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Managing Aerial Firefighting Activities on Airports

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AIRPORT COOPERATIVE RESEARCH PROGRAM

ACRP SYNTHESIS 32

Managing Aerial Firefighting Activities on Airports

A Synthesis of Airport Practice

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TRANSPORTATION RESEARCH BOARD

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AIRPORT COOPERATIVE RESEARCH PROGRAM

Airports are vital national resources. They serve a key role in transportation of people and goods and in regional, national, and international commerce. They are where the nation's aviation system connects with other modes of transportation and where federal responsibility for managing and regulating air traffic operations intersects with the role of state and local governments that own and operate most airports. Research is necessary to solve common operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the airport industry. The Airport Cooperative Research Program (ACRP) serves as one of the principal means by which the airport industry can develop innovative near-term solutions to meet demands placed on it.

The need for ACRP was identified in *TRB Special Report 272: Airport Research Needs: Cooperative Solutions* in 2003, based on a study sponsored by the Federal Aviation Administration (FAA). The ACRP carries out applied research on problems that are shared by airport operating agencies and are not being adequately addressed by existing federal research programs. It is modeled after the successful National Cooperative Highway Research Program and Transit Cooperative Research Program. The ACRP undertakes research and other technical activities in a variety of airport subject areas, including design, construction, maintenance, operations, safety, security, policy, planning, human resources, and administration. The ACRP provides a forum where airport operators can cooperatively address common operational problems.

The ACRP was authorized in December 2003 as part of the Vision 100-Century of Aviation Reauthorization Act. The primary participants in the ACRP are (1) an independent governing board, the ACRP Oversight Committee (AOC), appointed by the Secretary of the U.S. Department of Transportation with representation from airport operating agencies, other stakeholders, and relevant industry organizations such as the Airports Council International-North America (ACI-NA), the American Association of Airport Executives (AAAE), the National Association of State Aviation Officials (NASAO), Airlines for America (A4A), and the Airport Consultants Council (ACC) as vital links to the airport community; (2) the TRB as program manager and secretariat for the governing board; and (3) the FAA as program sponsor. In October 2005, the FAA executed a contract with the National Academies formally initiating the program.

The ACRP benefits from the cooperation and participation of airport professionals, air carriers, shippers, state and local government officials, equipment and service suppliers, other airport users, and research organizations. Each of these participants has different interests and responsibilities, and each is an integral part of this cooperative research effort.

Research problem statements for the ACRP are solicited periodically but may be submitted to the TRB by anyone at any time. It is the responsibility of the AOC to formulate the research program by identifying the highest priority projects and defining funding levels and expected products.

Once selected, each ACRP project is assigned to an expert panel, appointed by the TRB. Panels include experienced practitioners and research specialists; heavy emphasis is placed on including airport professionals, the intended users of the research products. The panels prepare project statements (requests for proposals), select contractors, and provide technical guidance and counsel throughout the life of the project. The process for developing research problem statements and selecting research agencies has been used by TRB in managing cooperative research programs since 1962. As in other TRB activities, ACRP project panels serve voluntarily without compensation.

Primary emphasis is placed on disseminating ACRP results to the intended end-users of the research: airport operating agencies, service providers, and suppliers. The ACRP produces a series of research reports for use by airport operators, local agencies, the FAA, and other interested parties, and industry associations may arrange for workshops, training aids, field visits, and other activities to ensure that results are implemented by airport-industry practitioners.

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Cover figure: P2V Neptune (Courtesy: Neptune Aviation Services).

FOREWORD

Airport administrators, engineers, and researchers often face problems for which information already exists, either in documented form or as undocumented experience and practice. This information may be fragmented, scattered, and unevaluated. As a consequence, full knowledge of what has been learned about a problem may not be brought to bear on its solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

There is information on nearly every subject of concern to the airport industry. Much of it derives from research or from the work of practitioners faced with problems in their day-to-day work. To provide a systematic means for assembling and evaluating such useful information and to make it available to the entire airport community, the Airport Cooperative Research Program authorized the Transportation Research Board to undertake a continuing project. This project, ACRP Project 11-03, "Synthesis of Information Related to Airport Practices," searches out and synthesizes useful knowledge from all available sources and prepares concise, documented reports on specific topics. Reports from this endeavor constitute an ACRP report series, *Synthesis of Airport Practice*.

This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. Each report in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems.

PREFACE
By Gail R. Staba
Senior Program Officer
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This synthesis study is intended to provide a review of current airport and agency [primarily the U.S. Forest Service (USFS)] practices, policies, and procedures at airports called upon to support aerial wildland firefighting suppression efforts.

Information used in this study was acquired through a review of the literature and interviews with ten airport operators (representing 13 airports), two commercial helicopter operators, and one regional fire center manager to gather insights on the current state of airport practices that support aerial wildland firefighting suppression efforts. The interviews followed a series of questions in areas such as community and economic matters, contracts, operations, and general business practices. While the interviews were structured, the interviewees were encouraged to freely discuss matters related to the topic of the study and to offer information on the subject that they believed was important

Tim Phillips, Critical Path International, LLC, West Jordan, Utah, collected and synthesized the information and wrote the report. The members of the topic panel are acknowledged on the preceding page. This synthesis is an immediately useful document that records the practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As progress in research and practice continues, new knowledge will be added to that now at hand.

CONTENTS

Note: Many of the photographs, figures, and tables in this report have been converted from color to grayscale for printing. The electronic version of the report (posted on the Web at www.trb.org) retains the color versions.

MANAGING AERIAL FIREFIGHTING ACTIVITIES ON AIRPORTS

SUMMARY   Wildland fires have been increasing dramatically in the past decade; the six worst fire years, as measured by the number of acres burned, have occurred since 2000. While the reasons for this record can be debated, the reality remains; the destructive effects of wildland fires are on the increase. With more people building and living in the wildland urban interface zone, the losses from fire are increasing too. Suppression of these fires has stretched resources to the point where fire suppression dollars are now being moved from other basic services and programs.

Resources to fight these fires have also dwindled with the decertification of a number of large fixed-wing aerial tanker aircraft for reasons of safety. Although no one fire attack method is more valuable than another, the ability to attack a fire from the air with large quantities of retardant or water is an important tool in this battle, a battle in which airports play an important role.

The objective of this report is to provide a review of current airport and agency—primarily the U.S. Forest Service (USFS)—practices, policies, and procedures at airports called upon to support aerial wildland firefighting suppression efforts. Since the early years of the twentieth century, the USFS and the Bureau of Land Management have been in the forefront of wildland firefighting suppression efforts. Those efforts have met with varying levels of success and have withstood a variety of changes in forestry management practices over the years. In the 1970s, the management practices established in 1926, commonly called the 10-acre policy and the 10:00 a.m. policy developed in 1935, were questioned and new practices, such as "prescribed natural fire," or as it was more commonly known, "let-burn," were developed and deployed. When the wildland fires of 1988 hit Yellowstone National Park, those practices were again modified.

As management philosophy and approaches changed, so did the practical use of aerial firefighting resources. The effects of the changes rippled through the aerial wildland firefighting community, including airports. In recent years, safety concerns developed over the use of older C-130 aircraft, ultimately reducing substantially the total cadre of large fixed-wing aircraft. Changes in management with the advent of the DHS, the changing role of the Federal Emergency Management Agency, and the growing requirements to implement, on a national level, the National Incident Management System have all had impacts on wildland fire management.

As the practices of federal agencies changed, state and local agencies also changed. Eventually, airports that support the aerial wildland firefighting operations had to adapt to these federal, state, and local responses. Ten airport operators (representing 13 airports), two commercial helicopter operators, and one regional fire center manager were interviewed to gather insights on the current state of airport practices that support aerial wildland firefighting suppression efforts. The interviews followed a series of questions about community and economic matters, contracts, operations, and general business practices. Although the interviews were structured, the interviewees were encouraged to freely discuss matters related to the topic of the study and to offer information on the subject that they believed

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was important; interestingly, the guideline questions appeared to have adequately covered the topic, as no interviewee believed there were additional topics to discuss.

The results of the interviews revealed several themes, but more often pointed out that relationships, policies, practices, customs, and procedures have a local flavor and style reflective of the nature of the airport, region, and local municipalities. A common theme discovered during the interviews was the very positive and high value that was placed on relationships between the airport operators and the user agency, in most cases, USFS. Airport operators with resident USFS operations praised the agency as tenants and were universally interested in keeping and expanding its presence at the airports; those airports without a permanent USFS operation were actively pursuing the establishment of a full-time base at their facilities. Other common themes noted from the interviews included specific operational issues with helicopters, security and access control issues at airports subject to Transportation Security Regulation 1542, and fuel flowage fees. On the issues of noise and other negative impacts to the community resulting from aerial operations, very few problems were identified.

Economics and financial matters were another area where interviewees had strong opinions and information to offer. The discussions focused on matters of fees and charges, and, as was expected, there was little consistency among airports, with the exception that each airport did charge airport users some form of fuel flowage fee. Contract provisions, rules and regulations, fee rates, insurance requirements, and use areas were all topics where local traditions and practices prevailed.

During the research of the available literature, it quickly became apparent that there was a dearth of written material on the subject of the role of airport operators in supporting aerial wildland firefighting suppression activities. The literature is voluminous concerning the internal operations of the various wildland firefighting agencies and the operations of aircraft; when airports are mentioned, it is on a subject like establishing landing zones for helicopters—information already known to most airport operators.

There are likely several reasons for the lack of information on the subject. The first reason is that while aerial wildland firefighting support operations have their unique aspects, the primary functions performed are not unique; pilots operate their aircraft and airport operators provide facilities for aircraft operators. The second reason is that the operational and technical matters related to aerial wildland firefighting support—that is, taxiway width, runway length and width, weight bearing requirements for surfaces, turning radii, and safety practices and procedures—are all matters that airport operators manage on an almost daily basis and are documented in numerous FAA Advisory Circulars. Contractual and public relations issues are generally matters of local custom and practice, particularly those legal matters associated with agreements such as the creation of rules and regulations for the airport. What the literature does contain that could be useful to airport operators is a bit of history and information about how the various federal and state agencies are structured and function. A basic understanding of these matters would likely benefit most operators' understanding of "how," "why," and "by whom" aerial wildland firefighting activities are conducted. Airport managers who are new to this or want to know the state of the arts might benefit from this information.

In closing, it should be noted that the greatest resources on this subject are the airport managers themselves and their willingness to share ideas and information. As long as this living library is open, there appears to be no need for further research on this subject.

CHAPTER ONE

INTRODUCTION

THE PROJECT

Reflecting the direction of the topic panel, the primary focus of this study is to provide a usable guide and reference source that airport operators can turn to when confronted with providing support for aerial firefighting operations. Second, the study provides information on existing practices in play at airports today. Finally, the study identifies information sources for airport operators on methods of managing firefighting activities at airports.

This synthesis project identified an issue that affects a significant number of airport operators across the United States, primarily in the western half of the country. Simply stated, the synthesis was developed to identify how airports manage operations when their facilities are used to support aerial wildland firefighting operations. The report shows that there are a variety of demands on airports operators when they support aerial firefighting operations; those demands are reviewed in this report. The synthesis also found that airport operators are eager to assist with these operations; and, as would be expected, each airport deals with the issues in truly "local" fashion. Some common themes were identified, but few trends were discovered in the ways that airports deal with the various, federal, state, and local agencies.

The review identified an increase in the wildland/urban interface zone where people live and are increasingly exposed to wildland fires (see Figure 1). Housing and other assets in the interface zone are increasing at a time when firefighting assets in the form of large aerial tanker availability is decreasing. Although no one fire attack method is more valuable than another, the ability to attack a fire from the air with large quantities of retardant or water is an important tool in this battle, a battle where airports pay an important role.

SYNTHESIS METHODOLOGY

Literature Review

During the topic development process, topic panel members and ACRP staff identified possible sources of information related to this project. The following documents were suggested by topic panel members for review:

- U.S. Forest Service (USFS) Fire and Aviation Management manuals, guides, and handbooks, http://www.fs.fed.

us/fire/aviation/av_library/index.html#d, including the *Interagency Air Tanker Base Operations Guide* (USFS), *Interagency Helicopter Operations Guide* (USFS), and airfield directories.
- 2002 Blue Ribbon Panel on Aerial Wildland Firefighting, http://www.nifc.gov/aviation/av_blribbon.html.
- *Federal Aerial Firefighting: Assessing Safety and Effectiveness,* http://www.wildlandfire.com/docs/2003_n_before/BRP_Final12052002-1.pdf.
- U.S. Forest Service, Malheur National Forest, Oregon, http://www.fs.fed.us/r6/malheur/fire/rappelling-index.shtml.
- U.S. Department of Interior, Bureau of Land Management (BLM), http://www.blm.gov/az/st/en/prog/fire/aviation.html.
- National Interagency Fire Center at Gowen Air National Guard Base, Idaho, http://www.globalsecurity.org/military/facility/gowen.htm.
- Ryan Air Attack/Helitack Base, Riverside CA http://en.wikipedia.org/wiki/Hemet-Ryan_Airport.

An initial review and search during the proposal phase indicated that a good deal of information about aircraft and internal firefighting procedures and practices is available, but there is little information directly related to the project topic. Much of the information pertinent to the airport operator's responsibilities is contained in the FAA's Advisory Circulars that airport operators use to guide the development and operation of their airports. The FAA has developed a large library of information on subjects where it has some form of regulatory responsibility. To organize this information, the FAA divides the library into various "series" of information, including Advisory Circulars. FAA Advisory Circulars that provide guidance on airport issues begin with the number "150"; for example, *Advisory Circular 150/5300-13, Airport Design,* provides FAA standards and recommendations for airport design. The majority of, but not all, guidance documents related to airport issues are contained in the "150 series" available from the FAA at http://www.faa.gov/airports/resources/advisory_circulars/ [accessed August 2011].

Interviews

Given the virtual absence of written material on this particular subject, the topic panel agreed that the most successful method for discovering current practices would be to interview

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FIGURE 1 Cabin and ground fire (National Park Service Photo Gallery).

members of the industry; that is, airport managers, aircraft operators, and base operators. A series of questions designed to guide the discussion was developed and tested on the three airport operator members of the topic panel; the test interviews allowed the principal investigator to sharpen the focus of the questions. Additionally, two helicopter operators (one Type I and one Type II) were interviewed to gain user perspectives. One USFS base operator was interviewed, whereas several declined to be interviewed, citing USFS policy on outside interviews. A copy of the interview guides are in Appendix A.

A list of interview candidates was compiled in consultation with the topic panel members; the final list of interview-

ees with contact information is in Appendix B. The Abilene Regional Airport (ABI) in Abilene, Texas, was added to the interviewee list because during the months of July and August 2011, the airport hosted a significant aerial suppression force fighting the wildland fires in the region. While Abilene Regional had hosted aerial firefighting operations in the past, the level of the 2011 effort was historic. Given the circumstances, ABI appeared likely to provide valuable information for this study, which indeed was true.

REPORT CONTENT

The report includes information that is immediately useful to airport operators in their day-to-day operations, while providing information that explains, from a historical perspective, the development of certain policies, practices, and procedures. Since most of the information that is of potential use to airport operators is web-based, links to the websites are provided. Some of the useful information to airport operators is information that changes with each fire scenario or condition, so the links provide real-time data on local fire issues from which operators can estimate future impacts on their operations. Additionally, the report provides source references for those readers interested in more detail on certain subject areas.

The table of contents provides a detailed outline of the report's topics that generally fall into one of several major subject topics:

- Airport and operator roles
- Fire management in general
- Money and contractual matters for airport operators
- Safety and operational matters
- Lessons learned
- Conclusions
- Appendices containing references and contact information resources.

The study report presents information focused on issues related to airport operators, but will also be helpful to users of airport services such as aircraft operators (fixed and rotary wing) and fire management agencies, both federal and state. Other readers include members of local government responsible for airport management oversight, such as airport authorities, cities, and multi-jurisdictional agencies.

CHAPTER TWO

AIRPORT AND AERIAL FIREFIGHTING SUPPRESSION AGENCIES—A REVIEW

BACKGROUND

In the world of aerial wildland firefighting there are few generalities that always apply; there are exceptions to nearly every scenario. For example, the USFS is the lead agency for wildland fire suppression in the United States except in Alaska, where BLM is the designated lead agency. There are practices and principles that are commonly accepted; however, the management/suppression of wildland fire is a cooperative arrangement that evolves because of various factors including financial and political relationships between local, regional, state, and federal agencies.

