valid NOTAM by human interference; Issuance of inaccurate NOTAM; Delay in resolution of conflict between actual conditions and NOTAM reported Issuance of conflicting NOTAMs	Minor - All the existing controls which regulate movement on the airport per JO 7110.65 Since ATCT and Airport Ops base their decisions about movement of aircraft on their prior coordination, not upon the NOTAMs, they concluded the worst credible outcome would be a slight reduction in ATCT services	Extremely Remote – due to effectiveness of existing controls, such as strict physical access employed by the Airport Operations to get into their facility where NOTAMs will be created. Periodic reset of passwords.	Low – 4D	Username & passwords required to access NOTAM Manager software	Low - 4D

				incoming NOTAMs. Pilots - requirement to see and avoid and pilots must secure ATC authorization to move on controlled airport surface areas. ATIS alerts pilots to active runways and thus pilots would be alerted to any conflict between ATIS info and NOTAMs. Physical barriers and warnings to pilots when closing a runway or taxiway. Legacy NOTAM system is complete back-up if NOTAM Manager system has problem. Software is SCAP approved.							
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Hazard # (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current / Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
TWR-D002	Data corruption caused by machine	Software/ Hardware Malfunction or corruption	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	See above TWR-D001 New system designed according to specific business requirements of NOTAM Manual New system created under specific software guidelines. New system tested according to specific Test Plan JIRA software used to find bugs & fix Every software revision and patch will be tested prior to implementation. NOTAM Manager system will allow user to see any problems quicker and switch to Legacy NOTAM system as full back-up. NOTAM Originators generally check their NOTAMs for correct publication.	Corrupted NOTAM causing delay in issuance of real NOTAM due to time needed to recognize valid NOTAM not issued Inaccurate information in the NAS	Minor – current legacy system operates under average 8 minute delay from creation to publication. With NOTAM Manager publication is nearly immediate, thus any delay will be obvious. User can diagnose problem or use legacy system as back-up.	Extremely remote – computer systems may crash, but don't switch 0s and 1s No experience over years of operation of current system of NOTAMs being corrupted and published NOTAM Manager and USNS don't permit garbage or nonsensical NOTAMs into the system – they are automatically rejected	Low – 4D	See those above in TWR-D001 The NOTAM Manager tool will not be deployed to any NOTAM originator unless they can originate in digital format (AIXM) at least ninety-five percent (95%) of the NOTAMs required by that originator. This will be confirmed by tabulating the prior year's NOTAMs and then ensuring the tool has the required menus, scenarios and templates to create at least 95% of the NOTAMs for that year.	Low – 4D

Hazard # (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current/ Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
TWR-D003	System unavailable	Network latency of NOTAM Manager, loss of connection or power failure.	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	NOTAM Manager provides visual computer alert if network connectivity lost. Normal system speed in processing NOTAM request would alert Airport Ops if NOTAM was not published within 1-2 minutes. Airport Ops has redundant power systems including generators. Legacy NOTAM system is complete back-up.	Delayed NOTAM	Minimal – immediate access to legacy backup system results in minor delay in NOTAM publication	Remote – Airport lost access to Internet only 5 times over last 15 months for total loss of 17 documented hours so rarely would Airport Ops loose power and legacy system is complete backup so only delay moving to legacy system.	Low – 5C	Report listing the number of system outages, regardless of responsibility (NOTAM Manager/FNS, Airport Ops or third party), by number, responsible party and length of incidents. These will be listed by type including: networking, power, hardware or any other interruptions of service. Report the number of Airport Ops NOTAMs created using the legacy system during the test.	Low – 5C

(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
TWR-D004	Lack of synchronization of the new system and the current legacy system used by Flight Service.	NOTAM created in new system will not show up in eNOTAM system, thus if created in NOTAM Manager cannot cancel via eNOTAM, if NOTAM Manager system suddenly becomes unavailable and need to cancel NOTAM	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	See those listed above under TWR-D003 Airport Ops can check FAA PilotWeb site for NOTAM number and then call FSS to cancel NOTAM.	Delay in cancellation of NOTAM	Minimal due to easy access to back-up system	Extremely Remote – it is very unlikely that this set of events will occur.	Low – 5D	A report listing the number of instances when Airport Ops determines there is a lack of synchronization between NOTAM Manager and eNOTAM system as well as the number of times Airport Ops has to call FSS to cancel a NOTAM created in NOTAM Manager.	Low – 5D

Hazard # (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current/ Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
TWR-D005	User input error	User input error due to fatigue FSS no longer checking NOTAMs Incomplete business rules from 7930.2 included in the NOTAM Manager software.	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	NOTAM Manager provides templates and drop-down menus to reduce human error. NOTAM Manager templates are airport specific – only Airport runways will be available to select by Airport Ops user. NOTAM Manager created using business rules of NOTAM Manual to exclude creation of duplicate NOTAMs, NOTAMs with expired dates, etc. NOTAM Manager performs quality checks to alert user to problems before publication. Airport Ops receives NOTAM annual training (Part 139) Any NOTAM which cannot be	Incorrect NOTAM Delay in issuance of NOTAM	Minor – Existing controls listed and continued quality control function provides by USNS and USNOF	Remote – Existing controls and use of pre-formatted templates in NOTAM Manager will reduce human error	Low- 4C	Human factor testing done prior to Airport live test to make software more user friendly Continue Human Factors testing to improve the system and reduce input User manual for NOTAM Manager provided to Airport Ops CBI or other media training by AIM subject matter experts Airport Ops provided account so they can test software prior to live test The NOTAM Manager tool will not be deployed to any NOTAM originator unless they can originate in digital format (AIXM) at least ninety-five percent (95%) of the NOTAMs required by that originator. This will be confirmed by tabulating the prior year's NOTAMs and then ensuring the tool has	Low – 4C

				created with templates or drop-down menus will be done via legacy system. NOTAM Manager displays NOTAM in plain language to help user see any mistakes. USNS and USNOF will continue quality checking function.					the required menus, scenarios and templates to create at least 95% of the NOTAMs for that year.	
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(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommend ed Safety Requirements	(11) Predicted Residual Risk
TWR-D006	Lapse of notification Failure of Airport Operations personnel to notify affected ATC facilities	Human error	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	Airport Ops coordinates all NOTAM activities with the ATCT prior to the action being taken and the NOTAM being issued. The NOTAM only represents the confirmation of proposed and coordinated agreements on closures, movements, etc. between Airport Ops and the ATCT. During periods of large NOTAM generation or other special events, Airport Ops may have a coordinator in the ATCT for face-to-face coordination between ATCT and Airport Ops. ATC Traffic Flow Management Units in ATCT, TRACON & ATC CENTER already coordinate NOTAM information which affects them. Terminal and en-route have ways of getting NOTAMs that are independent of the notification they receive from Flight Service or the NOTAM originator. When notifications are performed the notifying personnel copies the initials, date, and time of the person being notified.	Delayed NOTAM while clarify inconsistency of NOTAM vs. current operations	Minor – existing controls between Airport Ops and the ATCT and those b/n ATCT & TRACON & ATC CENTER would reduce severity	Remote – SMEs concluded this would only happen about once every year that lack of coordination would result in partial loss of ATC services	Low – 4C	LoA b/n Airport Ops and ATCT, TRACON & ATC CENTER which documents how notification process will work for each type of NOTAM issued by Airport Ops, i.e. Airport Ops will notify ATCT and if TRACON is affected, ATCT will notify, and if ATC CENTER is affected, TRACON will notify.	Low – 4C

