Federal Aviation Administration

DOT/FAA/AM-07/4
Office of Aerospace Medicine
Washington, DC 20591

An Analysis of Preflight Weather Briefings

O. Veronika Prinzo
Civil Aerospace Medical Institute
Federal Aviation Administration
Oklahoma City, OK 73125

Alfred M. Hendrix
Ruby Hendrix
Hendrix & Hendrix
Roswell, NM 88201

February 2007

Final Report

NOTICE

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT/FAA/AM-07/4		

4. Title and Subtitle	5. Report Date
An Analysis of Preflight Weather Briefings	February 2007
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
Prinzo OV,[1] Hendrix AM,[2] Hendrix R[2]	

9. Performing Organization Name and Address		10. Work Unit No. (TRAIS)
[1]FAA Civil Aerospace Medical Institute P.O. Box 25082 Oklahoma City, OK 73125	[2] Hendrix & Hendrix 15 Circle Drive Roswell, NM 88201	11. Contract or Grant No.

12. Sponsoring Agency name and Address	13. Type of Report and Period Covered
Office of Aerospace Medicine Federal Aviation Administration 800 Independence Ave., S.W. Washington, DC 20591	14. Sponsoring Agency Code

15. Supplemental Notes

Work was accomplished under approved task AM-B-05-HRR-516

16. Abstract

Weather is often cited as a factor in general aviation (GA) accidents and mishaps. The type of weather information requested from, or provided by, automated flight service station (AFSS) specialists is dependent on weather conditions at the time the preflight briefing occurs. However, little is known about how this weather information is used by GA pilots. The purpose of this research was to document the types of AFSS weather information that GA pilots requested and received and how this information might influence flight planning and weather–based decisions. A content analysis was performed on 306 GA pilot telephone conversations with AFSS specialists who staffed the preflight position. Twenty-four hours of continuous recordings of one good, typical, and bad weather day at an AFSS in the New England, Northwest Mountain, and Southwest Region were obtained prior to the Federal Aviation Administration contracting out those services. The data show that more calls were made on days of bad weather than on days of good and typical weather within the vicinity serviced by the AFSS. Approximately 78% of the pilots requested a preflight briefing (they requested a standard weather briefing more often than any other), and about 15% declined a weather briefing when asked by the AFSS specialist. Of the pilot-requested preflight weather briefings, specialists relayed the following weather items: Weather synopsis, sky conditions (clouds), visibility, and weather conditions at the departure, en route, and destination point. When pilots **declined** preflight weather briefings, as they did in 15.4% of the calls (good weather 16.7%, typical weather 5.0%, bad weather 20.6%), AFSS still relayed weather synopsis and sky conditions (clouds) in addition to any other weather conditions that might prove to be significant during a flight. Whether by asking for additional information or receiving weather information from specialists, 31 pilots decided that it was best to change their flight plans (46.9% delayed, 15.6% postponed or cancelled their flights, and 15.6% looked for alternate routes and destination points). Surprisingly, 27% of the pilots who were told 'VFR Flight Not Recommended' went ahead and filed a VFR flight plan anyway.

17. Key Words	18. Distribution Statement
Weather, Preflight Weather Briefing, Flight Service Station, General Aviation	Document is available to the public through the Defense Technical Information Center, Ft. Belvior, VA 22060; and the National Technical Information Service, Springfield, VA 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	24	

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

ABBREVIATIONS

As used in this report, the following abbreviations/acronyms have the meanings indicated

Abbreviation	Meaning
AFIS	Airborne flight information service
AFS	Flight Standards Service
AFSS	Automated Flight Service Station
AIRMET	Airmen's meteorological information
ATC	Air traffic control
ATIS	Automatic terminal information service
CFR	Code of Federal Regulations
DAT	Digital audiotape
DVRS	Digital voice reproducer system
EFAS	En route flight advisory service
FAA	Federal Aviation Administration
FAAO	FAA Order
FBO	Fixed-base operators
FSS	Flight Service Station
GA	General Aviation
GA-JSC	General Aviation Joint Steering Committee
IFR	Instrument flight rules
IMC	Instrument meteorological conditions
MOA	Military operations area
MTR	Military training route
NM	Nautical mile
NOAA	National Oceanic and Atmospheric Administration
NOTAM	Notice to Airmen
NTSB	National Transportation Safety Board
PFB	Preflight briefing
PIREP	Pilot weather report
SIGMET	Significant meteorological information
SME	Subject matter expert
TFR	Temporary flight restrictions
USA	United States of America
UTC	Coordinated universal time
VFR	Visual flight rules
WX	Weather

An Analysis of Preflight Weather Briefings

"… When it is evening, you say, `It will be fair weather; for the sky is red.'
And in the morning, `It will be stormy today, for the sky is red and threatening.'…."
—Matthew 16:2-3

Since its inception, the automated flight service station has evolved to be the single most widely used general aviation (GA) weather-information-provider. The *Code of Federal Regulations* (CFR) 14, Part 91.103 stipulates: "Each pilot in command shall, before beginning a flight, become familiar with all available information concerning that flight. This information must include- (a) For a flight under IFR or a flight not in the vicinity of an airport, weather reports and forecasts, …" Unlike the 14 CFR for Part 121 (domestic, flag, and supplemental) and Part 135 (commuter and on demand) operators, the regulations for Part 91 (general aviation) operators do not stipulate that GA pilots must contact a particular approved source for weather information. They can acquire any weather information in real-time from a multitude of sources that include television, radio, Internet, and AFSS or by simply going outside and looking at the sky conditions.[1]

In preparation for a flight, GA pilots can call their local AFSS to receive standard, abbreviated, and outlook preflight briefings. AFSS specialists provide them with local, en route, and destination weather information to aid route planning and go/no go decision-making when faced with possible adverse weather. Generally, the first contact by a GA pilot is with the Preflight position, where either a visual flight rules (VFR) or instrument flight rules (IFR) flight plan is filed and requests are made for any specific information. The Preflight position then would relay a briefing of items outlined in *FAAO 7110.10R Flight Services* § 3-2-1 through § 3-2-3 (Federal Aviation Administration, 2004).

After departure, a GA pilot flying a VFR aircraft could *use airborne flight information service (AFIS[2]), but would normally* contact the AFSS Inflight/Flight Watch position for additional weather information. The pilot of an IFR aircraft may also contact an AFSS Inflight specialist, use AFIS to receive weather information, or speak directly with an ATC specialist at a Terminal Radar Approach Control or En route Air Traffic Control facility.

Although the focus of this report is on the preflight weather briefings, the availability of weather information during actual flights is worthy of a separate study. In particular, accident data show that the number of in-flight contacts with AFSS, even by pilots ultimately involved in fatal weather accidents, averages 3% of the accident flights (Lenz 2006)[3]. According to Lenz it is this tactical information that is vital to pilots for avoiding weather hazard areas during IFR and VFR flights. Given the rapid and immediate access to, and availability of, weather information, it is surprising that weather still is listed as a causal or contributing factor in 30% to 35% of aviation accidents and incidents (Pearson, 2002). For a comprehensive review and summary of the NTSB accident reports involving fixed-wing general aviation aircraft weighing 12,500 pounds or less see the Nall Report (Aircraft Owners and Pilots Association Fight Safety Foundation 2005).

The Federal Aviation Administration (FAA) Flight Standards Service (AFS) General Aviation and Commercial Division's mission has initiated numerous GA safety programs in response to recommendations made by the National Transportation Safety Board (NTSB, 1968, 1974, 1976, 1989, 2005) regarding weather and pilot decision-making. The FAA-Industry General Aviation Joint Steering Committee (GA-JSC) has focused heavily on ways to mitigate accidents involving weather and pilot decision-making. FAA-sponsored research activities are attempting to identify the factors that give rise to GA pilots flying into instrument meteorological conditions.