Understanding from a historical perspective how these various arrangements and practices came into existence is often interesting and useful for airport operators as they deal with these entities. It is not possible within the budget of this project to examine the nuances of these relationships, as each agency has its own characteristics and practices. For airport operators new to the aerial wildland firefighting suppression "game" wanting to know more about how things work, the local USFS (or BLM) supervisor's office and fellow airport operators is always a good starting point. Other good starting points are state forestry, natural resources, or land agencies such as the Texas Forest Service or the North Carolina Department of Environmental and Natural Resources. The agency responsible for fire management in each state is usually a member of the National Association of State Foresters (NASF) and its contact information is available through the association's website (NASF 2011).

Determining which agency is in charge of aerial wildland fire suppression efforts, at any given time or in any given situation, is not easy. Responsibility for leading a wildland suppression effort is a process that by its very nature is usually in some state of flux. One of the reasons for this condition is that there are multiple agencies—local, state, Federal Emergency Management Agency (FEMA), USFS, BLM—with varying responsibilities for wildland fire suppression, depending on the status and location of the fire. Because wildland fires are not static situations, changing with weather and fuel conditions, the "who is in charge" question will also change. During large fires of national significance, the USFS will be "in charge" in the 48 contiguous states and Hawaii, while BLM will be in charge in Alaska.

FEDERAL AGENCIES

National Interagency Fire Center

The primary national wildland firefighting resource is the National Interagency Fire Center (NIFC) located adjacent to the Boise (Idaho) Airport. As the name indicates, the NIFC is the "nation's support center for wildland firefighting" (NIFC 2011). The NIFC began as a joint venture between the USFS, BLM, and the National Weather Service (NWS) in 1965. In the mid-1970s, the Bureau of Indian Affairs (BIA) and the National Park Service (NPS) also joined with the other services in the center. The U.S. Fish and Wildlife Service (USFWS) joined NIFC in 1979. In 2003, the U.S. Fire Administration (USFA), an agency within FEMA, joined NIFC, forming the center as it is known today. The primary focus of the NIFC is to promote interagency cooperation, reduce the duplication of services, cut costs, and coordinate planning and operations on a national level. The following is a list of web links for each of the NIFC agencies:

- National Interagency Fire Center Website—http://www.nifc.gov/
- Bureau of Land Management—http://www.blm.gov/nifc/st/en/prog/fire.1.html
- Bureau of Indian Affairs—http://www.bia.gov/index.htm
- National Park Service—http://www.nps.gov/fire/
- U.S. Fish & Wildlife—http://fws.gov/fire/
- U.S. Forest Service—http://www.fs.fed.us/fire/
- National Association of State Foresters—http://www.stateforesters.org/
- National Business Center (U.S. Department of Interior)—http://www.nbc.gov/
- National Oceanic and Atmospheric Administration—http://radar.srh.noaa.gov/fire/
- Federal Emergency Management Agency—http://www.fema.gov/.

To manage the massive amount of information and the details related to "national" wildland fire management, NIFC has developed the following management mechanism.

The United States and Alaska are divided into 11 Geographic Areas for the purpose of incident management and mobilization of resources (people, aircraft, ground equipment). Within each Area, an interagency Geographic Area Coordinating Group (GACG), made up of Fire Directors from each of the Federal and State land management agencies from within the Area, is

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established. Working collaboratively, the GACG's mission is to provide leadership and support not only for wildland fire emergencies, but to other emergency incidents (i.e., earthquakes, floods, hurricanes, tornadoes, etc.), as necessary. Authority for establishment of the GACG is through departmental policy and interagency agreements. Additional agreements are established with cooperators and other organizations in order to facilitate efficient fire management activities within and adjacent to the Area. A cost-effective sharing of resources among public agencies is a key component of the GACG mission and is expected by the public, Congress, and States.

All agencies and geographic areas work together under the auspices and direction of the National Interagency Fire Center (NIFC).

The Geographic Area Coordination Centers (GACC) is a result of an interagency agreement established by the respective Geographic Area Coordinating Group. The primary mission of the GACC is to serve Federal and State wildland fire agencies through logistical coordination and mobilization of resources (people, aircraft, ground equipment) throughout the geographical area, and with other geographic areas, as necessary. This is generally done through coordinating the movement of resources between the many Dispatch Centers within the geographic area and, as necessary, with the National Interagency Coordination Center (NICC) when resources are unavailable within the Area or when mobilization support is needed in other geographic areas.

Although the primary mission of the GACC is logistical coordination, the Center also has support programs in Predictive Services, Intelligence, and in several Centers' Fire Information. Predictive Services consists primarily of professional meteorologists who monitor weather and fuel conditions, conduct briefings, produce fire weather related products, liaison with the National Weather Service, and oversee all aspects of the Remote Automated Weather System (RAWS). The Intelligence Section is primarily responsible for collecting and disseminating wildland fire and prescribed fire activity information, monitoring the status of national firefighting resources, maintaining year-to-date and historical fire occurrence data, and managing the Site Report and ICS-209 programs. In some GACCs, the Predictive Services and Intelligence sections work as one unit called the Predictive Services Group. The Predictive Services and Intelligence Sections, whether separated or combined, work

collaboratively producing Weekly, Monthly, and Seasonal Fire Weather/Fire Danger Outlooks.

Each Coordination Center provides additional support to their respective geographic area's wildland fire community through training, workshops, special projects, and other tasks. Except for dispatch of air tankers and lead planes based outside the dispatch center responsibility the fire is located in, the GACC does not have initial-attack dispatch responsibilities (GACC 2011).

Figure 2 is from the Geographic Area Coordination Centers (GACC) portal at http://gacc.nifc.gov/ and identifies the centers according to geographic regions. The GACC website provides an excellent starting point and resources for airports by providing specific information about wildland fires within each geographic region. Web page links to each GACC follow:

- Alaska Interagency Coordination Center—http://fire.ak.blm.gov/
- Eastern Area Coordination Center—http://gacc.nifc.gov/eacc/
- Eastern Great Basin Coordination Center—http://gacc.nifc.gov/egbc/
- Northern California Geographic Area Coordination Center—http://gacc.nifc.gov/oncc/
- Northern Rockies Coordination Center—http://gacc.nifc.gov/nrcc/
- Northwest Interagency Coordination Center—http://www.nwccweb.us/index.aspx
- Rocky Mountain Area Coordination Center—http://gacc.nifc.gov/rmcc/
- Southern Area Coordination Center—http://gacc.nifc.gov/sacc/
- Southern California Geographic Area Coordination Center—http://gacc.nifc.gov/oscc/
- Southwest Coordination Center—http://gacc.nifc.gov/swcc/
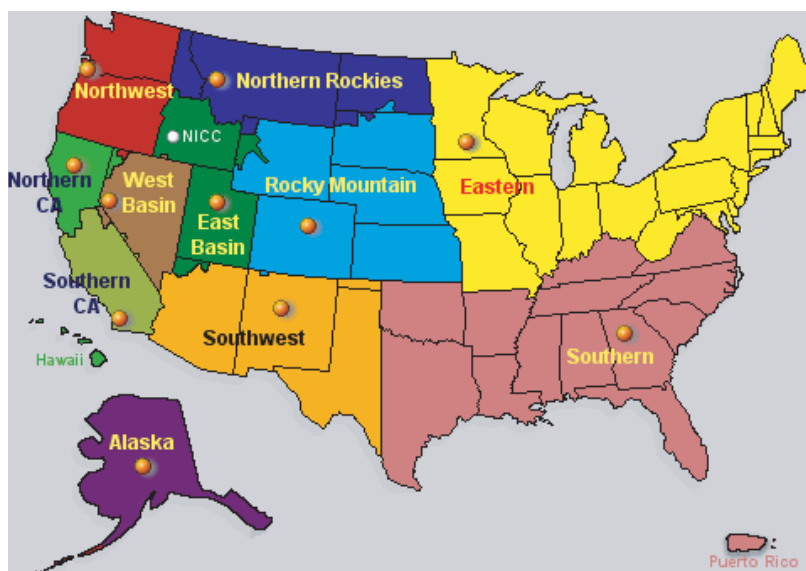
FIGURE 2 Geographic Area Coordination Centers according to geographic region (GACC 2011).

- Western Great Basin Coordination Center—http://gacc.nifc.gov/wgbc/.

Also within the NIFC is the National Interagency Coordination Center (NICC), which is the agency responsible for mobilizing "resources for wildland fire and other incidents throughout the United States," including the following four functions:

- Equipment and supply dispatching
- Overhead and crew dispatching
- Aircraft dispatching
- Intelligence and predictive services.

According to the NICC's mission statement:

The principal mission of the National Interagency Coordination Center (NICC) is the cost effective and timely coordination of land management agency emergency response to wildland fire incidents. This is accomplished through planning, situation monitoring, and expediting resource mobilization between the Bureau of Indian Affairs (BIA) Area, Bureau of Land Management (BLM) states, National Association of State Foresters (NASF), Fish and Wildlife Service (FWS) Regions, Forest Service (FS) Regions, National Park Service (NPS) Regions, National Weather Service (NWS) Regions, Federal Emergency Management Agency (FEMA) Regions, through the United States Fire Administration (USFA) and other cooperating agencies (Detailers Guide 2011).

Information about the U.S. Department of the Interior agencies, NWS, FEMA, NASF, regional associations, and state agencies, is in Appendix C—Additional Resources.

Airports

Airports are identified by various government agencies in various ways; the FAA uses a "hub" classification system (large-hub, medium-hub, small-hub, and non-hub) while the TSA uses a "category" system. More information on the FAA system of categorizing airports is available at: http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/categories/. In the USFS-centric world, airports are classified using the following definitions and descriptions.

Category 1. These are major airports that have paved, lighted, multiple runways served by FAA-approved instrument approach procedure(s). These runways are generally limited by their weight-bearing capacity.

Category 2. These airports generally serve small communities. They are equipped with at least one paved, lighted runway and services vary.

Category 3. These are airfields with limited or no services. They may be unpaved, unlighted, or seasonally maintained. They may be located on federal, state, county, municipal, or private land. Approval must be obtained from the appropriate National Forest dispatch office.

Category 4. These are mountain/remote airstrips and are restricted by the Forest Service to day Visual Flight Rules Service. Use must be authorized by the appropriate NF dispatch office. Pilots must have an endorsement on the Pilot Qualification Card and meet specific currency requirements (*Airfield/Airstrip Directory* 2000).

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AIRPORTS' ROLE IN AERIAL FIREFIGHTING

INTRODUCTION

For airport operators and the communities that support aerial wildland fire suppression operations, there are two broad categories where the airport aids, assists, or provides services to the aerial firefighting agencies. In the first category, the airport "hosts" a full-time fire suppression agency on a permanent basis, and the two entities enter into a formal agreement. In this scenario, the airport is the landlord and the agency is the tenant or leaseholder. Generally, the agreements are between the airport and a federal agency such as the USFS or BLM; however, it is not uncommon that the tenant is a state entity such as CAL FIRE (the California Department of Forestry and Fire Protection), a local agency, or regional entity with firefighting responsibilities. In the second scenario, a fire agency will mobilize for a specific event and establish a temporary base at an airport with no permanent support facilities. Depending on the physical location of the fire, the "airport fire base" size can vary from aerial firefighting support (aircraft and retardant mixing) to support for firefighting crews and fire management teams.

The mission of the USFS is "to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generation" (USFS—*About Us—Mission* 2008). Within the USFS is a working group called Forest Service Aviation with the mission to support the ground firefighter through a variety of means including safe delivery of smokejumpers, rappellers, air attack, firefighter and cargo transport, surveillance, aerial reconnaissance and fire intelligence gathering, and aerial delivery of fire retardant and water (USFS—*Fire & Aviation Management* 2010).

PERMANENT AERIAL FIREFIGHTING BASES

Permanent aerial firefighting bases on airports have developed over time and generally are located in areas where there are significant histories of wildland fires. Some bases are co-located with USFS regional offices, such as the Forest Service Region One offices in downtown Missoula, Montana, and the Aerial Fire Depot, Region One Fire Cache, Interagency Fire Science Laboratory, Northern Region Training Center, and smokejumper base located adjacent (and connected by a taxiway) to the Missoula International Airport. Other airports support aerial wildland firefighting suppres-

sion operations but also have a very specific mission, such as the training center for rappellers at on the Grant County Regional Airport in John Day, Oregon. Still others, such as Redding Airport in Redding, California, Rocky Mountain Metropolitan Airport in Broomfield, Colorado, and the base at Roberts Field in Redmond, Oregon, host a variety of state and USFS facilities and activities year-round including air tanker operations.

SEASONAL AERIAL FIREFIGHTING SUPPORT BASES

Seasonal aerial firefight support bases have no permanent facilities located on or adjacent to the airport. These airports, for the purposes of aerial wildland firefighting operations, are used when the responding firefighting agency determines that the airport's use is beneficial to the suppression effort.

NIFC maintains a list of airports and airport contact information for seasonal airports. The majority of seasonal airports support helitanker and single-engine air tankers operations; however, some other fixed-wing operations, such as fire surveillance, photography, cargo haul, and personnel transport, can also be accommodated.

When seasonal airports are used for aerial wildland firefighting, the first few hours and days of the attack are critical to the success of the operation. The responding firefighting agencies are capable of quickly establishing a self-contained base; however, they generally will require assistance from the airport operator. In the first 24 to 48 hours, agencies will often need, and the airport operators may be called on to assist or provide, some or all of the following:

- Office or workspace (hangar, trailer, or other "dry" space)
- Electrical power (both 110 and 220 volt)
- Restroom facilities
- Crew staging and briefing areas
- Telephone/facsimile/Internet/multi-media services
- Vehicle parking area
- Ramp access.

Shortly after the airport fire base is activated, additional support equipment and materials will arrive and may include

trailers, generators, water tanks/pools, retardant mixing plants, air traffic control units, and, of course, aircraft. As the temporary base is developed, the agency will need to coordinate with the airport operator for:

- Ramp/flight line access, badging, and access media
- Ramp area for operations
  - Aircraft parking
  - Aircraft maintenance (including portable lighting for night maintenance operations)
  - Aircraft fueling
- Fuel and fuel storage area
- Airfield security
- Parking for vehicles
- Temporary air traffic control tower (ATCT) site
- Commercial power/utilities
- Restroom facilities/portable toilets
- Potable water
- Water for firefighting operations
- Dust control
- Trash service/dumpsters
- Aircraft operating areas/ramps/maintenance areas
- Crew areas
- Phone service and emergency contact information
- Catering
- Jettison procedures/drills.

As the campaign proceeds, routines are established and operations generally settle down.

COMMUNITY ISSUES AND IMPACTS

All but one of the airport operators interviewed saw aerial wildland firefighting activities and the presence of a permanent or temporary base as significant to the financial health of the airport and the surrounding community. Several airports indicated a desire to expand firefighting operations on site. Airports without permanent bases were actively lobbying local agencies to establish full-time facilities. According to airport operators, local communities often saw substantial increases in revenue to hotel and restaurant services and ancillary services sectors such as grocery and convenience stores, restaurants and bars, and laundry facilities. Direct and indirect financial impacts were not quantitatively known; however, airport operators estimated that from 3% to 8% of the local economy is generated by government activities directly related to wildland firefighting suppression activities.

The primary source of cost recovery for the airports came in the form of fuel flowage and landing fees (more on this in chapter five). Additional income generators for the airport were rental cars, commercial flights by firefighting agencies, ground/property rental, and fuel sales by the airport and/or the airport's fixed-based operators (FBOs).

GRANT ASSURANCES AND AERONAUTICAL ACTIVITIES

Most public airports used by the various firefighting agencies have been developed, at least in part, by federal grants-in-aid from the FAA. As recipients of FAA grants-in-aid, airports enter into agreements with the agency and agree to abide by certain rules, commonly referred to as grant assurances or more formally known as airport sponsors assurances. These assurances are requirements attached to the grants-in-aid and are legally binding on the airport operator, or more specifically the governmental entity that accepts the grant—that is, the sponsor. Currently, there are 39 assurances; a copy of the current assurances is available on the FAA website at http://www.faa.gov/airports/aip/grant_assurances/ [accessed August 3, 2011].