Airports without Operating Air Traffic Control Towers

Hazard# (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current/ Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
NTW R-D001	Data corruption caused by humans	Unauthorized use or access	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	Part 139 Airport Ops must coordinate all NOTAM activities with the controlling ATC facility prior to the action being taken and the NOTAM being issued. The NOTAM only represents the confirmation of proposed and coordinated agreements on closures, movements, etc. between Airport Ops and the controlling ATC facility under their authority. (Part 139 (303 and 327 training) Per 7210.3, ATC Facilities must be cognizant of all NOTAMs under their area or responsibility and may recognize inconsistent NOTAMs and respond accordingly. USNS and USNOF perform validation checks on all incoming NOTAMs.	Cancellation of valid NOTAM by human interference; Issuance of inaccurate NOTAM by human interference; Delay in resolution of conflict between actual conditions and NOTAM reported Issuance of conflicting NOTAMs	Major - the worst credible outcome would be a slight reduction in ATCT services	Extremely Remote – due to effectiveness of existing controls Periodic reset of passwords.	Low – 3D	Username & passwords required to access NOTAM Manager software	Low - 3D

				"See and avoid" (91-113, 558, 555) Flight Service may notice an inconsistent NOTAM during pilot briefing and report it. Legacy NOTAM system is complete back-up if NOTAM Manager has problem. Physical barriers and warnings to pilots when closing a runway or taxiway. IDS and ERIDS that let controllers check NOTAMs.							
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Hazard # (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current/ Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
NTWR-D002	Data corruption caused by machine	Software/ Hardware Malfunction or corruption	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	See above NTWR-D001 NOTAM Manager designed according to specific business requirements of NOTAM Manual. NOTAM Manager created under specific software guidelines – see Section 4 above. NOTAM Manager tested according to specific Test Plan Software used to find bugs & fix Every SW revision and patch will be tested prior to implementation. NOTAM Manager will allow user to see any problems quicker and switch to Legacy NOTAM system as full back-up.	Corrupted NOTAM causing delay in issuance of real NOTAM due to time needed to recognize valid NOTAM not issued Inaccurate information in the NAS	Minor – current legacy system operates under average 8 minute delay from creation to publication. With NOTAM Manager publication is nearly immediate, thus any delay will be obvious. User can diagnose problem or use legacy system as back-up.	Extremely remote – computer systems may crash, but don't switch 0s and 1s No experience over years of operation of current system of NOTAMs being corrupted and published NOTAM Manager and USNS don't permit garbage or nonsensical NOTAMs into the system – they are automatically rejected	Low – 4D	See those above The NOTAM Manager tool will not be deployed to any NOTAM originator unless they can originate in digital format (AIXM) at least ninety-five percent (95%) of the NOTAMs required by that originator. This will be confirmed by tabulating the prior year's NOTAMs and then ensuring the tool has the required menus, scenarios and templates to create at least 95% of the NOTAMs for that year.	Low – 4D

Hazard # (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current/ Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
NTWR-D003	NOTAM Manager unavailable	Network latency, loss of connection or power failure.	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	NOTAM manager provides visual computer alert if network connectivity lost. Normal system speed in processing NOTAM request would alert Airport Ops if NOTAM was not published within 1-2 minutes. Legacy NOTAM system is complete back-up.	Delayed NOTAM	Minimal – immediate access to legacy backup system results in minor delay in NOTAM publication	Remote – Airport lost access to Internet only 5 times over last 15 months for total loss of 17 documented hours so rarely would Airport Ops loose power and legacy system is complete backup so only delay moving to legacy system.	Low – 5C	Report listing the number of system outages, regardless of responsibility (NOTAM manager/FNS, Airport Ops or third party), by number, responsible party and length of incidents. These will be listed by type including: networking, power, hardware or any other interruptions of service. Report the number of Airport Ops NOTAMs created using the legacy system during the test.	Low – 5C

(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
NTWR-D004	Lack of synchronization of the NOTAM Manager system and the current legacy system used by Flight Service.	NOTAM created in the new system will not show up in eNOTAM system, thus if created in NOTAM Manager you cannot cancel via eNOTAM, if NOTAM Manager suddenly becomes unavailable and need to cancel NOTAM	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	See those for NTWR-D003 Airport Ops can check FAA PilotWeb site for NOTAM number and then call FSS to cancel NOTAM.	Delay in cancellation of NOTAM	Minimal - due to easy access to back-up system	Extremely Remote – very unlikely will create NOTAM in the new system then it goes down and need to cancel using legacy system	Low – 5D	A report listing the number of instances when Airport Ops determines there is a lack of synchronization between NOTAM Manager and eNOTAM system as well as the number of times Airport Ops has to call FSS to cancel a NOTAM created in NOTAM manager.	Low – 5D

Hazard # (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current/ Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
NTWR-D005	User input error	User input error FSS no longer checking submitting NOTAMs	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	NOTAM Manager provides templates and drop-down menus to reduce human error. NOTAM Manager templates are airport specific – only Airport runways will be available to select by Airport Ops user. NOTAM Manager created using business rules of NOTAM Manual to exclude creation of duplicate NOTAMs, NOTAMs with expired dates, etc. NOTAM Manager also includes rules which exclude the creation of duplicate NOTAMs, creating NOTAMs with expired dates or times, publishing NOTAMs too far in advance, etc. further reducing errors. NOTAM Manager	Incorrect NOTAM Delay in issuance of NOTAM	Minor – Existing controls listed and continued quality control function provides by USNS and USNOF	Probable – Existing controls and use of pre-formatted template in NOTAM Manager will reduce human error	Medium-4B	Continue Human Factors testing to improve the system and reduce input errors. Continue to improve and upgrade the system to reduce the chance of input errors by continued Human Factors testing and feedback from the users. User manual for NOTAM Manager provided to Airport Ops CBI or other media training by AIM subject matter experts Airport Ops provided account so they can test software prior to live test Limit or eliminate the use of text boxes for smaller non-139 airports to reduce errors due to a lower amount of training for personnel. The NOTAM Manager tool will not be deployed to any NOTAM originator unless they can originate in digital format (AIXM) at least ninety-five percent	Low – 4C

				and FNS perform quality checks initially so the user is alerted to any problems with NOTAM quality prior to publication.					(95%) of the NOTAMS required by that originator. This will be confirmed by tabulating the prior year's NOTAMS and then ensuring the tool has the required menus, scenarios and templates to create at least 95% of the NOTAMS for that year.	
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Hazard # (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current/ Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
NTWR-D006	Lapse of notification– Failure of Airport Operations personnel to notify affected ATC facilities	Human error	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	See those listed under NTWR-D001 above	Delayed NOTAM while clarify inconsistency of NOTAM vs. current operations	Minor – existing controls between Airport Ops and the ATCT and those b/n ATCT & TRACON & ATC CENTER would reduce severity	Remote – SMEs concluded this would only happen about once every year that lack of coordination would result in partial loss of ATC services	Low – 4C	Letter of Agreement between Airport Ops and TRACON & ATC CENTER which documents exactly how notification process will work during test for each type of NOTAM issued by Airport Ops, i.e. Notification process as follows: Airport Ops will notify the appropriate ATC facility	Low – 4C

Obstruction Tower Light Operators (TLO)¹⁸

(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
TLO-D002	Data corruption caused by machine	Software/ Hardware Malfunction or corruption	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	FAA interface was designed according to specific business requirements of NOTAM Manual System interface will be tested according to specific Test Plan – Software used to find bugs & fix Testing done prior to deployment Low level operations required to be aware of all obstructions – lit or not	Corrupted NOTAM causing delay in issuance of real NOTAM due to time needed to recognize valid NOTAM not issued In accurate info in the NAS	Major - Reduction in safety margin requiring crew to follow abnormal procedures to avoid hitting TL With system interface tool publication is almost immediate, thus any delay will be obvious. User can diagnose problem or use legacy system as back-up.	Extremely remote – computer systems may crash, but don't switch 0s and 1s No experience over years of operation of current system of NOTAMs being corrupted and published USNS doesn't permit garbage or nonsensical NOTAMs into the system – they are automatically rejected	Low – 3D	Quality control check at interface like parsing of USNS Must check to make sure NOTAM was issued Memorandum of Agreement between AIM & TLO describing roles and Responsibility The NOTAM Manager tool will not be deployed to any NOTAM originator unless they can originate in digital format (AIXM) at least ninety-five percent (95%) of the NOTAMs	Low – 3D