For example, Driskill, Weissmuller, Quebe, Hand, Dittmar, and Hunter (1997) conducted a study to examine how pilots evaluate weather and terrain information in preparation of a flight. They had 150 pilots (age: 18-79 yrs) (flight time: 6-26,500 hrs) read three sets of 27 different weather scenarios, sort them from least to most comfortable about completing the flight, and assign a comfort rating to each one. Each scenario within a set was unique with respect to precipitation (light rain, moderate rain, heavy snow), visibility (1 NM, 4 NM, 8 NM), and ceiling (800 ft, 1800 ft, 4000 ft) and, when

[1] For a record of the source of weather information to be available, pilots must contact an AFSS, use DUATs, or use a commercial weather service provider.

[2] AFIS included any automated weather reports other than an AFSS or any other air traffic control facility. It included airborne systems, DUATS, etc.

[3] All references to Lenz are from personal communication with him in June 2006. Michael Lenz was with the FAA's Office of System Safety and is currently with the FAA's General Aviation and Commercial Division.

combined, they were plausible according to evaluations performed by weather experts. The weather scenarios were representative of three cross-country flights that varied in terrain (water: Great Lakes, non-mountainous: North Texas, mountainous: New Mexico). The major finding was that pilots consistently used the available weather information to determine the safety risk associated with VFR flights for all weather and terrain conditions. However, pilots differed in their degree of comfort with the presented weather scenarios when faced with flying over different terrains. Driskill et al. suggested that pilots might differentially weigh weather information according to terrain such that higher values (e.g., high visibility) compensated for lower values in others (e.g., low ceiling) for non-mountainous terrains but not for flights that involved mountainous terrains (they might use an absolute value for the decision point).

More recently, Knecht, Harris, and Shappell (2005) performed a simulation study that also examined weather-related pilot decision-making. In their study, pilots were provided with a hypothetical situation in which they were to transport a piece of equipment from an uncontrolled airfield near Oklahoma City, OK, to an oilfield near Amarillo, TX. The equipment was crucial to bring oil production back on-line. The low-incentive pilots were told that they were paid on a per-hour basis and would be paid regardless of their fly/no fly decision. Pilots in the high-incentive group received a sizeable bonus for immediate takeoff that decreased incrementally with every 30-min delay. In preparation for the VFR flight, all pilots received the same current weather report that included marginal visibility (1 sm, 3 sm, 5 sm) and cloud ceiling (1000 ft, 2000 ft). After receiving the weather report, they had to decide whether to fly, wait and try later, or cancel the flight. Those pilots choosing to wait received updated weather reports every 30 min until they either flew or two hours elapsed at which time the experiment ended (the weather never improved beyond marginal visibility). Like the findings reported by Driskell et al., the results of Knecht et al. suggested that pilots consider both the visibility and cloud ceiling(s) when deciding whether or not to fly. It may be that their value judgments became compromised when presented with external pressures such as a financial bonus (as evidenced with a tendency toward longer decision times when compared with pilots who were not offered a bonus). Since the vast majority of weather-related, fatal accidents occur on cross-country flights, these pressures are always present on actual flights (Lenz 2006).

Although informative, neither study included dynamic communication opportunities between the pilots and AFSS personnel (or access to other sources of weather information). Inasmuch as the most recent NTSB safety study (2005) reported that in 66% of the fatal and 58% of the non-fatal accidents, pilots received preflight weather information from an AFSS before their flights, it did not report on the quality of the information that these pilots received. Consequently, little is known about the information obtained from the AFSS and its influence on pilot decision-making during preflight preparations. While the types of services that AFSS provide are listed in the FAA publication *FAAO 7110.10R Flight Services*, data are not available as to either the frequency that these services are provided to pilots or the types of weather information pilots receive that might help mitigate GA fatal accidents related to weather or visibility. This is worthy of further study as related to accidents.

This study examined the communications that took place between the AFSS specialists staffing the Preflight position and pilots who called in on the telephone. The data were used to develop baseline descriptive statistics to describe the frequency of occurrence and content of preflight briefings with a special emphasis on documenting the types of weather information that pilots request and might use when planning a flight or making weather-based decisions. Specifically, we conducted a verbal content analysis on time-stamped digital audiotape (DAT) recordings that were obtained from FAA-operated AFSSs in the New England, Northwest Mountain, and Southwest Regions. In particular, preflight standard, abbreviated, and outlook weather briefings were examined that represented a good, typical, and bad weather day occurring around the area serviced by each of the three AFSS.

METHOD

Materials

Audiotapes. One AFSS in the New England, Northwest Mountain, and Southwest Region was contacted and asked to provide 24 hours of continuous DAT recordings that best represented a good, typical, and bad weather day at and around their facility. Each DAT contained separate voice records of all communication transmitted on the radio frequency assigned to a particular sector position on the left channel. The right channel contained the Coordinated Universal Time (UTC) time code. The NiceLogger™ Digital Voice Reproducer System (DVRS) decoded, displayed, and correlated time with the voice stream in real time. Presented in Table 1 are the dates and times of those recordings.

AFSS Communication Spreadsheet. Five areas of information were identified and recorded: **Facility Information** included briefing number, the name of the facility, sector/position identifier, an assigned AFSS specialist identifier, DAT time sample, the onset of preflight briefing in UTC (hr:min:sec), proposed departure time,

Table 1. AFSS sampled according to date and time (Local and UTC)

FAA Region / Weather	Date and Local Time	Date and UTC (Zulu Time)
New England		
Good	06/02/05 0000 to 06/02/05 2359	06/02/05 0400 to 06/03/05 0359
Typical	06/17/05 0000 to 06/17/05 2359	06/17/05 0400 to 06/18/05 0359
Bad	06/16/05 0000 to 06/16/05 2359	06/16/05 0400 to 06/17/05 0359
Northwest Mountain		
Good	05/27/05 0500 to 05/29/05 0500L	05/27/05 1200 to 05/29/05 1200Z
Typical	05/29/05 0500 to 05/31/05 0500L	05/29/05 1200 to 05/31/05 1200Z
Bad	05/31/05 0500 to 06/02/05 0500L	05/31/05 1200 to 06/02/05 1200Z
Southwest		
Good	06/12/05 0000 to 06/12/05 2359L	06/12/05 0500 to 06/13/05 0459Z
Typical	06/11/05 0000 to 06/11/05 2359L	06/11/05 0500 to 06/12/05 0459Z
Bad	06/10/05 0000 to 06/10/05 2359L	06/10/05 0500 to 06/11/05 0459Z

Figure 1. An example of a completed form containing pilot and AFSS specialist communications

Table 2. Number of calls made to each AFSS according to weather

Weather	FAA Region			Total
	New England	Northwest Mountain	Southwest	
Good	28 (30)	30 (30)	25 (30)	83 (90)
Typical	29 (30)	18 (20)	29 (30)	76 (80)
Bad	41 (46)	45 (45)	41 (45)	127 (136)
Total	98 (106)	93 (95)	95 (105)	286 (306)

and weather. **Aircraft Information** contained the call sign, type of aircraft, and any weather-related avionics equipment aboard[4]. **Flight Information** recorded whether the pilot filed a flight plan, the type flight plan, whether it was a day or night flight, the purpose of the flight, and the method of communication with the AFSS. **Pilot Requests/Reports** involved whether the pilot requested a preflight briefing, the type preflight briefing, the specific weather, NOTAMs, TFRs, special airspace activity, other weather information, and whether the preflight briefing altered the pilot's intention to fly. **AFSS Preflight Information** provided for the encoding of type of briefing, specific weather, NOTAMs, TFRs, special use airspace, other information related to the safety of the flight, and whether VFR flight was not recommended. Presented in Appendix A is a description of the Excel spreadsheet that was developed to record/encode this data. It allows for the inclusion of communications between the pilot and Inflight and Flight Watch positions.

Subject Matter Expert (SME)

The SME (a co-author of this report) was an instrument-rated pilot and former air traffic controller who had worked as an FAA Academy instructor for 8 years and had worked for 12 years in FAA supervision and management. This individual had previously encoded over 50,000 ATC messages, suggesting that he was highly familiar and expert in the extraction and codification of verbal messages.