Of the 39 assurances, the primary assurances that become active in the context of aerial wildland firefighting are Assurance 22—*Economic Nondiscrimination,* Assurance 24—*Fee and Rental Structure,* and Assurance 27—*Use by Government Aircraft.* These assurances are reproduced here:

[Assurance] 22. Economic Nondiscrimination.

a. It will make the airport available as an airport for public use on reasonable terms and without unjust discrimination to all types, kinds and classes of aeronautical activities, including commercial aeronautical activities offering services to the public at the airport.
b. In any agreement, contract, lease, or other arrangement under which a right or privilege at the airport is granted to any person, firm, or corporation to conduct or to engage in any aeronautical activity for furnishing services to the public at the airport, the sponsor will insert and enforce provisions requiring the contractor to
    (1) furnish said services on a reasonable, and not unjustly discriminatory, basis to all users thereof, and
    (2) charge reasonable, and not unjustly discriminatory, prices for each unit or service, provided that the contractor may be allowed to make reasonable and nondiscriminatory discounts, rebates, or other similar types of price reductions to volume purchasers.
c. Each fixed-based operator at the airport shall be subject to the same rates, fees, rentals, and other charges as are uniformly applicable to all other fixed-based operators making the same or similar uses of such airport and utilizing the same or similar facilities.
d. Each air carrier using such airport shall have the right to service itself or to use any fixed-based operator that is authorized or permitted by the airport to serve any air carrier at such airport.
e. Each air carrier using such airport (whether as a tenant, non tenant, or subtenant of another air carrier tenant) shall be subject to such nondiscriminatory and substantially comparable rules, regulations, conditions, rates, fees, rentals, and other charges with respect to facilities directly and substantially related to providing air transportation as are applicable to all such air carriers which make similar use of such airport and utilize similar facilities, subject to reasonable classifications such as tenants or non tenants and signatory carriers and non signatory carriers. Classification or status as tenant or signatory shall not be unreasonably withheld by any airport provided an air carrier assumes obligations substantially similar to those already imposed on air carriers in such classification or status.

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f. It will not exercise or grant any right or privilege which operates to prevent any person, firm, or corporation operating aircraft on the airport from performing any services on its own aircraft with its own employees (including, but not limited to maintenance, repair, and fueling) that it may choose to perform.

g. In the event the sponsor itself exercises any of the rights and privileges referred to in this assurance, the services involved will be provided on the same conditions as would apply to the furnishing of such services by commercial aeronautical service providers authorized by the sponsor under these provisions.

h. The sponsor may establish such reasonable, and not unjustly discriminatory, conditions to be met by all users of the airport as may be necessary for the safe and efficient operation of the airport.

i. The sponsor may prohibit or limit any given type, kind, or class of aeronautical use of the airport if such action is necessary for the safe operation of the airport or necessary to serve the civil aviation needs of the public. . . .

[Assurance] 24. Fee and Rental Structure. It will maintain a fee and rental structure for the facilities and services at the airport which will make the airport as self-sustaining as possible under the circumstances existing at the particular airport, taking into account such factors as the volume of traffic and economy of collection. No part of the Federal share of an airport development, airport planning or noise compatibility project for which a grant is made under Title 49, United States Code, the Airport and Airway Improvement Act of 1982, the Federal Airport Act, or the Airport and Airway Development Act of 1970 shall be included in the rate basis in establishing fees, rates, and charges for users of that airport. . . .

[Assurance] 27. Use by Government Aircraft. It will make available all of the facilities of the airport developed with Federal financial assistance and all those usable for landing and takeoff of aircraft to the United States for use by Government aircraft in common with other aircraft at all times without charge, except, if the use by Government aircraft is substantial, charge may be made for a reasonable share, proportional to such use, for the cost of operating and maintaining the facilities used. Unless otherwise determined by the Secretary, or otherwise agreed to by the sponsor and the using agency, substantial use of an airport by Government aircraft will be considered to exist when operations of such aircraft are in excess of those which, in the opinion of the Secretary, would unduly interfere with use of the landing areas by other authorized aircraft, or during any calendar month that

a. Five (5) or more Government aircraft are regularly based at the airport or on land adjacent thereto; or

b. The total number of movements (counting each landing as a movement) of Government aircraft is 300 or more, or the gross accumulative weight of Government aircraft using the airport (the total movement of Government aircraft multiplied by gross weights of such aircraft) is in excess of five million pounds [FAA, *Grant Assurances* (*Obligations*) 2011].

Assurance 22 was the most discussed topic during interviews with both airport and aircraft operators. From the airport operators' perspective, it raised three issues: technical compliance with the requirement to allow carrier self-fueling; the safety of fueling operations (discussed in more detail in the next section); and the economic tipping point of providing a level playing field between the self-fueler and the FBO, while providing revenue for the operation of the airport (see Airport Sponsor Assurance 24—*Fee and Rental Structure*).

For aircraft operators, especially of rotary-wing aircraft, the issue was entirely economic. The cost of fuel was identified as a major operational cost that could be reduced by self-fueling. While the aircraft operators appeared to understand the "philosophical" concept of a fuel flowage fee, they did not understand why they should pay it if they were self-fueling.

Assurance 24 discussions with several of the airport operators revealed a real concern on the part of the airports and agencies as to how the "self-sustaining" element might affect future lease negotiations. Historically, aerial firefighting suppression agencies such as the USFS and BLM have entered into long-term agreements with airport operators that by today's standards would be viewed as very favorable. Many of those agreements and successor agreements were crafted more than 50 years ago and factored in the value (i.e., potential economic development) that an agency brought not only to the airport but to the surrounding community. Now, as the airport sponsors and fire suppression agencies are facing the expiration of these contracts, there is concern on both sides of the negotiating table about the terms of successor agreements.

Given the FAA's requirements on airports to "maintain a fee and rental structure for the facilities and services at the airport which will make the airport as self-sustaining as possible" (FAA Order 5190.6B, *FAA Airport Compliance Manual* 2009) and the FAA's Policy Regarding the Establishment of Airport Rates and Charges (http://www.faa.gov/airports/airport_compliance/), airports are concerned about future negotiations, as are the firefighting agencies.

For airport operators, one of the important sentences in Assurance 27 is the one that allows the airport operator and the agency to agree on reasonable fees for the use of the airport.

MINIMUM STANDARDS AND RULES AND REGULATIONS

Minimum standards and rules and regulations go hand-in-hand and can hardly be discussed separately. Although not required by the FAA, minimum standards and rules and regulations documents are highly encouraged; while not approved by the FAA, the agency reviews them for "appropriateness" on request (FAA *Advisory Circular 150/5190-7, Minimum Standards for Commercial Aeronautical Activities* 2009). Historically, as relates to the subject of this study, airports have had frequent and often difficult confrontations with aeronautical users over the issue of self-fueling on the airfield and the payment of fuel flowage or other use fees. During the interviews, airport operators reported the self-fueling and fuel flowage fee issues had been for the most part

resolved, at least with airports that had solid rules and regulations documents. Those operators that had addressed the issues of self-fueling and payment of fuel flowage fees (and other fees) by self-fuelers had generally resolved the once significant headaches associated with these issues. Although getting agreement on the rules and regulations surrounding these issues was challenging, once they were legally adopted by the airports, self-fuelers, users, and FBOs all had acceded. Those airport operators interviewed without strong rules and regulations, or without any, were continuing to experience challenges on these matters.

Although airport rules and regulations are customized to match the conditions at any particular facility, examples can be found on some airport websites, such as Boise Airport in Idaho, http://www.cityofboise.org/Departments/Airport/AboutBoiseAirport/index.aspx [accessed August 3, 2011].

The FAA has developed several guidance documents on the subject that can be found on the FAA website.

- FAA *Advisory Circular 150/5190-7, Minimum Standards for Commercial Aeronautical Activities,* http://www.faa.gov/airports/resources/advisory_circulars/index.cfm/go/document.information/documentNumber/150_5190-7 [accessed January 17, 2012].
- Order 5190.6B *FAA Airport Compliance Manual* http://www.faa.gov/airports/resources/publications/orders/ [January 17, 2012].

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CHAPTER FOUR

FIRE MANAGEMENT TEAM ROLES

INTRODUCTION

Explaining the detailed management of a major wildland fire is significantly beyond the scope of this study, but this chapter provides an overview of and insight into the complexity of the systems that are mobilized when a major wildland firefighting effort is initiated. Understanding the mechanisms, the major players, and their interaction is helpful to airport operators who will inevitably become involved in the firefight.

At the center of the federal effort is the NIFC in Boise. Within the NIFC is the NICC, which is the "focal point for coordinating the mobilization of resources for wildland fire and other incidents throughout the United States" (NICC 2011).

> Wildfire suppression is built on a three-tiered system of support—the local area, one of the 11 geographic areas, and finally, the national level. When a fire is reported, the local agency and its firefighting partners respond. If the fire continues to grow, the agency can ask for help from its geographic area. When a geographic area has exhausted all its resources, it can turn to NICC at the National Interagency Fire Center (NIFC) for help in locating what is needed, from air tankers to radios to firefighting crews to incident management teams (NICC 2011).

Assisting in the efforts of the federal agencies and part of the NIFC is the National Multi-Agency Coordination Group (NMAC).

> The NMAC is comprised of representatives from the Bureau of Land Management, Bureau of Indian Affairs, National Park Service, Forest Service, U.S. Fish and Wildlife Service, Federal Emergency Management Administration [sic], and the National Association of State Foresters. The NMAC group at NIFC prioritizes and allocates resources.
> The NMAC group at NIFC prioritizes and allocates resources when there are critical shortages of national resources such as smokejumpers, air tankers, or Type 1 Incident Management Teams (NICC 2011).

INCIDENT MANAGEMENT

The federal government is constantly changing and modifying how it responds to major incidents; the attack on the World Trade Center, the response to Hurricane Katrina, and other significant events have brought about significant changes in how the federal government responds to incidents, including wildland fires. A thorough review of the process and history of the development of incident management is beyond the scope of this study; however, understanding how the federal

government becomes involved in wildland fires, what its role is, and how it interacts with state, tribal, local, and other federal entitled can be useful to airport operators.

On February 28, 2003, the DHS released Presidential Directive 5, *Management of Domestic Incidents* [a full text copy of that directive is available at http://www.dhs.gov/xabout/laws/gc_1214592333605.shtm#1 (accessed January 17, 2012)]. One of the many provisions of Directive 5 was the creation of the National Incident Management System (NIMS) and the requirement that political jurisdictions adopt and train staff in NIMS requirements.

> 20. Beginning in Fiscal Year 2005, Federal departments and agencies shall make adoption of the NIMS a requirement, to the extent permitted by law, for providing Federal preparedness assistance through grants, contracts, or other activities. The Secretary shall develop standards and guidelines for determining whether a State or local entity has adopted the NIMS (DHS, Homeland Security Presidential Directive 5, 2011).

In addition to the NIMS standard, DHS and FEMA have developed a significant body of documents on emergency management practices; one of those documents is called the *Overview: ESF and Support Annexes Coordinating Federal Assistance In Support of the National Response Framework,* January, 2008 [the document is available on line at http://www.fema.gov/emergency/nrf/index.htm (accessed August 5, 2011)]. The information of value to airport operators is found on pages 19 and 20 where FEMA describes the activities and actions of the various federal agencies and how they relate to each other (FEMA—*NRF Resource Center* 2011).

EMERGENCY SUPPORT FUNCTION

Federal Level

At the federal level, the management of wildland fire is identified as Emergency Support Function (ESF) #4, commonly called "the firefighting annex." This is the document where the USFS is designated the primary coordinating agency (except in Alaska where BLM is the designee) for federal wildland firefighting suppression responses. As stated in Emergency Support Function Annex #4:

> National support is accomplished through the National Interagency Coordination Center (NICC) located at the National Interagency Fire Center (NIFC) in Boise, ID. All support provided by

the NICC will be coordinated with the National Response Coordination Center (NRCC).

Coordination with and support of State and local fire suppression organizations is accomplished through the State Forester, State Fire Marshal, State emergency management agency, or other appropriate State agency and/or tribal fire suppression organizations operating under the Incident Command System (ICS) element of the *NIMS* Command and Management component (FEMA—Emergency Support Function # 4—Firefighting Annex 2008).

State Level

Each state commonly has designated a lead agency for coordination of matters related to emergency planning and specifically for matters directly related to wildland fire operations. Because each state deals with these matters as it sees fit, airport operators commonly are familiar with the agency in their state government that is the designated lead for matters related to wildland fire. A good place to gain information on these matters is the website hosted by the NASF [http://www.stateforesters.org/about_nasf (accessed February 17, 2012)], where the association maintains a pull-down menu of members and contact information.

Local Level

Emergency planning for wildland fires on the local level, as on the state level, will vary depending on the structure of local government. In most instances, airport operators are involved with their local emergency planning authority/agency.

FEDERAL RESPONSE TO WILDLAND FIRES

As stated earlier, the USFS is the agency with prime responsibility (BLM in Alaska) for fires on federal lands and may be involved in fire management on non-federal lands through one of two mechanisms, interagency agreements or a presidential declaration under the Stafford Act. In these cases, where resources of a state are not sufficient to meet the situation, the governor may request federal assistance.

INCIDENT MANAGEMENT TEAMS

One of the first wildfire respondents an airport operator might meet is the senior representative of an incident management team (IMT); commonly this person is called the inci-

dent commander (IC). In the early stages of a wildland fire response, the IC will likely be from a Type IV or V IMT (see definitions in the following paragraph). As the wildland fire response is increased (assuming the fire grows), ICs will change, and handoffs between IMTs and ICs will occur. Generally, transitions and incident management changes occur as shown in Figure 3 (FEMA–USFA, *About Incident Management Teams,* 2011).

Within the NIMS protocols, there are five levels (types) of IMTs, any and all of whom could be involved in an aerial wildland firefighting event. In general, IMTs are identified according to their ability to handle the varying complexities of wildland fires. The definitions that follow are taken from the *USFA Incident Management Team Training Program Overview* (USFA Incident Management Team Training Program Overview 2004).

In August 2003, USFA convened a Focus Group of stakeholders and experts from across the country to best determine the means to develop all-hazards IMTs across the country. In the wildland fire community, the USFS and the National Wildfire Coordinating Group (NWCG) recognize five "Types," or levels, of IMTs; the Focus Group agreed to stay with this model for the all-hazards emergency response community. The IMT types, including certifying level and basic make-up, as recommended by the Focus Group are:

Type 5: Local Village and Township Level—consist of emergency response providers from a small to medium sized municipality or a group of smaller jurisdictions who are part of a mutual aid agreement. It is envisioned that Type 5 IMTs would be developed in, but not limited to, areas serviced by smaller volunteer or combination departments that, individually, may not have adequate resources but jointly could support an IMT. It would, in most cases, respond and operate within the jurisdictional boundaries of those communities that are signatories to the agreement.

The responsibility for certifying the readiness of this IMT shall reside with the local authority having jurisdiction (AHJ) or their designee.

Type 4: City, County, or Fire District Level—consist of emergency response personnel from a larger and generally more populated area, typically within a single jurisdiction. This level IMT may be developed within larger city or county departments or fire districts. The membership will involve personnel from emergency response and public safety agencies or organizations within the jurisdiction. This team would primarily respond and operate within the city, county, or fire district having jurisdiction.

The responsibility for certifying the readiness of this IMT rests with the county or regional authority having jurisdiction (AHJ) or their designee.
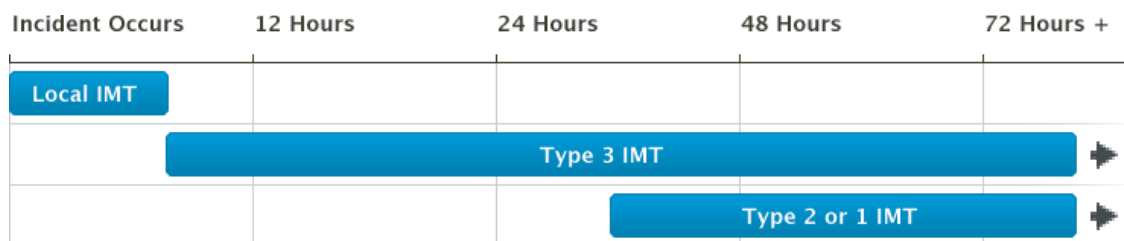
FIGURE 3 Incident management changes over time (FEMA–USFA, *About Incident Management Teams* 2011).

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Type 3: State or Metropolitan Area Level—consist of personnel from different departments, organizations, or agencies within a state or metropolitan region who have trained together to function as a team. The teams are intended to support incident management at incidents that extend beyond one operational period. Type 3 IMTs will respond and operate throughout the State or large portions of the State, depending upon State-specific laws, policies, and regulations.

The responsibility of certifying the readiness of this IMT rests with the State or with a regional Council of Government or their designee.

Type 2: National and State Level—consist of federally or state certified personnel; have less staffing and experience than Type 1 IMTs; and are typically used on smaller scale national or state incident. Type 2 IMTs are currently in existence, and operate through the U.S. Forest Service.

Type 1: National and State Level—consist of federally or state certified personnel; are the most robust IMTs with the most experience; are fully equipped and self-contained. Type 1 IMTs are now in existence, and operate through the U.S. Forest Service.

U.S. FIRE SIZE CLASSES

Another useful metric that helps airport operators understand and be prepared to become involved in an aerial wildland firefighting support effort is the size of the fire. The USFS has developed the following class structure to describe fire sizes in terms of acreages; as fires grow, the likelihood of federal assistance/intervention grows.