¹⁸ The SRM Panel concluded that due to the use of the system to system interface rather than NOTAM Manager no data corruption hazard would occur, thus there is no #1 and no human input error would occur and thus no #5 hazard would occur.

									required by that originator. This will be confirmed by tabulating the prior year's NOTAMs and then ensuring the tool has the required menus, scenarios and templates to create at least 95% of the NOTAMs for that year.	
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(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
TLO-D003	System interface tool unavailable	Latency of system, loss of connection or power failure	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	Normal system speed in processing NOTAM request would alert originator if NOTAM was not published within 1-2 minutes. FNS Redundant servers, diverse located servers, back-up generators for servers Legacy NOTAM system is complete back-up.	Delay in NOTAM issuance and cancellation	Minor – immediate access to legacy backup system results in minor delay in NOTAM publication	Extremely Remote – Web-based feature provides access at other locations, all existing control plus legacy system	Low – 4D	Monitor number of times and length of time originator has to use legacy system during first 2 years. Memorandum of Agreement between AIM & TLO describing roles and Responsibility	Low – 4D

(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
TLO-D004	Lack of synchronization of the system interface and the current legacy system used by Flight Service.	NOTAM created in NOTAM Manager-like tool will not be available for cancellation by Flight Service	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	Obstruction Light Operators can check FAA Pilot Web site for NOTAM number and then call FSS to cancel NOTAM	Delay in cancellation of NOTAM	Minimal – due to easy access to back-up system	Extremely remote – very unlikely will create a NOTAM the system interface and then be unable to cancel using legacy system,	Low – 5D		Low – 5D

(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
TLO-D006	Lapse of notification – Failure of personnel to notify affected ATC facilities	Human error	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	IDS pulls NOTAMs from USNS ERIDs pulls NOTAMs 91.103 requires pilots to obtain NOTAMs before flight Pilots are required to comply with minimum safe altitudes in 91.119 Code of Federal Regulations §91.113 & AIM 555 & 558 requires pilots to see and avoid all hazards in the air and on the ground.	ATC may be unaware of NOTAM	Minor – ATC alerts pilots to obstructions whether lit or not if they are talking to pilots	Remote – once a year the FSS may forget to notify the affected ATC facility from the automatic eNOTAM alert	Low – 4C	Memorandum of agreement to indicate roles and responsibilities. Continued training and tracking of lapses of notification. An eNOTAM will be sent to FSS by the FNS for each new NOTAM and NOTAM cancellation to require the FSS specialist to notify the affected ATC facilities.	Low – 4C

Technical Operations – Facilities & Equipment (AJW) (Operation Control Centers)

(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
Tech Ops- D001	Data corruption caused by humans	Unauthorized users or access to direct-entry tool	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	Coordination between field and OCC and SOC ATC facilities are alerted to NOTAM by phone & fax due to SOPs of Tech ops – both OTS and RTS ATC terminal facilities may have IDS and thus can review NOTAMS ERIDs for ATC CENTERS USNS validates and USNOF quality checks all incoming NOTAMS. Originators can quality check NOTAMS using NAIMES site Legacy NOTAM system is complete back-up if digital tool has problem. Pilots have internal checks before they use navigational equipment and will report navigation troubles to ATC.	Cancellation of valid NOTAM by human interference; Issuance of inaccurate NOTAM by human interference; Delay in resolution of conflict between actual conditions and NOTAM reported Conflicting NOTAMS	Minor – slight reduction in ATC services	Extremely Remote – due to effectiveness of existing controls, such as strict physical access employed by the FAA to get into their facility where NOTAMS will be created.	Low – 4D	Username & passwords required to access software Levels of privilege to access site	Low - 4D

(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
Tech Ops- D002	Data corruption caused by machine	Software/ Hardware Malfunction or corruption	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	See those above in Tech Ops-D001 NOTAM Manager-like tool is designed according to specific business requirements of NOTAM Manual Tool is created under specific software guidelines Tool tested according to specific Test Plan Software used to find bugs & fix Users don't have administrator rights and software is centrally managed	Corrupted NOTAM causing delay in issuance of real NOTAM due to time needed to recognize valid NOTAM not issued Inaccurate info in the NAS	Minor –Slight reduction in ATC services With the NOTAM Manager entry tool publication is almost immediate, thus any delay will be obvious. User can diagnose problem or use legacy system as back-up.	Extremely remote – computer systems may crash, but don't switch 0s and 1s No experience over years of operation of current system of NOTAMs being corrupted and published NOTAM Manager and USNS don't permit garbage or nonsensical NOTAMs into the system – they are automatically rejected	Low – 4D	See those above The NOTAM Manager tool will not be deployed to any NOTAM originator unless they can originate in digital format (AIXM) at least ninety-five percent (95%) of the NOTAMs required by that originator. This will be confirmed by tabulating the prior year's NOTAMs and then ensuring the tool has the required menus, scenarios and templates to create at least 95% of the NOTAMs for that year.	Low – 4D

(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
Tech Ops-D003	System unavailable	Network latency of NOTAM Manager tool software, loss of connection or power failure	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	NOTAM Manager tool provides visual computer alert if network connectivity lost. Normal NOTAM Manager entry tool speed in processing NOTAM request would alert originator if NOTAM was not published within 1- 2 minutes. Redundant servers, diverse located servers, back-up generators for servers Originators have back-up generators if power is lost. and also contingency plans if lost connectivity Legacy NOTAM system is complete back-up.	Delayed NOTAM	Minor – immediate access to legacy backup system results in minor delay in NOTAM publication	Extremely Remote – all existing control plus legacy system	Low – 4D	Monitor number of times and length of time originator has to use legacy system during first 2 years. Contingency requirement should also be contained in this tool so other OCC could serve as backup to original OCC.	Low – 4D

(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommend ed Safety Requirement s	(11) Predicted Residual Risk
Tech Ops- D004	Lack of synchronizati on of the NOTAM Manager like tool and the current legacy system used by Flight Service.	NOTAM created in NOTAM Manager-like tool will not be available for cancellation by Flight Service via OPUS.	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	Tech Ops can check FAA Pilot Web site for NOTAM number and then call FSS to cancel NOTAM.	Delay in cancellation of NOTAM	Minimal – due to easy access to back-up system	Extremely remote – very unlikely will create NOTAM in NOTAM- Manager like tool and then goes down and need to cancel using legacy system,	Low – 5D		Low -5D

(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
Tech Ops-D005	User input error	Human error FSS is no longer submitting NOTAMs	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	NOTAM Manager-like tool provides templates and drop-down menus to reduce human error. Tool is created using business rules of NOTAM Manual to exclude creation of duplicate NOTAMs, NOTAMs with expired dates, etc. Originators will be able to have input into requirements of tool Tool performs quality checks to alert user to problems before publication. Originators receive On the Job Training Any NOTAM which cannot be created with templates or drop-down menus will be done via legacy system. Tool displays NOTAM in plain language to help user see any mistakes. If navigation equipment is indicated as OK and a pilot can't use it – they will let ATC know. USNS and USNOF will continue validation & and have access to quality checking function. Tool provides additional checks to eliminate duplicate NOTAMs, those with expired dates, etc.	Incorrect NOTAM Delay in issuance of NOTAM	Minor – Slight reduction in ATC services Existing controls listed and continued quality control function provides by USNS and USNOF	Probable – SME indicates that tech ops personnel make mistakes on selecting the wrong piece of equipment several times a month.	Medium - 4B	Human factor testing done prior to deployment to make software more user friendly User manual for NOTAM Manager provided to originators CBT training or as determined by originator Originators will be involved in the design of the new tool and have ability to test via demo before deployment NOTAM Manager tool could be tied to current RMLS to reduce human entry error. The NOTAM Manager tool will not be deployed to any NOTAM originator unless they can originate in digital format (AIXM) at least	Low – 4C