Procedure

The SME was provided with, and trained on, one DVRS and received the most recent version of *FAAO 7110.10R Flight Services*. It guided the development of the AFSS communication spreadsheet**.** The SME also was instructed on whom to contact at each AFSS facility, should additional information be needed (e.g., call-sign identifiers, routes).

[4] This information was provided by the pilots when talking with the AFSS specialist.

The SME listened to a voice sample stored on the DVRS and developed a form to record the types of information exchanged between pilots and AFSS specialist. While listening a second time, the SME recorded the contents of each transmission onto the data entry form such as the one displayed in Figure 1.

During a third pass, the accuracy of the encodings was evaluated, and if correct, left alone. In some instances additional information was added while, in others, values were corrected to reflect what was spoken. These data were entered onto the EXCEL spreadsheets and verified by the SME and data entry clerk. If, during error checking, a discrepancy was found, they went to the DVRS and listened yet again to the time sample that correlated with the message and data point in question.

The EXCEL spreadsheets were imported into SPSSx and combined to create a master database. The data were once again subjected to error checking, and only three data points were corrected.

RESULTS

As shown in Table 2, the recordings represented 306 calls made on good, typical, and poor weather days occurring in the New England, Southwest, and Northwest Mountain Regions.[5] Each cell in the table represents the number of calls according to the aircraft call sign (not in parentheses) made to the AFSS on a particular day and total number of calls (in parentheses). Not surprisingly, more unique calls were made on days with bad weather than on good and typical weather days, $\chi^2(2) = 16.03$, $p \leq .05$ and the geographical location of the FAA AFSS did not matter, $\chi^2(2) = 0.13$.

The SME listened to the tapes and documented whether the pilot requested (239) or declined (47) a preflight briefing (PFB). He also recorded the types of

[5] To meet the assumptions of the Chi-Square test, 10 pilots made more than one call to an AFSS. Their calls were not included in the statistical analysis, thereby reducing the number of unique calls to 286.

Table 3. Type of preflight weather briefing requested according to the type of flight plan filed

	Type of Preflight Weather Briefing Requested				
Flight Plan	Standard	Abbreviated	Outlook	None	Total
VFR	72	63	22	9	166
IFR	39	35	8	38	120
Total	111	98	30	47	286

weather information requested by pilots or provided by the AFSS specialists.

The pilots generally fell into three basic groups. 1) Local fliers; training schools, students, aircraft buffs, and "hole borers" that stay within 30-50 miles of the departure point and return to that airport. This group made up a large part of the VFR briefings. 2) Fixed-base operators (FBOs) who rent aircraft and transport passengers for hire, advanced training, and short distance carriers (with stored or pre-filed flight plans), and pilots of larger aircraft. There appeared to be approximately 60% VFR and 40% IFR pilots. 3) Business, military (training and operations), corporate, and long-distance lifeguard pilots who probably will be looking at Internet aviation weather services while discussing the preflight briefing with the AFSS specialist.

As shown in Table 3, an examination of the type of flight plan filed revealed that the VFR pilots requested standard weather briefings more often than either abbreviated, outlook, or no briefings $\chi^2(3) = 68.17$, $p \leq .05$. On the other hand, IFR pilots seemed to request standard and abbreviated briefings to a greater extent than outlook briefings and no weather briefings more often than outlook briefings $\chi^2(3) = 21.80$, $p \leq .05$.

The data presented in Tables 4-5 show that, regardless of weather conditions, of the pilot-requested preflight weather briefings, AFSS specialists relayed the following weather items: Weather synopsis, sky conditions (clouds), visibility, weather conditions at the departure, en route, and destination point. More detailed weather data were passed during periods of adverse weather. Although used to a lesser degree, these data included adverse conditions, altimeter, cloud tops, dew point, icing conditions, surface winds, winds aloft, temperature, thunderstorm activity, precipitation, precipitation intensity, visibility obscuration, other weather, PIREP, AIRMET/SIGMET, MOA, MTR, NOTAMs, and TFRs (see abbreviations).

When pilots **requested** preflight briefings on a good weather day, AFSS specialists relayed weather synopsis, sky conditions, visibility, as well as the weather conditions at the departure point, en route weather conditions, and weather at the destination approximately 75%- 85% of the time with surface winds included 73.3%. During these briefings, pilots tended to request sky conditions, winds aloft, and NOTAMs to a greater extent than to request the weather at the destination point or en route. They were even less likely to request visibility, surface winds, or upper level winds. Pilots never requested precipitation intensity, icing conditions, altimeter, or TFRs.

On a typical weather day, as part of a requested preflight briefing, AFSS specialists relayed sky conditions, provided a weather synopsis, as well as relayed the weather conditions at the departure, en route, and destination points between 86.8% to more than 93% of the time. To a lesser extent (76.3%-51.3%), they also provided surface winds, visibility, adverse conditions, thunderstorm activity, and NOTAMs. Pilots, in turn, asked about the en route weather, sky conditions, and weather at the destination point, followed by requests for TFRs, weather conditions at the departure point, and NOTAMs. They never requested visibility obscuration, temperature, dew point, precipitation intensity, or altimeter information.

Finally, on bad weather days, as part of a requested preflight briefing, AFSS specialists relayed the sky conditions, provided a weather synopsis, relayed adverse conditions, provided weather information at the departure, en route, and destination points, and surface winds during 80.6% - 89.9% of the briefings. At least 50% of these briefings also included visibility, AIRMET/SIGMET, precipitation, and winds aloft information. Pilots, in turn, requested the weather at their destination point, followed by en route conditions, weather at the departure point, and winds aloft. They never asked about ATC delays, visibility obscuration, the temperature, or dew point.

When pilots **declined** preflight weather briefings, as they did in 15.4% of the calls (good weather 16.7%, typical weather 5.0%, bad weather 20.6%), AFSS specialists still relayed weather synopsis and sky conditions (clouds), in addition to any other weather conditions that might prove to be significant during a flight. During these briefings, on good weather days some pilots asked about the weather at their destination points, TFRs, thunderstorm activity, and en route weather conditions. On typical weather days, conversations included weather conditions at the point of departure, en route, and at the destination, in addition to winds aloft, thunderstorm activity

Table 4. Percentage of pilot-requested/reported weather information as a function of whether a preflight weather briefing was or was not requested by the pilot

Type of Pilot-Requested/Reported Weather Information	Type of Weather Day for AFSS					
	Good		Typical		Bad	
	PFB Requested[1]	PFB Not Requested	PFB Requested	PFB Not Requested	PFB Requested	PFB Not Requested
Did pilot report having AFIS[2]	25.3%	13.3%	17.1%	0.0%	26.9%	25.0%
Did pilot request destination WX	18.7%	6.7%	23.7%	25.0%	27.8%	0.0%
Did pilot request TFRs	2.7%	6.7%	19.7%	0.0%	10.2%	10.7%
Did pilot request thunderstorm activity	1.3%	6.7%	1.3%	0.0%	3.7%	3.6%
Did pilot request winds aloft	24.0%	0.0%	10.5%	25.0%	14.8%	3.6%
Did pilot request en route WX conditions	14.7%	0.0%	26.3%	25.0%	23.1%	0.0%
Did pilot request WX conditions at departure point	13.3%	0.0%	15.8%	25.0%	21.3%	0.0%
Did pilot request other WX	0.0%	0.0%	7.9%	25.0%	12.0%	0.0%
Did pilot report thunderstorm activity	8.0%	0.0%	14.5%	25.0%	9.3%	0.0%
Did pilot request NOTAMs	20.0%	0.0%	14.5%	0.0%	13.0%	7.1%
Did pilot request AIRMET/SIGMET	4.0%	0.0%	3.9%	0.0%	11.1%	3.6%
Did pilot request PIREP	4.0%	0.0%	1.3%	0.0%	0.9%	3.6%
Did pilot request cloud tops	1.3%	0.0%	6.6%	0.0%	5.6%	3.6%
Did pilot request ATC delays or flow control advisories	0.0%	0.0%	2.6%	0.0%	0.0%	3.6%
Did pilot request icing conditions	0.0%	0.0%	1.3%	0.0%	3.7%	3.6%
Did pilot request sky conditions (clouds)	25.3%	0.0%	25.0%	0.0%	12.0%	0.0%
Did pilot request visibility	12.0%	0.0%	10.5%	0.0%	2.8%	0.0%
Did pilot request surface winds	9.3%	0.0%	6.6%	0.0%	12.0%	0.0%
Did pilot request MOA or MTR	4.0%	0.0%	1.3%	0.0%	0.9%	0.0%
Did pilot request precipitation	2.7%	0.0%	7.9%	0.0%	4.6%	0.0%
Did pilot request visibility obscuration	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%
Did pilot request temperature	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%
Did pilot request dew point	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%
Did pilot request precipitation intensity	0.0%	0.0%	0.0%	0.0%	1.9%	0.0%
Did pilot request altimeter	0.0%	0.0%	0.0%	0.0%	0.9%	0.0%