- Class A—one-fourth acre or less
- Class B—more than one-fourth acre, but less than 10 acres
- Class C—10 acres or more, but less than 100 acres
- Class D—100 acres or more, but less than 300 acres
- Class E—300 acres or more, but less than 1,000 acres
- Class F—1,000 acres or more, but less than 5,000 acres

- Class G—5,000 acres or more (NWCG, Glossary of Wildland Fire Terminology 2011).

AIRPORT SIZES

The airport operator's role is to safely operate the airport for the benefit of all users. That having been established, it is important to recognize the limits of what an airport operator can be expected to do for tenants and their operational needs. The limitations fall into two broad areas: safety and preferential treatment.

Safety decisions are often challenging and vary widely depending on the nature of the airport. For instance, closing a taxiway to accommodate additional firefighting aircraft parking at a controlled airport might be safer than closing a taxiway at an uncontrolled airport without taxiway lights. Experienced airport operators suggest putting such judgment calls to "sleep test"; if your decision on a safety call is one that keeps you awake at night, then do not do it. It is important to remember that during aerial firefighting operations, things are not "normal," and irregular operations are times when safety margins should be increased, not decreased.

The second issue is preferential treatment for aerial firefighters who might be given use of the airport that others would not be granted. The test here is, "Would I allow this operation if there were not a fire?" For instance, would an airport operator allow "this person" to drive on the flight line for parts or meal delivery? Would aircraft that exceeded the known weight bearing of a surface be allowed to land? Should fuel be delivered from a fuel jobber's semi directly into a nurse truck on the ramp? These and similar operational matters must be considered and decided.

CHAPTER FIVE

FINANCIAL, ECONOMIC, AND CONTRACTUAL MATTERS

INTRODUCTION

This section of the report is based on discussions with aircraft operators, government entities, and airport operators. Given the current macroeconomics of the times, and given that the interviews were with the individuals that deal with the financial matters of their respective companies, it is clear the discussions needed to be substantive. The discussions of financial and economic issues initiated and followed three themes: (1) rates and charges, (2) capital development, and (3) economic benefits for the community.

RATES AND CHARGES

Although the sample population was relatively low, it became obvious from the interviews that there was no consensus on the actual "rate" or "fee" that individual airports charged to users. Of the various types of fees that are charged, the only one all airport operators imposed was some form of a fuel flowage fee.

The airport operators were the most vocal on these matters, and were keenly aware of the contributions that the firefighting agencies make to the community at large, as well as to the airport. Given these issues, the airport operators also recognized some of the dilemmas tenant agencies such as USFS, BLM, etc., will face over the coming years in complying with the economic provisions of the grant assurances and other FAA guidance documents.

Fuel Flowage Fees

A fuel flowage fee is paid to the airport operator based on the "sale" or "delivery" of fuel to the airport or into the fuel tank of an aircraft. Fuel flowage fees have become a source of contention between fuel users (aircraft operators), fuel suppliers (commonly FBOs), and airport operators. Airport operators impose, by written agreement or in some form of a legally/formally adopted set of rules and regulations, the requirement on aircraft operators to pay a fuel flowage fee. The fee may be imposed in a number of different ways, but in all cases, the revenue is used for the benefit of the airport.

Accounting for fuel flowage can be time-consuming. Some airport operators have chosen to employ an "audit trail" mechanism, through which fuel flowage fees are based

on fuel delivered onto airport property as opposed to a mechanism based on the amount of fuel pumped into an aircraft fuel tank. Commonly, bulk fuel is supplied to FBOs and volume users—most commonly helicopter operators—by oil distributors (jobbers) that report to the airport operator when a delivery is completed. Airport operators invoice users a fixed fee for each gallon of fuel delivered by the jobber. This works well for deliveries that are made to the airport but becomes problematic when, for instance, a helicopter "nurse truck" fills at the jobbers distribution facility off-site.

In other instances, airport operators have established procedures for users such as helicopter operators to report the volume of fuel pumped at the airport. Obviously, this self-reporting mechanism is subject to abuse, but may be preferable given the amount of effort needed to provide a legitimate audit trail. In other instances, agreements with the federal agency (commonly the USFS) have been developed where the aircraft operator—again, most commonly a helicopter company—reports the amount of fuel used to the agency, and the agency itself remits the fuel flowage fee to the airport operator. Although these are common procedures, other mechanisms have been deployed.

Landing Fees

Landing fees are another topic in which there is little or no consensus, with regard to establishing landing fees for helicopters.

Airports that provide services to regularly scheduled airlines have a somewhat easier time of establishing a landing fee rate than airports that have no established ratemaking methodology or mechanism. For airports that service air carriers, a common practice is to establish an "airfield cost center" where the airfield is defined and expenses associated to the cost center are tracked. The cost (total expense) of operating the airfield is divided by the total annual landed weight, which then yields a dollar cost per thousand pounds; there are variations on this theme, but the principles are the same. If an airline has entered into a long-term agreement with the airport, then the airline pays what is commonly called a signatory rate; if no agreement is signed, then the airline is charged the nonsignatory rate, generally 25% or 30% higher than the signatory rate. All of these agreement elements are negotiated with the airlines. When a landing

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fee is established in this fashion, airport operators commonly charge commercial operators (including firefighting aircraft) landing fees based on these rates.

Several airport operators reported during the interviews that they inherited agreements with the USFS that established landing and other use fees and a mechanism to increase them. The fee increase mechanisms might be annual, biannual, or triennial inflators tied to an index such as the consumer price index or a mutually acceptable negotiated inflator. In other instances, where no landing fee was established, the local operator accepted the landing fee offered by the USFS representative.

Landing fees for helicopters appear to be more complex for airport operators to determine. The most pragmatic solution was to treat helicopters as fixed-wing aircraft and determine landing fees based on weight and the number of landings. Other operators established a per-day fee based on helicopter size; commonly the fee was determined by the size of the helicopter used (Type I, II, or III) and included unlimited takeoffs and landings. Still others charged no fee if the helicopter operator purchased fuel at the airport (see Table 1). Several operators opted for an "overnight parking fee" that included the landing fee. The fee was commonly associated to the size of the helicopter as above.

Despite the lack of consensus about establishing and collecting landing fees, each airport operator noted that its services are important to the users, and that it is important that the users help defray the operating costs of the airport.

Other Use Fees

During the airport operator interviews, a number of different fee mechanisms were discussed. These fees had been negotiated on an airport-by-airport basis. Ramp use fees, used by several airports to generate revenue, were assessed on aircraft operators for parking or using the airports ramp areas; fees were based on the size of the aircraft or on a per aircraft/per day basis. One airport established an all-encompassing per day rate that included ramp use and landing fees.

Several airports developed fees for recovery of services such as dust control (water trucks), equipment storage, and water use for retardant mixing (metered per gallon basis). One enterprising FBO developed a shopping and delivery service for firefighting crews in remote locations.

Agreements

In the course of this study, four agreements were provided by airport operators documenting individual arrangements for USFS use of the airport during wildland firefighting efforts. The airports that provided the information did so with the understanding that the copies would not be reproduced in the report. (Usually, airport managers are very willing to share this type information with other airport operators upon request.)

While each of the agreements had some elements in common—generally the boilerplate sections developed by city or airport attorneys—many of the sections were developed to address particular issues or matters of a local nature. The agreements were variously structured as memoranda of understanding, USFS contracts, short-term airport use agreements, and airport authority use resolutions.

The agreement forms are unimportant (for this discussion); the provisions stipulating the terms of use are important and vary with the particular needs of each airport. More than half of the airport operators interviewed have permanent USFS facilities at their airports and have entered into long-term agreements addressing the terms and fees for the use of these facilities and other important matters. Several of the operators believed that it was important that the agreements for the lease and use of land be distinct from the contracts for facilities such as hangars, dry storage, and other buildings.

The following is a checklist of items that are commonly considered in agreements between an airport and an aerial firefighting support agency/user such as the USFS, BLM, or aerial applicator. The actual form or provision will be determined on a case-by-case basis. This checklist is intended to be generic and serve only as a reminder about issues that might appropriately be addressed in an agreement. In the fol-

TABLE 1
TYPE SPECIFICATION FOR FIREFIGHTING HELICOPTERS

Type	1	2	3
Useful Load at 59°F at Sea Level	5,000	2,500	1,200
Passenger Seats	15 or more	9–14	4–8
Retardant or Water Carrying Capability (gallons)	700	300	100
Maximum Gross Takeoff/Landing Weight (lb)	12,501+	6,000–12,500	Up to 6,000

Source: *Interagency Helicopter Operations Guide*, June 2009, Chart 6.1: ICS Type Specifications for Helicopters, page 6-2.

lowing narrative the term "agreement" is used for simplicity; "agreement" in this context also includes a memorandum of understanding, memorandum of agreement, contract, lease, purchase order, or any other form used to describe arrangements between parties.

Boilerplate: These are "standard" subsections in agreements that address issues that may arise, including:

- Costs and attorneys' fees. In the event of a legal dispute, the party that loses pays the winning party's legal fees.
- Arbitration. Any disputes about the contract will be resolved through arbitration proceedings, not in a lawsuit.
- Choice of law. In the event of a dispute, a choice of law provision determines which state's legal rules will be applied in the lawsuit.
- Jurisdiction. In the event of a dispute, a jurisdiction clause determines where (in which state and county) the lawsuit is filed.
- Waiver. This permits the parties to forego the right to sue for breach of a particular provision of the agreement without giving up any future claims regarding the same provision.
- Severability. This permits a court to sever (take out) an invalid provision while maintaining the rest of the agreement.
- Integration. An integration clause says that the written contract represents the final agreement of the parties. Often, it explicitly states that any prior agreement or discussions of the agreement has been superseded by the written contract and that any further modification to the contract must be in writing.
- Attachments. This guarantees that attachments and exhibits will be included as part of the agreement.
- Notice. This describes how each party will provide notices to the other (e.g., an intention to terminate the agreement).
- Relationships. This prevents either party from claiming an inaccurate business relationship with the other (e.g., by stating that the parties are partners or that one is the other's employee).
- Assignment. This affects the ability of the parties to sell or transfer their rights under the agreement to another party.
- Force majeure (also referred to as "Acts of God"). This clause establishes that the agreement will be suspended in the event of unforeseen disasters such as earthquakes, hurricanes, floods, and so on).
- Headings. This clause provides that the heading terminology used in the agreement have no special significance.
- Escrow. This provision allows each party to place trade secrets, payments, or other information into a special account to be opened only under certain and specific conditions.
- Jury trial waivers. This establishes that if there is a court battle over the contract, the parties agree to have the

dispute heard by the judge and to forego their rights to a jury trial.
- Limitations on damages. This sets a cap on or otherwise limits the types of damages that may be awarded in a contract dispute.
- Warranties. These are promises or assurances made by each party regarding various contract obligations.
- Indemnity. In an indemnity provision, one party guarantees that it will cover the costs of certain disputes brought by third parties (i.e., individuals or companies that are not parties to the agreement).
- Liability. This defines which party accepts legal and fiscal responsibility for each item covered in the agreement.
- Confidentiality. This guarantees that the parties will not disclose certain information.
- Announcements. This establishes the manner in which the parties can make public disclosures about elements of the contract, for instance statements about a forthcoming merger or joint business venture.
- Counterparts. This sets forth the right of the various parties to execute (sign) copies of the agreement without all being present in one place at one time to sign them all. (Nolo 2011).
- No party deemed drafter. This addresses the principal of law stating that any ambiguity in a contract shall be construed to the detriment of the contract's author.
- Termination. This clause specifies when and under what conditions the agreement is or may be terminated.
- Utilities. This identifies the party or parties responsibilities for maintenance and payment of fees for utility services.
- Fees. This specifies the costs for various services provided.

Other subsections that may be addressed in contracts or agreements include:

- Purpose. States the reason the agreement is being proposed.
- Witnesseth. Basically mean "takes notice of this"
- Location. This identifies the specific site referred to in the agreement. A site drawing may be attached or a legal description provided or added.
- Responsibilities. This identifies the obligations of each party with regard to each element of the agreement.
- Commencement/expiration/termination. These sections establish the effective date and duration of the agreement and in some cases the reasons for its cancellation.
- Funding. This establishes which parties will pay for specific improvements or acquisitions.
- Maintenance. This specifies which party/parties must maintain the facilities subject to the agreement.
- Insurance. This specifies the nature and amounts of insurance to be carried by the renter. Contracts usually require that the airport is among the entities insured.

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- Rules and regulations. This generally refers to additional documents governing conduct of persons or companies (renters included) while on the airport property.

Rates and Charges Summary

As is typical of the airport industry, there was little consensus on the types of fees and rates charged by airports. On the other hand, airport operators as a group are very open to sharing information with one another and often exchange ideas, practices, and documents on such matters as fees and agreements. Most airport operators believed that it was helpful to have an established rate mechanism or fee structure published in their rules and regulations document. While the form varied, the use of written agreements with the USFS (and other agencies) was believed to be helpful and a widely accepted practice.

CAPITAL DEVELOPMENT

Over the years, airports have built and leased facilities to the USFS, creating mutually satisfying relationships. Each airport operator currently hosting a firefighting agency at the airport expressed appreciation for the benefits that those agencies, primarily the USFS, bring to the airport and community. Not only do those agencies make a positive contribution to the airport's bottom line, they are always described as "good" neighbors and partners.

Several airport operators have expressed concerns about the future of these relationships, given the economic stress on airports and on virtually all government agencies. The increasing demand for fire suppression is in direct conflict with shrinking budgets and accelerating costs, some of which are associated with fees that airport operators must charge to meet their sponsor assurances, particularly the provisions of Assurance 24 [FAA, *Grant Assurances* (*Obligations*) 2011].

One of the concerns expressed by airport operators is the FAA's pressure on airport operators to get "fair market value" for its property. The challenge for airport operators is determining exactly what "fair market value" means for a particular facility, so that they meet their obligations under the sponsor assurances. This will likely make more challenging the task of negotiating future successor agreements with aerial firefighting agencies and encouraging USFS development on the airport. Airport operators also cautioned that while some facilities used by the USFS can only be located on an airport,

certain administrative and support functions can be located elsewhere in the community or in regional centers.

As airports look to the future, it will become increasingly important to develop alternative sources of revenue to help with development costs. One airport operator interviewed was able to obtain state economic development grant funds, matched with local fire department funds, city funds, and airport funds, to construct a joint use multi-purpose fire center on the airport where each agency could be housed in (and charged for) facilities owned and maintained by the operator. Airport operators, tenants, third-party developers, and users will have to consider new and nontraditional partnerships to develop creative solutions to the financial challenges of today.

COMMUNITY ECONOMIC BENEFITS

As noted in previous sections of this study, the airport operators acknowledged the significant impacts that aerial wildland firefighting operations have on the airport and the local community. Only one negative impact was identified, noise from tanker operations; however, that impact was usually described as less than significant. As airport operators are generally very sensitive to noise complaints, it is significant that most local residents understand it is the firefighting aircraft trying to protect the local area that generate the noise. Several airport operators noted that most noise complaints arise when firefighting efforts continue for extended periods of time.

According to the airport managers interviewed, positive economic benefits to a community resulting from an aerial wildland firefighting operation (either permanent or transient), include increased use of:

- Hotels/motels
- Restaurants
- Groceries, convenience stores, and service stations
- Laundry services and laundromats
- Rental car leasing
- Catering services
- Portable restrooms
- Equipment rental.

The benefits of a permanent firefighting agency on an airport have been identified in chapter three, but it is equally important to recognize the beneficial and multiplying effect of its presence on a community.

CHAPTER SIX

SECURITY, SAFETY AND OPERATIONAL MATTERS

SECURITY

In the years since the September 11, 2001 (9/11), attacks on commercial aviation, the tension between maintaining a strong security posture while "being open for business" has generated challenges and conflicts for all users of the airport system. In general, the larger the airport, the more challenges are presented. Airports with commercial service and subject to Transportation Security Regulation (TSR) 1542 must address more threats than general aviation airports, where the risks are different. The primary issues for users of the airports in a post-9/11 setting revolve around "access control."

Access controls are the measures that airport operators deploy to make certain that only individuals with a legitimate need are able to access the airport's "perimeter fence" or secure areas. The two most common methods of controlling access are issuing identification badges and computerizing access security systems. The computerized access security systems are used to, as the name implies, control access by some form of individual credential, usually an access card or biometric screening such as a retinal or fingerprint scan. Before access can be authorized, airport operators must submit information on each individual in the form of a background check. Background checks usually take two or three days to complete, although they can take upwards of five days.

These delays are especially difficult for aerial wildland firefighting managers and crews because their work is time-critical. Often, alternative arrangements are made to allow "normal" firefighting operations to continue until all individuals are trained and obtain their access credentials. These alternative arrangements usually involve hiring security staff with the appropriate credentials to provide crew and staff escorts until the screening process is completed. At most commercial service airports, this requires a "changed condition" amendment to the airport security plan.