				Pilots have internal checks before they use navigational equipment and will report navigation troubles to ATC.					ninety-five percent (95%) of the NOTAMs required by that originator. This will be confirmed by tabulating the prior year's NOTAMs and then ensuring the tool has the required menus, scenarios and templates to create at least 95% of the NOTAMs for that year.	
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(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
Tech Ops-D006	Lapse of notification Failure of Tech Ops personnel to notify affected ATC facilities FSS personnel no longer to notify affected ATC facilities	Human error	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	Initial and final coordination/notification of ATC affected facilities is SOP for Tech Ops if maintenance If failure of equipment – then notify affected ATC facilities when equipment is back up ERIDS and IDS systems alert ATC about NOTAMs Pilot and ATC communicate about equipment use or lack thereof Coordination & notification function is tracked in RMLS	Lack of notification ATC unaware of change to NAS	Minor – slight reduction in ATC services	Extremely Remote – SME indicates will only happen about every 3 years	Low – 4D	Tech ops training to emphasize need for notification because extra layer of notification is no longer there from FSS.	Low – 4D

Airspace NOTAM Originators

Hazard # (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current/ Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
AS-D001	Data corruption caused by humans	Unauthorized use or access	All NAS operations including periods of maximum NOTAM generation, such as large snow and ice storms.	NOTAM originators coordinate most NOTAM activities with ATC prior to the action being taken and the NOTAM being issued. Per 7210.3, Controllers must be cognizant of all NOTAMs under their area of and may recognize unauthorized, inconsistent NOTAM and respond accordingly. USNS and USNOF perform validation checks on all incoming NOTAMs. Software is SCAP approved See and Avoid responsibility for pilots.	Cancellation of valid NOTAM by human interference; Issuance of fake NOTAM by human interference Delay in resolution of conflict between actual conditions and NOTAM reported Issuance of conflicting NOTAMs	Minor - All the existing controls which regulate the coordination and issuance of NOTAMs make the worst credible outcome a slight reduction in ATCT services	Extremely Remote – due to effectiveness of existing controls. Periodic reset of passwords.	Low – 4D	Username & passwords required to access new software	Low - 4D

Hazard # (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current/ Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
AS-D002	Data corruption caused by machine	Software/ Hardware Malfunction or corruption	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	See those above in AS-D001 NOTAM Manager/ system interface will be designed according to specific business requirements of NOTAM Manual System created under specific software guidelines System tested according to specific Test Plan Software used to find bugs & fix Every software revision and patch will be tested prior to implementation. NOTAM Originators generally check their NOTAMs for correct publication. A military radar operator observing VFR pilots entering an active MOA would terminate hazardous activities if the VFR plane was using a transponder Pilots- see and avoid	Corrupted NOTAM causing delay in issuance of real NOTAM due to time needed to recognize valid NOTAM not issued Inaccurate information in the NAS	Major – Due to the hazards associated with special activity airspace including military operations, parachute activity, and others; having a pilot unaware of a condition such as this could result in a VFR pilot inadvertently entering a “hot” Military Operations Area (MOA) or parachute zone. A loss of separation with military aircraft or skydivers is a credible risk.	Extremely remote – computer systems may crash, but don’t switch 0s and 1s No experience over years of operation of current system of NOTAMs being corrupted and published New system and USNS don’t permit garbage or nonsensical NOTAMs into the system – they are automatically rejected	Low – 3D	Ensure the testing and reliability of the new entry systems. Ensure that NOTAM originators check their new NOTAM is correct in the USNS. The NOTAM Manager tool will not be deployed to any NOTAM originator unless they can originate in digital format (AIXM) at least ninety-five percent (95%) of the NOTAMs required by that originator. This will be confirmed by tabulating the prior year’s NOTAMs and then ensuring the tool has the required menus, scenarios and templates to create at least 95% of the NOTAMs for that year.	Low – 3E If each originator checked to make sure the correct new NOTAM was in the system the likelihood of a machine error causing an incorrect NOTAM to be published reduces to extremely improbable.

Hazard # (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current/ Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
AS-D003	NOTAM Manager or system interface unavailable	Network latency of software, loss of connection or power failure	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	System provides visual computer alert if network connectivity lost. Normal system speed in processing NOTAM request would alert a NOTAM originator to a problem if it was not published within 1-2 minutes. Legacy NOTAM system is complete back-up.	Delayed NOTAM	Minimal – immediate access to legacy backup system results in minor delay in NOTAM publication	Remote - power losses, network latency or loss of Internet connection is expected to occur about once a year.	Low – 5C	Report listing the number of system outages, regardless of responsibility (NOTAM Manager, Airport Ops or third party), by number, responsible party and length of incidents. These will be listed by type including: networking, power, hardware or any other interruptions of service. Report the number of NOTAMs created using the legacy system.	Low – 5C

(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
AS-D004	Lack of synchronization of the NOTAM Manager/system interface and the current legacy system.	NOTAM created in NOTAM Manager/system interface system will not show up in eNOTAM system, thus if created in NOTAM Manager the originator cannot cancel via the legacy system, if the new system suddenly becomes unavailable and need to cancel NOTAM	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	Legacy system is a back-up - originator can check FAA PilotWeb site for NOTAM number and then call FSS to cancel NOTAM.	Delay in cancellation of NOTAM	Minimal due to easy access to back-up system	Extremely Remote – very unlikely will create NOTAM in the new system then it goes down and need to cancel using legacy system	Low – 5D	A report listing the number of instances when the originator determines there is a lack of synchronization between the new system and eNOTAM system.	Low – 5D

Hazard # (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current/ Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
AS-D005	User input error	User input error FSS no longer responsible for writing NOTAM text Incomplete business rules from 7930.2 included in the NOTAM Manager software.	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	NOTAM Manager provides templates and drop-down menus to reduce human error. New system created using business rules of NOTAM Manual to exclude creation of duplicate NOTAMs, NOTAMs with expired dates, etc. New system performs quality checks to alert user to problems before publication. Originators have initial and recurrent NOTAM training Any NOTAM which cannot be created with templates or drop-down menus will be done via legacy system. New system displays NOTAM in plain language to help user see any mistakes.	Incorrect NOTAM Delay in issuance of NOTAM	Minor – Existing controls listed and continued quality control function provides by USNS and USNOF. The system interface uses data from existing systems that are already used to enter NOTAMs so the chance of entering the wrong NOTAM is the same as the accepted risk currently. NOTAM Manager has drop down boxes that are designed to make inputting NOTAMs error	Remote – Existing controls and use of pre-formatted template in NOTAM Manager system will reduce human error The system interface uses data from existing systems that are already used to enter NOTAMs so the chance of entering the wrong NOTAM is the same as the accepted risk currently.	Low- 4C	Continue Human Factors testing to improve the system and reduce input errors. Continue to improve and upgrade the system to reduce the chance of input errors by continued Human Factors testing and feedback from the users. User manual for the NOTAM Manager provided to NOTAM originators CBI or other media training by AIM subject matter experts Originators provided account so they can test software prior to live test	Low – 4C