[1] The number of pilot preflight briefing (PFB) is: Good WX Requested = 75, Good WX Not Requested = 15; Typical WX Requested = 76, Typical WX Not Requested = 4; Bad WX Requested = 108, Bad WX Not Requested = 28.

[2] AFIS is a data link aircraft flight information service that offers graphical and text weather data to pilots.

Table 5. Percentage of AFSS-relayed/reported weather information as a function of whether a preflight weather briefing was or was not requested by the pilot

Type of AFSS Relayed/Requested Weather Information	Type of Weather Day for AFSS					
	Good		Typical		Bad	
	PFB Requested	PFB Not Request	PFB Requested	PFB Not Requested	PFB Requested	PFB Not Request
Did AFSS relay WX synopsis	86.7%	6.7%	92.1%	50.0%	88.0%	3.6%
Did AFSS relay sky conditions (clouds)	85.3%	6.7%	93.4%	25.0%	88.9%	3.6%
Did AFSS relay visibility	81.3%	0.0%	73.7%	25.0%	71.3%	3.6%
Did AFSS relay destination WX	78.7%	6.7%	92.1%	0.0%	87.0%	3.6%
Did AFSS relay en route WX conditions	78.7%	0.0%	89.5%	25.0%	87.0%	3.6%
Did AFSS relay WX conditions at departure point	74.7%	6.7%	86.8%	0.0%	83.3%	3.6%
Did AFSS relay surface winds	73.3%	0.0%	76.3%	25.0%	80.6%	3.6%
Did AFSS relay adverse conditions	69.3%	0.0%	68.4%	25.0%	88.0%	21.4%
Did AFSS relay NOTAMs	62.7%	0.0%	51.3%	0.0%	49.1%	14.3%
Did AFSS relay winds aloft	54.7%	0.0%	42.1%	0.0%	51.9%	3.6%
Did AFSS relay AIRMET/SIGMET	41.3%	6.7%	31.6%	25.0%	61.1%	21.4%
Did AFSS relay temperature	36.0%	0.0%	17.1%	0.0%	40.7%	0.0%
Did AFSS relay thunderstorm activity	29.3%	0.0%	52.6%	50.0%	47.2%	7.1%
Did AFSS relay precipitation	26.7%	6.7%	38.2%	25.0%	54.6%	3.6%
Did AFSS relay altimeter	25.3%	0.0%	7.9%	0.0%	11.1%	0.0%
Did AFSS relay cloud tops	22.7%	0.0%	38.2%	25.0%	25.0%	3.6%
Did AFSS relay visibility obscuration	16.0%	0.0%	15.8%	0.0%	13.0%	0.0%
Did AFSS relay TFRs	16.0%	6.7%	47.4%	0.0%	29.6%	17.9%
Did AFSS relay other WX	9.3%	0.0%	18.4%	25.0%	43.5%	21.4%
Did AFSS relay PIREP	8.0%	0.0%	22.4%	0.0%	33.3%	3.6%
Did AFSS relay precipitation intensity	8.0%	6.7%	10.5%	25.0%	33.3%	3.6%
Did AFSS relay dew point	5.3%	0.0%	10.5%	0.0%	20.4%	0.0%
Did AFSS relay MOA or MTR	5.3%	0.0%	2.6%	0.0%	3.7%	0.0%
Did AFSS relay icing conditions	1.3%	0.0%	1.3%	0.0%	25.9%	17.9%
Did AFSS relay ATC delays or flow control advisories	1.3%	0.0%	0.0%	0.0%	2.8%	3.6%
Did AFSS advise EFAS available	8.0%	20.0%	22.4%	50.0%	15.7%	17.9%
Did AFSS advise current AFIS	20.0%	13.3%	15.8%	0.0%	21.3%	14.3%
Did AFSS request PIREP	54.7%	53.3%	36.8%	25.0%	39.8%	21.4%
Did AFSS state VFR flight not recommended	10.7%	0.0%	6.6%	0.0%	10.2%	0.0%
Did pilot change flight plan	0.0%	0.0%	14.5%	0.0%	15.7%	0.0%
Did pilot change altitude	21.3%	0.0%	1.3%	0.0%	0.0%	0.0%

Table 6. Outcome of AFSS specialist preflight weather briefing on pilot flight plan decision making*

	Type of Weather			
Outcome	Good	Typical	Bad	Total
Pilot changed the flight plan				
VFR Filed Flight Plan	(2.01%) 5	(3.51%) 8	(2.89%) 11	24
IFR Filed Flight Plan	(0.40%) 1	(0.44%) 1	(1.31%) 5	7
Pilot did not change the flight plan				
VFR Filed Flight Plan	(20.08%) 50	(18.42%) 42	(13.12%) 50	142
IFR Filed Flight Plan	(10.84%) 27	(10.96%) 25	(16.01%) 61	113
Total	83	76	127	286

*Normalized percentages are presented in parentheses, number of unique briefings

and other weather information. On bad weather days, their conversations included TFRs, NOTAMs, winds aloft, and to a much lesser extent, thunderstorm activity, AIRMETs/SIGMETs, cloud tops, icing conditions, PIREPs, and ATC delays/flow control advisories.

A final analysis was performed to determine what effect receiving a preflight briefing had on the pilots' intentions to fly. The data presented in Table 6 show that 31 GA pilots changed their flight plans after talking with AFSS specialists. Whether by asking for additional information or receiving weather information from AFSS specialists, the pilots decided that it was best to change their flight plans. Some delayed (46.9%), postponed, or cancelled (15.6%) their flights while others looked for alternate routes and destination points (15.6%). This result shows that about 10% of the time, AFSS information positively affected the decision-making process, influenced pilot actions, and in these cases may have helped them avoid weather-related flight incidents.

Upon further investigation, for 22 of the filed flight plans, the AFSS specialist advised the pilot that a VFR flight was not recommended. Approximately 86% of these recommendations went to pilots who had filed VFR flight plans. Among this group of pilots, all but 27% changed their flight plan. For pilots who filed IFR flight plans, all but 9% decided to change their flight plans. Of the pilots who changed their IFR flight plans, there was not enough information to record their outcomes/determine their future plans.

DISCUSSION

We all know that weather is often cited as a factor in aviation accidents and mishaps. Given that weather is a prominent force, it is not surprising that the type of weather information requested from, or provided by, AFSS specialists is dependent on weather conditions at the time the preflight briefing occurs. We expect AFSS specialists to provide more weather information during periods of adverse weather. Likewise, we would not expect an AFSS specialist to provide thunderstorm activity to a GA pilot when there was no thunderstorm activity forecast anywhere in, or around, the vicinity of where the flight was to take place.