From the perspective of the firefighters, these delays are an impediment, because security access processes differ from airport to airport. From the airport operators' perspective, the necessity of adhering to safety regulations can conflict with the need to maximize the use of the facilities by the firefighters. Airports with active security plans in place often meet with local firefighting entities to review security requirements and provide for changes before the start of the fire season.

SAFETY AND OPERATIONAL MATTERS

Aircraft Parking

Although most airports have additional ramp space to accommodate the occasional transient aircraft, a large influx of P-3 and or P2V aircraft or Type I helicopters can create challenges (see Figure 4). During major mobilizations to support wildfire suppression, airport operators can find themselves scrambling to find sufficient ramp areas.

Interviews with airport operators revealed several common concerns. Helicopter operations, particularly the large Type I aircraft, require large landing zones because of the helicopters' size but also because of the significant downwash created during liftoff, hover, taxi, and landing. Recommendations on helicopter operations, including landing zones, are contained in the *Interagency Helicopter Operations Guide,* Chapter 8 (2009). Several operators commented that helicopters, particularly Type I helicopters, can be major foreign object damage (FOD) generators on airports when they arrive and depart from "turf" areas of the airport as opposed to prepared surfaces. Several experienced airport operators suggested that during initial approaches to the airport, helicopters be cautioned to avoid operations over FOD-generating turf.

Several airport operators also shared experiences with aircraft operating and/or parking on surfaces with insufficient weight-bearing capacity; the P2V Neptune was identified as a particularly problematic aircraft because of its weight and single-wheel landing gear configuration. Staging/parking of aircraft is especially complicated at commercial service airports with security requirements under TSR 1542.

Hazardous Materials

The subject of pollution from the retardant mixing process was discussed with airport operators, and no problems were identified or noted. Airport operators stated that the USFS takes pollution very seriously; when spills have occurred, they were cleaned up quickly and properly.

Notices to Airmen

No airport operators interviewed identified any problems or issues with notice to airmen (NOTAM) procedures. When queried, operators suggested that airports without operating

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FIGURE 4 Type I helicopter (NIFC website).

ATCT consider posting a notice in the airport/facility directory (A/FD) noting the likelihood of aerial wildland firefighting operations, as appropriate. An example of an A/FD entry from McCall Airport, Idaho, obtained online [http://www.airnav.com/airport/KMYL (accessed Aug. 16, 2011)] follows:

> In this particular example, as it relates to firefighting activities, the airport manager has noted that the USFS conducts practice parachute jumps in the vicinity of the airport (USFS PRACTICES PARACHUTE JUMPS INVOF ARPT) and that during the summer months there are increased USFS flight operations (INCREASED FOREST SERVICE FLIGHT OPNS DURG SUMMER MONTHS).

Access Control

As discussed in the earlier Security section, access control remains a problem for aircraft and airport operators alike. It is unlikely that airport TSR 1542 security program requirements will become less demanding in the future, given the current state of aviation security concerns. General aviation airports are currently not mandated under TSRs, but operate under a voluntary security program outlined in the TSA's *Security Guidelines for General Aviation Airports,* Information Publication A-001, May 2004. Access control guidance and recommendations, as well as other security matters related to general aviation airports, are contained in this document (TSA, *Airport Security Guidelines* 2011).

Damage to Facilities

Approximately half of the operators interviewed reported at least some minor damage to airport facilities during or resulting from aerial wildfire suppression efforts. Damage ranged from runway and taxiway lights destroyed (aircraft taxiing over the lights) to destruction of a fence when a P2V (see Figure 5) lost its hydraulic brakes and a ramp that sustained damage when a fully loaded P2V got "lost" and taxied onto a ramp rated for

FIGURE 5 P2V Neptune (NIFC website).

light aircraft. In each instance, the USFS took responsibility for the costs associated with the repairs.

One airport operator detailed his practice of taking digital photos of the airport during a facilities inspection with the USFS representative before the beginning of each fire season. This practice helped avoid, and quickly resolved, questions related to damage of airport facilities.

Jettison Areas

More than half of the airport operators interviewed stated that retardant jettison areas had been established for use during controlled releases of retardant. The remaining operators were in rural areas where retardant could be released over open areas without concern. While a couple of airport operators addressed the issue of jettison procedures in a memorandum of understanding with the local ATC facility, most shared the information verbally with the USFS and/or Unicom operator. Controlled jettisoning of retardant was not a major concern to any of the airport operators, and none noted any history of problems related to the practice, although most recommended that procedures be developed to cover the eventuality of a controlled release.

Portable Air Traffic Control Towers and Temporary Flight Restrictions

Each airport operator in the survey group without a permanent ATCT had experiences with the activation of a portable ATCT—a generator-powered, self-contained facility that can be tailored to the airport and begin operating within hours. No airport operator could specifically identify the level of flight operations that triggered the call by the USFS for the establishment of a portable ATCT, but it appeared to be a combination of approximately six aircraft (helicopter and/or fixed wing) operating from the airport simultaneously and was commonly associated with reduced visibilities owing to smoke. The deci-

sion to establish a temporary ATCT is made by the controlling agency, normally coordinated by the USFS through the NIFC and the FAA. The primary issue for airport operators related to portable ATCTs is the identification of a suitable site. Preplanning and identification of a suitable site were recommended by most airport operators; approval or review of the site by regional FAA airports staff was encouraged.

Temporary flight restrictions (TFRs) were discussed with the airport operators, but no concerns were voiced. One of the airport operators did make the point that TFRs are often misunderstood by pilots. The definition of a TFR, from FAA *Advisory Circular 91-63C* (*FAA Advisory Circular 91-63C, Temporary Flight Restrictions* 2004), is a "regulatory action issued through the U.S. Notice to Airmen (NOTAM) system to restrict certain aircraft from operating within a defined area, on a temporary basis, to protect persons or property in the air or on the ground."

The key word in this definition is the word "restrict" as opposed to the misunderstanding that operations are "prohibited"; in some instances, the restriction is a prohibition, but not always. TFRs, when established in association with wildland fire suppression efforts, commonly "restrict" rather than "prohibit" flights.

Operations Coordination

When controlling agencies establish an IC at an airport, one of the important functions of that IC is the daily briefing conducted by the IMT. Commonly, all parties affected by wildland fire suppression efforts are invited/requested/expected to participate in the daily briefing. In most instances, the daily briefing is conducted by means of a telephone bridge connection that allows participants to dial into the call. These briefings are an excellent mechanism for individuals to gain operational information about planned fire suppression activities and for airport staff to relay information of operational significance to the IC.

During extended firefighting operations, IMT teams and/or ICs commonly rotate and take breaks from what are often 24/7 operations. Airport operators need to be aware that these changes occur and plan for changes in IMT leadership. To make these transitions easier, it is helpful for airport operators to provide written contact information for key airport and community officials to the IMT.

Construction Planning

In most locations throughout the United States, the airport construction and wildland fire season run almost in parallel. Although some airports have multiple runways and taxiways, many airports used by wildland fire suppression aircraft are limited to one runway. When work on or adjacent to a critical airport facility, such as a runway or taxiway, is underway, it is often necessary to enforce operational restrictions (including closure) on those facilities to meet safety requirements. This reality can cause challenges for airport operators and firefighting operations.

Two airport operators in the survey group actually placed provisions in construction documents to address this issue. All airport operators were sensitive to the issue and discussed/planned for this eventuality during the design and planning phases of a project to minimize impacts on aircraft operations. In many instances, airport operators planned critical work phases around wildland firefighting efforts, including scheduling and completing work during nighttime hours when there are usually no firefighting flights. In some instances, critical project work was completed during the early or late portions of the traditional wildfire season.

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CHAPTER SEVEN

LESSONS LEARNED—A REVIEW OF THE INTERVIEWS

AIRPORT OPERATOR INTERVIEWS

In June 2011, ten airport operators participated in an interview process designed to gather additional information for the study. Given the limited written material discovered during the initial review, the topic panel determined that individual interviews would likely yield the more useful data. The airport operators were selected based on a number of characteristics, including size of airport, location, facilities, ATCT, commercial/general aviation operations, and experience with firefighting operations. During the interviews, the airport operators were asked a series of questions about their airports and issues related to aerial wildland firefighting operations.

Figure 6 shows the approximate location of the airports where interviews were conducted with operators. Contact information for each airport operator interviewed is located in Appendix B. Current information on airport contacts is available at http://airnav.com under the "Airports" tab. The matrix here identifies the characteristics of the airports where the operators were interviewed. Table 2 provides the characteristics of the airports interviewed.

AIRPORT DESCRIPTION

Abilene Regional Airport (ABI), Abilene, Texas

ABI is located in the north central part of Texas and is one of the designated diversion airports supporting Dallas/Fort Worth International Airport. ABI is a Federal Aviation Regulation (FAR) 139 certificated airport serving the region surrounding Abilene. ABI was not one of the original airports selected for interviews but was added because of its role in helping support the major wildland fires that struck New Mexico and Texas during the summer of 2011. Because ABI was a base for major operations supporting aerial wildland firefighting during the course of this study, it presented a unique opportunity to gain insights into what happens at an airport when major campaigns of this type "pop-up" overnight at an airport. While ABI has supported similar operations in the past, it does not have a permanent USFS or Texas Forestry unit on the field. The interview was conducted during major wildland firefighting operations that were near or exceeded historical levels and provided invaluable information.

Rocky Mountain Metropolitan Airport (BJC), Broomfield, Colorado

The Rocky Mountain Metropolitan Airport is located approximately nine miles northwest of downtown Denver along the Rocky Mountain Front Range. The airport primarily services general aviation operators but does maintain a FAR 139 airport operating certificate. BJC hosts a major USFS operation and is the primary base for aerial operations along the front range from Wyoming to New Mexico, supporting helicopter operations, including Type I, and large air tankers, such as P2V aircraft. The airport also has lease agreements for the basing of USFS spotter (Beech King Air) aircraft; permanent full-time USFS employees work from facilities at the airport.

Grant County Regional Airport/Ogilvie Field (GCD), John Day, Oregon

GCD is owned and operated by Grant County in east central Oregon. Ogilvie Field is a general aviation airport with two lighted runways—5,220 × 60 ft and 4,471 × 60 ft—both with a single-wheel weight-bearing capacity of 12,500 lb. The airport is overseen by a full-time manager and supports a year-round presence of USFS and Oregon Department of Forestry personnel.

GCD is currently the primary training base for certification of rappel firefighters. The airport has developed a niche program that trains firefighters to access remote fire line areas using helicopters and rappelling techniques. The airport has capitalized on this program and worked with the USFS to develop new facilities on the airport for use by the service and the airport/community.

Missoula International Airport (MSO), Missoula, Montana

MSO and the USFS Region One Aerial Fire Depot share a common boundary and operate a "through-the-fence" fire suppression operation for the lands west of the city of Missoula. The USFS and the MSO have an agreement that accommodates the USFS aerial fire suppression efforts in Region One. The Missoula Fire Center has a large cadre of smokejumpers and hotshot crews in addition to a depot that provides a major

Identifier	Airport	State
ABI	Abilene Regional Airport	TX
U70	Cascade Airport	ID
GCD	Grant County Regional Airport/Ogilvie Field	OR
MYL	McCall Municipal Airport	ID
MSO	Missoula International Airport	MT
RDD	Redding Municipal Airport	CA
RDM	Roberts Field Airport	OR
BJC	Rocky Mountain Metropolitan Airport	CO
O05 O02 201	Rogers Field Airport Nervino Airport Gansner Field Airport	CA
GEG	Spokane International Airport	WA
SFF	Felts Field Airport	WA

FIGURE 6 Location of airports where airport operator interviews were conducted.

cache of firefighting materials, a fire science laboratory, tanker and smokejumper aircraft, a retardant mixing/loading facility, and a museum. MSO is also the home base of Neptune Aviation Services, one of the largest fixed-wing aerial firefighting air tanker businesses in the United States, operating a large fleet of P2V aircraft.

McCall Municipal Airport (MYL), McCall, Idaho

McCall Municipal Airport is owned and operated by the city of McCall and is a general aviation airport with one 6,108 × 75 ft runway with the following weight-bearing capacity: 12,500 lb single wheel, 78,000 lb double wheel, and 135,000 lb double tandem, an unusual and fortuitous capability for a general aviation airport. The airport employs a full-time manager and

has a resident USFS facility. The USFS and airport support large fixed-wing aerial tanker operations, Type I helicopters, and a smokejumper base.

Plumas County Airports—Quincy, California

O05   Rogers Field Airport, Chester, California
O02   Nervino Airport, Beckwourth, California
201   Gansner Field Airport, Quincy, California

Plumas County operates three general aviation airports, all supporting aerial wildland firefighting services in different ways. The Chester Airport (Rogers Field) is the largest and most active airport supporting smokejumpers, Type I and II helicopters, and fixed-wing spotter aircraft operations.

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Additionally, CAL FIRE has aircraft and a base of operations at Rogers Field. Nervino and Gansner airports support helicopter and spotter aircraft as well as hotshot and rappel crews. Construction of a new fire station is planned at Nervino Airport that will support firefighting operations, actual construction dates are not known.

Redding Municipal Airport (RDD), Redding, California

Redding Airport serves seven counties in north central California and has a major USFS/CAL FIRE complex on airport property. The 58-acre facility supports all manner of aerial wildland firefighting activities including large fixed-wing tankers, smoke jumpers, Type I–III helicopters, and training and maintenance facilities. CAL FIRE maintains a base at the airport with small multi-engine aircraft, Bell Aircobra helicopters, and OV-10 Bronco spotter aircraft.

Roberts Field Airport (RDM), Redmond, Oregon

Roberts Field Airport provides a major base of operations for the USFS in the region. The Redmond airport and the USFS have over the years developed a major wildland firefighting facility on property owned by the airport. The USFS Fire Center campus has been jointly developed in a cooperative way over the years and includes a number of facilities constructed by the airport operator and leased to the USFS. The facilities and ground leases agreements (30 years old) are soon to expire, setting the stage for the development of a new operating agreement between the USFS and the airport.

The USFS facilities support heavy fixed-wing operations, Type I, II, and III helicopter operations, smokejumpers, and fire depot/cache activities. Redmond's location in central Oregon makes it one of the most active firebases in the Northwest.

Spokane County–City Airport System—Spokane, Washington

GEG Spokane International Airport
SFF Felts Field Airport

The county and city of Spokane sponsor two facilities in Spokane, one an air carrier airport (GEG) and the other a busy general aviation reliever airport (SFF). Historically, both airports have been used to support aerial wildland firefighting operations. However, most operations are based out of the Coeur d'Alene airport (COE) approximately 20 miles to the east in Idaho. The Spokane International Airport has hosted firefighting aircraft in recent years, including military C-130s with the modular airborne firefighting system (MAFFS). Additional information on the MAFFS system is available online at http://www.fs.fed.us/fire/aviation/airplanes/maffs. HTML [accessed Aug. 28, 2011].

Cascade Airport (U70), Cascade, Idaho

Cascade Airport is a general aviation airport owned by the city of Cascade. A manager who oversees the airport's single FBO operates the airport. The facility has one runway that is approximately $4,300 \times 60$ ft. The airport is lighted and has a single-wheel weight-bearing capacity of 12,500 lb. During aerial wildland firefighting operations, the airport can accommodate Type I, II, and III helicopter operations. Fixed-wing aircraft use the airport for flying support missions such as crew and material hauls and spotter operations. The airport could support single-engine air tanker operations, but no permanent retardant mixing capability exists on the airport.

SUMMARY OF AIRPORT OPERATOR INTERVIEW QUESTIONS

Interviews with airport managers were completed during June 2011. Those interviews focused on a series of questions about aerial wildland firefighting operations at the managers' airport or airports they had previously operated. The summary under each question provides insights into their thoughts and ideas related to the study issues. Responses and lessons learned were aggregated to maintain confidentiality.

General Background Data

1. Describe your professional experiences dealing with the agencies that have used your airport for aerial wildland firefighting.

The reason for this discussion was to learn about the range of experience that the various airport managers have in the field of wildland firefighting operations.

The airport managers who participated in the interviews had a significant depth and breadth of experience in dealing with aerial firefighting. Several had more than 30 years of airport management experience, and all had at least four years. Of the ten airport managers interviewed, seven have permanent aerial firefighting facilities on or adjacent to their airport. Of the seven with permanent facilities, four would be considered regional centers with multiple firefighting activities and/or multiple agencies sharing facilities.

The airport managers interviewed worked at airports that hosted multiple firefighting agencies: USFS and local (state/county/city) firefighters, USFS depots/caches, smokejumpers, rappellers, Type I, II, and III helicopter operations, large air tankers and single-engine air tankers, training facilities, retardant preparation facilities, mobile/temporary ATC facilities, hangars, repair stations, and administrative support facilities. Several airport operators also supported military aircraft, both fixed-wing and rotary-wing operations ranging from Blackhawks to MAFFS-equipped C-130s. The airports where no

FIGURE 7 Mobile Aerial Fire Fighting System (MAFFS) (USFS website).

permanent facilities had been developed were active seasonally depending on the nature of the fire season in the area.