				USNS and USNOF will continue quality checking function for the short term. Pilots see and avoid. Coordination may cause an incorrect NOTAM error to be spotted by the controlling facility.		resistant.			Software developers should work with USNOF personnel for 7930.2 business rules help and advice. The NOTAM Manager tool will not be deployed to any NOTAM originator unless they can originate in digital format (AIXM) at least ninety-five percent (95%) of the NOTAMs required by that originator. This will be confirmed by tabulating the prior year's NOTAMs and then ensuring the tool has the required menus, scenarios and templates to create at least 95% of the NOTAMs for that year.	
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(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommen ded Safety Requireme nts	(11) Predicted Residual Risk
AS-D006	Lapse of notification Failure of Airspace originators who used to call the FSS to notify the affected ATC facilities.	Human error	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	SAA originators and CARF coordinates all NOTAM activities with ATC prior to the action being taken and the NOTAM being issued. ATC Traffic Flow Management Units in ATCT, TRACON & ATC CENTER already coordinate NOTAM information which affects them. Terminal and en-route have ways of getting NOTAMs that are independent of the notification they receive from Flight Service or the NOTAM originator. When notifications are performed the notifying personnel copies the initials, date, and time of the person being notified. SAU (SAA) NOTAMs are delivered to the centers and the centers notify the terminal facilities. This is not affected by the safety case.	Delayed NOTAM while clarify inconsistency of NOTAM vs. current operations	Minor – existing controls between NOTAM originators and the affected ATC facilities	Remote – SMEs concluded this would only happen about once every year that lack of coordination would result in partial loss of ATC services	Low – 4C	Letter of Agreement between NOTAM originators and the affected ATC facilities specifying the notification requirement and other procedures.	Low – 4C

GPS NOTAM Originators¹⁹

Hazard # (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current/ Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
GPS-D001	Data corruption caused by humans	Unauthorized use or access	All NAS operations including periods of maximum NOTAM generation, such as large snow and ice storms.	NOTAM originators coordinate most NOTAM activities with ATC prior to the action being taken and the NOTAM being issued. USNS and USNOF perform validation checks on all incoming NOTAMs. Software is SCAP approved Pilots would see that their GPS navigation equipment was not operational and use backup navigation systems.	Cancellation of valid NOTAM by human interference; Issuance of fake NOTAM by human interference; Delay in resolution of conflict between actual conditions and NOTAM reported Issuance of conflicting NOTAMs	Minimal – Pilots are trained to recognize and deal with failures of navigation systems. There are backups available to GPS such as ILS, VOR, TACAN, NDB, ATC radar, etc.	Extremely Remote – due to effectiveness of existing controls. Periodic reset of passwords.	Low – 5D	Username & passwords required to access the new software	Low - 5D

¹⁹ The SRM Panel concluded that since the legacy system for creating GPS NOTAMs does not involve a legacy software system like currently used by FSS, there would be no lack of synchronization between a new and legacy system, thus hazard #4 does not pertain to GPS NOTAMs.

Hazard # (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current/ Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
GPS-D002	Data corruption caused by machine	Software/ Hardware Malfunction or corruption	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	See above in GPS-D001 NOTAM Manager/ system interface will be designed according to specific business requirements of NOTAM Manual System created under specific software guidelines System tested according to specific Test Plan. Software used to find bugs & fix Every software revision and patch will be tested prior to implementation. System will allow user to see any problems quicker and switch to Legacy NOTAM system as full back-up. NOTAM Originators generally check their NOTAMs for correct publication. Pilots would see that their GPS navigation equipment was not operational and use backup navigation systems.	Corrupted NOTAM causing delay in issuance of real NOTAM due to time needed to recognize valid NOTAM not issued Inaccurate information in the NAS	Minimal – Pilots are trained to recognize and deal with failures of navigation systems. There are backups available to GPS such as ILS, VOR, TACAN, NDB, ATC radar, etc.	Extremely remote – computer systems may crash, but don't switch 0s and 1s No experience over years of operation of current system of NOTAMs being corrupted and published New system and USNS don't permit garbage or nonsensical NOTAMs into the system – they are automatically rejected	Low – 5D	Ensure the testing and reliability of the new entry systems. The NOTAM Manager tool will not be deployed to any NOTAM originator unless they can originate in digital format (AIXM) at least ninety-five percent (95%) of the NOTAMs required by that originator. This will be confirmed by tabulating the prior year's NOTAMs and then ensuring the tool has the required menus, scenarios and templates to create at least 95% of the NOTAMs for that year.	Low – 5D

Hazard # (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current/ Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
GPS-D003	NOTAM Manager or system interface unavailable	Network latency of software, loss of connection or power failure	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	System provides visual computer alert if network connectivity lost. Normal system speed in processing NOTAM request would alert a NOTAM originator to a problem if it was not published within 1-2 minutes. Legacy NOTAM system is complete back-up. Pilots would see that their GPS navigation equipment was not operational and use backup navigation systems.	Delayed NOTAM	Minimal – immediate access to legacy backup system results in minor delay in NOTAM publication	Remote – Power losses, network latency or loss of Internet connection is expected to occur about once a year.	Low – 5C	Report listing the number of system outages, regardless of responsibility (NOTAM Manager, Airport Ops or third party), by number, responsible party and length of incidents. These will be listed by type including: networking, power, hardware or any other interruptions of service. Report the number of NOTAMs created using the legacy system. In case the new system is down there needs to be a way to call the NOTAM help desk to issue a NOTAM.	Low – 5C

Hazard # (1)	Hazard Description (2)	Causes (3)	System State (4)	Existing Control or Requirement (5)	Possible Effects (6)	Severity/ Rationale (7)	Likelihood/ Rationale (8)	Current / Initial Risk (9)	Recommended Safety Requirements (10)	Predicted Residual Risk (11)
GPS-D005	User input error	User input error due to fatigue Incomplete business rules from 7930.2 included in the NOTAM Manager software.	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	NOTAM Manager provides templates and drop-down menus to reduce human error. New system created using business rules of NOTAM Manual to exclude creation of duplicate NOTAMs, NOTAMs with expired dates, etc. New system performs quality checks to alert user to problems before publication. Originators have initial and recurrent NOTAM training New system displays NOTAM in plain language to help user see any mistakes. USNS and USNOF will continue quality checking function for the short term. Pilots would see that their GPS navigation equipment was not operational and use backup navigation systems.	Incorrect NOTAM Delay in issuance of NOTAM	Minimal – Pilots are trained to recognize and deal with failures of navigation systems. There are backups available to GPS such as ILS, VOR, TACAN, NDB, ATC radar, etc.	Remote – Existing controls and use of pre-formatted template in NOTAM Manager will reduce human error The system interface would use data from existing systems that are already used to enter NOTAMs so the chance of entering the wrong NOTAM is the same as the accepted risk currently.	Low-5C	Continue Human Factors testing to improve the system and reduce input errors. Continue to improve and upgrade the system to reduce the chance of input errors by continued Human Factors testing and feedback from the users. User manual for the NOTAM Manager provided to NOTAM originators CBI or other media training by AIM subject matter experts Originators provided account so they can test software prior to live test The NOTAM Manager tool will not be deployed to any NOTAM originator unless they can originate in digital format (AIXM) at least ninety-five percent (95%)	Low – 5C

									of the NOTAMs required by that originator. This will be confirmed by tabulating the prior year's NOTAMs and then ensuring the tool has the required menus, scenarios and templates to create at least 95% of the NOTAMs for that year.	
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(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommen ded Safety Requiremen ts	(11) Predicted Residual Risk
GPS-D006	Lapse of notification Failure of test engineers to notify the affected ATC facilities.	Human error	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	Current notifications done by the field test engineers are not affected by the implementation of the new NOTAM entry Manager.	Confusion while clarifying inconsistency of NOTAM vs. current operations	Minor – existing controls between NOTAM originators and the affected ATC facilities. The new system does not affect the existing procedures of the test engineers notifying the affected ATC facilities.	Remote – SMEs concluded this would only happen about once every year that lack of coordination would result in partial loss of ATC services	Low – 4C	Letter of Agreement between NOTAM originators and the affected ATC facilities specifying the notification requirement and other procedures.	Low – 4C

FDC NOTAM Originators²⁰

(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
FDC-D001	Data corruption caused by humans	Unauthorized users or access to direct-entry tool or system interface	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	Coordination between requesting agency and originator, i.e. HQ, service area and field offices ATC facilities are alerted to NOTAM by phone, fax or e-mail ATC terminal facilities may have IDS and thus can review new FDC NOTAM Center must forward FDC NOTAM lists to terminal facilities USNS performs validation checks and USNOF does quality checking on FDC NOTAMs All FDC NOTAMs require USNOF action to process FDC NOTAMs thru USNS Pilots must get NOTAM info from FSS, Internet, etc. prior to every flight Aeronav Products (OKC) uses direct-entry tool (NTS) which is AIXM compliant already	Cancellation of valid NOTAM by human interference Issuance of fake NOTAM by human interference Delay in resolution of conflict between actual conditions and NOTAM reported Conflicting NOTAMs	Minor – slight reduction in ATC services	Extremely Remote – due to effectiveness of existing controls	Low – 4D	Username & passwords required to access software Software is Web-based and SCAPped Levels of privilege to access site	Low - 4D

²⁰ The SRM Panel concluded that since FDC NOTAMs are not created by FSS using their software there would be no synchronization issues and thus hazard #4 would not occur.

(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
				Charting office uses NES tool Third party providers for instrument procedures use NES tool Originators can quality check NOTAMs using PilotWeb site Legacy system is complete back-up						

(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
FDC-D002	Data corruption caused by machine	Software/ Hardware Malfunction or corruption	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	See those above in FDC-D001 NOTAM Manager or system interface is designed according to specific business requirements of NOTAM Manual New system created under specific software guidelines – see Section 4 above. New system tested according to specific Test Plan – Software used to find bugs & fix Testing done prior to deployment	Corrupted NOTAM causing delay in issuance of real NOTAM due to time needed to recognize valid NOTAM not issued Inaccurate info in the NAS	Minor – current legacy system operates under a 3 minute delay from creation to publication. With new tool the publication is almost immediate, thus any delay will be obvious. User can diagnose problem or use legacy system as back-up.	Extremely remote – computer systems may crash, but don't switch 0s and 1s No experience over years of operation of current system of NOTAMs being corrupted and published The new system and USNS don't permit garbage or nonsensical NOTAMs into the system – they are automatically rejected.	Low – 4D	See those above. The NOTAM Manager tool will not be deployed to any NOTAM originator unless they can originate in digital format (AIXM) at least ninety-five percent (95%) of the NOTAMs required by that originator. This will be confirmed by tabulating the prior year's NOTAMs and then ensuring the tool has the required menus, scenarios and templates to create at least 95% of the NOTAMs for that year.	Low – 4D

(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
FDC-D003	System unavailable	Network latency of NOTAM Manager tool software, loss of connection or power failure	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	New system provides visual computer alert if network connectivity lost. Normal system speed in processing NOTAM request would alert originator if NOTAM was not published within 1-2 minutes. Redundant servers, diverse located servers, back-up generators for servers Other options available for originators if power is lost. Legacy NOTAM system is complete back-up.	Delayed NOTAM	Minor – immediate access to legacy backup system results in minor delay in NOTAM publication	Extremely Remote – Web-based feature provides access at other locations, all existing control plus legacy system	Low – 4D	Monitor number of times and length of time originator has to use legacy system during first 2 years.	Low – 4D

(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recommended Safety Requirements	(11) Predicted Residual Risk
FDC-D005	User input error	Human error USNOF no longer submitting NOTAMS except under extreme circumstances	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	NOTAM Manager tool provides templates and drop-down menus to reduce human error. NOTAM Manager system templates are FDC specific New system created using business rules of NOTAM Manual to exclude creation of duplicate NOTAMS, NOTAMS with expired dates, etc. Originators will be able to have input into requirements of tool New system performs quality checks to alert user to problems before publication. FDC originators receive On the Job Training for NOTAM entry USNS and USNOF will continue validation & and have access to quality checking function. NTS will use a system interface and thus not need a NOTAM Manager-like tool Quality control SOPs for special NOTAMS that originate from Sys Ops Security	Incorrect NOTAM Delay in issuance of NOTAM	Minor – Existing controls listed and continued quality control function provides by USNS and USNOF	Remote – Existing controls and use of pre-formatted template in NOTAM Manager system will reduce human error System interfaces with existing entry system would keep the likelihood on entry mistakes at the current level.	Low- 4C	Human factor testing done prior to deployment to make software more user friendly User manual for the new system provided to originators CBT training or as determined by originator Originators will be involved in the design of the new tool and have ability to test via demo before deployment. The NOTAM Manager tool will not be deployed to any NOTAM originator unless they can originate in digital format (AIXM) at least	Low – 4C

									ninety-five percent (95%) of the NOTAMs required by that originator. This will be confirmed by tabulating the prior year's NOTAMs and then ensuring the tool has the required menus, scenarios and templates to create at least 95% of the NOTAMs for that year.	
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(1) Hazard #	(2) Hazard Description	(3) Causes	(4) System State	(5) Existing Controls or Requirements	(6) Possible Effects	(7) Severity/ Rationale	(8) Likelihood/ Rationale	(9) Current/ Initial Risk	(10) Recomm ended Safety Require ments	(11) Predicted Residual Risk
FDC- D006	Lapse of notification – Failure of personnel to notify affected ATC facilities	Human error	All NAS Operations including periods of maximum NOTAM generation, such as during large snow and ice storms.	7930.2 ATC CENTERS disseminate FDC NOTAM information to the appropriate terminal facilities. AJR-2, SOPs requires notification of affected ATC facilities AJV-11 doesn't have notification requirement Coordination prior to NOTAM creation 8260.19 2-23 AeroNav Products requirement re: notification	Delayed NOTAM while clarify inconsistency of NOTAM vs. current operations	Minor – existing controls plus coordination prior to NOTAM issuance	Extremely Remote –	Low – 4D		Low – 4D

Appendix B – Examples of NOTAM Originator’s Workflow

Examples of Legacy System Workflow

Example 1

An airport with a continuously operated Air Traffic Control Tower (ATCT) needs to close a runway for snow removal operations.

Step 1 – The originator, Airport Operations personnel, coordinates the anticipated runway closure with their Air Traffic Control Tower (ATCT).

Step 2 – An Airport Operations employee provides the NOTAM information to Flight Service Station (FSS) via phone, fax or eNOTAM. While the Airport is waiting for the NOTAM to be published, the Airport may alert the local aviation companies, airline operation's offices, and interested users of the proposed NOTAM in accordance with the airport's policies and procedures using airport support software such as Passur, Information Dissemination and Display System (IDS) or by fax.

Step 3 – FSS records the identity of the submitter and transmits the NOTAM information to the United States NOTAM System (USNS). Flight service is responsible to notify the affected Air Traffic Control (ATC) facilities of the NOTAM.

Step 4 – When the USNS receives the information from FSS, it performs the automatic computer checks as explained above to check the NOTAM for errors. Once accepted the new NOTAM receives a number which is transmitted back to FSS and the NOTAM is distributed to users. The originator confirms correct NOTAM publication.

Step 5 – Return to normal conditions. When the condition requiring the NOTAM no longer exists, the originator contacts the FSS to cancel the NOTAM. Steps 3 and 4 are repeated for NOTAM cancellation and the FSS is responsible for notification of the affected ATC facilities.

Example 2

An uncontrolled airport without an Air Traffic Control Tower (ATCT) needs to close a portion of a taxiway for repaving.

Step 1 – Prior to closing the taxiway and beginning work the originator, Airport Operations, plans and coordinates the repair operation.

Step 2 – When ready to begin repaving, an Airport Operations employee provides the NOTAM information to Flight Service Station (FSS) via phone, fax or eNOTAM.

Step 3, 4 and 5 – Same as above in example 1.

Example 3

A flashing light on a radio broadcast tower burns out and the obstruction light operator needs to create a NOTAM.

Step 1—The originator, a tower operator, in a control center receives an alarm stating that a light is out. The operator follows internal procedures that record, track, and confirm the outage.

Step 2 – A tower operator provides the NOTAM information to Flight Service Station (FSS) via phone, fax or eNOTAM.

Step 3, 4 and 5 – Same as above in example 1.

Example 4

A pilot reports to air traffic control (ATC) that a component of the approach lighting system at an airport is not functioning properly.

Step 1—ATC will confirm the outage with a second pilot if possible. If confirmed ATC calls Technical Operations to inform them of the problem.

Step 2 – A Technical Operations employee provides the NOTAM data to Flight Service Station (FSS) via phone, fax, or eNOTAM. Technical Operations also notifies the affected ATC facilities when the ANF are taken out of service and when repaired and returned to service. Technical Operations personnel review the published NOTAM for quality control purposes.

Step 3, 4 and 5 – Same as above in example 1.

FDC Example

An FDC NOTAM needs to be created for laser light activity.

Step 1 – The service area office where the laser light activity will take place receives the information about the laser light activity.

Step 2 – The service area office sends the data to USNOF within 7 days of the proposed activity. The service area office is also responsible for notification of the affected ATC facilities but in this case the service area office may delegate notification responsibility to their respective FSS and/or ATCT.

Step 3 – USNOF personnel format the data and publish the FDC NOTAM in USNS where the NOTAM is sent to all NOTAM users just like with Domestic NOTAMs.

Step 4 – USNS sends the NOTAM to the affected ATC CENTER and the ATC CENTER notifies the affected terminal facilities.

Step 5 – When the NOTAM needs to be cancelled, the service area office notifies USNOF to cancel the NOTAM.

Examples of Digital NOTAM Workflow of Originators

The following examples demonstrate the current process that various NOTAM originators use to create Domestic NOTAMs in the categories listed above.

Example 1

An airport with a continuously operated Air Traffic Control Tower (ATCT) needs to close a runway for snow removal operations.

Step 1 – The originator, Airport Operations personnel, coordinates the anticipated runway closure with their Air Traffic Control Tower (ATCT).

Step 2 – An Airport Operations employee logs on to the NOTAM Manager system via the Internet using a previously assigned secure username and password to enter the NOTAM information. The system provides a series of menus and templates to create a NOTAM by following NOTAM manual business rules. The system checks the format at the source and then sends the NOTAM to USNS. While the Airport is waiting for the NOTAM to be published, the Airport may alert the local aviation companies, airline operation's offices, and interested users of the proposed NOTAM in accordance with the airport's policies and procedures using airport support software such as Passur, Information Dissemination and Display System (IDS) or by fax.

Step 3 – FSS is no longer involved in sending the proposed NOTAM to USNS.

Step 4 – When the USNS receives the information, it performs the automatic computer checks as explained above to check the NOTAM for errors. Once accepted the new NOTAM receives a number and the NOTAM is distributed to users. The originator confirms correct NOTAM publication and notifies the affected ATC facilities as per letter of agreement,

Step 5 – Return to normal conditions. When the condition requiring the NOTAM no longer exists, the originator cancels the NOTAM using the NOTAM Manager system. Steps 2 and 4 are repeated for NOTAM cancellation and the originator is responsible for notification of the affected ATC facilities.

Example 2

An uncontrolled airport without an Air Traffic Control Tower (ATCT) needs to close a portion of a taxiway for repaving.

Step 1 – Prior to closing the taxiway and beginning work the originator, Airport Operations, plans and coordinates the repair operation.

Step 2 – When ready to begin repaving, an Airport Operations employee logs on to the NOTAM Manager system via the Internet using a previously assigned secure username and password to enter the NOTAM information. The system provides a series of menus and templates to create a NOTAM by following NOTAM manual business rules. The system checks the format at the source and then sends the NOTAM to USNS.

Step 3 – FSS is no longer involved in sending the proposed NOTAM to USNS.

Step 4 – When the USNS receives the information, it performs the automatic computer checks as explained above to check the NOTAM for errors. Once accepted the new NOTAM receives a number and the NOTAM is distributed to users. The originator confirms correct NOTAM publication and notifies the affected ATC facilities as per letter of agreement.

Step 5 – Return to normal conditions. When the condition requiring the NOTAM no longer exists, the originator cancels the NOTAM using the NOTAM Manager system. Steps 2 and 4 are repeated for NOTAM cancellation and the originator is responsible for notification of the affected ATC facilities.

Example 3

A flashing light on a radio broadcast tower burns out and the obstruction light operator needs to create a NOTAM.

Step 1– The originator, a tower operator, in a control center receives an alarm stating that a light is out. The operator follows internal procedures that record, track, and confirm the outage.

Step 2 – A tower operator logs into their own system which manages obstruction tower lights and using this system sends a Digital NOTAM via a system interface to the USNS.

Step 3 – FSS is no longer involved in sending the proposed NOTAM to USNS.

Step 4 – When the USNS receives the information, it performs the automatic computer checks as explained above to check the NOTAM for errors. Once accepted the new NOTAM receives a number and the NOTAM is distributed to users. The originator confirms correct NOTAM publication. In this case, since we are describing a new Obstruction Light NOTAM, the FSS performs the ATC notification function when it receives the new Obstruction Light out NOTAM as per a Letter of Agreement.

Step 5 – Return to normal conditions. When the condition requiring the NOTAM no longer exists, the originator cancels the NOTAM using the system interface. Steps 2 and 4 are repeated for NOTAM cancellation and the FSS is responsible for notification of the affected ATC facilities.

Example 4

A pilot reports to air traffic control (ATC) that a component of the approach lighting system at an airport is not functioning properly.

Step 1– ATC will confirm the outage with a second pilot if possible. If confirmed ATC calls Technical Operations to inform them of the problem.

Step 2 – A Technical Operations employee first enters the equipment requiring service in the Event Manager tool which is tied to their RMLS database. Once a ticket has been created in RMLS, the Tech Ops employees will log on to the NOTAM Manager system via the Internet using a previously assigned secure username and password to enter the NOTAM information. The system provides a series of menus and templates to create a NOTAM by following NOTAM manual business rules. The system checks the format at the source and then sends the NOTAM to USNS.

Step 3 – FSS is no longer involved in sending the proposed NOTAM to USNS.

Step 4 – When the USNS receives the information, it performs the automatic computer checks as explained above to check the NOTAM for errors. Once accepted the new NOTAM receives a number and the NOTAM is distributed to users. Technical Operations personnel review the published NOTAM for quality control purposes.

Step 5 – Return to normal conditions. When the condition requiring the NOTAM no longer exists, the originator cancels the NOTAM using the NOTAM Manager system. Steps 2 and 4 are repeated for NOTAM cancellation and the originator is responsible for notification of the affected ATC facilities.

FDC Example

An FDC NOTAM is created for Laser Light Activity.

Step 1 – The service area office where the laser light activity will take place receives the information about the laser light activity.

Step 2 – The service area office employee logs on to the NOTAM Manager system via the Internet using a previously assigned secure username and password to enter the NOTAM information. The system provides a series of menus and templates to create a NOTAM by following NOTAM manual business rules. The system checks the format at the source and then sends the NOTAM to USNS. The service area office is also responsible for notification of the affected ATC facilities as per letter of agreement or FAA policies.

Step 3 – USNOF is no longer involved in sending the proposed NOTAM to USNS.

Step 4 – When the USNS receives the information, it performs the automatic computer checks as explained above to check the NOTAM for errors. Once accepted the new NOTAM receives a number and the NOTAM is distributed to users. USNS sends the NOTAM to the affected ATC CENTER and the ATC CENTER notifies the affected terminal facilities.

Step 5 – When the NOTAM needs to be cancelled the service area office employee cancels the NOTAM using the NOTAM Manager system.