The purpose of the voice tape analysis was to document the types of weather information that pilots requested and how they might use that information. In particular, preflight standard, abbreviated, and outlook weather briefings representing a good, typical, and bad weather day occurring around the area serviced by an AFSS in the Midwest Mountain, Southwest, and New England Regions were obtained and reviewed. Of primary interest was the weather information relayed by AFSS specialists to the pilot and the pilot's comprehension and use of this information. Of lesser interest, but still important, was information concerning special use airspace (military training areas, MTRs; military operations areas MOAs; and temporary flight restrictions, TFRs).

We noted some differences among the facilities and AFSS specialists. In particular, the facilities differed in type of weather (based on their geographical location), special use airspace, terrain, requests for AFIS, requests for PIREPs, and their familiarity with the local flying public. The specialists differed mostly in the order in which they delivered weather items — although all of them seemed to follow closely the briefing guide presented in *FAAO 7110.10R Flight Services*. They also differed in their requests for PIREPs, suggestions to use EFAS (Flight Watch), the amount of verbiage spent to relay the briefing, and the amount of verbiage received from pilots.

Some of the pilots declined a weather briefing. They did not specify their reasons to the AFSS specialists. We

can speculate that with the currently available technology (e.g., Internet aviation weather services and DUATS) these pilots felt they could adequately self-brief themselves on the weather. Even among the pilots who did not request a briefing, once they started talking with the AFSS specialists, they asked questions — they were searching for additional information that would lead to a safer and more satisfying flight experience. For example, marginal VFR conditions with sky conditions at 1500 broken overcast, visibility 3 miles, light rain showers in the area, may have challenged the pilot's skills; while 2500 broken overcast, visibility 5+ miles, may have been within his or her comfort zone. (The former information may have led some pilots to decide not to fly, while the latter did not.) During typical weather conditions, pilots who did not request a preflight briefing still asked the AFSS specialist about the weather conditions at their departure point (25%), en route (25%), and at the destination point (25%). On marginal VFR days, they also asked about any TFRs, NOTAMs, AIRMETs/SIGMETs, and PIREPs as well as thunderstorm activity, winds aloft, cloud tops, ATC delays, and flow control advisories.

Notably, after hearing a preflight briefing many of the pilots made a determination as to whether to continue, delay or otherwise postpone, or cancel their intended flights. Sometimes the weather at the local AFSS was good but the weather conditions either en route or at the destination point were problematic. Delaying a departure could result in the pilot missing the weather. For others, a change in either the route or arrival airport, or changing from a VFR to an IFR flight plan allowed some of them to continue with their plans. Most important, the majority of the pilots who listened to the preflight briefing based their decisions on the best available information.

Always of concern were the few pilots who ignored the AFSS advice that "VFR Flight Not Recommended.[6]" The AFSS specialists issued this recommendation based on the observed or forecast conditions provided to them by the National Weather Service. In spite of having received a preflight weather briefing, the AFSS specialists' recommendation that VFR flight not recommended, and possibly other real-time, readily available weather sources and information, these pilots chose not to listen. They were aware of the risks yet made the deliberate decision to fly anyway. We do not know why.[7]

There have certainly been times when VFR pilots flew successfully into IFR conditions that raised their levels of confidence, allowing them to take on increasingly more challenging weather conditions (Goh and Wiegmann, 2001). In fact, Goh, Wiegmann, and O'Hara (2002) reported that in their simulation study, pilots' previous flight experience affected their situational assessment and risk perception. In a follow-on simulation study Goh, Weigmann, and O'Hare (2002) found that in some instances experience aided in diagnosing weather conditions — more experienced pilots may be more likely to divert from flight into adverse weather. In other cases experience altered pilots' perceptions as to their abilities — that is, it increased pilot confidence. Consequently, it reduced perceived risk and promoted VFR flight into IMC. What is missing are data to determine how often this actually happens and oversight to break this type of accident chain.

What we do know is that most aviation fatalities and mishaps are preventable in light of the information provided by the AFSS. The accident reports indicate that flight in IMC conditions by VFR-only pilots, or instrument rated pilots not on IFR flight plans, poses a significant threat of loss of aircraft control, controlled flight into terrain and presents a hazard to other IFR aircraft that may be authorized to be in the vicinity (AOPA 2005). The conclusions drawn from the analysis of fatal weather accidents and events related to weather encounters indicates that timely dissemination of adverse weather information is a key factor to preventing weather encounters (Lenz, personal communication).

The following recommendations are suggested to all general aviation pilots:

[6] ***7110.10R*** § **3–2–1-b-2.** VFR Flight Not Recommended (VNR). Include this statement when VFR flight is proposed and sky conditions or visibilities are present or forecast, surface or aloft, that in your judgment would make flight under visual flight rules doubtful. Describe the conditions, affected locations, and times. **EXAMPLE** – "There are broken clouds along the entire route between niner and one one thousand feet at the present time. With the approach of a cold front, these clouds are forecast to become overcast and to lower to below seven thousand with mountains and passes becoming obscured. V–F–R flight is not recommended between Salt Lake City and Grand Junction after two two zero zero ZULU." "V–F–R flight is not recommended in the Seattle area until early afternoon. The current weather at Seattle is indefinite ceiling three hundred sky obscured, visibility one, mist, and little improvement is expected before one eight zero zero ZULU." **NOTE** – This recommendation is advisory in nature. The decision as to whether the flight can be conducted safely rests solely with the pilot.

[7] Personal communication with Doug Pearson led him to provide the following insights that were derived from reviewing six years of NTSB accident data. He suggested that pilots who fly after being told "VFR Flight Not Recommended" by AFSS specialists may do so for the following reasons: 1) They were in a hurry, had urgent business to attend to or an appointment that they could not miss and pressed on despite IFR conditions. 2) They were experienced pilots and had flown through IFR conditions many times before and been able to fly successfully... thus slowly building up a level of confidence that allowed them to take on increasingly worse weather conditions. 3) They had flown many times before when the forecast was for IFR (weather forecasts are often slanted towards the worst possible conditions to ensure all aspects of the situation are covered from the aviation weather forecaster's perspective) and they neither experienced IFR conditions nor were weather conditions as bad as previously forecast. So they pressed on even when IFR was forecast, believing that the weather would not be as bad as predicted.

1) When calling into an AFSS, let the specialist know if you are new to the area or unfamiliar with the typical weather patterns. The specialist's familiarity with the local flying public and area specifics provides you with the added benefit of receiving information not available elsewhere.
2) During the preflight weather briefing, pay particular attention to differences in weather conditions at the departure point, en route, and destination. Although you may know what it is like to fly in your home town, your experience with weather in different localities may prove to be beyond your skill or comfort level.
3) While receiving a preflight weather briefing, let the specialist know if you need additional information, more detailed information or need clarification of some part of that briefing. That information may lead to a safer and more satisfying flight experience.
4) After receiving the preflight weather briefing, the most important decision you must make is whether or not to fly. If marginal visual flight conditions or adverse weather are factors, it may be best to delay, postpone, or cancel the flight or consider alternate routes and destination points.
5) Deciding to fly when the AFSS specialist indicates that "VFR flight not recommended" presents a significant risk. Before take-off, call the local AFSS and receive a weather update. Since your last preflight briefing, there could be significant weather changes that could adversely impact the safety and comfort of your flight along your filed route and at your destination point. Remember, 661 accidents in the USA occurred between 1990-present where VFR into IMC was identified as a "cause or factor" by the NTSB. Of these, 80% resulted in a fatality.[8]
6) While in flight, call into Flight Watch for the current weather conditions. You also can receive an FSS-recorded weather broadcast. These weather services can provide you with accurate weather information to aid your decision-making, should weather become a threat. As pointed out by Lenz, an analysis of 586 recent fatal weather accidents indicated that only 19 pilots had updated their weather information through FSS/AFSS.