2. What types of operations are conducted on your airfield?

During the interviews, the following types of operations were identified and discussed; in most instances, these operations occurred at more than one of the airports.

- Fixed-wing air tanker operations. As of the 2011 aerial wildland firefighting season, 19 medium air tankers, P2V Neptunes and P-3 Orions, were under contract for use by the USFS DC-10 (heavy) and B-747 (super heavy) tankers are also entering service. Active military C-130s are used when available and fitted with the MAFFS (see Figure 7). A large fleet of single-engine air tankers are

also used by various government agencies in wildfire suppression efforts.

- Rotary-wing air tanker operations. Given the nature of aerial wildland firefighting operations, the helicopter has become a staple in the toolbox of fire managers. Helicopters are commonly used on tasks such as:
  – Equipment transport to remote areas
  – Crew haul
  – Retardant application (water and chemical)
  – Rappelling fire crew placement
  – Surveillance and fire mapping
  – Reseeding
  – Helitorch.

  Helicopters are classified by the USFS by size conforming to the characteristics in Table 1. Type 1 helicopters such as the Erickson air-crane, are the most challenging for airport operators because of their size and significant downwash during approach and departure phases of flight (see Figure 8).
- Smokejumpers. The USFS and BLM maintain cadres of smokejumpers for firefighting operations at various locations in the intermountain west and Alaska. USFS smokejumper bases are in McCall and Grangeville, Idaho; Redding, California; Missoula and West Yellowstone, Montana; Winthrop, Washington; and Redmond, Oregon. BLM smokejumper bases are in Boise, Idaho, and Fairbanks, Alaska. Smokejumpers are commonly dropped into fires where ground access is limited or time is short. Smokejumpers are highly trained and capable of operating for a minimum of two days with supplies they carry with them. DC-3, Twin Otters, and similar aircraft are commonly used as jump aircraft (USFS—*Smokejumpers* 2011).

TABLE 2
CHARACTERISTICS OF AIRPORTS WHERE OPERATOR INTERVIEWS WERE CONDUCTED

Identifier	Airport Common Name	State	Federal/State Agency on Airport	Certificated or General Aviation	Tower
ABI	Abilene Regional Airport	TX	No	FAR 139	Yes
BJC	Rocky Mountain Metropolitan Airport	CO	Yes, USFS Base	FAR 139	Yes
GCD	Grant County Regional Airport/Ogilvie Field	OR	Yes, USFS Base	GA	No
MSO	Missoula International Airport	MT	Yes, USFS Base (through the fence)	FAR 139	Yes
MYL	McCall Municipal Airport	ID	Yes, USFS Base	GA	No
GEG	Spokane International Airport	ID	No	FAR 139	Yes
SFF	Felts Field Airport		No	GA	Yes
O05	Rogers Field Airport	CA	Yes, USFS Base	GA	No
O02	Nervino Airport		No	GA	No
2O1	Gansner Airport		No	GA	No
RDD	Redding Municipal Airport	CA	Yes, USFS—CAL FIRE Base	FAR 139	Yes
RDM	Roberts Field Airport	OR	Yes, USFS Base	FAR 139	Yes
U70	Cascade Airport	ID	None	GA	No

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FIGURE 8 Type I helicopter (USFS website).

- Rappellers. The mission of rappellers is similar to smoke-jumpers (there is a search and rescue role for rappellers), but instead of parachuting into the fireground they rappell from a helicopter (see Figure 9). Thirteen rappel crews are currently staffed: Central Oregon Rappellers (Oregon), Gallatin Rappel Crew (Montana), Frazier Rappel Base (Idaho), Krassel Heli-Rappellers (Idaho), Malheur Rappel Crew (Oregon), Prescott Rappellers (Arizona), Price Valley Heli-Rappellers (Idaho), Provo Rappel Crew (Utah), Salmon Heli-Rappellers (Idaho),

FIGURE 9 Helicopter rappel (National Park Service website).

Siskiyou Rappel Crew (Oregon), Sled Springs Rappel Crew (Oregon), Teton Interagency Helitack (Wyoming), and Wanatchee Valley Rappellers (Washington).
- Aerial fire depot. The function of an aerial fire depot is to provide a centralized (regional) warehouse for firefighting supplies used during fire suppression. The depot also has the ability to repair equipment and move supplies to fire crews as needed.
- Airbase. An airbase has permanent facilities to maintain and hangar aircraft, and mix and load retardant; it supports firefighting operations and, in some instances, other functions of the user agency (usually USFS or BLM or, less commonly, local firefighting agencies such as CAL FIRE or the Oregon Department of Forestry).
- Dormitory and housing facilities. Some USFS bases on airports provide aircrew and firefighters, and places to live during firefighting operations.
- Fire control management facilities. During active firefighting operations, fire management teams are created based on the size of the fire. At airports with permanent agency facilities, the team works there. At airports without permanent facilities, the lead agency will often rely on portable (trailer/tent) facilities.

3. Where is the aerial firefighting base located in relation to the airport property?

The focus of this question and subsequent discussion was to explore the issues related to airport layout and functional operations.

Airport operators identified several important elements necessary to support firefighting efforts.

- Establish a single landside access point to funnel and limit entry onto the airport.
  - This is important to controlling access, primarily for security purposes, but also to improve safety.
  - A second (alternate) access point to airside is important in the event that the primary access is not available. Locate access point(s) on property leased (or owned) by the tenant and identify the tenants responsibilities related to controlling access in the lease provisions.
- Access and operating areas for helicopters are important planning issues to consider to minimize the negative effects of rotor downwash, including
  - Crew and maintenance access, and
  - A clear area for rotor operation during takeoff and landing.

At airports without permanent facilities that want to encourage the use of their airport, operators often consider discussing with agency representatives their needs for:

- Electrical power
- Water for support facilities and retardant mixing plant Site location for aircraft parking, staging, maintenance, etc.

- Temporary ATCT mobile unit, as needed
- Support trailers
- Vehicle parking
- Security and access control.

Community, Contractual, and Economic Issues

1. What community impacts (hotels, rental cars, restaurants, noise, congestion, and so on) have you identified when a sustained (30+ days) aerial firefighting suppression effort is initiated on your airport?

Each airport operator recognized the positive economic effects on the community of aerial wildland firefighting operations. Airport operators noted that the broader benefits were often greater for the community than to the airport; however, they were quick to note the often substantial benefits that also come to the airport.

The impacts were clearly divided into two types, depending on the use of the airport by government agencies. Those airports with permanent facilities on or adjacent to airport property recognized and appreciated the regularity of the revenue stream and the positive impact on their budgeting processes, whereas those without permanent facilities identified both positive and negative results from the seasonal and unpredictable nature of each fire season.

Airports with permanent facilities and personnel recognized the value of the agency for airport finances, but also identified the often significant agency spending in the community and the subsequent multiplier effect of those dollars. One airport operator indicated that the USFS operation might account for as many as 200 additional jobs in the local community.

Those airports that provide seasonal support to aerial firefighting noted that they do not "depend" on agency revenues from year to year because of the unpredictable nature of fire operations and the associated revenues. They do, however, use the monies for airport development and maintenance purposes during those years when they are involved in firefighting operations. In general, it was noted that airport operators do not consider the monies received from users as "revenue enhancements," but more appropriately as cost recovery mechanisms that help defray the expense of operating the airport.

Collectively, the airports identified many community revenue enhancements resulting from aerial firefighting operations; increases were noted in the following service sectors:

- Catering
- Sale of water for firefighting operations
- Hotel operations
- Restaurants
- Portable toilets
- Convenience, gas sales, and grocery stores
- Equipment rental, including heavy equipment
- Vehicle rental
- Laundry services
- Property rental for "fire camps" where smokejumpers commonly camp out during break periods, use of local parks and fairgrounds
- Fuel sales and fuel flowage fees
- Landing and parking fees.

In comparison to the positive impacts of aerial wildland firefighting operations, the negative impacts are considered by the airport operators to be relatively minor, but include the following:

- Press reporting of forest fires and smoke in the area discourages tourism.
- Noise complaints increase during extended operations, but are often understood by the local population.
- Dust is generated by vehicle and helicopter operations.
- Security and airfield access were not identified as issues by airport operators, but were considered by aircrews to be a problem.
- Increased workload for airport staff/field maintenance staff was noted.
  - Construction coordination was identified as an issue to be considered but not a significant problem. Airport operators take firefighting operations into consideration during the construction planning process.
  - Conflicts with other users might arise. One airport identified potential impacts to its extensive student pilot training operations and the potential for conflicts with the scheduling and expansion of the training operation.
- Potential damage to surfaces from overweight operations, particularly during the heat of the summer season, was noted.

Several airport operators identified how cooperative relationships with the USFS have had mutual benefits for the service, the community, and the airport. At one airport, the USFS assisted the airport manager in convincing the FAA to widen and strengthen a taxiway to support USFS aircraft in excess of the minimum design group standards for the airport. In another instance, the airport secured a development grant from a state agency to build facilities for use by the USFS, local pilots, the airport, and the community. In yet another instance, the airport was able to secure funding for the construction of a joint use fire station based on the strength of its use agreement with BLM; that agency also provided some funding for the facilities' construction.

2. Fuel sales and fueling of aircraft are often issues that arise when aerial firefighting suppression activities occur on airports. These matters can involve a host of challenging issues such as safety, fees, self-fueling rights, wet leases, and fuel storage/transfer.

The issue was raised to clarify the current "state" of fueling operations at airports. Fueling and self-fueling issues have

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been "hot button" issues for airport operators, fueling operators (generally FBOs), and aircraft operators. At the heart of the fueling/self-fueling controversy are two issues, safety and money. In terms of this study, the fueling issue is primarily related to helicopter operations. Helicopter operators travel with their own maintenance and fueling operations and often provide their own fuel, whereas fixed-wing operators generally purchase their fuel from one of the airport vendors. Because fueling is a revenue source for the airport and because fueling safety is a potential liability for the airport operator, tensions continue to arise over this issue.

Airport Operators' Perspective on Self-Fueling

Airport operators have two ministerial duties related to fueling operations in this context: the first is to ensure the safety of fueling operations conducted on the airport, and the second is to comply with sponsor grant assurances, particularly Assurance 22 and 24 [FAA, *Grant Assurances* (*Obligations*) 2011].

In the past, airport operators often found themselves between a rock (the self-fueler) and a hard place (the FBO). Over the years, the FAA has established the "right" of aeronautical users to self-serve, including the right to self-fuel. More detailed information on this subject can be found in FAA Order 5190.6B, *FAA Airport Compliance Manual,* section 11.1. At the same time, the FAA suggested that the "sponsor should design its self-service rules and regulations to ensure safe operations, preservation of facilities, and protection of the public interest." Further, the FAA states that a "sponsor may require the owner or operator to confine aircraft maintenance, servicing, and fueling operations to appropriate locations with equipment appropriate for the job being done" (FAA Order 5190.6B, *FAA Airport Compliance Manual* 2009).

During the interviews with the airport operators, it was observed that the controversy over fueling operations that existed in the past has to a large extent been resolved at those airports which have established rules and regulations with regard to self-serve/self-fueling issues. At airports that have not addressed this issue, tension continues between aeronautical users, FBOs, and the airport operators.

The second point of contention for airport operators—and one that is gaining momentum, largely because of the economics of airports (both sponsor and FAA) operations—is the issue of self-sustaining operations. Because there are fewer federal dollars to support capital projects and FAA operations, airports are being pressured to comply with Sponsor Assurance 24—*Fee and Rental Structure.*

Fee and Rental Structure. It will maintain a fee and rental structure for the facilities and services at the airport which will make the airport as self-sustaining as possible under the circumstances existing at the particular airport, taking into account such factors as the volume of traffic and economy of collection. No part of the Federal share of an airport development, airport planning or noise compatibility project for which a grant is made under Title 49,

United States Code, the Airport and Airway Improvement Act of 1982, the Federal Airport Act, or the Airport and Airway Development Act of 1970 shall be included in the rate basis in establishing fees, rates, and charges for users of that airport [Federal Aviation Administration, *Grant Assurances* (*Obligations*) 2011].

Aircraft Operators' Perspective on Self-Fueling

For the aircraft operator (particularly helicopter), there are two primary issues related to the self-fueling issue: the cost of fuel and fuel flowage fees charged by airport operators. Helicopter operators generally travel with a fuel tender so they can support their operations in the field (on the fire ground) and are not dependent on airport fueling facilities as are their fixed-wing counterparts. In general, helicopter operators like to base on airports because it is more convenient for their flight and maintenance crews, not because of the availability of fuel.

Costs are an issue in a competitive environment, and fuel costs, which can be substantial, are highly variable. Although fuel flowage fees are common in the industry, the rates vary from five to ten cents per gallon at the airports interviewed in this study. Helicopter operators frequently will avoid using airports because accounting for fuel used and paying fuel flowage fees are considered burdensome, particularly during the busy firefighting season. This is true even when the USFS agrees to make payment to the airport operator for fuel dispensed into the helicopter on the airport.

Helicopter operators often arrange for fuel through jobbers and, because of their annual volume of purchases, are able to negotiate discounts not available from FBOs or airports. Helicopter operators are inspected and meet USFS standards, including their fuel tenders/pumpers, but many are also required to meet a different set of rules and regulations promulgated by each airport operator. Often, it is easier and more economical for the helicopter operators to base at facilities other than airports.

Fixed-Base Operators' Perspective on Self-Fueling

For the FBO, the issue is also economic. The FBO pays the airport operator various fees for the right to operate its business on the field with the expectation of making a profit. Fuel sales are a profit leader for most FBOs, and self-fueling in any form is competition. FBOs expect the airport operators to maintain a level playing field as it relates to these matters. Because self-service, including self-fueling, is a right established and enforced by the FAA for aeronautical users, FBOs expect the airport operator to keep the playing field level through rules and regulations that apply to self-fuelers and FBOs alike.

Conclusion and Comment on Self-Fueling

No other single issue generated more discussion in this study than the issue related to fuel sales, fueling, and fuel flowage

fees. There were several interviewee recommendations that were almost universally made:

- Airports need to develop rules and regulations regarding self-fueling and the payment of fuel flowage fees.
- It is important that written agreements between the controlling agency (federal, state, or local) and the airport specifically address the fee structures of the airport as they relate to use by aerial firefighting operators.
  - The agreement need to be reviewed with the controlling agency annually prior to the anticipated start date of wildland fire season.
  - It is important that the agreement makes the controlling agency responsible for the payment of the fuel flowage fee for its contract aircraft.

3. Is crowd control and public access to operational and security restricted areas a problem?

No airport operator interviewed reported any issues related to crowd control or public access. Two operators provide public viewing areas for airport users.

4. At your airport, who is responsible for coordinating aerial firefighting suppression intergovernmental relations? With whom do you deal on contractual matters for the use of the airport for aerial firefighting suppression matters?

Each airport representative interviewed confirmed that negotiations on airport leases were conducted by the airport manager as the airport representative. Negotiations by the other party/parties (USFS, BLM, state, etc.) were usually conducted with the local agency representative; that is, the base manager when a permanent facility is located on the airport or at the local office when no facilities are on base.

Three of the airport managers interviewed noted that they were beginning negotiations on successor-use agreements to accords set to expire in the next two years. The airport managers and the respective USFS base managers indicated that the regional contracting officers for the USFS would be taking a more active role in future negotiations.

The airport managers believed that future negotiations with the agencies were likely to be more challenging because of the FAA's emphasis on fair market value issues for airport lease negotiations. Historically, airports have entered into agreements with the USFS for long periods (30 plus years) under favorable terms because the USFS brought jobs to the airport and the community at large. The FAA is looking to airports to meet Sponsor Assurance 24 requirements by using fair market value notions and other mechanisms with all tenants [FAA, *Grant Assurances* (*Obligations*) 2011].

5. When damage to airport-owned assets is caused by aerial firefighting suppression activities, how are repairs completed (by whom) and how is the cost for repairs reimbursed, if at all?

Four of the airports interviewed stated that damage from aerial firefighting aircraft had occurred at their airports. Losses ranged from broken runway/taxiway lights to major damage to ramp areas. In each instance, the federal agency sponsoring the activity (USFS, FEMA) paid for the repairs. Airport managers emphasized that these issues should be addressed in agreements with the appropriate agency.

Operational Issues

1. During aerial firefighting operations, has a temporary air traffic control tower (ATCT) ever been established on your airport?