Appendix C – Safety Risk Management Panel Members

Meeting Dates: September 21-23, 2010

Meeting Location: 475 School Street, SW, Washington, DC 20024

Meeting Purpose: NOTAM Originators SRMP Meeting

Attendees:

Name	Organization	Phone	e-mail Address
Kevin Le	FAA/AJR-32 AIM Engineering Services Safety	202-385-7017	Kevin.Le@faa.gov
Jeff C. Barnes	FAA/AJR-32 AIM Engineering Services Safety	202-385-7699	Jeff.C.Barnes@faa.gov
Kathlyn Hoekstra	FAA/AJR-32 AIM PO Lead	202-493-5603	Kathlyn.Hoekstra@faa.gov
Tim Carper	FAA/AJR-C (SOSM)	202-385-7553	Tim.ctr.Carper@faa.gov
Bob Thornburgh	FAA/AJR-C (SOSM)	202-385-7027	Robert.P.Thornburgh@faa.gov
Byron Abraham	FAA/AJR-C (SOSM)	202-385-7557	Byron.ctr.Abraham@faa.gov
Tom Schneider	FAA/AFS-420	405-954-5852	thomas.e.schneider@faa.gov
Dave Zimmers	USNOF (FAA/AJR-115)	703-904-4477	David.Zimmers@faa.gov
Colby Abbott	FAA/AJV-11 Airspace, Regulations, and ATC Procedures Group	202-267-9231	Colby.Abbott@faa.gov
Chet MacMillan	FAA/AJS-22	202-385-4876	Chet.MacMillan@faa.gov
Martino Dennis	FAA/AJS-52	202-385-4840	Martino.Dennis@faa.gov
Michael Riso	PASS	202-293-7277	Michael.Riso@faa.gov
Dennis Billups	FAA/AJW-C21	913-254-8015	Dennis.Billups@faa.gov
Tal Haley	FAA/AJR-2 Air Traffic Security	202-267-8276	Talwyn.Haley@faa.gov

Michael Meyers	FAA/AAS-100	202-267-8785	Michael.Meyers@faa.gov
Mark Carver	FAA/AJR-B2	202-385-7775	Mark.Carver@faa.gov
James Harvey	Air Traffic Control Safety and Operations Support	202-385-7567	James.L.Harvey@faa.gov
Freddie James	FAA/AAS-300 Airports	202-267-8792	Freddie.James@faa.gov
Arthur Cupps	Lockheed Martin Company	301-640-3664	Arthur.Cupps@lmco.com
Carroll Carter	Lockheed Martin Company	571-223-3196	carroll.j.carter@lmco.com
Jocelyn Cox	CNA	202-580-7451	Jocelyn.ctr.Cox@faa.gov
Shaelynn Hales	CNA	202-580-7519	Shaelynn.ctr.Hales@faa.gov
Jennifer Bewley	CNA	202-580-7506	Jennifer.ctr.Bewley@faa.gov
Mark Miner	FAA/AJW-12	703-925-3026	Mark.Miner@faa.gov
Glenn Smith	TAC2/ASI Safety	202-314-1230	glenn.smith@auatac.com
Drew Henderson	TAC2/TASC Safety	202-314-1370	andrew.henderson@auatac.com
Paul Pederson	TAC2/TASC Safety	202-314-1340	paul.pederson@auatac.com

Appendix D – Glossary

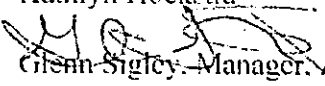
AC	Advisory Circular
AD	Aerodrome
AI	Aeronautical Information
AIM	Aeronautical Information Management
AIR	American Institutes of Research
Airport	Airport with a continuously operation Air Traffic Control Tower
Airport Ops	Airport personnel responsible for the operations of the Airport
Airport Surface Area NOTAMs	“D” NOTAMs created using keywords including: aerodrome, runway, taxiway, ramp, apron, service or obstruction
AISR	Aeronautical Information System Replacement
AIXM	Aeronautical Information Exchange Model
AJR-32	FAA’s Aeronautical Information Management Group
AJR-C	System Operations Safety Directorate
AMS	Acquisition Management System
ARC	Aviation Rulemaking Committee
APRON	Apron
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATCT	Air Traffic Control Tower
CM	Configuration Management
“D” NOTAMs	Distant NOTAMs
DDN	Direct-entry Digital NOTAM system
DEN	Denver International Airport
DINS	Defense Internet NOTAM Service
DOD	Department of Defense
eNOTAM	Legacy analog system used to collect NOTAM information for Flight Services/Lockheed Martin
ERIDS	En Route Information Display System
FLM	Front Line Manager
FNS	Federal NOTAM System
FS-21	Flight Service for the 21 st Century system used by FSS
FSS	Flight Service Station
FTI	FAA Telecommunication Infrastructure
GA	General Aviation
GUI	Graphical User Interface
HCI	Human Computer Interaction
HF	Human Factors
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
HW	Hardware
ICAO	International Civil Aviation Organization
IDS4	Information Display System-4
ILS	Instrument Landing System
“L” NOTAMs	Local NOTAMs - combined with D NOTAMs under NOTAM

	realignment
LoA	Letter of Agreement
NAIMES	NAS Aeronautical Information Management Enterprise System
NADIN	National Airspace Data Interchange Network
NAS	National Airspace System
NextGen	Next Generation Air Traffic Control Systems
NOTAM	Notice to Airmen
NOTAMs	Notices to Airmen
OASIS	Operational and Supportability Implementation System used by FSS
OBST	Obstruction
OPS or Ops	Operations
PilotWeb	Web-based Aeronautical Information Service for Pilots
PO	Program Office
RAMP	Ramp
RWY	Runway
SCAP	Security Certification and Authorization Package
SOP	Standard Operation Procedures
SME	Subject Matter Expert
SMS	Safety Management System
SRM	Safety Risk Management
SRMD	Safety Risk Management Document
SRMGSA	Safety Risk Management Guidance for System Acquisitions
SRMP	Safety Risk Management Panel
SSL	Secure Sockets Layer
Surface Area	Area on airport property that could be the subject of a NOTAM
SVC	Service
SW	Software
TALPA	Takeoff/Landing Performance Assessment
TXY	Taxiway
TMU	Traffic Management Unit
TRACON	Terminal Radar Approach Control
USNOF	United States NOTAM Office
USNS	United States NOTAM System
WMSCR	Weather Message Switching Center Replacement
XML	eXtensible Markup Language

Signature Page

Title: Digital NOTAM Originators Safety Risk Management Document

Prepared By: Kathlyn Hoekstra

Initiator:  CG/67/11
Glenn Sigley, Manager, AIM NOTAM Group, AJV-2

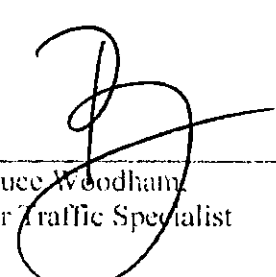
Initiator's Organization: Aeronautical Information Management Division, AJV-2

Initiator's phone number: 202-267-9400

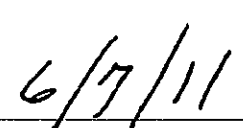
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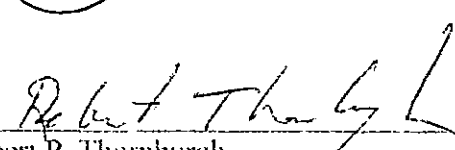
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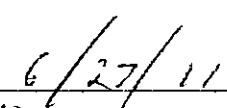
Bruce Woodham
Air Traffic Specialist



Date

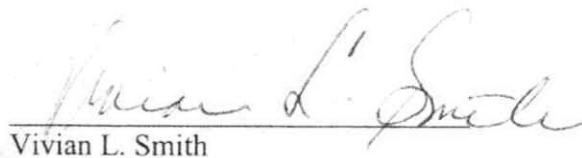


Robert P. Thornburgh
Safety Engineer



Date

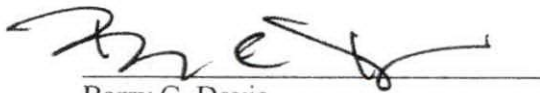
SRMD Approved By:



Vivian L. Smith
Manager, Safety Risk Management (AJR-C)
System Operation Services

6/27/11
Date

Risk Acceptance Signature(s):



Barry C. Davis
Acting Director, Aeronautical Information Management
AJV-2

24 June 2011
Date