Unlike travelers from the past who relied solely on naturally occurring moon and sky conditions to predict local weather, modern day travelers have real-time weather information. For example, earlier travelers learned that a red sky at dusk indicated that the following day would probably be dry and fine for travel. They didn't know that the evening sky's redness resulted from the sun shining through dust particles that were being pushed ahead of a high pressure system bringing in dry air. They also learned that a red sky at dawn was a fair indication that a storm was approaching. It took centuries for people to learn that the sky's redness at dawn resulted from an approaching low pressure system carrying a lot of moisture in the air. And that moisture could become rain, snow, sleet, or hail (depending upon season and geographical location).

Like these early travelers, we can still look up at the sky to predict local weather conditions. Unlike early travelers, we also have very sophisticated and technologically advanced tools that experts use to provide us with current and future weather information. Luckily, a multitude of weather-providers are available with state-of-the-art forecasting tools to supplement GA pilots simple act of looking up at the sky and reading the local sky conditions.

However, technological progress does not necessarily equate to improved safety. Although improvements in weather detection and forecasting capability have occurred, this information may not be available to GA pilots who are in flight. Likewise, if weather information is available, it may not be received in the cockpit in a timely manner for pilots to make safe decisions. In still other cases, the pilots may have received timely and accurate information but did not understand its implication regarding the safety of flight. As Lenz pointed out, simple misunderstandings regarding weather information have led to fatal accidents

Both early travelers and GA pilots share a common thread — they must decide whether to go or stay home in light of the information available at the time. This simple choice is a primary human factor that can result in safe or unsafe acts. As much as the FAA's primary mission is to promote safety and the FAA has reduced GA accidents by 12% over the last 5 years (AOPA 2005), the study into causal and contributing factors related to weather accidents offers an opportunity to reduce the largest cause of aviation fatalities — VFR flight into IMC.

[8]Data downloaded from the NTSB accident database. Data extraction and computation provided by Cristy Detwiler under the direction of Dr. Carla Hackworth.

REFERENCES

Aircraft Owners and Pilots Association (2005*). Nall Report – Accident trends and factors for 2004*. www.aopa.org/asf/publications/nall.html. Accessed 9 January, 2007.

Bible, Revised Standard. *Matthew*, from The holy Bible, Revised Standard version. Electronic Text Center, University of Virginia Library. etext.lib.virginia.edu/rsv.browse.html. Accessed 9 January, 2007.

Driskill, W.E., Weissmuller, J.J., Quebe, J., Hand, D.K., Dittmar, M.J., and Hunter, D.R. (1997). *The use of weather information in aeronautical decision-making.* Report no. DOT/FAA/AM-97/3. Washington, DC: Federal Aviation Administration.

Federal Aviation Administration (1995a). *7110.10R Flight Services*. www.faa.gov/ATPUBS/FSS/INDEX.HTM. Accessed 9 January, 2007.

Goh, J., Wiegmann, D., and O'Hare, D. (2002). The effects of distance traveled and pilot experience on pilot's decisions to continue visual flight rules flight into adverse weather. *Aviation, Space, and Environmental Medicine, 73*(3), 252-3.

Goh, J. and Wiegmann, D. A. (2001). Visual flight rules flight (VFR) into adverse weather: An empirical investigation of the possible causes. *The International Journal of Aviation Psychology*, 11, 359-79.

Knecht, W., Harris, H., and Shappell, S. (2005). *The influence of visibility, cloud ceiling, financial incentive, and personality factors on general aviation pilots willingness to take off into marginal weather, Part I: The data and preliminary conclusions*. Report no. DOT/FAA/AM-05/7. Washington, DC: Federal Aviation Administration.

National Transportation Safety Board. (1968). *An analysis of U.S. general aviation accidents involving weather as a cause/related factor 1966,* Notation 155. Washington, DC: Author.

National Transportation Safety Board. (1974). *Special study of fatal, weather-involved general aviation accidents*. Report no. NTSB-AAS-74-2. Washington, DC: Author. www.amelia.db.erau.edu/reports/ntsb/aas/AAS74-02.pdf. Accessed 9 January, 2007.

National Transportation Safety Board. (1976). *Non-fatal, weather-involved general aviation accidents.* Report no. NTSB/AAS-76-3. Washington, DC: Author. www.amelia.db.erau.edu/reports/ntsb/aas/AAS76-03.pdf. Accessed 9 January, 2007.

National Transportation Safety Board. (1989). *General aviation accidents involving VFR flight into IMC.* Report no. NTSB/SR-89-01. Washington, DC: Author. www.amelia.db.erau.edu/reports/ntsb/sr/SR89-01.pdf. Accessed 9 January, 2007.

National Transportation Safety Board. (2005). *Risk factors associated with weather-related general aviation accidents*. Report no. NTSB/SS-05/01. Washington, DC: Author.

Pearson, D.C. (2002). *VFR flight not recommended: A study of weather-related fatal aviation accidents*. SR SSD 2002-18. Atlanta GA: NOAA/National Weather Service. www.srh.noaa.gov/topics/attach/html/ssd02-18.htm. Accessed 9 January, 2007.

APPENDIX A
AFSS Communication Database Codebook

COLUMN	Variable Names	Variable Descriptions & Value Labels	Explanation/Examples
FACILITY INFORMATION			
A	LINENUM	Line Number	Sequentially numbered briefings according to Facility and Sector ID.
B	FAC_ID	Facility ID	Name of the facility (3-letter identifier).
C	SEC_ID	Sector/Position ID Preflight (*number*) Example: PF15	Identifies the sector/position of the facility recorded in FAC_ID. The Flight Service Station includes Preflight, Inflight, Flight Watch, NOTAM, and Flight Data positions. For this study, the Preflight position was used. This column will allow an expansion of the spreadsheet to include the Inflight and Flight Watch positions, using the current DAT tapes. It is possible that other positions may be combined with the Preflight position (one AFSS specialist working two or more positions). When this occurred, an attempt was made to identify only the preflight data. In some cases data collected from combined positions was included in the Preflight position. For example, Preflight (*number*) **PF15**.
D	AFSS_SP	AFSS Specialist 1=First 2=Second 3=Third	This column contains an AFSS specialist number, beginning with "1." Each specialist was identified by assignment of a unique sequential number (e.g., 1, 2, 3, etc.). Each change in specialist was determined by listening to changes in the specialist's voice.
E	DAT_DATE_TIME	DAT Date/Time Group	Indicates the beginning date and time of the AFSS facility DAT file.
F	TIME_PFLT_BRF	Time Preflight Briefing	Indicates the beginning time of the preflight briefing to a pilot.
G	PROPOSED_DPT_TIME	Proposed Departure Time	When the pilot did not state the proposed departure time, the encoder added 30 minutes to the beginning time of the preflight briefing and used it as the proposed departure time.
H	TYPE_WX_DAY	Type Weather Day 1=Good weather 2=Typical weather 3=Bad weather	Identifies the weather type (good, typical, bad) for the day of the DAT recording, as determined by the facility.