Each of the non-towered airports interviewed stated that temporary ATCTs had been established at their airport during aerial firefighting operations. The decision to establish control of airspace and ground movements was made by the firefighting agency in charge, generally the USFS through NIFC in consultation with the FAA. The decision to establish control using a portable ATCT was reported to be based on the intensity of aircraft (fixed-wing and/or helicopter) activity. Several airport operators noted that six aircraft operating at the same time appeared to be the triggering event for establishment of a temporary tower. The airport managers also noted that reductions in visibility, generally from smoke, also affect the decision to establish a temporary tower.

These temporary tower facilities are self-contained, with the ability to generate their own power, although some airport operators have provided commercial power to the units with generators providing a backup power source. One airport operator developed a joint use facility with the USFS, which provided for a temporary tower facility in the airport terminal (joint use facility); the area is used as an airport observation deck when not being used for ATCT purposes. Several airport managers suggested that siting for the temporary tower be discussed with the controlling agency in advance of each fire season to assure the needs of controllers and the airport are met and to avoid any problems during the actual season. The managers also stated that it is important to coordinate the site for a portable tower with the regional FAA staff assigned to the airport.

2. Do you allow "fire camps" where firefighters can set up tents on airport managed property?

Based on interviews with the airport managers, this once common practice appears to have been replaced by the use of off-airport facilities. Although several managers noted that they could accommodate fire camps at the airport in other than secure areas, they generally coordinated with the community to put the firefighters in local parks and/or areas such as fairgrounds, which are more centrally located and within walking distance of city services.

When asked if they would charge the USFS to allow fire camps on the airport, each airport operator stated that they

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would not charge for such use, citing the positive relationship that they have with the USFS and not wanting to "nickel and dime" the USFS and the fire crews that are doing such hard and dangerous work. Security issues were cited by all interviewees as a primary concern related to fire camps on the airfield or even on the airport.

3. The aerial firefighting process can involve a good deal of water and other chemicals such as ammonia-based slurry retardants. Have you experienced any problems with these chemicals and the environment, such as ground contamination or storm water runoff issues?

Each of the airport operators interviewed where retardant is mixed on property is aware of the issues related to storm water runoff and has addressed the matters in ways that are effective in its local area. Retardant containment ranges from full treatment of all water on the airport to only monitoring the outflows, often as part of the airport's Storm Water Pollution Prevention Plan. No airport operators interviewed expressed any concerns or had experienced any problems related to retardant releases; to the contrary, all operators expressed positive experiences with the USFS's handling and cleanup of retardant.

4. Aerial firefighting suppression season commonly corresponds with airport construction season.

Each airport operator had stories to relate about construction experiences and the need to coordinate all airport activities, including firefighting. The operators were very aware that construction and fire seasons frequently coincide. Airport operators varied in their approaches to solving the problem, with some even suggesting that the issue be addressed in the construction documents.

All operators addressed their concerns during construction design meetings. In some instances, critical phases of the construction, such as those that require a runway or taxiway closure, were staged prior to or after the traditional fire season. In other instances, the work was completed at night when firefighting operations were not conducted. Several airport operators implemented contractual arrangements that allowed them to stop or alter construction based on the needs of aerial firefighting aircraft.

In all cases discussed with the airport operators, there was a very high level of consideration given to aerial firefighting operations. Several airport operators suggested that the USFS be invited to construction design meetings to address the issue.

5. How do you "educate" aerial firefighting suppression support personnel about compliance with airport restrictions such as movement/non-movement areas, security matters (TSR 1542), airport rules and regulations, delivery of firefighting supplies, firefighter access to the restricted areas, and other compliance matters?

Each of the airports interviewed had at some point experienced problems with firefighting teams related to security, movement area violations, or unauthorized activities on the airport. Given that each airport has its unique features, the solutions varied. At the airports that require a security plan, the information about access and movement area restrictions is usually dealt with in one of two ways. The first is that the tenant, most likely the USFS, is held responsible for controlling access to the airfield through its access points; as is the industry practice, USFS personnel are trained and then train their vendors and employees. Second, employees that are "badged" receive various forms of training such as security/access control and driver training as part of the badging process.

General aviation airports without TSA-approved security plans report that they meet with the senior fire base manager to review the requirements and rely on the base manager to brief the staff and employees. Airport operators also attend the daily operational briefings conducted by the fire base manager to identify problems and to share information. Airport operators reported that the USFS fire base managers are very responsive, and most problems are quickly solved. The general aviation airports noted that the TSA visits their airports on an annual basis.

6. If it became necessary for one of the aerial firefighting suppression aircraft to jettison a load of firefighting retardant, is there a designated jettison site on the airport? Are there procedures established for the use of this site?

Half of the airports interviewed had established procedures for the jettisoning of retardant on airport property (see Figure 10). Other airport operators indicated that they lived in areas where the pilots could pick an area to unload, and it would cause no problems; in other words, the areas were remote. Two airports stated that they expressly prohibit the practice of jettisoning retardant on airport property except in emergency situations. Several airports experienced accidental discharges of retardant, but no serious problems were encountered. Where

FIGURE 10 Single engine air tanker (SEAT) (USFS website).

procedures are developed at airports with an ATCT, a common practice is to develop a letter of agreement or memorandum of understanding to codify the practices and procedures for jettisoning retardant on airport property.

7. Have you experienced issues/problems with FOD that is generated by aerial firefighting suppression operations, including retardant on ramps, taxiways, and runways? What is the nature of the problem and how did you deal with the matters?

Each airport operator, with one exception, reported that FOD becomes an issue when helicopter operators are present on or when arriving and departing from airports. The FOD generators are the hover/taxi/arrival/departure maneuvers that generate downwash over soft (infield) surfaces. Once the manager talks with the helicopter operators about the issue, the problem is resolved until a new pilot arrives, and the cycle is repeated. It was suggested that a note in the A/FD might be helpful to remind pilots of this issue/problem.

8. As it relates to aerial firefighting suppression operations, who issues NOTAMs concerning operations?

When queried about NOTAM responsibility; that is, who issues NOTAMs and when, airport operators did not identify any problems. However, when asked about adding information to the "airport remarks" portion of the A/FD, the opinions were divided along the lines of towered and non-towered airports. At airports where towers operated during aerial firefighting operations, the value of a comment in the directory was consider marginal; at airports without operating ATC facilities, the operators considered an addition to the directory prudent.

The issue of TFRs was discussed with several airport operators, but no real issues were identified. In the context of aerial wildland firefighting operations, TFRs are issued by the FAA under 14 CFR Part 91, Section 91.137, Temporary Flight Restrictions in the Vicinity of Disaster/Hazard Areas [see *Advisory Circular 91-63C, Temporary Flight Restrictions (TFRs)*, FAA, May 20, 2004, p. 1].

As stated in *Advisory Circular 91-63C,* a "TFR is a regulatory action issued via the U.S. Notice to Airmen (NOTAM) system to restrict certain aircraft from operating within a defined area, on a temporary basis, to protect persons or property in the air or on the ground."

General and Closing Issues

1. What issues or matters are important to airport operators as they relate to aerial firefighting suppression efforts that have not been discussed above?

This question was designed to spur discussion about any related matters that had not been captured in the previous

questions and provide airport managers the opportunity to express their opinions on issues/matters that they believed were important.

Operating Agreements

- Three-quarters of the airport operators commented that having a written agreement was critical for smooth operations. Each operator suggested that an annual review, prior to fire season, of the agreement was very helpful. Several airport operators encouraged a walk-through of the premises to be used by the firefighting agency.
- The operators recommended that airport security plans be reviewed and modified as needed for such things as changed conditions, identification practices, and operating in security areas.

Communications

Crews, including management teams, rotate during extended wildland firefighting suppression efforts. Establishing a mechanism to update calling trees and contact information is critical to smooth operations.

The lead fire suppression agency usually holds daily briefings that are useful to airport operators. The briefings are commonly teleconferenced on a dial-in basis and provide an opportunity for airport operators to understand the agency's plans for the day/week ahead and provide a chance for the airport operators to share information.

Security

One of the real problem areas for both airport operators and aerial wildland firefighting agencies is security, particularly at airports that operate under TSR 1542 and have an airport security plan. At this time, general aviation airports implement various voluntary security guidelines.

- Commercial service/TSR 1542 airports implement various access control requirements, including badging, that can affect aerial operations during the initial response setup.
  - Most airport security plans require individuals who access the airport (inside the security fence) to have an identification badge. To receive an identification badge, individuals must have successfully completed a background check. Application, background check, and training can take from three to ten days, depending on a variety of factors.
  - Some TSR 1542 airports coordinate "changed condition" modifications to their airport security plans with the TSA to allow for temporary escorting provisions or other mechanisms to mitigate some of the security issues. These mitigation strategies can help,

CHAPTER EIGHT

CONCLUSIONS

Based on the review, including the interviews of airport managers, helicopter and fixed-wing operators (pilots), and U.S. Forest Service officials, the state of the wildland firefighting industry appears solid. This document was prepared with the idea that there are airport operators who have yet to experience the seemingly overnight transformation of their airports into a firebase supporting significant aerial firefighting efforts. That uninitiated airport operator, after reading this study, will have a reasonable idea what to expect, which agencies are involved, what issues he or she will face, where to get help, and how to deal with most of the challenges. If there are matters not covered in this study, help from a neighboring airport operator is only one telephone call away.

Airport operators and the firefighting agencies (U.S. Forest Service and Bureau of Land Management primarily) will have to continue to work closely as they both face significant financial stresses in the future. Clearly, from the interviews, goodwill and understanding of each other's needs already exist. Both airports and agencies appear willing to work out win-win solutions to benefit the communities they serve.

One important issue remains: how to get this document into the hands of those airport operators who are not familiar with how to support an aerial wildland firefighting effort. The airport operators who can use the information in this study are the small community general aviation airports with part-time managers or managers who also are responsible for other city operations. Several airport operators suggested that ACRP take the initiative to notify as many aviation organizations as possible that the publication is available online; however, a significant number of airport operators (particularly the smaller operators) do not know about the work of ACRP. Various industry representatives were also mentioned as possible avenues for "pushing" this research to users, including the Airport's Council International (ACI), the American Association of Airport Executives (AAAE), and the National Association of State Aviation Officials (NASAO).

The synthesis uncovered that airports with existing operations and experience with the various firefighting agencies have a significant amount of information that they are willing to share with other airport operators. It appears that one of the strongest, if not the strongest, sources of information is the network of airport operators, if only that resource can be fully utilized.

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ACRONYMS AND ABBREVIATIONS

A/FD	Airport/Facility Directory
ATCT	Air traffic control tower
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
FAR	Federal Aviation Regulation
FBO	Fixed-based operators
FEMA	Federal Emergency Management Agency
FOD	Foreign object damage
GACC	Geographic Area Coordination Center
IC	Incident Command
IMT	Incident Management Team
NASF	National Association of State Foresters
NICC	National Interagency Coordination Center
NIFC	National Interagency Fire Center
NMAC	National Multi-Agency Coordination Group
NIMS	National Incident Management System
NOTAM	Notice to Airmen
NPS	National Park Service
NWS	National Weather Service
TFR	Temporary Flight Restrictions
TSR	Transportation Safety Regulation
USFA	U.S. Fire Administration
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service

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APPENDIX A
Interview Guides

AIRPORT OPERATOR INTERVIEW GUIDE

Airport Data

Airport Represented: _____

Interview Date: _____

Interviewee:

    Name _____

    Position/Job Title _____

Mailing Address:

    Street Name/No. _____

    City/State/Zip _____

Contact Information:

    Telephone: _____

    Cell Phone: _____

    E-mail: _____

General Background Data

1. Describe your experiences dealing with the agencies that have used your airport for aerial wildland firefighting?
2. What types of operations are conducted on your airfield?
3. Where is the aerial firefighting base located in relation to the airport property?

Community, Contractual and Economic Issues

1. What community impacts (hotels, rental cars, restaurants, noise, congestion, others) have you identified when a sustained (30+ days) aerial firefighting suppression effort is initiated on your airport?
2. Fuel sales and fueling of aircraft are often issues that arise when aerial firefighting suppression activities occur on airports. These matters can involve a host of challenging issues such as safety, fees, self-fueling rights, wet leases, and fuel storage/transfer.
3. Is crowd control and public access to operational and security restricted areas a problem?
4. At your airport, who is responsible for coordinating aerial firefighting suppression intergovernmental relations? With whom do you deal on contractual matters for the use of the airport for aerial firefighting suppression matters?
5. When damage to airport-owned assets is caused by aerial firefighting suppression activities, how are repairs completed (by whom) and how is the cost for repairs reimbursed, if at all?

Operational Issues

1. During aerial firefighting operations, has a temporary air traffic control tower (ATCT) ever been established on your airport?
2. Do you allow "fire camps" where firefighters can set up tents on airport managed property?
3. The aerial firefighting process can involve a good deal of water and other chemicals such as ammonia-based slurry retardants. Have you experienced any problems with these chemicals and the environment, such as ground contamination or storm water runoff issues?
4. Aerial firefighting suppression season commonly corresponds with airport construction season.
5. How do you "educate" aerial firefighting suppression support personnel about compliance with airport restrictions such as movement/ non-movement areas, security matters (TSR 1542), airport rules and regulations, delivery of firefighting supplies, firefighter access to the restricted areas, and other compliance matters?
6. If it became necessary for one of the aerial firefighting suppression aircraft to jettison a load of firefighting retardant, is there a designated jettison site on the airport? Are there procedures established for the use of this site?

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7. Have you experienced issues/problems with FOD that is generated by aerial firefighting suppression operations, including retardant on ramps, taxiways and runways? What is the nature of the problem and how did you deal with the matter(s)?
8. As it relates to aerial firefighting suppression operations, who issues NOTAMs concerning operations?

General and Closing Issues

1. What issues or matters are important to airport operators as they relate to aerial firefighting suppression efforts that have not been discussed above?
2. What topics do you think I should have asked you about, but did not?
3. How can we, the people that are putting together this document, make the product most useful for you?

HELICOPTER OPERATOR INTERVIEW GUIDE

Operator Data

Company Represented: _____

Interview Date: _____

Interviewee:

    Name: _____

    Position/Job Title: _____

Mailing Address:

    Street Name/No.: _____

    City/State/Zip: _____

Contact Information:

    Telephone: _____

    Cell Phone: _____

    E-mail: _____

General Discussion Subjects

1. What support can airport operators provide to your company when you are engaged in providing aerial firefighting suppression effort from airports?
2. What problems have you experienced when dealing with airport operators when you are engaged in providing aerial firefighting suppression activities?
3. What issues or matters are important to helicopter operators as it relates to aerial firefighting suppression efforts that have not been discussed above?
4. What topics do you think I should have asked you about, but did not?