AFSS Communication Database Codebook (continued)

COLUMN	Variable Names	Variable Descriptions & Value Labels	Explanation/Examples
AIRCRAFT INFORMATION			
I	ACID	Aircraft Identification	The aircraft identification was taken from the flight plan filed, or the identification used in communicating with AFSS when no flight plan was filed. When no identification was available, the column contains an unknown (UNK, with each unknown being numbered sequentially, e.g. UNK1, UNK2, UNK3, etc.). In accordance with FAA aircraft identification procedures, the identification should include a prefix of November (N), company prefix (Delta (DAL)), military (Air Force 1234 (A1234)), manufacturer name or manufacturer assigned name, etc.
J	AC_TYPE	Aircraft Type	The FAA designator for the aircraft type and the suffix, when available. The suffix will give some indication of the avionics on board the aircraft. If aircraft type was unknown, encoding was Unknown (UNK). Some were spelled out.
K	AC_ADV_WX_EQUIP	Aircraft Advanced Weather Equipment 1=Yes 2=No	This includes deicing, radar, and other electronics that would indicate weather. AFSS personnel are not required to request this information, and few pilots volunteer.
L	P_FP	Did Pilot File Flight Plan 1=Yes 2=No	Did pilot file a flight plan with the Preflight position entered in Sector/Position ID (SEC_ID).
M	TYPE_FP	Type Flight Plan 1=VFR 2=IFR	Flight plans were identified/encoded as either VFR or IFR. The following items are normally included departure (takeoff location or position), route, destination (airfield or point of cancellation), type aircraft, altitude, estimated time of departure (ETD), estimated time en route (ETE), pilot name and address, and aircraft color, etc.
N	DAY_NIGHT	Day or Night 1=Day 2-Night	Using the proposed departure time, each flight was identified/encoded as a day or night flight. As the sunrise and sunset times were not available, the hours 1300 to 0300 Zulu (Seattle), 1100-0100 Zulu (Fort Worth), 1000-0000 Zulu (Bridgeport) were considered daytime.
O	MISSION	Mission/Purpose of flight 1=Recreational 2=Business 3=Commercial 4=Instructional 5=Unknown 6=Military 7=Balloon/Blimp	The purpose of the flight may be indicated by pilot report, identification of the aircraft (business jet, military, etc.). The encoder used some discretion in identifying the mission. When there was insufficient data, the encoding was “5” (Unknown). When Aircraft Type was “BALLOON,” Mission was encoded “7” (Balloon/Blimp) unless specifically stated otherwise, e.g., “1” (Recreational).
P	COMM_MTHD	Communication Method 1=Telephone 2=Radio	Preflight briefings are generally conducted via telephone. However, in some cases, radio might be used. This could include discrete frequency; transmit on aircraft frequency, receive on VOR.

COLUMN	Variable Names	Variable Descriptions & Value Labels	Explanation/Examples
PILOT REQUESTS/REPORTS			
Q	P_REQ_PFLT_BRF	Did Pilot Request Preflight Briefing 1=Yes 2=No	From the pilot contact with the AFSS Preflight briefer, the encoder determined if the communication used was a request for a preflight briefing. For example, "What's it look like Dallas to Waco?" was considered a request for a briefing.
R	P_TYPE_PFLT_BRF	Type Preflight Briefing Pilot Requested 1=Standard 2=Abbreviated 3=Outlook 4=None	**Standard briefing** would be relayed in conjunction with a flight plan, VFR or IFR, and includes adverse conditions (Example: AIRMET/ SIGMET), synopsis, current conditions, en route forecast (summarized), destination forecast, winds aloft, NOTAM, PIREPs (requested and relayed), EFAS (Flight Watch) when appropriate, and MOA, MTR, TFR when requested. "Request a standard briefing." "Can you give me the weather from Amarillo to Oklahoma City to Memphis?" "I'm departing Dallas to Waco to Hobby – what do you have for that?" **Abbreviated briefing** is relayed when the pilot requests information to supplement mass disseminated data, or updating previous briefing, or when the pilot requests specific data. "I only need winds aloft for Roswell." **Outlook briefing** is relayed for a proposed departure beyond 6 hours. "What's the weather look like in North Texas for tomorrow?" Many pilots do not use the terms "standard," "abbreviated," or "outlook" when requesting weather. Encoder used what appeared to be the intent.
NOTE: Items U through AS may be included in a standard briefing. These data were encoded to record the information that the pilot requested or reported (before and after briefing).			
U	P_REQ_DPT_WX	Did Pilot Request Weather Conditions at Departure Point (Current and/or forecast weather). 1=Yes 2=No	1-"Request weather at (*departure point*)." 2-No request
V	P_REQ_ENRTE_WX	Did Pilot Request En route Weather Conditions (Current and/or forecast weather). 1=Yes 2=No	1-"What do we have going up to (*point*)?" 2-No request
W	P_REQ_DEST_WX	Did Pilot Request Destination Weather (Current and/or forecast weather). 1=Yes 2=No	1-"Anything at (*destination*)?" 2-No request

AFSS Communication Database Codebook (continued)

COLUMN	Variable Names	Variable Descriptions & Value Labels	Explanation/Examples
PILOT REQUESTS/REPORTS			
X	P_REQ_PIREP	Did Pilot Request PIREP 1=Yes 2=No	1-"Are there any PIREPs?" 2-No request
Z	P_REQ_TSTORM	Did Pilot Request Thunderstorm Activity 1=Yes 2=No	1-Are there any thunderstorms in the area?" 2-No request
AA	P_REQ_ICING	Did Pilot Request Icing Conditions 1=Yes 2=No	1-"Any icing?" "What altitude?" 2-No request
AB	P_REQ_SURF_WND	Did Pilot Request Surface Winds 1=Yes 2=No	1-"What are the winds?" 2-No request
AC	P_REQ_WND_ALFT	Did Pilot Request Winds Aloft 1=Yes 2=No	1-"What are the winds aloft at six thousand and nine thousand?" 2-No request
AD	P_REQ_SKYCOND	Did Pilot Request Sky Conditions (Clouds) 1=Yes 2=No	1-"What are the clouds scattered or broken?" 2-No request
AE	P_REQ_CLD_TP	Did Pilot Request Cloud Tops 1=Yes 2=No	1-"What are the tops?" 2-No request
AF	P_REQ_PRECIP	Did Pilot Request Precipitation 1=Yes 2=No	1-"Any rain?" 2-No request
AG	P_REQ_PRECIP_INTNS	Did Pilot Request Precipitation Intensity 1=Yes 2=No	1-"Is the snow heavy or light?" 2-No request
AH	P_REQ_VIS	Did Pilot Request Visibility 1=Yes 2=No	1-"What is the visibility at (point)?" 2-No request

AFSS Communication Database Codebook (continued)

COLUMN	Variable Names	Variable Descriptions & Value Labels	Explanation/Examples
AI	P_REQ_VIS_OBSCUR	Did Pilot Request Visibility Obscuration 1=Yes 2=No	1-"Is that smoke from fires or just haze?" 2-No request
AJ	P_REQ_TEMP	Did Pilot Request Temperature 1=Yes 2=No	1-"What is the temperature today?" 2-No request
AK	P_REQ_DEWPT	Did Pilot Request Dew Point 1=Yes 2=No	1-"What is the dew point?" 2-No request
AL	P_REQ_ALTM	Did Pilot Request Altimeter 1=Yes 2=No	1-"Say Phoenix altimeter." 2-No request
AM	P_REQ_OTR_WX	Did Pilot Request Other Weather 1=Yes 2=No	1-"Is there anything else that might help?" 2-No request
AN	P_REQ_NOTAM	Did Pilot Request NOTAMs 1=Yes 2=No	1-"Do you have NOTAMs along my route?" 2-No request
AO	P_REQ_TFR	Did Pilot Request TFRs 1=Yes 2=No	1-"Is the temporary restriction at Dallas still in effect?" 2-No request
AP	P_REQ_MOA_MTR	Did Pilot Request MOA or MTR 1=Yes 2=No	1-"Is the Pecos MOA open?" 2-No request
AQ	P_REQ_AIRMET_SIGMET	Did Pilot Request AIRMET/SIGMET 1=Yes 2=No	1-"No SIGMETs today?" 2-No request
AR	P_REQ_ATC_DEL_FC_ADV	Did Pilot Request ATC Delays or Flow Control Advisories 1=Yes 2=No	
Y	P_RPT_PIREP	Did Pilot Report PIREP 1=Yes 2=No	1-"The tops of clouds are ten thousand two hundred." 2-No report
AS	P_RPT_AFIS	Did Pilot Report Having Automated Flight Information Service 1=Yes 2=No	

COLUMN	Variable Names	Variable Descriptions & Value Labels	Explanation/Examples
AFSS PREFLIGHT INFORMATION			
NOTE: Items AT through BS were encoded if they were relayed or requested by the AFSS briefer during the preflight briefing, or as a reply to a pilot request, i.e., any information within these categories was encoded.			
S	AFSS_ISSUES_PFLT_BRF	Did AFSS Issue Preflight Briefing 1=Yes 2=No	
T	AFSS_TYPE_PFLT_BRF	Type Preflight Briefing AFSS Issued 1=Standard 2=Abbreviated 3=Outlook 4=None	The preflight briefing types were taken from FAA Order 7110.10R subpara 3-2-1: **Standard briefing** would be relayed in conjunction with a flight plan, VFR or IFR, and includes adverse conditions (Example: AIRMET/ SIGMET), synopsis, current conditions, en route forecast (summarized), destination forecast, winds aloft, NOTAM, PIREPs (requested and relayed), EFAS (Flight Watch) when appropriate, and MOA, MTR, TFR when requested. **Abbreviated briefing** is relayed when the pilot requests information to supplement mass disseminated data, or updating previous briefing, or when the pilot requests specific data. **Outlook briefing** is relayed for a proposed departure beyond 6 hours.
AT	AFSS_REL_ADVRS_COND	Did AFSS Relay Adverse Conditions 1=Yes 2=No	
AU	AFSS_REL_WX_SYN	Did AFSS Relay Weather Synopsis 1=Yes 2=No	
AV	AFSS_REL_DPT_WX	Did AFSS Relay Weather Conditions at Departure Point (Current and/or forecast weather). 1=Yes 2=No	Current and/or forecast weather. 1-"Yuma shows few clouds at fifteen hundred wind two eight zero at ten gusting to fifteen visibility ten or more altimeter two nine nine three." 2-No relay
AW	AFSS_REL_ENRTE_WX	Did AFSS Relay En route Weather Conditions (Current and/or forecast weather). 1=Yes 2=No	Current and/or forecast weather. 1-"Looks like you'll be east of any weather the winds at seven thousand are one three five at six at nine thousand one six zero at eight clear below twelve thousand." 2-No relay
AX	AFSS_REL_DEST_WX	Did AFSS Relay Destination Weather (Current and/or forecast weather). 1=Yes 2=No	Current and/or forecast weather. 1-"Your ETA at Roswell about one four three zero it will be one five thousand broken visibility fifteen winds north three five zero at one one knots." 2-No relay

AFSS Communication Database Codebook (continued)

COLUMN	Variable Names	Variable Descriptions & Value Labels	Explanation/Examples
AY	AFSS_REL_PIREP	Did AFSS Relay PIREP 1=Yes 2=No	1-"PIREP tops ten thousand two hundred." 2-No relay
AZ	AFSS_REQ_PIREP	Did AFSS Request PIREP 1=Yes 2=No	1-"We could use a PIREP if you're going over to Denver." 2-No request
BA	AFSS_REL_TSTORM	Did AFSS Relay Thunderstorm Activity 1=Yes 2=No	1-"The front has passed and thunderstorm dissipated." 2-No relay
BB	AFSS_REL_ICING	Did AFSS Relay Icing Conditions 1=Yes 2=No	1-"No icing." "Light clear ice at nine thousand." 2-No relay
BC	AFSS_REL_SURF_WND	Did AFSS Relay Surface Winds 1=Yes 2=No	1-"Two nine zero at twelve." 2-No relay
BD	AFSS_REL_WND_ALOFT	Did AFSS Relay Winds Aloft 1=Yes 2=No	1-"Nine thousand two seven zero at ten twelve thousand two eight zero at eighteen." 2-No relay
BE	AFSS_REL_SKYCOND	Did AFSS Relay Sky Conditions (Clouds) 1=Yes 2=No	1-"Twenty five hundred broken three thousand overcast." 2-No relay
BF	AFSS_REL_CLD_TP	Did AFSS Relay Cloud Tops 1=Yes 2=No	1-"A PIREP here by a one eighty two says tops are nine thousand five hundred." 2-No relay
BG	AFSS_REL_PRECIP	Did AFSS Relay Precipitation 1=Yes 2=No	1-"No rain in vicinity." "A drizzle over the east Cascades." 2-No relay
BH	AFSS_REL_PRECIP_INTNS	Did AFSS Relay Precipitation Intensity 1=Yes 2=No	1-"Light rain shower ten north of Puttman." 2-No relay
BI	AFSS_REL_VIS	Did AFSS Relay Visibility 1=Yes 2=No	1-"Visibility clear below eight thousand." "Visibility ten." 2-No relay
BJ	AFSS_REL_VIS_OBSCUR	Did AFSS Relay Visibility Obscuration 1=Yes 2=No	1-"Smoke from the fire east side of the mountain." 2-No relay

AFSS Communication Database Codebook (continued)

COLUMN	Variable Names	Variable Descriptions & Value Labels	Explanation/Examples
BK	AFSS_REL_TEMP	Did AFSS Relay Temperature 1=Yes 2=No	1-"Hot today. Surface temperature fifty two twelve thousand forty two." 2-No relay
BL	AFSS_REL_DEWPT	Did AFSS Relay Dew Point 1=Yes 2=No	1-"The dew point is forty two." 2-No relay
BM	AFSS_REL_ALTM	Did AFSS Relay Altimeter 1=Yes 2=No	1-"Seattle altimeter two nine nine two." 2-No relay
BN	AFSS_REL_OTR_WX	Did AFSS Relay Other Weather 1=Yes 2=No	1-"Look for some turbulence going over the mountain range." 2-No relay
BO	AFSS_REL_NOTAM	Did AFSS Relay NOTAMs 1=Yes 2=No	1-"We have a NOTAM that Seattle VOR is out of service today until fourteen hundred." 2-No relay
BP	AFSS_REL_TFR	Did AFSS Relay TFRs 1=Yes 2=No	1-"The flight restriction around the fire east of Puttman has expired." 2-No relay
BQ	AFSS_REL_MOA_MTR	AFSS Relay MOA or MTR 1=Yes 2=No	1-"The Pecos MOA is active zero eight zero zero to one six zero zero local daily." 2-No relay
BR	AFSS_REL_AIRMET_SIGMET	Did AFSS Relay AIRMET/SIGMET 1=Yes 2=No	1-"SIGMET has been issued for thunderstorms and low visibility in the area of Albuquerque." 2-No relay
BS	AFSS_REL_ATC_DEL_FC_ADV	Did AFSS Relay ATC Delays or Flow Control Advisories 1=Yes 2=No	
BT	AFSS_AFIS	Did AFSS Advise Current Automated Flight Information Service 1=Yes 2=No	
BU	AFSS_VFR_NOT_REC	Did AFSS State VFR Flight Not Recommended 1=Yes 2=No	This requirement is included in preflight briefings. However, it merits inclusion as a single variable to be recorded/encoded. 1-"VFR flight Durango to Crested Butte not recommended." 2-AFSS did not state VFR flight not recommended.

AFSS Communication Database Codebook (continued)

COLUMN	Variable Names	Variable Descriptions & Value Labels	Explanation/Examples
BV	P_CHG_FP	Did Pilot Change Flight Plan 1=Yes-before preflight briefing 2=Yes-after preflight briefing 3=No	Flight plan or altitude change after receiving a preflight briefing (standard or abbreviated). The purpose of this data is for analysis of the actions taken by a pilot after a preflight briefing.
BW	P_CHG_ALT	Did Pilot Change Altitude 1=Yes-before preflight briefing 2=Yes-after preflight briefing 3=No	Flight plan or altitude change after receiving a preflight briefing (standard or abbreviated). The purpose of this data is for analysis of the actions taken by a pilot after a preflight briefing.
BY	COMMENTS	Encoder (SME) Comments	Pilot weather requests and AFSS weather information relays that are out of the norm are recorded for further study.
BZ	PFLT_BRF_ANALYSIS	Preflight Briefing for Detailed Analysis Y=Yes	Encoded “Y” if AFSS preflight briefing contains information that merits detailed analysis.
CA	P_CMTS_DAT	Interesting Pilot Comments (from DAT)	