APPENDIX B

Interviewee List

Airport	Identifier	Type	Owner	Contact
Abilene Regional Airport *Abilene, TX*	ABI	139	City of Abilene P.O. Box 60 Abilene, TX 79604	Don Green, CM Director of Aviation 2933 Airport Blvd., Suite 200 Abilene, TX 79602 325-676-6367 Office Don.Green@abilenetx.com http://www.abilenetx.com/Airport/index.htm
Cascade Airport *Cascade, ID*	U70	GA	City of Cascade P.O. Box 649 Cascade, ID 83611	Ray Arnold Manager Box 1094 Cascade, ID 83611 208-382-4844 Office 208-634-9284 Cell rayarnold@frontiernet.net
Grant County Regional Airport/Ogilvie Field *John Day, OR*	GCD	GA	Grant County 201 S. Humbolt, Ste. 280 Canyon City, OR 97820	Colin English Manager 720 Airport Road John Day, OR 97820 541-575-1151 airport@grantcounty-or.gov http://www.grantcountyregional airport.com/default.htm
McCall Municipal Airport *McCall, ID*	MYL	GA	City of McCall 216 E. Park McCall, ID 83638	John Anderson, AAE Manager 216 E. Park McCall, ID 83638 208-634-1488 janderson@mccall.id.us http://www.mccall.id.us/government/ departments/airport/airport.html
Missoula International Airport *Missoula, MT*	MSO	139	Missoula County Airport Authority 5225 Highway 10 West Missoula, MT 59808	Cris Jensen, AAE Director 5225 Highway 10 West Missoula, MT 59808 406-728-4381 cjensen@flymissoula.com http://www.flymissoula.com/
Redding Municipal Airport *Redding, CA*	RDD	139	City of Redding Airports Division 6751 Woodrum Circle, #200 Redding, CA 96002-6071	Rod Dinger, AAE Manager 6751 Woodrum Circle, #200 Redding, CA 96002-6071 530-224-4320 Office rdinger@ci.redding.ca.us http://ci.redding.ca.us/transeng/ airports/index.htm
Roberts Field Airport *Redmond, OR*	RDM	139	City of Redmond 716 SW Evergreen Redmond, OR 97756-0100	Carrie Novick, AAE 2522 SE Jesse Butler Circle # 17 Redmond, OR 97756-8643 541-504-3496 carrien@ci.redmond.or.us http://www.ci.redmond.or.us/internet/ index.php?option=com_content&task =view&id=233&Itemid=292
Rocky Mountain Metropolitan Airport *Broomfield, CO*	BJC	139	Jefferson County 100 Jefferson Co. Pkwy. Golden, CO 80419	Kenneth Maenpa, CM Manager 11755 Airport Way Broomfield, CO 80021 303-271-4850 kmaenpa@jeffco.us http://jeffco.us/airport/

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Rogers Field Airport *Chester, CA*	O05	GA	County of Plumas 198 Andy's Way Quincy, CA 95971-7007	Joe Wilson Manager 198 Andy's Way Quincy, CA 95971-7007 530-283-6299 City Office 530-258-3616 FBO joewilson@countyofplumas.com http://www.countyofplumas.com/index.aspx?nid=163
Spokane International Airport *Spokane, WA*	GEG	139	Spokane County-City Airport Board Box 19186 Spokane, WA 99219	Ryan Sheehan Director of Operations 9000 W. Airport Dr. Spokane, WA 99224 509-998-7261 rsheehan@spokaneairports.net http://www.spokaneairports.net/index.htm
Felts Field Airport *Spokane, WA*	SFF	GA	Spokane County-City Airport Board Box 19186 Spokane, WA 99219	Ryan Sheehan Director of Operations 9000 W. Airport Dr. Spokane, WA 99224 509-455-6455 rsheehan@spokaneairports.net

HELICOPTER OPERATOR INTERVIEWS		
Company	Type of Operation	Contact
Erickson Air-crane Incorporate	Heavy lift Type I helicopters	Mike Rotunda U.S. Aerial Firefighting Manager 5550 S.W. Macadam Ave., Suite 200 Portland, OR 97239 505-603-9275 Office mrotonda@ericksonaircrane.com http://www.ericksonaircrane.com/index.php
P.J. Helicopters	Medium lift Type II helicopters	Dave Vansauls President and Director of Maintenance 903 Langley Way Red Bluff, CA 96080 530-527-5059 Office dave@pjhelicopters.com http://pjhelicopters.com/

APPENDIX C

Additional Resources

This appendix was developed during the research portion of this study. As noted in other sections of this report, most of the information on this subject comes directly from the web. Government agencies are placing files on their websites that would be useful, interesting, and helpful for an airport operator seeking additional information about a particular subject related to wildland firefighting. As an example, on the NIFC website under the Aviation link [http://www.nifc.gov/aviation/aviation_main.html (accessed August 31, 2011)] is a hyperlink (Reference Materials and Guides) that connects to documents on a number of subjects of interest and use such as the *Interagency Helicopter Operations Guide,* the *BIA Aviation Plan,* and other sites related to this study.

There is substantial information about how federal and state governments agencies deal with the suppression of wildland fires, the use of aerial resources (fixed- and rotary-wing aircraft), and the deployment of resources, but precious little about airport operations. To that end, the following is a list of sites where airport operators can educate themselves about these matters. With each link, there is a brief description of the information contained on the site. These sources are in addition to those cited in the References section of the report.

The primary focus of the federal agencies responsible for wildland fire suppression is on the western states. In general, most information concerns operations in Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. There is little, if any, reference to other states on the federal websites (USFS, BLM, BIA, or NPS) related to wildland firefighting operations; however, much of the information relative to the western states is relevant to other states.

The following is intended to guide readers of this study to sites directly related to the study's subject. During the course of researching, this study reviewed hundreds of pages of web links; the following supplemental sites are highlighted because they are most useful and, in some instances, difficult to find.

Bureau of Land Management

The BLM website (www.blm.gov) is one of the most helpful websites in terms of information about wildland fire issues, most likely because BLM manages a significant amount of federal land, the largest amount of any federal agency according to the website. The www.blm.gov/nifc/st/en/prog/fire/Aviation/Administration.html (accessed August 23, 2011) site is recommended for further information.

- On this web page BLM has posted state aviation plans from Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, and Wyoming with links to each state's plan.
  - The plans tend to follow a common format and are customized for each state.
  - Airport operators will find useful information about wildland aerial firefighting matters in the plans.

- On this web page is a link to the Office of Fire and Aviation Directory. This link leads to a portable document file (.pdf) phone directory for all units at the NIFC and for personnel within BLM and other agencies responsible for managing aerial wildland firefighting operations.

National Park Service

This website hosts the best resources for information about how the federal firefighting service works and the documents that guide those operations. On the web page titled Fire and Aviation Management http://www.nps.gov/fire/fire/fir_wil_planningandpolicy.cfm (accessed September 1, 2011) is a document created by the NPS called the *Reference Manual 18: Wildland Fire Management—National Park Service.* A brief description of the information contained in this manual follows:

> Chapters 1 through 21 represent the most detailed and comprehensive guidance on implementing Service-wide wildland fire management policy for the National Park Service. Reference Manual 18 (RM 18) provides NPS field employees legal references, operating policies, standards, procedures, general information, recommendations, and examples to assist them in carrying out Management Policies and Director's Orders. This document is intended to be read in its entirety. While certain chapters or sections provide important guidance by themselves, there is an interrelationship among the chapters that provides clarity and continuity for the management of wildland fire on lands administered by the National Park Service.

The manual can be downloaded in pdf format at http://www.nps.gov/fire/fire/fir_wil_planningandpolicy.cfm.

The most valuable section of the manual is Appendix I, which contains hundreds of web links in the "Toolbox"; each web link has a short title that identifies the information available.

FEDERAL AND NATIONAL AGENCIES

U.S. Department of the Interior

The U.S. Department of the Interior (DOI) was created by an act of Congress in 1849 with the charge to attend to the country's internal affairs. Like many other federal agencies, DOI found its responsibilities were increased over time and now include the following agencies with direct responsibilities for wildland fire suppression. Each of these agencies is a member of the NICC:

- The National Park Service
- U.S. Fish and Wildlife Service
- Bureau of Land Management
- Bureau of Indian Affairs.

The DOI's Mission Statement says it "protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future" (DOI—Who We Are 2011).

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National Park Service

The NPS was formed in 1916 and is charged with the responsibility to tend to the 394 units of the National Park System, including 123 historical parks/sites, 74 monuments, 58 national parks, 25 battlefields/military parks, 18 preserves, 18 recreational areas, 10 seashores, 4 parkways, 4 lakeshores, and 2 reserves. Responsibilities also include management of the NPS lands and management of wildland fire (NPS Overview 2010). As a point of clarification, "units" that the NPS administers include lands other then those commonly known by the public and identified previously.

The NPS mission is "to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (NPS website 2011).

U.S. Fish and Wildlife Service

In 1940, DOI consolidated two existing bureaus, the Bureau of Fisheries and the Bureau of Biological Survey, resulting in the formation of the Fish and Wildlife Service. Over time, additional responsibilities were assigned to that agency, and in 1974 it was redesignated as the U.S. Fish and Wildlife Service (USFWS). According to the USFWS website, it manages more than 145 million acres, including 552 national wildlife refuges, more than 27,000 special management areas, and operates 69 national fisheries in the United States and its territories (USFWS—*About the U.S. Fish and Wildlife Service* 2010).

The USFWS mission is "to work with others to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people" (USFWS—*About the U.S. Fish and Wildlife Service* 2010).

Bureau of Land Management

BLM, according to the bureau's website, manages more than 245 million surface acres of land (700 million acres of subsurface land) and is the largest land manager of all federal agencies. The majority of the lands administered by BLM are located in the 12 western states and Alaska (*BLM: Who We Are, What We Do* 2011).

The BLM mission is "to sustain the health, productivity, and diversity of America's public lands for the use and the enjoyment of present and future generations" (*BLM: Who We Are, What We Do,* 2011).

Bureau of Indian Affairs

BIA is the oldest bureau in DOI, dating back to 1824. BIA administers and manages 55 million surface acres of land (DOI, Indian Affairs 2011).

The BIA mission is to "enhance the quality of life, to promote economic opportunity, and to carry out the responsibility to protect and improve the trust assets of American Indians, Indian tribes, and Alaska Natives" (DOI, Indian Affairs 2011).

U.S. Forest Service

The USFS was established in 1905 within the Department of Agriculture with responsibility to manage public lands in the national forests and grasslands (*USFS—About Us* 2010). The USFS has multiple responsibilities for the public lands it administers, but one of the largest roles is its activities associated with fire management and the aviation resources associated with those activities. As identified on the USFS Fire and Aviation Management web page (http://www.fs.fed.us/fire/), Forest Service Fire and Aviation Management "is a diverse group of people working to advance technologies in fire management and suppression, maintain and improve the extremely efficient mobilization and tracking systems in place, and reach out in support of our Federal, State, and International fire partners" (*USFS—Fire & Aviation Management* 2010).

The mission of the USFS is "to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations" (*USFS—About Us—Mission* 2008).

National Weather Service

The NWS is one of the major components of the National Oceanic and Atmospheric Administration (NOAA) under the U.S. Department of Commerce. The NWS's critical role in support of the NIFC is to identify weather conditions and their impact on fire behavior. For airport operators, one of the most useful services of the NWS related to wildland firefighting is the up-to-date "Fire Weather" page (http://radar.srh.noaa.gov/fire/) where current fire conditions can be accessed.

The mission of NWS is to provide "weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community" (NOAA 2011).

Federal Emergency Management Agency

Of all the federal agencies with a major role in preparing for and dealing with disasters such as major forest/range fires, FEMA is probably the agency with the most dynamic background. Currently, FEMA is part of DHS and now plays a major role in emergency planning and preparedness for all disasters, including terrorism. The follow information from "FEMA History" on the agency's website http://www.fema.gov/about/history.shtm explains its evolution.

The Federal Emergency Management Agency coordinates the federal government's role in preparing for, preventing, mitigating the effects of, responding to, and recovering from all domestic disasters, whether natural or man-made, including acts of terror. FEMA can trace its beginnings to the Congressional Act of 1803. This act, generally considered the first piece of disaster legislation, provided assistance to a New Hampshire town following an extensive fire. In the century that followed, ad hoc legislation was passed more than 100 times in response to hurricanes, earthquakes, floods, and other natural disasters.

By the 1930s, when the federal approach to problems became popular, the Reconstruction Finance Corporation was given authority to make disaster loans for repair and reconstruction of certain public facilities following an earthquake, and later, other types of disasters. In 1934, the Bureau of Public Roads was

given authority to provide funding for highways and bridges damaged by natural disasters. The Flood Control Act, which gave the U.S. Army Corps of Engineers greater authority to implement flood control projects, was also passed. This piecemeal approach to disaster assistance was problematic and it prompted legislation that required greater cooperation between federal agencies and authorized the President to coordinate these activities.

The 1960s and early 1970s brought massive disasters requiring major federal response and recovery operations by the Federal Disaster Assistance Administration, established within the Department of Housing and Urban Development (HUD). Hurricane Carla struck in 1962, Hurricane Betsy in 1965, Hurricane Camille in 1969, and Hurricane Agnes in 1972. The Alaskan Earthquake hit in 1964 and the San Fernando Earthquake rocked Southern California in 1971. These events served to focus attention on the issue of natural disasters and brought about increased legislation. In 1968, the National Flood Insurance Act offered new flood protection to homeowners, and in 1974 the Disaster Relief Act firmly established the process of Presidential disaster declarations.

However, emergency and disaster activities were still fragmented. When hazards associated with nuclear power plants and the transportation of hazardous substances were added to natural disasters, more than 100 federal agencies were involved in some aspect of disasters, hazards and emergencies. Many parallel programs and policies existed at the state and local level, compounding the complexity of federal disaster relief efforts. The National Governor's Association sought to decrease the many agencies with which state and local governments were forced to work. They asked President Jimmy Carter to centralize federal emergency functions.

Executive Order 12127

President Carter's 1979 executive order merged many of the separate disaster-related responsibilities into the Federal Emergency Management Agency (FEMA). Among other agencies, FEMA absorbed: the Federal Insurance Administration, the National Fire Prevention and Control Administration, the National Weather Service Community Preparedness Program, the Federal Preparedness Agency of the General Services Administration, and the Federal Disaster Assistance Administration activities from HUD. Civil defense responsibilities were also transferred to the new agency from the Defense Department's Defense Civil Preparedness Agency.

John Macy was named as FEMA's first director. Macy emphasized the similarities between natural hazards preparedness and the civil defense activities. FEMA began development of an Integrated Emergency Management System with an all-hazards approach that included 'direction, control, and warning systems which are common to the full range of emergencies from small isolated events to the ultimate emergency—war.'

The new agency was faced with many unusual challenges in its first few years that emphasized how complex emergency management can be. Early disasters and emergencies included the contamination of Love Canal, the Cuban refugee crisis, and the accident at the Three Mile Island nuclear power plant. Later, the Loma Prieta Earthquake in 1989 and Hurricane Andrew in 1992 focused major national attention on FEMA. In 1993, President Clinton nominated James L. Witt as the new FEMA director. Witt became the first agency director with experience as a state emergency manager. He initiated sweeping reforms that streamlined disaster relief and recovery operations, insisted on a new emphasis regarding preparedness and mitigation, and focused agency employees on customer service. The end of the Cold War also allowed Witt to redirect more of FEMA's limited resources from civil defense into disaster relief, recovery, and mitigation programs.

In 2001, President George W. Bush appointed Joe M. Allbaugh as the director of FEMA. Within months, the terrorist attacks of Sept. 11th focused the agency on issues of national preparedness and homeland security, and tested the agency in unprecedented ways. The agency coordinated its activities with the newly formed Office of Homeland Security, and FEMA's Office of National Preparedness was given responsibility for helping to ensure that the nation's first responders were trained and equipped to deal with weapons of mass destruction.

A New Mission: Homeland Security

Billions of dollars of new funding were directed to FEMA to help communities face the threat of terrorism. Just a few years past its 20th anniversary, FEMA was actively directing its 'all-hazards' approach to disasters toward homeland security issues. In March 2003, FEMA joined 22 other federal agencies, programs and offices in becoming the Department of Homeland Security. The new department, headed by Secretary Tom Ridge, brought a coordinated approach to national security from emergencies and disasters—both natural and man-made.

On October 4, 2006, President George W. Bush signed into law the Post-Katrina Emergency Reform Act. The act significantly reorganized FEMA, provided it substantial new authority to remedy gaps that became apparent in the response to Hurricane Katrina in August 2005, the most devastating natural disaster in U.S. history, and included a more robust preparedness mission for FEMA.

As it has for almost 30 years, FEMA's mission remains: to lead America to prepare for, prevent, respond to and recover from disasters with a vision of 'A Nation Prepared' (*FEMA— History* 2011).

FEMA's mission is "to support our citizens and first responders to ensure that as a nation we work together to build, sustain, and improve our capability to prepare for, protect against, respond to, recover from, and mitigate all hazards" (*FEMA— FEMA Mission* 2011).

National Association of State Foresters

The NASF is a "non-profit organization comprised of the director of forestry agencies in the states, territories and the District of Columbia for the United States" (NASF 2011). The NASF is an important agency because it represents a link between the federal fire agencies and the state agencies responsible for fire protection in the individual states and territories, including the District of Columbia. NASF is also one of the six participating agencies of the NICC (NICC 2011).

REGIONAL ASSOCIATIONS

In the United States, there are three regional associations of state foresters that have been formed "to support forest management practices and polices unique to the regional characteristics and need of our diverse forest resources in the United States" (NASF 2011). These regional associations focus on matters of a regional nature and interests.

- Northeastern Area Association of State Foresters—http://www.northeasternforests.org/ [accessed Aug. 25, 2011]
  Ian MacFarlane
  Executive Director
  P.O. Box 4465
  Washington, D.C. 20017-0465
  202-526-4804

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- Southern Group of State Foresters—http://www.southern forests.org/about [accessed Aug. 25, 2011]
  Mike Zupko
  Executive Director
  P.O. Box 930
  Winder, Georgia 30680
  770-267-9630
- Council of Western State Foresters—http://www.wflcweb. org/council/ [accessed Aug. 25, 2011]
  Caitlyn Peel
  Executive Director
  2850 Youngfield Street, 4th Floor
  Lakewood, CO 80215
  303-445-4362

STATE AGENCIES

Within each state and territory of the United States, there are agencies designated as the primary entity to administer state lands; it is often these agencies that deal with aerial firefighting suppression efforts. These agencies are known by different titles such as commissions, divisions, forest services, administrations, departments, offices, or units, but all of them have one thing in common: they tend to land matters and connect to one of the federal agencies identified above.

These various state agencies belong to the NASF, which maintains a website where members and their contact information is available (NASF 2011).

Abbreviations used without definitions in TRB publications:

AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation