THE INFLUENCE OF TESTIMONIALS ON DECISION-MAKING OF GENERAL AVIATION PILOTS

A Dissertation by

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DEDICATION

To my parents, family and friends who been there for me
through all the ups and downs

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ABSTRACT

Patients often solicit the advice of friends, or receive second-hand reports of ‘friends of a friend,’ about treatments for medical conditions. These testimonials can play an influential role in a patient’s selection of a medical course of action (Sutter, 2006; Ubel, Jepson, & Baron, 2001). Similarly, pilots solicit information from various sources when making a “go or no go” decision about flying (FAA, 1991). However, one area that lacks research concerns the effect of the “pilot report” (testimonial) that a general aviation (GA) pilot may solicit at their flying club or Fixed Based Operator (FBO). This testimonial may contain information about actual weather conditions experience by pilots who have recently landed. The purpose of this study is to investigate whether pilot testimonials influence decisions to go or no-go and how this influence is moderated by the perceived quality of the testimonial. The analysis shows that testimonials had little impact on pilots’ weather decision making in most flight scenarios, and that pilots’ decisions were more strongly influenced by text and graphical weather information. In the flight scenario where the “expert” pilot gave a testimonial to no-go, findings showed that the testimonial was found to be as influential as text and graphical weather in making go or no-go decisions. In regards to the quality of the testimonial, the findings suggest the “expert” testimonial was judged as more credible; however, this did not increase the influence the ranking of the testimonial. Alternative explanations for the effects of the “testimonials” are discussed.

PREFACE

This research adds to the existing decision making literature concerning GA pilots. There is a higher rate of fatalities among non-instrument rated GA private pilots due to pilots flying from visual metrological conditions (VMC) rather than instrument metrological conditions (IMC). The influence of testimonials in decisions appears in other domains such as medical treatments; however; the power of testimonials is not discussed in the decision making process of GA pilots. Pilots often solicit information and advice from other pilots as they gather flying related weather data prior to making a decision to fly, or not to fly. The purpose of this study is to determine the effect of pilot testimonials in a “go no-go” decision based on the credibility of the source.

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LIST OF ABBREVIATIONS

AC	Advisory Circular
AcTS	Actual test score, independent and dependent variable based on hypothesis
ADM	Aeronautical Decision Making
AOPA	Aircraft Owners and Pilot’s Association
ATP	Airline Transport Pilot
CEFC	Cessna Employee’s Flying Club
CFII	Certified Flight Instrument Instructor
CmR	Comfort rating, dependent variable
CnR	Confidence rating, dependent variable
DPE	Designated Pilot Examiner
EMP	Airport identifier for Emporia Municipal in Emporia, KS
FAA	Federal Aviation Administration
FBO	Fixed Based Operator
GA	General Aviation
GNG	Go-no-go decision, dependent variable
ICT	Airport identifier for Wichita Mid-Continent in Wichita, KS
IFR	Instrument Flight Rules
IMC	Instrument Metrological Conditions
ME	Multi-Engine Rating
MEI	Multi-Engine Instructor
METAR	Aviation Routine Weather Report

MVMC	Marginal Visual Metrological Conditions
NASA	National Aeronautics and Space Administration
NTSB	National Transportation Safety Board
PerTS	Perceived test score, dependent variable
PNC	Airport identifier for Ponca City Regional in Ponca City, OK
PTT	Airport identifier for Pratt Industrial in Pratt, KS
SLN	Airport identifier for Salina Municipal in Salina, KS
SME	Subject Matter Expert
TAF	Terminal Area Forecast
VFR	Visual Flight Rules
VMC	Visual Metrological Conditions
WDG	Airport identifier for Woodring Regional in Enid, OK
WSU	Wichita State University

CHAPTER 1

INTRODUCTION

Each year the Aircraft Owners and Pilots Association (AOPA) publishes "The Nall Report" containing a yearly summary of accident data of general aviation (GA) aircraft along with trend data by the type. The data is derived from the database maintained by the National Transportation Safety Board (NTSB) on all aircraft accidents in the United States. For example, the report publishes data on the accident rates broken down by aircraft type (single or multi engine), pilot flight hours, certificates held, mechanical failures, weather conditions, accident type (i.e. midair collisions), and the contribution of drug/alcohol and pilot incapacitation. The Nall Report's (2008) data indicates that weather related accidents accounted for 4.2% of the total single-engine, fixed gear aircraft. Pilots continuing from visual metrological conditions (VMC) into instrument metrological conditions (IMC) accounted for 75% of the fatalities of these weather related accidents and 13.6% of the total fatal accidents (Krey, 2007). See Appendix D for detailed definitions of VMC and IMC. This means that non-instrument rated private pilots are flying into IMC weather (such as clouds) without the proper training and required instrument rating. Therefore, weather related decision-making skills should be a high priority of general aviation (GA) pilots due to the high fatality rate incurred by this particular phenomenon.

The Federal Aviation Administration (FAA) prescribes a systematic approach for pilots to employ when making various aviation decisions, such as weather related "go-no go" decisions. Facilitating these aviation decisions the FAA encourages instructors to teach Aeronautical Decision Making (ADM), the DECIDE model and various risk management methods including Crew Resource Management (CRM), personal risk checklist, life events checklist, and assessments as a means of improving the pilot's knowledge and effectiveness in making better and safer decisions (FAA, 1991). The Aeronautical Decision Making (ADM) advisory circular brings to light various operational pitfalls such as peer pressure, the urgency to get to the destination (known as get there-itis), flying at or slightly below the minimum cloud ceiling or visibility in a familiar area (known as scud running), and visual flight rules (VFR) into IMC weather. The FAA developed a self-assessment recommended to determine physical and mental state of pilots prior to flying. The advisory circular also describes five attitude categories (antiauthority, impulsivity, invulnerability, macho, and resignation), and ways to deal with these attitudes. These attitudes may cause pilots to place themselves and their aircraft in potentially fatal positions. For example, pilots displaying invulnerable characteristics may rationalize that they can handle any situation, and that nothing during a flight would cause an injury or fatality. Another behavior the advisory circular discusses is stress with a result to increase pilot awareness and understanding of the demands that are placed on them, both consciously and unconsciously.

The common ADM model taught to pilots is the DECIDE model. DECIDE is an acronym standing for Detect, Estimate, Choose, Identify, Do, and Evaluate. A description of each of these proscribed steps follows below (excerpt from AC 60-22):

Detect – The decision maker detects the fact that change has occurred.

Estimate - The decision maker estimates the need to counter or react to the change.

Choose – The decision maker chooses a desirable outcome (in terms of success) for the flight.

Identify – The decision maker identifies actions which could successfully control the change.

Do – The decision maker takes the necessary action.

Evaluate – The decision maker evaluates the effect(s) of his action countering the change.

There is little incentive for a student pilot to learn ADM or the DECIDE model because this information is not part of the test question bank for the private pilot test. Also, the advisory circular and aviation literature does not consider the effects of testimonials made by other pilots while reviewing weather information to make a "go-no go" decision. The credibility of the testimonial, and the knowledge level of the pilot who is listening to the testimonial, may play a role in how much the pilot weighs the information to make a decision about whether to carry on with the flight. O'Hare (2003) also concluded the ADM model

> "… will be easier to continue with an existing course of action than to change to a new one, as this requires continual monitoring, planning and risk assessment. As such, the models predict that errors due to continuing on with an unprofitable course of action will be more prevalent than errors due to prematurely switching to other courses of action" (p. 223).

This suggests that VFR pilots may continue flight in IMC because it represents the point of least resistance or work. The VFR pilot does not need to synthesize the weather information to find a safer route, develop a new flight plan, and inform air traffic control of changes.

CHAPTER 2

LITERATURE REVIEW

Aviation Weather Decision-Making Studies

GA pilots' weather decision making processes have become an important focus of academic research. Goh & Wiegmann (2001) investigated why GA pilots fly from VFR into IMC weather. They indentified several factors that predict a pilot's tendency or likelihood of flying into IMC. These factors include 1) perception of one's own flight abilities (knowledge level), and 2) regularity of risk-taking behavior and the ability to determine visibility. The study found that more knowledgeable pilots tended to also be more confident and were more willing to take risks. The GA pilots also tended not to perceive the hazards presented in the flight scenario as a threat to the safety of the flight choosing to continue rather than to divert the aircraft away from possible danger. However, less knowledgeable pilots more often chose to divert the flight when presented with the same scenario. The study also found that pilots possessing overconfidence in their ability to fly the aircraft misjudge visibility conditions, and therefore, increase the chances of flying into IMC. These findings suggest that the pilots who continued into IMC do not have an accurate perception of visibility and began making errors early in the decision making process.

Pauley & David (2008) evaluated pilots' anxiety towards hazardous weather conditions and questioned them about the number of unsafe weather events they had experienced in flight. Pilots were instructed to complete the Implicit Association Test and the Hazardous Events Scale. These instruments measured the participants' fearfulness of various weather conditions using word associations and pictures. The results showed pilots with few experiences in adverse weather events reported increased anxiety towards poor weather while pilots with more experience in hazardous weather conditions were more likely to be less fearful. Evaluation indicated that experienced weather flyers exhibit an increased likelihood of continuing a flight from VFR into IMC.

Wiggins & O'Hare (2003) investigated expert and novice pilots' decisions to continue a flight when presented with photographs of an actual flight. Pilots with more than or less than 1000 cross country flight hours were categorized as expert and novices, respectively. Each pilot was presented with ten photographs and a questionnaire eliciting responses about the weather cues in the photograph and if continued VMC was possible. The data shows that expert pilots were more likely to continue the flight as planned, felt confident with their decision, and used cues such as horizontal visibility and cloud concentration more than the novice. These results concur with the findings Goh & Wiegmann (2001) and Pauley & David (2008) findings that, when compared to novices, "expert" pilots were more likely to continue the flight based on scenario presented, confidence level, and their ability to read and understand the weather cues presented.

Expertise and Knowledge

Expertise

The preceding studies indicate that perceived expertise may increase risk taking behavior and increase the predictability of an expert pilot flying into adverse weather conditions. An "expert" synthesizes prior knowledge and experiences to acquire a solution to a presented problem; and the "expert" has the ability to quickly determine the important cues, and is more likely to determine an appropriate decision in the situation (O'Hare, 2003).

One of the challenges faced by researchers in aviation literature is to determine whether an "expert" pilot can be defined in generalities of age, book knowledge, total flight hours, cross-country hours, or the number of experiences related to a particular task. Both O'Hare (2003) and Tsang (2003) suggest that experience plays the largest role in aviation expertise; however, other noted variables, such as recent flight hours, or the number of flight ratings, may have a smaller role in defining an expert pilot. Tsang (2003) suggests that domain specific knowledge may be an important factor in distinguishing expert and novice pilots. Domain specific knowledge goes beyond facts or procedures of the task. A pilot takes this procedural information combined with practice over time to create action sequences that are effective in aviating, navigating, and communicating. The increased effectiveness of the action sequences is due to the better organization of information that the expert possesses. Experts can quickly recognize patterns in the information presented, take partial information and "fill in the blanks", and understand the changes in their environment to anticipate the future situation.

Wiggins & O'Hare (1995) used several computer based flight scenarios to evaluate inexperienced, intermediate and experienced general aviation pilots on information gathering, strategies (i.e. search patterns, time spend examining information, number of pieces of information retrieved), and decision making. Grouping the participants according to the number of cross-country hours previously acquired, a computer based menu system with basic aviation information pertaining to an aircraft, weather, and descriptions of six decision making scenarios measured was administered. Wiggins and O'Hare found that experienced pilots accessed more aircraft and weather information than less experienced pilots while intermediate and experienced pilots were more likely to continue the flight after reviewing the weather information and scenario description. When time pressure was increased, inexperienced pilots failed to choose not to continue the flight, suggesting that they may have difficulty developing a strategy. The researchers hypothesized that expert pilots would not be able to articulate their goals and focus on a decision, which was confirmed in the verbal protocol. This study provides support that weather-related decision making could be a pilot skill that is not acquired in training, but developed over time and varied experience in different kinds of weather conditions.

Studies of submarine officers compared information gathering strategies of expert and student submarine officers. Like aviation, the submarine environment is very dynamic offering the operator information of varying quantity and quality. Studies using submarine search scenarios show that experts use their experience integrated with the various pieces of data to arrive at decision with a good outcome; unlike novices who, if the information presented failed to correspond with textbook responses, generally responded incorrectly. Experts were found to employ a strategy of confirming their decision by evaluating whether their decision was consistent with information from a second source (Kirschenbaum, 1992). In this research, the confirmation data is a secondary weather report from a testimonial that influences pilots in their decision to fly.

Knowledge

Besides expertise, core knowledge plays a factor in the understanding of a task and the accuracy of the decision made. Kruger & Dunning (1999) tested the ability of undergraduate psychology students to identify the quality of jokes. The researchers found that the students in the bottom quartile in terms of their ability to identify funny jokes perceived their ability to recognize humor much higher (58%) than their true ability while students who scored very high on identifying funny jokes (92%) received a slighter higher than average perceived ability of quality of jokes (75%). Poorer performers overestimate their ability, while higher performers underestimate their skills. The findings were replicated three more times, twice using logical reasoning skills and once using grammar ability rather than subjective social skills. The results were similar; poorer performing students over estimated actual ability as reflected in the test scores, while top test performers underestimate their ability. This study suggests a false-consensus effect in the top performers. This means that the top performers assume everyone taking the tests performed as well as they did and underestimated their abilities. More interestingly, the poor performers do not recognize the level of their ability. Even with feedback and social comparison, the bottom quartile participants failed to gain insight into their actual knowledge level. Kruger & Dunning (1999) state that

> "when people are incompetent in the strategies they adopt to achieve success and satisfaction, they suffer a dual burden: Not only do they reach erroneous conclusions and make unfortunate choices, but their incompetence robs them of the ability to realize it" (p.1121).

In aviation these results may imply that less experienced, and thus less knowledgeable, pilots may be more susceptible to poor decision making in a fly or not to fly weather environment. The low knowledge pilots may over-estimate their abilities and continue flight from VFR into IMC.

Influence of Testimonials

A testimonial is an endorsement for a product, or a particular action, resulting in a positive or negative outcome. A person potentially uses written and verbal testimonials in decision making processes. A testimonial is interesting due to the influence it can have on another person's outcome.

The effects of testimonials have been studied in the medical domain (Ubel et al., 2001). Decision aids used to determine a medical outcome include statistical data, various medical literature publications, and solicited testimonials from people who have been through a similar medical issue. Two experiments were conducted to determine the influence of testimonials. The first experiment gave participants a hypothetical scenario of a health issue, statistical data regarding a particular health condition, and treatment choices combined with a majority of testimonials that concurred with the statistical data. The second experiment presented the same information and included an equal number of testimonials which supported and did not support the statistical data. In both experiments, a control group received all the information, except the testimonials. The results showed that the participants who received the testimonials, regardless of the number of testimonials supporting the statistical data, were influenced by those comments in their decision of medical treatments with participants choosing medical treatments that had favorable outcomes by the fictional patients displaying similar medical issues (Ubel et al., 2001).

Another study demonstrating the influence of testimonials asked introductory psychology students to identify upper level psychology course they intended to enroll in. One group of students only received statistical data, while a second group received both statistical data and face-to-face time with ten advanced psychology students. The face-to-face time provided the introductory students with an opportunity to listen to a few comments from the upper classmen and their ratings of the class. The findings suggest that the students who received the testimonials were more likely, than the students who only received the statistical data, to enroll in the courses that were highly rated by the advanced students. Even though the statistical data came from a much larger group than the ten advanced students and should be assumed to be more accurate, the experiment with the introductory students showed the potential power of testimonials and the influence of testimonials in decision making process (Borgida & Nisbett, 1977).

Another issue regarding the use of information is the reliability of the source. One essay (Sutter, 2006) found in ascending order of advertisements, hearsay, testimonials, testimonials from friend and authorities, sworn testimony, recorded observations, recorded systematic observations, recorded results of experiments, recorded and results of replicated experiments influence decision making outcomes.

In general the research suggests that testimonials influence decisions when the decision-makers receive a number of components of information for a positive outcome. Even when the information is statistically based, people will use an available testimonial to influence their decision. It also indicates that the quality of the testimonial may be a factor in the weight the testimonial will hold with the receiver, and a testimonial from a credible source will be more influential than a non-credible source.

Communication Theory

The Yale Communication Theory was developed in the 1950's by Carl Hovland. This theory discusses the approval or agreement of the message as a function of the credibility of the source. Hovland's research shows that the source cues affect the message of providing source of information to a receiver. The intentions, expertness, and trustworthiness of the source are cues used by the receiver to formulate an opinion of the message. Perceived expertise is influenced by the education level of the speaker or their knowledge of the topic, confident speaking style, or straightforwardness. Perceived trustworthiness can be influenced by the source's eye contact, by talking quickly or if the receiver believes he is not being persuaded. The higher the credibility of the source, the faster the acceptance of the information presented, and the more favorably the receiver judges the information. Also, a credible source would cause an increase in opinion change from the receiver's own beliefs (Giffin, 1967; Hovland, Janis, & Kelley, 1953; Myers, 2008). Pilots may judge credibility by the number of pilot licenses and ratings a person holds, or by how active of a pilot is the person. For example, a Master CFII with five thousand hours may have a higher perceived credibility as a source for information than a private pilot with one hundred hours.

Source credibility has been shown to influence receivers' acceptance or rejection of statements made by other speakers. One study using undergraduate history students at Yale University administered a questionnaire under the "National Opinion Survey Council." The questionnaire contained queries related to steel, drugs, movies, and atomic submarines, accompanied by some unrelated questions. Students, in the related questions, were asked their opinion based on an issue with different credible sources (trustworthy opposing untrustworthy); the students could answer either in the affirmative or negative position for each of the topics. The data suggests that students, more often than not, changed their opinion about the topic if the information was presented by a highly credible source. An untrustworthy source caused a rejection of the information by the subject, who then used their own initial opinion as a response (Hovland & Weiss, 1951). The findings suggest that the perceived credibility of the source of the message can influence the decision maker's opinion.

Again, the power of the testimonial has the ability to change the receiver's initial opinion of an issue, based on the perceived quality of the information presented. In aviation, a pilot can determine perceived source credibility through various social venues. Pilots participate in a fly-in where food is being served, FAA or AOPA safety seminars, poker runs (a contest to fly to several airports to pick up a playing card to complete a poker hand, best hand wins and there is usually a lunch), ride-sharing, air races, and other contests where pilots become familiar with one another and learn about other people's flying abilities. Pilots can also experience flying abilities by seeing other pilots in the air at a crowded, no air traffic control tower airport, and listening to other pilots on the radio to gain a perceived quality of the pilot.

Further evidence of the power of testimonials is shown in a study using two hundred business people as subjects who took the Consumer Opinion Survey to assess a microcomputer to use based on two levels of credibility (high and moderate) and two situations (buy or lease). Both variables were mixed throughout the survey. The results suggest that source credibility is dependent on the situation. When purchasing the microcomputer, the higher credibility source provoked a more favorable response, even if the original attitude of the subject was negative towards the microcomputer (Harmon & Coney, 1982). This provides further evidence towards the theory that the quality of the source can influence the subject's response. In aviation, all the data on a pilot or aircraft is public information. Databases from the NTSB, NASA's Aerospace Safety Advisory Panel (ASAP), www.landings.com, club and fixed base operator's (FBO) newsletters are resources for information on accidents, near misses or infringement of a FAA procedures, licenses, medical certificates, and various lessons learned while flying. All of these resources provide an avenue for a pilot to gain source credibility from another pilot.

The Yale Communication Theory shows that a credible source can provide powerful testimonial to a recipient. One way to understand the entire communication process is through the Communication Theory S→M→R model. This model reviews the **S**ource giving the **M**essage and the **R**eceiver to get the desired outcome. This paradigm shows communication as a one-way model. The source does not receive any feedback from the receiver. This paradigm has evolved into I↔D↔E which reflects the **I**ndividual with **D**ata in their **E**nvironment communicating a message. The more modern communication theory presented shows a two-way communication line, meaning there is a feedback loop for the sender and the receiver (Ruben, 1984). An example of this in aviation is a private pilot reviewing his flight plan and weather for an upcoming flight. Another pilot enters the FBO returning from a flight, and the private pilot asks the returning pilot how the weather "looked out there". The returning pilot gives his thoughts on the weather and what he thinks this pilot should do in regards to deciding whether or not to fly. The pilot has to make a decision to fly or not to fly based on the information presented. To link to the paradigm, the **I**ndividual is the returning pilot, the **D**ata is the testimonial on the weather and the opinion on whether to fly or not to fly, and the **E**nvironment is the FBO. In this scenario, there is a two-way communication between pilots to send and receive information to make a decision.

Study Overview

The purpose of this study was to identify variables that predict go or no-go decision when pilots are confronted with marginal visual metrological conditions (MVMC), given differences in pilot knowledge and the availability of testimonials from credible and less credible sources.

Therefore, three hypotheses have been developed:

- Pilots' expertise, knowledge (AcTS), comfort to accepting risk (CmR), and pilot licenses will be similarly predictive as weather testimonials to their decision to Go No-Go (GNG) into MVMC.
- Pilots scoring lower on the pilot's knowledge test will overestimate their test performance (Kurger, 1999).

- Pilots will rank testimonials from a credible source higher than TAFs, METARs and graphical weather and rank testimonials from a non-credible source lower than the weather data provided (Hovland, 1951 and 1953).

The first hypothesis has the following dependent variables:

- Expertise – defined as total flight hours. A pilot needs 1500 total flight hours for an air transport rating and this will be used to assign pilots into the non-expert and expert pilot categories. Flight hours have been used by other researchers including Tsang (2003), O'Hare (1990), Driskill, et al. (1998), Wiggins & O'Hare (1995) to identify expert pilots.
- Knowledge – determined by their score of the 50-question survey taken from the FAA test question data bank.
- Comfort Rating – CmR – determined from a 5-point Likert rating scale where (1) Accept Least Risk and (5) Accept Greatest Risk of the pilot's willingness to accept risk given a specific scenario (Driskill, 1998).

* Pilot rating – Private Pilot, Instrument Rated, Commercial Rated, ATP.
* Weather testimonial – ranking of the weather testimonial.

The second hypothesis based on Kurger & Dunning (1999) research states people with lower knowledge on a subject tend to perceive themselves as more competent than they perform.

- Participants will be asked from the 50 FAA questions, how many do you think you answered correctly? (PerTS)

- Confidence Rating (CnR) – determined from a 5-point Likert scale where (1) Not Confident at all and (5) Very Confident on the pilot's rating of their confidence with their answers after taking the knowledge questionnaire (50 question FAA test).

The third hypothesis is based on Hovland et al. (1951 & 1953) research on the power of the testimonial. His research found that participants will often use testimonials rather than statistical data to make a medical treatment decision. When applied to a flight scenario, high quality testimonials will be rated higher than the weather information presented, and low quality testimonials will be rated lower than the weather information presented.

- Weather testimonials – each participant will rank the importance of the TAFs, METARs, weather graphics and testimonials given.

CHAPTER 3

METHODOLOGY

Participants

The demographic questionnaire and pilot exam (see appendix A) was sent to 132 general aviation pilots. Online surveys were sent to Cessna Employee's Flying Club (CEFC) members, previous research participants, Experimental Aircraft Association (EAA) members, Kansas '99's members and Learjet Flight Operations employees. Of the 132 surveys sent: 69 (52%) of the pilots did not respond, 63 (48%) pilots completed the online portion of the study. Sixty pilots (45%) completed the second part of the study and therefore, a sample size of 60 was used for the analysis. Three pilots (2%) partially completed the online survey, and two pilots (2%) opted-out. The survey was also announced through word of mouth, emails and presentations to solicit interest. Table 1 below shows the primary pilot affiliation for each participant.

Table 1
Primary Pilot Affiliation

Pilot Affiliation	Study Demographics	Total Surveys Sent
Cessna Employee's Flying Club	70% (N=42)	65% (N=86)
Previous Research Participant	13% (N=8)	23% (N=31)
Experimental Aircraft Association	10% (N=6)	7% (N=9)
Learjet Flight Operations	5% (N=3)	2% (N=3)
Kansas '99s	2 %(N=1)	2% (N=3)
Total	100% (N=60)	100 (N=132)

All participants from the first part of the study participated in the second part of the study. Pilots were defined as a student pilot, sport pilot or licensed pilot holding a current medical certificate in which their primary flying is done in a general aviation aircraft.

Materials

Part 1

The purpose of Part 1 was to collect demographic data, pilot completing the FAA exam, perceived exam score and confidence rating. The demographic questionnaire and pilot exam was posted on SurveyMonkey and an email sent to the pilot community requesting participation. The exam was open for six weeks and a reminder email was sent two weeks after initial contact. The demographics and pilot exam were comprised of the consent form, demographic questions, aviation experience questionnaire, fifty questions from the FAA private pilot written exam (AcTS) and querying the pilot's perceived knowledge (PerTS) and confidence on the exam (CnR) (see Appendix A). Most of the FAA private pilot written test questions focused on decision making, weather and some memory fact items. Pilots were requested to complete the FAA private pilot written section as if the pilot were actually taking the test which is closed references. The approximate time to complete the survey was 30-40 minutes.

Part 2

The purpose of Part 2 was to present the five flight scenarios to the pilot to review and determine their go no-go decision, comfort to risk rating and ranking of the weather information. The evaluations were conducted in a lab at Wichita State University (WSU) to simulate a FBO room where pilots complete their flight planning. The lab was transformed into an aviation environment with posters, sectional charts, etc to simulate as close as possible a flight planning area at a Fixed Base Operator (FBO) or flying club.

Figure 1. Lab used in second part of study to simulate a pilot's room at an FBO.

Testimonial biographies, stable items such as sectional charts, and five scenarios (see Appendix B) were presented using paper and pencil format. Packets containing reference flight planning information were provided for the decision-making questions by the GA pilot participants. The flight planning information packets (see Appendix C) contained MVMC for the described flight scenario. Each packet consisted of:

- Wichita Sectional chart
- Kansas City Sectional chart
- TAFs for departure and destination airports
- METARs for departure and destination airports
- Winds aloft where available
- Weather graphics

The approximate time to complete the decision-making evaluation was approximately one hour.

Design and Procedure

The study was completed in two sessions. The first session consisted of an online demographics survey and a pilot exam. The participants were grouped by their score on the

FAA private pilot questions (AcTS). The dependent variables are the perceived test score (PerTS) and confidence rating (CnR).

The second session consisted of five flight scenarios completed on paper and pencil at WSU. Participants were given packets of documents containing the testimonial biographies, stable items and flight planning information in a manila folder for each flight scenario of the questionnaire. The routes designed include:

- No testimonial, ICT- PNC (58 nm), leave at 8 am
- Joe testimonial to go, ICT – WDG (78 nm), leave at 8 am
- Joe testimonial to not go, ICT – SLN (69 nm), leave at noon
- Dan testimonial to go, ICT- PTT (62 NM), leave at noon
- Dan testimonial to not go, ICT – EMP (71 nm), leave at 8 am

These routes were familiar to the pilot participants and the weather packets reflect MVMC.

The independent variable was the testimonial (no testimonial, Joe suggesting to go, Dan suggesting to go, Joe suggesting to no-go and Dan suggesting to no-go). The dependent variables include the comfort rating (CmR) and ranking of the importance of the information presented.

Participants who completed both parts of the study were entered into a lottery for one of two $50 gift cards to Sporty's Pilot Shop as a gratuity for their participation.

Scenario Development

The scenarios were developed using guidelines described by Driskill, et al. (1998). Scenario guidelines include realism in the content, contain alternative choices, should not be totally unsafe or an obvious 'book solution', motivational conditions, verification by a subject matter expert, and take approximately one hour to complete.

The five scenarios and weather packets were reviewed by two Subject Matter Experts (SMEs): Eric Davis – CFII, 1800+ total flight hours as a GA pilot and over 1000 hours as an instructor and RosaLee Argotsinger – CFII, MEI, ATP, Chief Flight Instructor of the CEFC, 3100+ total flight hours as a GA pilot and over 2500 hours as an instructor. Each set of the scenario's text and weather graphics were tested by six pilot participants. After reviewing the initial set of scenarios, 17% of the participants elected to go on the flights. After further modification of the scenarios and review by the SMEs, the percentage of participants electing to-go increased to 33%. The scenarios were subject to a third round of edits and review by the SMEs with minimal changes to the text weather to reflect lower winds, slightly higher visibility and slightly higher ceilings. The results of preliminary testing showed that 24% of the participants elected to go on the flights in accord with the work of Knecht (Knecht, 2005, 2008), and therefore the final stimuli were used. The decrease in the yield is not meaningful and was likely due to the small sample size. In the last set of scenarios, the weather conditions were more favorable in wind, visibility and ceilings to attempt a flight.

Statistical Approach

Binary Logistic Regression

A binary logistic regression analysis by means of the enter method was performed using SPSS 12.0 to predict go no go decision outcomes for each flight scenario, based on the five predictors (expertise, AcTS, CmR, pilot license and rank of weather testimonial). Expertise was derived from the self reported total flight hours, where 1500 or more total flight hours was considered expert. Analysis reveals that pilot license category (i.e., sport pilot license, private pilot license, commercial license, CFI and ATP) was moderate to highly correlated with AcTS (r

= .468, *p*<0.01) and Expertise (r = .631, *p*<0.01), and thus was not included in subsequent regression analysis.

The Mahalanobis distance method was used to screen the data for each of the five flight scenarios for outliers. For a multivariate analysis, the Mahalanobis distance determines an outlier by calculating the χ^2 with a statistical significance at $p < .001$ (Mertler & Vannatta, 2002). Outliers were eliminated from the final data analysis.

A Hosmer and Lesmeshow test was calculated for goodness-of-fit between the observed and predicted number of cases for the two categories of go or no-go. The Hosmer and Lesmeshow is a chi-square test, where a good fit is determined by a high p-value (Kinnear & Gray, 2000).

The *Wald* test is used to determine the significance of each predictor in the Binary Logistic Regression and results will be reported below. The odds ratio, also reported, is another means of interpreting the regression coefficients. The odds ratio describes the effect of the predictor on the outcome; it is the odds of being classified in one category of the outcome (Mertler & Vannatta, 2002; Tabachnick & Fidell, 2001).

The below chart reflects the SPSS coding for the binary logistic regression analysis.

Table 2
Binary Logistic Regression Coding

Variable	Coding
GNG	
Go	0
No-Go	1
Expertise	
0-1499 hours	0
>1500 hours	1
Comfort in Accepting Risk (CmR)	
Accept Least Risk	1
Accept Some Risk	2
Neutral	3
Accept More Risk	4
Accept Greatest Risk	5
Testimonial	
High Ranked (most important)	1
	2
	3
Less Ranked (least important)	4
Actual Test Score (AcTS)	Continuous Variable

Knowledge

A standard independent t-test was conducted and table 3 shows the coding scheme used for SPSS.

Table 3
Knowledge Coding

Variable	Coding
Actual Test Score (AcTS)	Continuous Variable
Perceived Test Score (PerTS)	Continuous Variable
Confidence Rating (CnR)	
Not Confident at all	1
Somewhat Unconfident	2
Neutral	3
Somewhat Confident	4
Very Confident	5

Rankings of Testimonials

The following paragraphs describe the statistical methods used to analyze the data across the flight scenarios. First, the ranking data of the weather information was subjected to a Kruskal-Wallis one-way analysis of variance of ranks. This test statistic is used for comparing more than two variables. Second, the Mann-Whitney test statistic is used to analyze rank data of two samples (Daniel, 1990). In this study the Mann-Whitney was used like a post-hoc to determine statistical significance found in the Kruskal-Wallis. The four items ranked were: TAFs, METARs, graphical weather and the testimonial. The ranking coding was "1" was highly ranked (most important) to a 4 which was lesser ranked (least important).

An analysis was completed using Friedman Chi-Square and a Nemenyi's Procedure to determine difference in the rankings of the weather information presented within each flight scenario. The Freidman chi-squared is a one-way repeated measure design for within subjects. This allows for a comparison between the rankings of the TAFs, METARs, Graphical Weather and Testimonials in each flight scenario. If statistical significance is found between the rankings, a Nemenyi's procedure was conducted. The mean difference was calculated between two of the weather presentations. A critical difference value is calculated with the Nemenyi's procedure and is compared to the mean difference. If the mean difference is greater than the critical difference value, the comparison of the two weather presentations is found to be statistically significant (Heiman, 2002).

CHAPTER 4

RESULTS

Demographic Data

The pilot age range was 24 - 78 (M=44.4 years, SD=13.7) with 55 males and 5 females (8.3%), which approximates the published demographics of the pilot population (e.g. M=45.1 years old and 6.18% females) (FAA, 2009).

Table 4 lists the pilot licenses held by participants in this study and for comparison a breakdown of the published 2008 licenses.

Table 4
Pilot License Demographics

License	Study Demographics	Pilot Population
Sport	2 (3.3%)	Not reported by FAA
Private	28 (46.7%)	36.3%
Commercial	8 (13%)	20.3%
Certified Flight Instructor (CFI)	8 (13%)	15.2%
Air Transport Pilot (ATP)	14 (23%)	23.9%

*(FAA, 2009)

The majority of the study participant's reported being employed as engineers. Table 5 defines the occupations of the participants.

Table 5
Pilot Occupations

Occupation	Participants
Engineer	58% (N=35)
Pilot	18% (N=11)
Management	8% (N=5)
Professor	3.3% (N=2)
Retired	3.3% (N=2)
Sales	3.3% (N=2)
Other	5% (N=3)

The participants were highly educated, with all participants being college educated as shown in Table 6 below.

Table 6
Pilot Education

Education	Participants
Some college	3.3% (N=2)
College graduate	47% (N=25)
Some graduate school	17% (N=10)
Completed graduate school	38% (N=23)

The self reported total flight hours ranged from 55 to 21,850 (M=2753.7 hours, SD=4118.8, N=60), with estimates of 0-120 (M=26.4 hours, SD=35.8, N=59) accumulated over the last three months and estimates of 0-500 (M=114.5 hours, SD=141.9, N=59) accumulated over the last twelve months. Most participants reported receiving their flight training from Part 61 schools (N=28, 47%), Part 141 schools (N=20, 33%), Military (N=7, 11%) and Private Instruction, which is Part 61, but not at an actual structured school or FBO (N=5, 8%).

Pilots reported flying a variety of aircraft described in Table 7 below.

Table 7
Primary Aircraft Flown

Aircraft	Participants
Cessna Single Engine	68% (N=41)
Business Jet	16.7% (N=10)
Experimental/Ultralight/Kit/Sport	8.3% (N=5)
Other	7% (N=4)

Although, 16.7% of the participants flew business jets as part of their employment, upon further probing it was found that these pilots owned their own aircraft including a Cessna 172, Cessna 310, Beech Baron, Pitts Special, and were general aviation pilots.

Other survey responses can be found in Appendix E.

Predictive Variables of GNG Decision Making

Across all five flight scenarios, there was a 44% Go rate with the pilot participants. Table 8 shows the decision of the participant based on each flight scenario.

Table 8
Overall GNG Decision from the Participants

GNG	PNC (No Testimonial)	WDG (Non-Expert "Go")	SLN (Non-Expert "No-Go)	PTT (Expert "Go)	EMP (Expert "Go)
GO	70.0%	48.3%	30.0%	58.3%	15.0%
NO-GO	30.0%	51.7%	70.0%	41.7%	85.0%

Ponca City (PNC) Flight Scenario

Data screening for the PNC flight scenario led to the elimination of six outliers for a final sample of N=54, and a 70% Go rate. Figure 2 is a box plot showing the Mahalanobis Distance analysis for outliers.

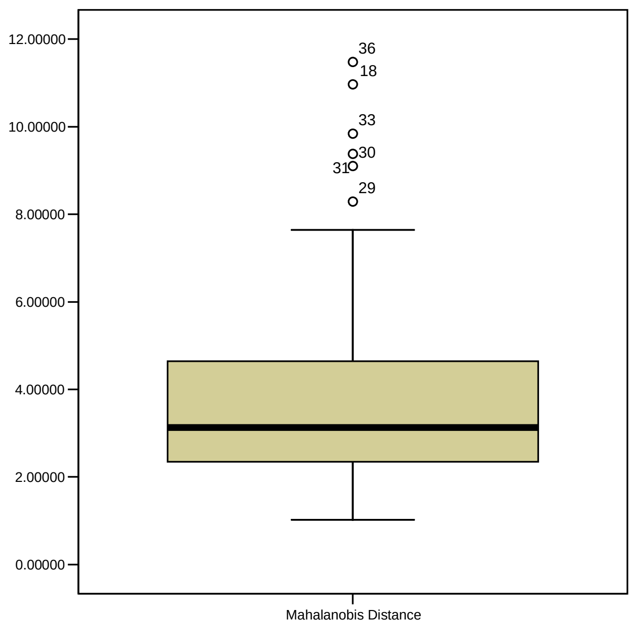

Figure 2. Box plot of Mahalanobis Distance analysis for outliers in the PNC flight scenario

Overall classification was moderate at 70.4%, using no predictors. The classification improved to 77.8% with the addition of the three predictors with classification rates of 94.7% for Go and 37.5% for No-Go decisions. Therefore, the predictors increased the successful classification of the pilots in the GNG. The model fit using the Hosmer and Lesmeshow test, χ^2 (8) = 9.30, p = .318. Table 9 shows regression coefficients, Wald statistics, and odds ratios for each of the three predictors. *Wald* statistic indicated that CmR (M=2.67) was the only variable to significantly predict GNG. The odds ratio for this variable suggests that participants who are more comfortable in accepting risk are three times more likely to go on the flight.

Table 9
Logistic Regression Analysis of GNG for PNC Flight Scenario

	B	*Wald*	*df*	*p*	Odds Ratio	CI $_{.95}$ Lower	CI $_{.95}$ Upper
CmR	-1.168	7.17	1	0.007	0.311	0.132	0.731
Expertise	-0.376	0.25	1	0.617	0.687	0.157	3.000
AcTS	-0.033	0.17	1	0.676	0.967	0.827	1.131
Constant	3.362	1.10	1	0.295	28.852		

Notes: CmR – Comfort in Accepting Risk; AcTS – Actual Test Scores

Woodring Regional (WDG) Flight Scenario

Data screening for the WDG flight scenario led to the elimination one outlier for a final sample of N=59, and a 47% Go rate. Figure 3 shows a box plot showing the Mahalanobis Distance analysis for outliers.

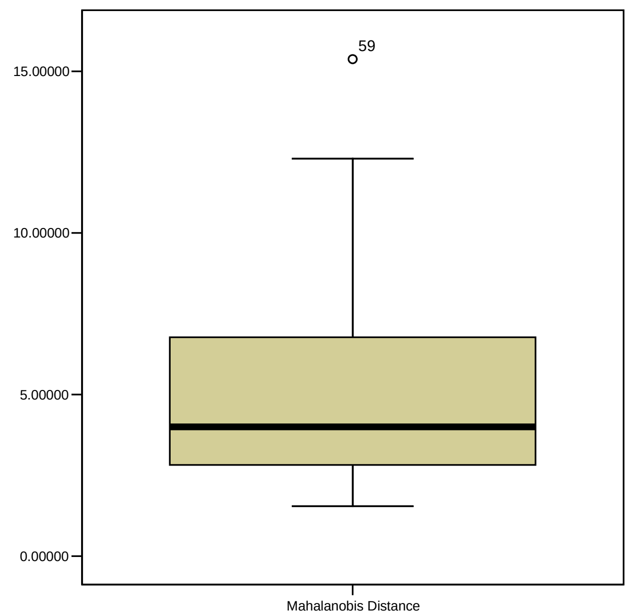

Figure 3. Box plot of Mahalanobis Distance analysis for outliers in the WDG flight scenario

Overall classification was fair at 52.5%, using no predictors. This improved to 76.3% with the addition of the four predictors with classification rates of 75.0% for Go and 77.4% for No-Go decisions. The model fit using the Hosmer and Lesmeshow test, χ^2 (8) = 13.16, p = .107. Table 10 shows regression coefficients, Wald statistics, and odds ratios for each of the four predictors. *Wald* statistic indicated that CmR (M=2.63), Testimonial, and Expertise significantly predicts GNG. The odds ratio for CmR suggests that participants who are more comfortable in accepting risk are two times more likely to go on the flight. The odds ratio for Expertise shows that higher experience participants are five times more likely to report a go in this scenario. Lastly, the odds ratio for the Testimonial shows participants are three times more likely to select no-go for the flight if the testimonial is ranked with little importance. Since, this scenario has Joe our "non-expert" pilot providing a testimonial to Go, this supports the lack of influence of the testimonial.

Table 10
Logistic Regression Analysis of GNG for WDG Flight Scenario

	B	*Wald*	*df*	*p*	Odds Ratio	CI $_{.95}$ Lower	CI $_{.95}$ Upper
CmR	-0.643	4.40	1	0.036	0.525	0.288	0.959
Testimonial	1.180	6.08	1	0.014	3.255	1.274	8.317
Expertise	-1.401	4.68	1	0.030	0.246	0.069	0.876
AcTS	0.071	1.02	1	0.313	1.074	0.935	1.233
Constant	-4.781	2.37	1	0.124	0.008		

Notes: CmR – Comfort in Accepting Risk; AcTS – Actual Test Scores

Salina Municipal (SLN) Flight Scenario

No outliers were identified in the SLN flight scenario resulting in a final sample of N=60, and a 30% Go rate. Figure 4 shows a box plot showing the Mahalanobis Distance analysis for outliers.

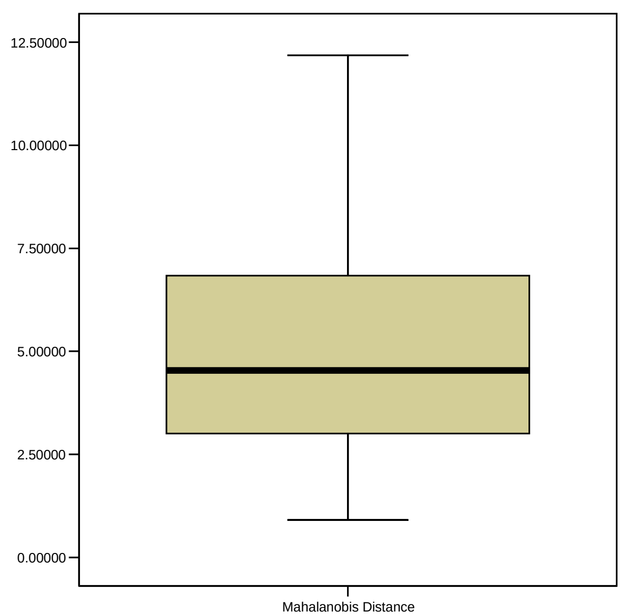

Figure 4. Box plot of Mahalanobis Distance analysis for outliers in the SLN flight scenario

Overall classification was moderate at 70.0%, using no predictors. The classification improved to 90.0% with the addition of the four predictors with classification rates of 83.3% for Go and 92.9% for No-Go decisions. The model fit using the Hosmer and Lesmeshow test, χ^2 (8) = 5.74, *p* = .677. Table 11 shows regression coefficients, *Wald* statistics, and odds ratios for each of the four predictors. *Wald* statistic indicated that CmR (M=2.37) significantly predicts GNG. The odds ratio for this variable suggests that participants who are more comfortable in accepting risk are ten times more likely to go on the flight.

Table 11
Logistic Regression Analysis of GNG for SLN Flight Scenario

	B	*Wald*	*df*	*p*	Odds Ratio	CI $_{.95}$ Lower	CI $_{.95}$ Upper
CmR	-2.395	12.64	1	<0.001	0.091	0.024	0.341
Testimonial	-0.740	1.38	1	0.240	0.477	0.139	1.638
Expertise	-1.646	2.77	1	0.096	0.193	0.028	1.342
AcTS	0.090	0.67	1	0.414	1.094	0.882	1.358
Constant	7.026	2.06	1	0.152	1125.402		

Notes: CmR – Comfort in Accepting Risk; AcTS – Actual Test Scores

Pratt Industrial (PTT) Flight Scenario

Data screening for the PTT flight scenario led to the elimination of one outlier for a final sample of N=59, and a 58% Go rate. Figure 4 shows a box plot showing the Mahalanobis Distance analysis for outliers.

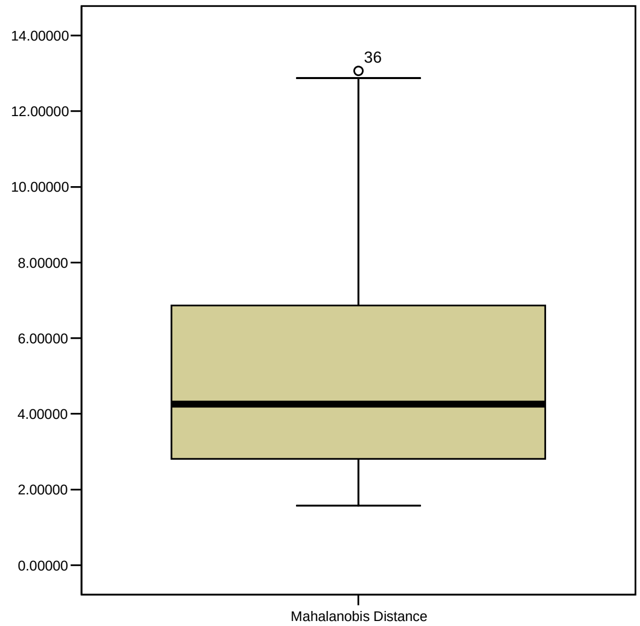

Figure 5. Box plot of Mahalanobis Distance analysis for outliers in the PTT flight scenario

Overall classification was fair at 57.4%, using no predictors. The classification improved to 81.4% with the addition of the four predictors and with classification rates of 82.4% for Go and 80.0% for No-Go decisions. The model fit using the Hosmer and Lesmeshow test, χ^2 (8) = 12.99, p = .112. Table 12 shows regression coefficients, *Wald* statistics, and odds ratios for each of the four predictors. *Wald* statistic indicated that Expertise and Testimonial significantly predict GNG. The odds ratio for Expertise shows that higher experience participants are five times more likely to report a go in this scenario. The odds ratio for the Testimonial shows participants are four times more likely to select no-go for the flight if the testimonial is ranked with little importance. Since, this scenario has Dan the "expert" pilot providing a testimonial to Go, this supports the lack of influence of the testimonial.

Table 12
Logistic Regression Analysis of GNG for PTT Flight Scenario

	B	*Wald*	*df*	*p*	Odds Ratio	CI $_{.95}$ Lower	CI $_{.95}$ Upper
CmR	-0.516	1.78	1	0.183	0.597	0.279	1.275
Testimonial	1.431	8.23	1	0.004	4.181	1.573	11.110
Expertise	-1.533	4.27	1	0.039	0.216	0.050	0.923
AcTS	0.001	0.00	1	0.992	0.999	0.862	1.158
Constant	-3.225	0.84	1	0.359	0.040		

Notes: CmR – Comfort in Accepting Risk; AcTS – Actual Test Scores

Emporia Municipal (EMP) Flight Scenario

The final sample for the EMP flight scenario was N=59 following the elimination of one outlier for a 15% Go rate. Figure 4 shows a box plot showing the Mahalanobis Distance analysis for outliers.

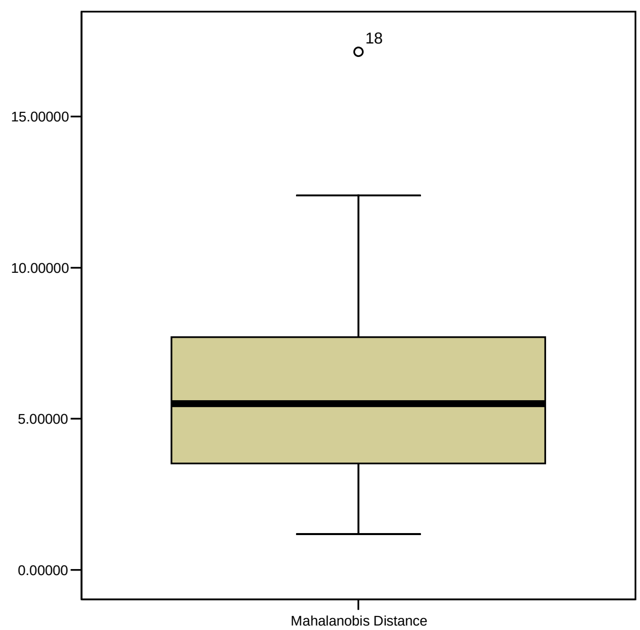

Figure 6. Box plot of Mahalanobis Distance analysis for outliers in the EMP flight scenario

Overall classification was good at 86.4%, using no predictors. There was no improvement (83.1%) with the addition of the four predictors. The successful classification rates of 12.5% for Go and 94.1% for No-Go decisions were calculated. The model fit using the Hosmer and Lesmeshow test, χ^2 (8) = 13.893, p = .085. Table 13 shows regression coefficients, *Wald* statistics, and odds ratios for each of the four predictors. *Wald* statistic indicated that CmR (M=1.98) significantly predicts GNG. The odds ratio for this variable suggests that participants who are more comfortable in accepting risk are four times more likely to go on the flight.

Table 13
Logistic Regression Analysis of GNG for EMP Flight Scenario

	B	*Wald*	*df*	*p*	Odds Ratio	CI $_{.95}$ Lower	CI $_{.95}$ Upper
CmR	-1.445	6.53	1	0.011	0.236	0.078	0.714
Testimonial	-0.371	0.731	1	0.393	0.690	0.295	1.616
Expertise	0.092	0.01	1	0.927	1.096	0.156	7.714
AcTS	-0.028	0.05	1	0.819	0.972	0.765	1.236
Constant	7.475	2.26	1	0.133	1763.507		

Notes: CmR – Comfort in Accepting Risk; AcTS – Actual Test Scores

These results from the five flight scenarios suggest that the four predictor variables do not all contribute equally to the GNG decision and does not support the first hypothesis.

Perceived Knowledge Level

Performance on FAA test questions from session one was used to define three variables: AcTS, short for **AC**tual **T**est **S**cores; PerTS, short for **PER**ceived **T**est **S**cores or a subjects estimate of how well they believed they performed on the test; and a difference score derived by subtracting PerTS from AcTS. The maximum possible score on the FAA exam was 50 correct answers. The range of AcTS and PerTS scores was 30 – 49 (M=41.3, SD=4.6, N=58) and 25 –

50 (M=40.0, SD=7.0, N=58), respectively. Initial examination of AcTS and PerTS identified one missing data point in the PerTS which was deleted from the analysis. A review of the descriptive statistics for the three variables reveals a moderate kurtosis (3.974) in the difference score. This was confirmed by visual examination of the box plot output which indicated the presence of an outlier. Therefore, a second case was deleted from the sample leaving an N=58 for the analysis.

The participants were grouped into "low-knowledge" pilots (AcTS <45; N=44; M=39.72; SD=3.67) and "high-knowledge" pilots (AcTS≥45; N=14; M=47.00; SD=1.66). Both deleted cases were "low-knowledge" pilots. An independent samples t-test was also performed between the "low-knowledge" and "high-knowledge" groups on the difference score between AcTS and PerTS (low-knowledge difference M=2.18, SD=7.31; high-knowledge difference M=.29, SD=2.43). Non-equal variances were found through the Levene's Test (F=14.16, p<.001). The "low-knowledge" and "high-knowledge" were not statistically different (t (53) = 1.14, p = .26) suggesting the groups are well calibrated to their respective knowledge level, the participants know what they do not know. An additional analysis was performed to check whether the null finding is potentially due to the a priori classification of pilots into "low-knowledge" and "high-knowledge" participants based on the use of an arbitrary criterion of 45 correct answers. Additional analysis using criterions of 40 and 35 were also conducted. The analysis using a criterion of 40 correct answers revealed no statistical significant (t (56) = -.883, p = .385) difference; and likewise using a criterion of 35 correct answers also showed no statistical significance (t (56) = -.285, p = .78). Therefore, results show that the participants were not simply a result of the criterion chosen to define high and low knowledge pilots.

Figure 7 shows the plot of AcTS and PerTS versus participant. The data for the "low-knowledge" pilots shows greater scatter above and below their PerTS relative to the "high-knowledge" pilots. The "high-knowledge" pilots appear to be well calibrated; their perception of their performance is in line with their actual performance on the FAA knowledge test.

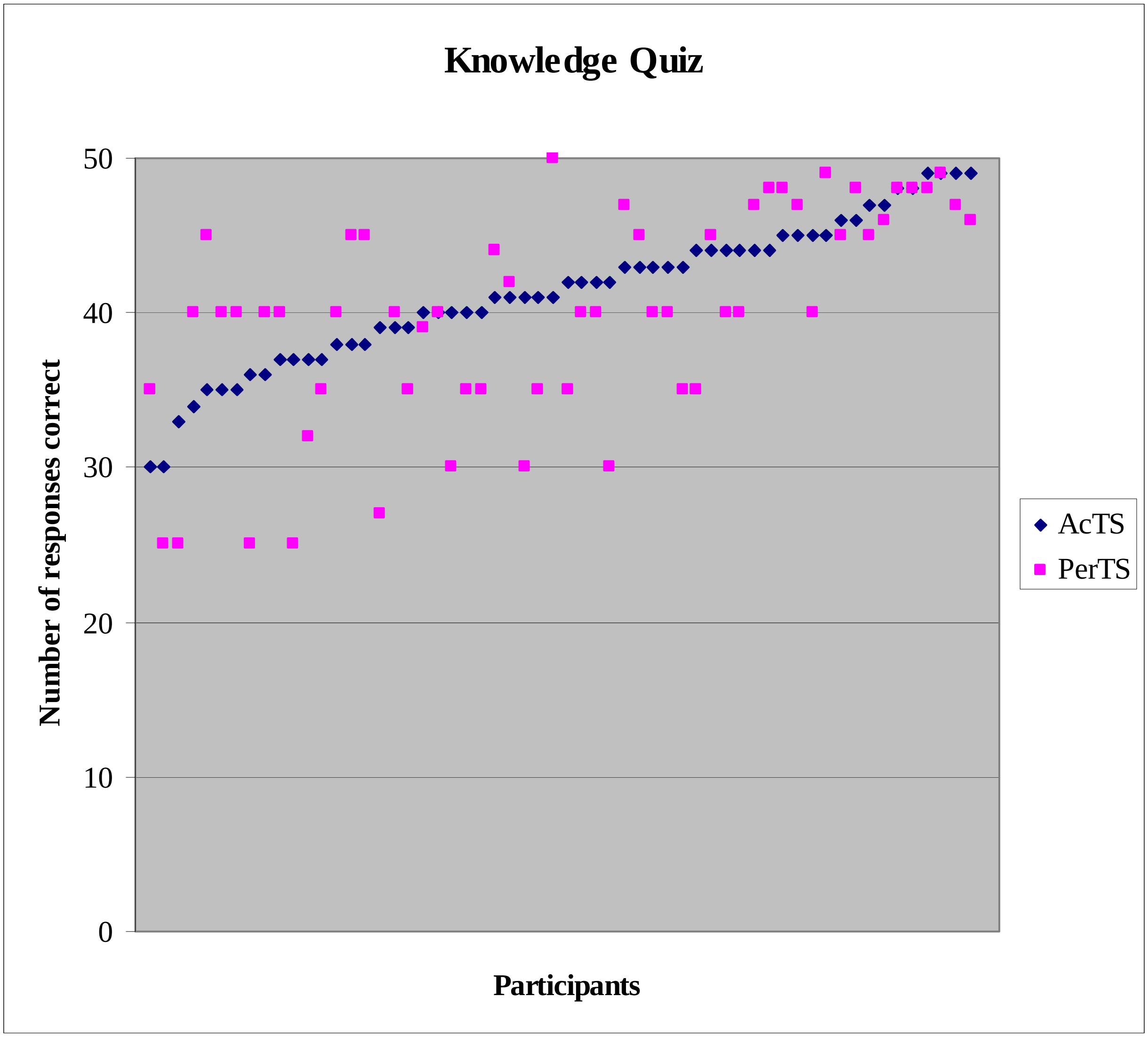

Figure 7. Participants versus correct responses to the knowledge quiz and perceived scores by the pilots

As a more conservative analysis, the upper and lower fourteen participants, according to their actual test scores, were analyzed using a t-test. The analysis showed using the difference data a non-statistical significant (t(16)=-0.18, p=0.86) difference between the groups. Details of this analysis can be found in Appendix F.

In addition to the global statistical comparison of the AcTS and PerTS scores, an analysis was performed comparing the AcTS and PerTS separately for the "low-knowledge" and "high-knowledge" pilots. The paired t-test for the "low-knowledge" pilots AcTS (M=39.43, SD=3.71) and PerTS (M=37.86, SD=6.59) was not significant $t(43) = 1.70$, $p = .10$. The paired t-test performed on the "high-knowledge" pilots AcTS (M=47.00, SD=1.67) and PerTS (M=46.71, SD=2.34) was also not significant $t(13) = 0.44$, $p = .67$.

This analysis confirms the results of the independent t-test reported above, namely that the pilots' perceptions of their ability are closely matched by independent measures of their knowledge level. The pilot's Confidence Rating (CnR) is also consistent with this outcome, with 73.3% of participants rating their confidence in their PerTS as Somewhat Confident to Very Confident.

Ranking of Weather Testimonials

Across All Flight Scenarios

Each flight scenario, with the exception of the PNC route, contained a testimonial by either Joe ("non-expert") or Dan ("expert"). WDG scenario described Joe as advocating for the pilot participant to go and the SLN scenario contained Joe advocating to not go. The PTT scenario contained Dan promoting to the pilot participant to go and EMP scenario contained Dan promoting to no-go. Analysis of participant rankings of the importance of the reference weather information using the Kruskal-Wallis test (Mini-Tab V14.2) revealed a significant difference in the overall rankings (H = 225.68, p <.001). Further analysis using a Kruskal-Wallis for each of the weather presentations across all of the flight scenarios, revealed that graphs and testimonials were ranked significantly higher than either METARS or TAFs. METARS (H = 6.18, p = .186) were not statistically significant, and TAFs (H = 9.79, p = .064) were not significant. However, Graphs (H=17.40, p = .002) and Testimonials (H=31.31, p < .001) were statistically significant.

The PNC flight scenario with no testimonial was the control flight. Each flight scenario with a testimonial was compared against the PNC flight to evaluate the Graph rankings using a Mann-Whitney Test. The analysis found that SLN (W=3057.5, p < .001), PTT (W=3150.5, p = .007), and EMP (W=2975.5, p < .001) were statistically significant. This indicates that in these flight scenarios, with testimonials, the graphical weather was ranked higher than in the control flight. Only the WDG flight scenario was found to be not statistically significant (W=3369.5, p = .137). This suggests that the weather graphics received different rankings depending on the scenario. The graphical weather information was ranked higher in the SLN (M=2.83), PTT (M=2.75) and EMP (M=2.93) scenario than in the PNC (M=2.28) scenario.

Comparison of the testimonials offered by Joe, the non-expert, and Dan the expert reveals statistical significance (W=16593.0, p < .001) suggesting that Dan was ranked higher by the pilots than Joe. The testimonial provided by Dan was judged to be more credible than Joe's. However, this is a moot point since the median ranking for Dan and Joe was 4.0 and 3.0 respectively, suggesting the testimonial was not important in making the GNG decision. This was confirmed by comparing the rankings of testimonials relative to the other sources of weather information (METAR, TAFs, and Graphs) provided to the participants. Using a Mann-Whitney analysis: METAR (Median= 2.0, W=86865.0, p <.001), TAFs (Median= 2.0, W=83427.0, p <.001), and Graphs (Median= 3.0, W=75750.0, p <.001) received lower average rankings (lower ranking meaning better) than testimonials. Therefore, the METAR, TAFs and Graphs were ranked by the user to be the more important information by the pilots than the testimonials. Figure 8 shown below illustrates the ranking of each weather presentation, METAR, TAF, graphical weather and testimonial in all the flight scenarios together. METARs and TAFs were ranked much higher than the graphical weather and testimonials, showing the textual weather information, as more important to the pilot participant than other weather information.

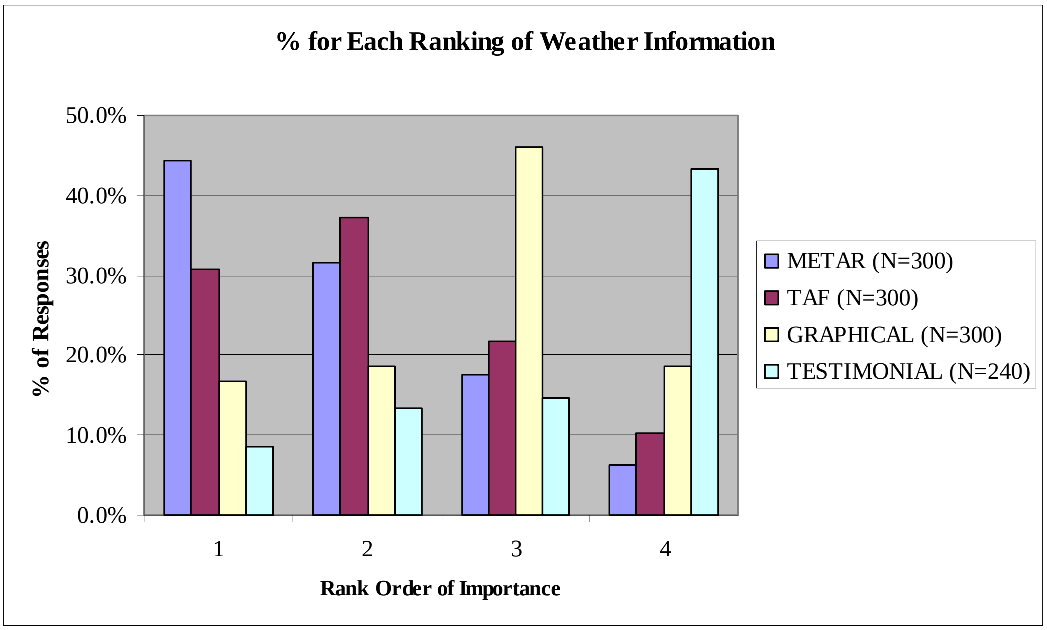

Figure 8. Ranking of weather information for all flight scenarios

Within Each Flight Scenario

The Friedman Analysis for within each flight scenario is shown in Table 14.

Table 14
Friedman Analysis Summary of Rank Testimonial Data (N=60)

	METAR MEAN	TAF MEAN	GRAPH MEAN	TESTM MEAN	χ^2	*df*	*p*
PNC	1.73	2.02	2.25	N/A	8.03	2	0.018
WDG	1.95	1.95	2.50	3.60	65.34	3	<0.001
SLN	1.73	2.08	2.85	3.33	56.82	3	<0.001
PTT	1.82	2.28	2.75	3.17	36.27	3	<0.001
EMP	2.12	2.42	2.95	2.55	11.88	3	0.008

Each scenario showed a statistical significance of the ranking data between the text, graphical and testimonial. The Nemenyi's procedure was completed and indicated that the ranks were not equal with the exception of the EMP flight scenario. This suggests that the testimonials were not ranked equally to the text and graphical weather, meaning the testimonials were ranked in a manner indicating that it was not important to the pilot's decision. The details of the Nemenyi's analysis for the PNC, WDG, SLN and PTT flight scenarios can be found in Appendix G. Analysis of the EMP flight scenario, where the expert pilot was providing a testimonial to no-go, revealed that the testimonial was ranked as important to the pilot's decision as the text and graphical weather. Table 15 depicts the results of the Nemenyi's procedure.

Table 15
Nemenyi's Procedure on EMP Flight Scenario (N=60)
Critical Difference = 0.66

	Mean Difference	Significant (*)
METAR-TAF	-0.30	
METAR-GRAPH	-0.83	*
METAR-TESTM	-0.43	
TAF-GRAPH	-0.53	
TAF-TESTM	-0.13	
GRAPH-TESTM	0.40	

Figure 9 depicts the rankings of the information presented to the pilot participant. It is interesting to note that unlike previous flight scenarios, the expert testimonial is ranked higher. The textual weather overall is still ranked higher, but the "Expert" pilot telling the participant to not go on the flight has some influence. This may be due to the pilot population being risk aversive making it easier for a pilot to "no go" while on the ground with an "Expert" pilot advising not to go.

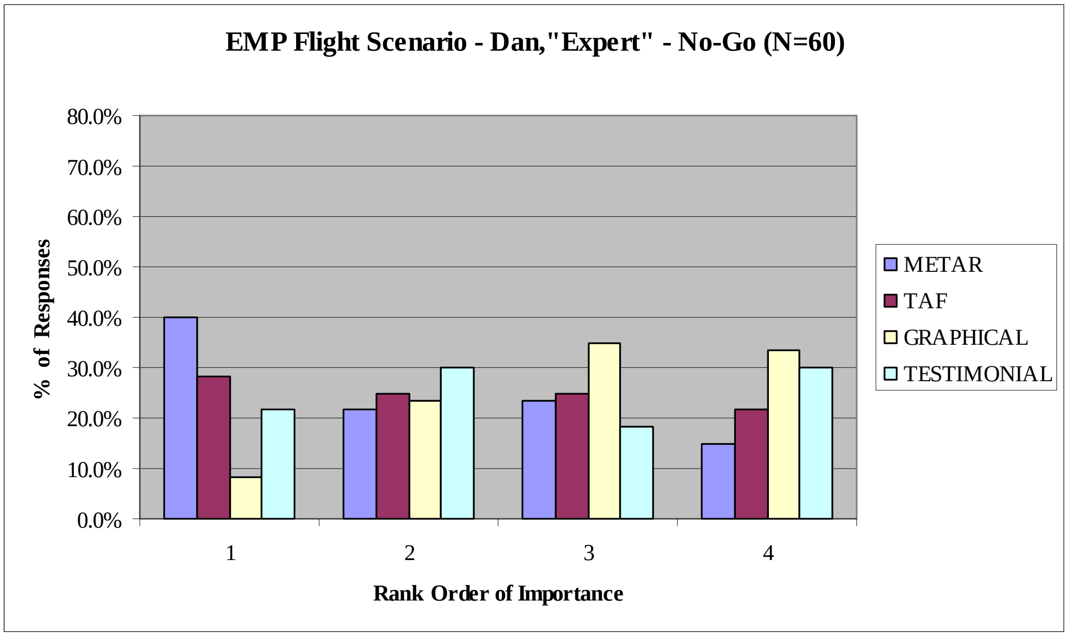

Figure 9. Ranking of weather information for EMP flight scenario

Figure 10 depicts the rankings of the information presented on the PNC flight scenario with no testimonial presented. The textual weather outranks the graphical weather.

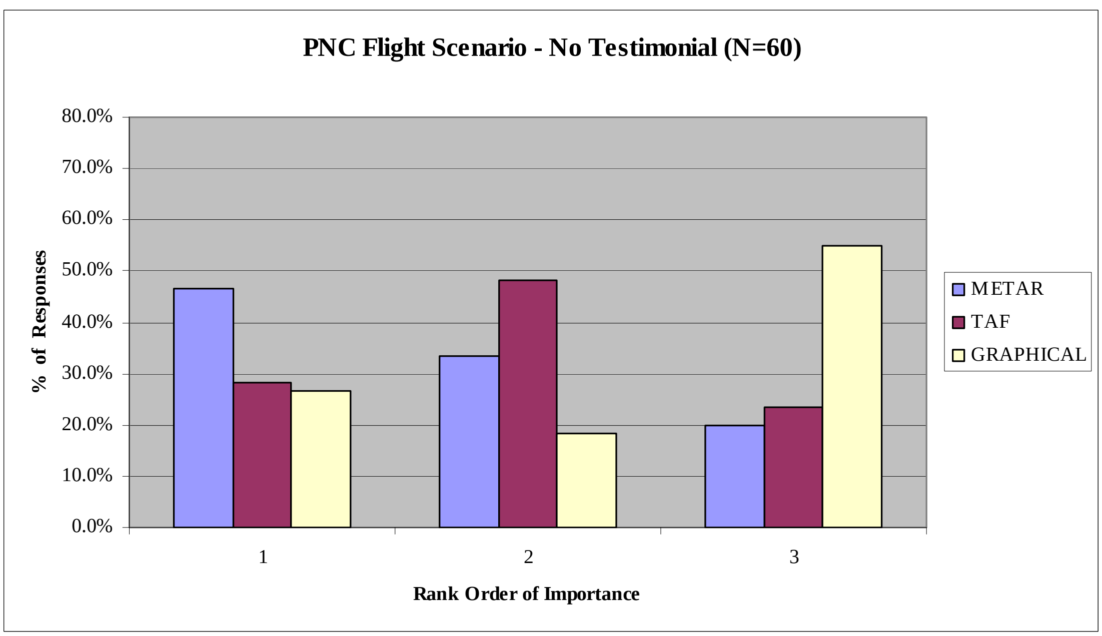

Figure10. Ranking of weather information for PNC flight scenario

Figure 11 shows the rankings of the information presented in the WDG flight scenario where Joe, the "Non-Expert" was recommending to the participant, not to go on the flight. The testimonial was overwhelmingly ranked less influential than the textual weather presented. This suggests the pilot participants ignore the non-expert's suggestion to go on the flight.

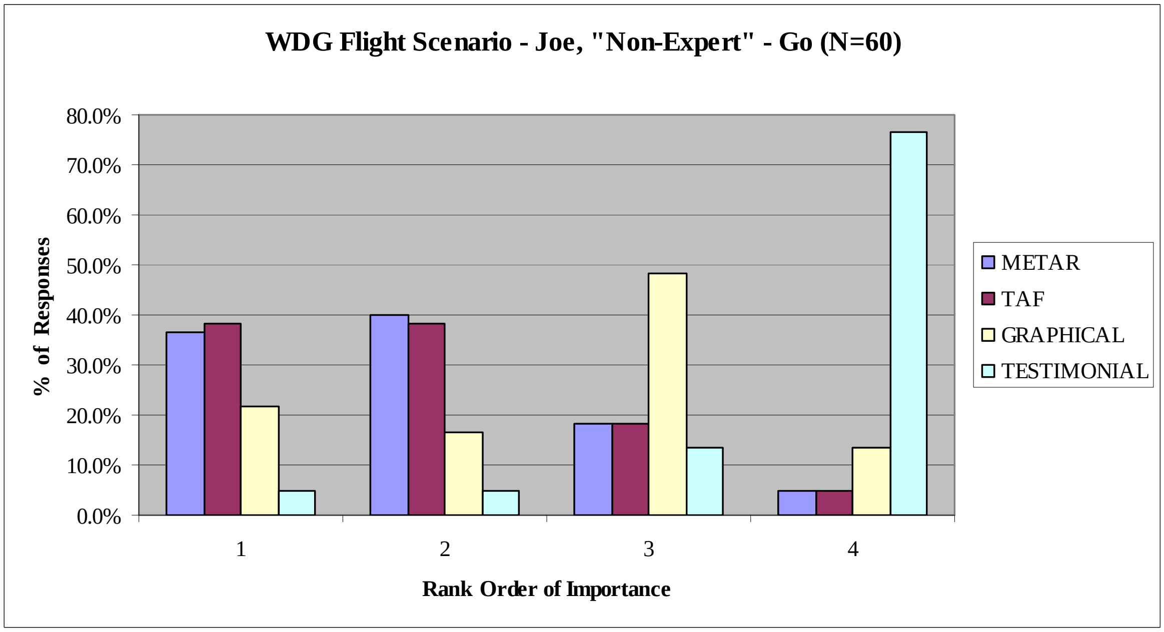

Figure 11. Ranking of weather information for WDG flight scenario

Figure 12 represents the rankings of the different weather information presented for the SLN flight scenario where Joe the "Non-Expert" pilot is suggesting to not go on the flight. Again, the textual weather of METARs and TAFs out ranks the graphical weather and testimonial.

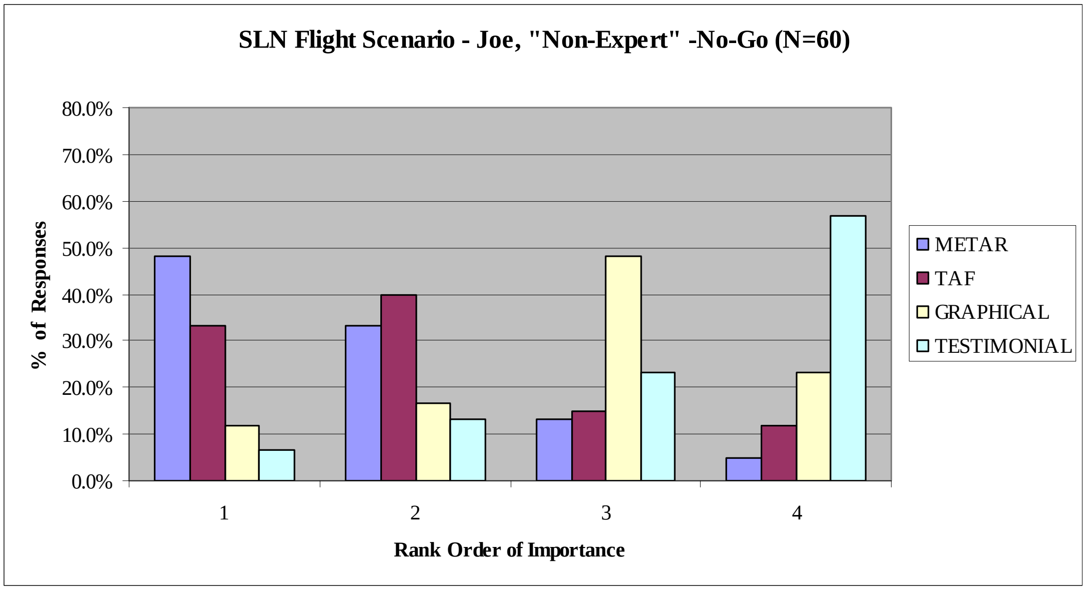

Figure 12. Ranking of weather information for SLN flight scenario

Figure 13 depicts the weather rankings for the PTT flight scenario where Dan the "Expert" pilot suggests to the participant to go on the flight. As repeated in other flights, the textual weather is ranked more important than the graphical weather or testimonial.

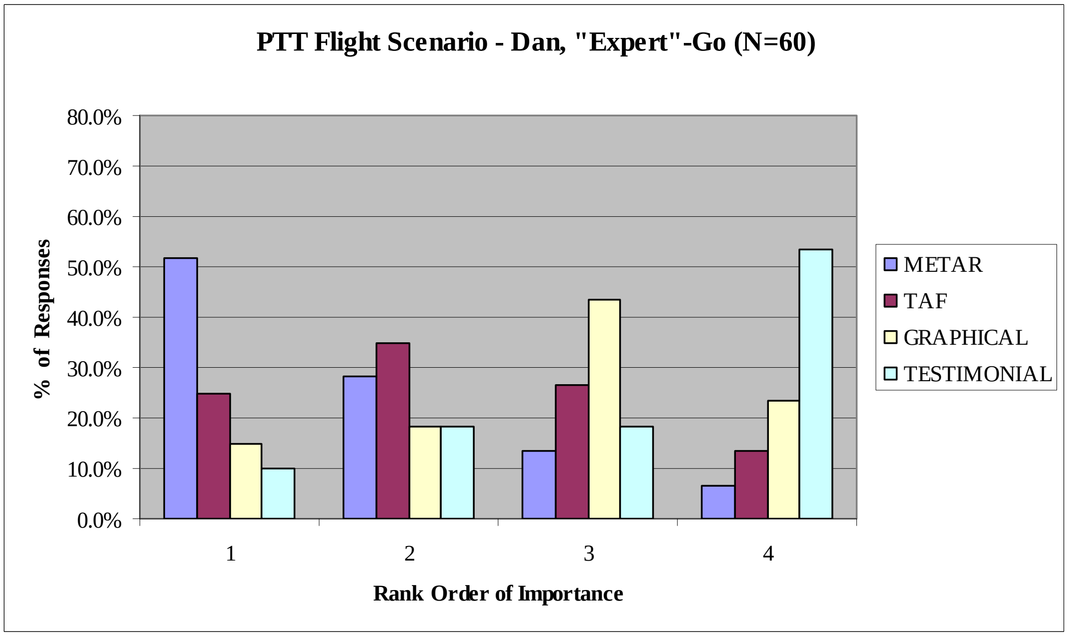

Figure 13. Ranking of weather information for PTT flight scenario

CHAPTER 5

DISCUSSION

The findings of this experiment suggest that the primary factor influencing pilot go or no-go decision is their comfort in accepting risk. In this sample population, the pilots were not willing to accept risk. Testimonials were found to be less influential than either TAFs, METARs and graphical weather presentations in making go no-go decisions, except in the last flight scenario. This result does not concur with the findings from studies where participants are asked to decide among alternative medical treatments (Sutter, 2006; Ubel et al., 2001), which shows that testimonials influence patients' decision making in medical treatments. Also, unlike the educational literature (Kruger & Dunning, 1999), the pilot participants showed little evidence of over or under confidence suggesting they were well attuned to their knowledge level.

Predictive Variables to GNG Decision Making

The variables used to predict the GNG dependent variable were expertise, actual test scores (AcTS), comfort to accepting risk (CmR), and the perceived value (rankings) of the weather testimonial. The hypothesis was that all the predictive variables would contribute to the GNG decision. The pilots' license was not used as a predictive variable because it was highly correlated with expertise. Overall, the results showed that few of the predictor variables were found to influence the go no-go decisions.

The binary logistic regression model classification category for each of the scenarios was good, ranging from 78% to 90%. In each flight scenario, with the exception of PTT, CmR was identified to be statistically significant predictor of GNG decisions. The participants were only comfortable accepting a relatively low amount of risk, and this was significant in making the

GNG decisions. One reason for this may be that not all of the scenarios were compelling enough to encourage risky behavior. A number of situational factors may increase risk taking including, peer pressure from a passenger, or the need to get to the destination due to an appointment. The flights scenarios involved a hypothetical flight to an airport for breakfast or lunch, which few participants would have considered a compelling reason to fly. This may be the result of the framing effect, which is where decision outcomes can be influenced by context or the wording of the question (Matlin, 2005). O'Hare (1990) and Wickens & Hollands (2000) suggest the framing effect can also be where people review potential losses and gains based on some neutral point. Since there is nothing to be gained by going on the flight; the pilot may be more conservative in accepting risk thereby minimizing any potential loss. A risk perception study by Hunter (2006) found pilots who had high self-confidence and who were generally more cognizant of the risk would rate flight scenarios as less risky. When pilots exhibited a greater sense of safety, pilot participants rated flight scenarios higher in risk. O'Hare (1990) suggests that younger, less experienced pilots underestimate the risks in general aviation, while older and more experienced pilots are conservative. This is interesting since the pilots in this study were not comfortable accepting much risk in a marginal weather situation and tended to no-go more often than go regardless of age and experience. This pilot group is highly educated and aware of their ability, and may be overly conservative relative to a more diverse pilot sample. The marginal weather and the lack of a strong motivational factor most likely resulted in a low comfort rating to accept risk.

In the WDG and PTT weather scenarios where the testimonial recommended a Go decision, the testimonial variable was found to be statistically significant with a high odds ratio (i.e. meaning low influence) suggesting the pilot participant did not value the testimonial. This suggests that the testimonial did not weigh heavily in their decision making process which is in agreement with the third hypothesis on the influence of the testimonials. The participants generally ignored the testimonial by their "fellow" pilot to go fly diminishing the usefulness of the pilot report. In general, the pilot participants were less influenced by the testimonials compared to the other weather information; however, when the testimonials are analyzed with the other predictive variables in the regression, the testimonials have little contribution even with the high odds ratio resulting in a no-go decision.

Expertise was statistically significant in two flight scenarios – WDG and PTT, where both our testimonial pilots were advocating to "go" on the flight. This suggests that while knowledge has no predictive value in the GNG decision making process, expertise may have a small predictive value. This does not concur with other published findings (Driskill et al., 1998; Knecht, 2005, 2008) showing that expertise plays a significant role in the decision making process to fly for the pilot. One potential reason for this could be that the purpose of the flight was not a good enough reason to go given the marginal weather involved.

Perceived Knowledge Level

The hypothesis was that pilots scoring poorly on the pilot's knowledge test would be over confident and overestimate their test performance. The AcTS and PerTS scores were not found to show a difference between knowledge levels, which does not support the hypothesis that low knowledge pilot would be over confident. The close correspondence between actual test scores and ratings of perceived performance would appear to suggest that pilots have good meta cognitive skills suggesting they know what they don't know. In other words they have an accurate self-schema about their ability in the aviation domain. The participant's confidence rating, CnR, was high, suggesting their ability to have introspection on their abilities.

There are at least two explanations for this. First, pilots may differ in important ways from the participants used in other published studies. For example, Kruger & Dunning (1999) used undergraduate students and assessed their abilities on rating jokes, logical reasoning and grammar. Generally, undergraduate students are not domain experts in any of these areas. However, the general aviation pilot will have participated in ground and flight training, their abilities have been evaluated by a Designated Pilot Examiner (DPE), which is an independent evaluator provided to the student pilot by the FAA, their knowledge of the flight rules, their ability to fly, and ability to interpret weather have also been assessed. The participants receive feedback about their knowledge and ability throughout the training process from a flight instructor, and this continues after their actual license with regular flight reviews. These flight reviews are conducted by a certified flight instructor or the FAA DPE and are performed in a similar manner as when the original license is issued. Therefore, the typical pilots have received high quality feedback from a professional instructor which may allow them to better evaluate what they know.

Another example from Fennema and Kleinmuntz (1995) studied participants making decision about advisors reviewing student loans based on the application information for accuracy and effort. Findings suggest the participants' perceived accuracy and effort were not calibrated; however with training some of the discrepancies were reduced. This then advocates that training may allow pilot participants to be calibrated in their PerTS to their AcTS. There may also be some self-verification to the pilot's perception of themselves regarding their knowledge about aviation through the continuous feedback they receive (Kunda, 1999). The participants in this group are knowledgeable about piloting, they work in the aviation industry in various capacities; and therefore, they could almost be considered as subject matter experts in their own right. This unique knowledge of the subject matter may allow for better introspection of one's own abilities.

Secondly, in this study, the general education level of the participant group is higher than participants in other studies. All but two participants were college graduates, exceeding the national average of 29.4% reported by the Census Bureau (2009). The pilot participants being very familiar with aviation (through the education from piloting instruction) may show a level of meta-cognition; knowing one's own cognitive process such as knowledge, memory, and situational awareness (Wickens & Hollands, 2000). Since this is a familiar domain, the pilots may be using an automated process to recall aviation information for the knowledge test and exhibiting confidence in their ability (Graf & Birt, 1996). Seventy-one percent of the pilot participant's were from the Cessna Employee's Flying Club (CEFC). This group has access to many safety messages, publications and information through newsletters, weather interpretation information, safety classes, guest lectures and other training materials readily available; and therefore, the group may be very sensitized to their knowledge level. This may even lead to the pilot's procedural memory being used to recall the test questions, and since this is information regularly used for flight, it could be highly accurate on recall and their perceived scores are closer to their actual test scores. Another potential source of accuracy with the procedural memory could be that the FAA Test questions are published. These are standardized questions used in receiving each license or rating. Pilots use various methods for studying these questions, but the questions have immediate feedback found in a number of published books stating what the correct response is and why the response is correct. The pilots have a high knowledge of the questions based on the publications and seeing the question (or a form of the question) in prior studies.

Influence of Weather Testimonials

The hypothesis was that pilots would rank testimonials from a credible source higher than text or graphical weather information and rank testimonials from a non-credible source lower than the weather information provided. Overall, the weather testimonials were found by participants to be less useful than the other weather information, with the exception of the last flight scenario. This suggests that non-credible sources or positive testimonials (advocating to go on the flight) do not influence go no-go decisions. Several factors may explain this result. Firstly, there is the participants' lack of personal knowledge of "Dan" or "Joe" having neither flown with nor met the pilots offering the testimonial. Also, the testimonial was offered in paper form and did not allow the participant to meet or view a person of the pilot offering the recommendations. These limitations may have limited the effectiveness of the testimonial.

Secondly, many of the participants were employed in various capacities within the aviation industry and flew as a hobby. Thus they might be expected to have greater domain knowledge which may make them less susceptible to the effect of the testimonial. This is very unlike participants in the medical studies who are likely to have less domain knowledge and may rely more on the testimonial. The absence of domain knowledge may affect the degree to which participants rely on testimonials given the findings of research studies presented by the medical professional may not be as meaningful to the patient.

A study by Huffman (1974) using farmers, suggest that experience and education are factors in decision making. The researcher provided the farmers with information on the use of nitrogen fertilizer on their corn fields. The findings suggest that farmers with more education were better able to use the information on fertilizer application to increase the crop yield. In a similar study by Huffman (1977), there was a positive correlation between the education attainment of farmers and their economic condition. In this study, education in agriculture led to a more profitable outcome for the farmer. Menz & Longworth (1976) refers to this phenomena as allocative ability linking it to information processing and decision making. Allocative ability is the ability to perceive and respond to change and it has several components including experience and education. The more experience, education or training a person has in their specific domain may provide for a more effective outcome and better self-knowledge. The farmers were able to take the information about fertilizer application and use it to their advantage to increase corn production and profits. Similarly, it is possible that the more highly educated the pilot, the better the ability to synthesize the information into a decision to go or not to go as well as improve their meta knowledge to be able to predict their test scores. The pilot focuses more on the text and graphical weather than the testimonial due to their domain expertise, education, experience and ability.

Finally, it could be theorized that education may allow the pilots to better integrate the text and graphical weather as primary information and the testimonials less important additional information. Lehman, Lempert & Nisbett (1988) studied graduate students in psychology, law, and medicine and found a statistical difference between the statistical and conditional reasoning abilities between first year and third year students. Third year students had an increase in statistical and conditional reasoning. This could suggest that the educated pilot has better reasoning skills for the information presented.

The differences in the rankings of the graphical weather may have been due to the short flight plans. Each flight plan was less than 80nm prioritizing the text weather of METAR and TAFs. Graphical weather is generally used for more strategic flight planning for long flights to determine weather in the far future. Text weather is more tactical, used for local flying to see the changing weather condition over the next few hours (Davis & Argotsinger, 2010).

For the EMP flight scenario containing Dan, the “expert” pilot testimonial, the findings show that the testimonial was ranked as important as the information they were given and therefore, may have been influenced in the pilot’s decision to no-go on the flight. One explanation for the difference in the influence of the testimonial in the EMP flight scenario is Dan, as a credible source, is providing negative information (no-go). According to research by Richey, McClelland & Shimkunas (1967) negative information is more salient than positive information. In their study, university students were given positive or negative information about a stranger in which the student then needed to rate the character of the stranger. The results suggest when negative information is presented, a disproportionate negative character rating of the stranger is found. Another study by Richey et al. (1975) presented different amounts of both positive and negative information together about a stranger for a participant to rate their character. The findings suggest that a single negative statement about the stranger outweighed the five positive behaviors presented eliciting a negative character rating. Weinburger, Allen & Dillion (1981) suggest that negative information stands out more and therefore has a stronger impact to a person. They go on to propose that people are surrounded by more positive cues in their social environment, and as a result, negative information is more salient and therefore more attributable to our actions. A second explanation based on Gilbert et al. (2009) suggests that people surround themselves with others who have similar preferences or personality traits. A person solicits testimonials from their social network. Therefore, people may be receiving testimonials that reinforce their opinions towards a decision. In this sample group of pilots, their willingness to accept risk was scored very low which could be a contributing factor. The pilot deciding to go or no-go on the flight is likely to believe the testimonial due to the credibility of the source, but also because they share a bias towards accepting low risk. The negative testimonial from a credible source is in line with the beliefs of the pilot accepting low risk. There is a saying in the aviation community that it is much safer to be on the ground wishing you were flying, than flying wishing you were on the ground.

The quality of the testimonial was found to be statistically significant, meaning that the expert “Dan” was ranked higher than the non-expert “Joe” reflecting the findings found in other domains. However, since the testimonials were ranked very high (meaning less important) relative to the METAR, TAFs and graphical weather information, the significance of the perceived quality most likely contributed very little to the decision making process.

CHAPTER 6

CONCLUSIONS

The experiment allows some limited conclusions to be drawn about the influence of testimonials possibly because of the homogenous sample of pilots. The pilots' ranked text and graphical weather higher than the testimonials and the quality of testimonials were judged to differ significantly from each other. The pilots may weight text and graphical weather more because of the detail they provide about local weather conditions. METARs and TAFs offer greater detail relevant to making a go no-go decision then may be available in testimonials.

The results of this study do not reflect a strong influence of the testimonial; however, one flight scenario suggests influence of our expert testimonial. The expert advocates to no-go on this flight, which then produces a high no-go rate from the participant. This could be due to both the participants being conservative in accepting risk and a reinforcement of the no-go testimonial.

For the other flight scenarios, a more compelling reason to fly may need to be presented for the testimonial may prove to be more influential.

This pilot population showed evidence of meta cognitive skills – they know what they don't know. This pilot group's perception of their test scores were on average similar to their actual test scores. This may derive from the frequent testing and evaluations from having a pilot's license with immediate feedback given to the pilot.

CHAPTER 7

FUTURE RESEARCH

In light of the limitations of this study, future research might include an improved experiment paradigm where the testimonials would come from an actual pilot or a video of a pilot offering a testimonial. This would allow a more interactive approach to the testimonial. Another improvement could be to provide a more compelling reason to fly. Examples for a compelling flight scenario include starting at an airport away from the pilot's home (a returning to home flight), the pilot needing to be at an appointment or a family emergency.

Also, it is important to replicate the findings with a more diverse pilot population different from what is used in this report from Wichita, KS. If this study was replicated at Oshkosh for example, would the hypothesis be supported?

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APPENDICES

APPENDIX A

CONSENT FORM, DEMOGRAPHICS AND KNOWLEDGE SURVEY

Thank you for visiting the survey for my dissertation at WSU.

Purpose: You are invited to participate in a study to examine the decision making and strategies of general aviation pilots. I hope to learn what materials you use as a pilot that influences your decision making skills.

Participant Selection: You were selected as a possible participant in this study because of your current piloting status at a local manufacture's flying club, EAA member, Kansas 99's member, Kansas Pilot Association or pilot from a FBO. We are seeking at least 50-70 pilots to participate.

Explanation of Procedures: If you decide to participate, you will participate in a two phase study. First, a screening survey containing a self-reported assessment of your demographics and fifty questions found on the FAA written examination. The survey will take approximately 30-40 minutes to complete. If you do not have enough time to complete the survey on-line you can request a paper copy from:

Wichita State University
Psychology Department
Attention: Cindy Miller, Box 34
1845 N Fairmont
Wichita, Kansas 67260
or email requests to: camiller-strick@wichita.edu

The second phase of the study will take place on the WSU campus. You will be given five flight scenarios with flight planning materials (weather, sectional charts, etc) and will answer several questions after reviewing each packet of information. This will take approximately 1 to 1.5 hours scheduled at a convenient time for you.

Discomfort/Risks: There is no discomfort or risk with this study.

Benefits: This study will provide research to help determine what information (and the weight of this information) is used by pilots to make weather related go-no-go decisions. Currently, the available scientific literature does not consider the effects of testimonials on pilot's go-no-go decisions in the aviation domain.

Confidentiality: Any information obtained in this study in which you can be identified will remain confidential and will be disclosed only with your permission. At the beginning of your participation you will be assigned a participant number under which your data will be recorded. Your name will not be directly associated with any of the data collected.

Compensation or treatment: As a thank you for participating in this study you will be entered into a lottery for one of two $50.00 Sporty's Pilot Shop Gift Cards. Wichita State University does not provide medical treatment or other forms of reimbursement to persons injured as a result of or in connection with participation in research activities conducted by Wichita State University or its faculty, staff, or students. If you believe that you have been injured as a result of participating in the research covered by this consent form, you can contact the Office of Research Administration, Wichita State University, Wichita, KS 67260, telephone (316) 978-3285.

Refusal/Withdrawal: Participation in this study is entirely voluntary. Your decision whether or not to participate will not affect your future relations with Wichita State University. If you agree to participate in this study, you are free to withdraw from the study at any time without penalty.

Contact: If you have any questions about this research, you can contact me at: Cindy Miller, Wichita State University, Psychology Department Box 34, 1845 N Fairmont, Wichita, Kansas 67260 or email requests to: camiller-strick@wichita.edu. If you have any additional questions, contact: Dr. Alex Chaparro at Wichita State University, Psychology Department Box 34, 1845 N Fairmont, Wichita, Kansas 67260 or email requests to: alex.chaparro@wichita.edu (316) 978-3038. If you have questions pertaining to your rights as a research participant, or about research-related injury, you can contact the Office of Research Administration at Wichita State University, Wichita, KS 67260-0007, or call at (316) 978-3285.

You are under no obligation to participate in this study. If you wish, you may have a copy of this consent form. You are making a decision about whether or not to participate in this study. Your signature indicates that you have read the information provided above and have voluntarily decided to participate.

Yes, I would like to participant
No, I would not like to participant

Age Consent
In order to participant in this study all participants must be over the age 18 years. Are you at least 18 years old?

Yes
No

To ensure that you are aware of your rights regarding your participation in this study, a PDF copy of the consent form is available for you to download.
Please click on the link below and download the consent form, so you can have a copy for your own personal records.

ConsentPDF2
Would like to download a copy of the consent form?

Yes, I would like to download a copy of the consent form.
No, I do not want to download a copy of the consent form.

Last Name:
Middle Initial:
First Name:

Phone number (to be used only to contact you for the second part of the study):
Email address:

What is your age?
Do not want to answer

What is your gender?
Male
Female

What is your occupation? (If you are retired please provide your previous occupation)

What is your education background?

Some high school
High school graduate
Trade school or Business College
Some college
College graduate
Some post graduate education
Graduate degree

Are you a pilot with a current medical certificate?
Yes
No

Total Flight Hours Logged
Please estimate the hours
X X X X X

What licenses and ratings do you hold?
(Please check all that apply)

Sport Pilot
Private
Instrument
Commercial
CFI
CFII
ATP
Multiengine
Other: ____

How many hours have you logged in the last three months?
Please estimate the hours
X X X

How many hours have you logged in the past 12 months?
Please estimate the hours
X X X X
Where did you receive the majority of your flight training?

FAA licensed Part 141 School
FAA licensed Part 61 School
Military
Other: _____________________________________

What do you fly most often?
(Model)
____
____

How often do you fly in IMC conditions?

Extremely rarely
Very rarely
Somewhat rarely
Somewhat often
Very often
Extremely often
Not applicable

How often do you fly in marginal VMC conditions?

Extremely rarely
Very rarely
Somewhat rarely
Somewhat often
Very often
Extremely often

How often do you fly in VMC condition?

Extremely rarely
Very rarely
Somewhat rarely
Somewhat often
Very often
Extremely often

How often do you fly with an active VFR flight plan?

Extremely rarely
Very rarely
Somewhat rarely
Somewhat often
Very often
Extremely often
Not applicable

How often do you fly an IFR flight plan?

Extremely rarely
Very rarely
Somewhat rarely
Somewhat often
Very often
Extremely often
Not applicable

What is the typical duration of your flights?

Please estimate the hours
X X

When you fly, how often do you stay in the pattern or fly in a local practice area?

Extremely rarely
Very rarely
Somewhat rarely
Somewhat often
Very often
Extremely often

How often do you take cross country flights?

Extremely rarely
Very rarely
Somewhat rarely
Somewhat often
Very often
Extremely often

What is the typical duration of those cross country flights?

Less than one hour
An hour to three hours
5 + hours
9+ hours

Where have you obtained most of your flight hours?
(For example, flying in the military, commercial flying, GA leisure flying, etc.)

Commercial Part – 135 Operations
Commercial Part – 91 Operations
Non-commercial (GA leisure flying, $100 hamburger, traveling for fun)
Military
Other: ______________________________________

These questions are taken from the FAA private pilot written exam. Please do not look up the answers to these questions, but to response to the best of your ability as if you are taking the actual test.

METAR KINK 121845Z 11012G18KT 15SM SKC 25/17 A3000

METAR KBOI 121854Z 13004KT 30SM SCT150 17/6 A3015

METAR KLAX 121852Z 25004KT 6SM BR SCT007 SCT250 16/15 A2991

SPECI KMDW 121856Z 32005KT 1 1/2SM RA OVC007 17/16 A2980 RMK RAB35

SPECI KJFK 121853Z 18004KT 1/2SM FG R04/2200 OVC005 20/18 A3006

FIGURE 12.—Aviation Routine Weather Reports (METAR).

274. PLT059 PVT
(Refer to figure 12.) The wind direction and velocity at KJFK is from
A) 180° true at 4 knots.
B) 180° magnetic at 4 knots.
C) 040° true at 18 knots.

275. PLT059 PVT
(Refer to figure 12.) The remarks section for KMDW has RAB35 listed. This entry means
A) blowing mist has reduced the visibility to 1-1/2 SM.
B) rain began at 1835Z.
C) the barometer has risen .35 inches Hg.

276. PLT059 PVT
(Refer to figure 12.) What are the current conditions depicted for Chicago Midway Airport (KMDW)?
A) Sky 700 feet overcast, visibility 1-1/2SM, rain.
B) Sky 7000 feet overcast, visibility 1-1/2SM, heavy rain.
C) Sky 700 feet overcast, visibility 11, occasionally 2SM, with rain.

TAF

KMEM 121720Z 121818 20012KT 5SM HZ BKN030 PROB40 2022 1SM TSRA OVC008CB
FM2200 33015G20KT P6SM BKN015 OVC025 PROB40 2202 3SM SHRA
FM0200 35012KT OVC008 PROB40 0205 2SM -RASN BECMG 0608 02008KT BKN012
BECMG 1012 00000KT 3SM BR SKC TEMPO 1214 1/2SM FG
FM1600 VRB06KT P6SM SKC=

KOKC 051130Z 051212 14008KT 5SM BR BKN030 TEMPO 1316 1 1/2SM BR
FM1600 18010KT P6SM SKC BECMG 2224 20013G20KT 4SM SHRA OVC020
PROB40 0006 2SM TSRA OVC008CB BECMG 0608 21015KT P6SM SCT040=

FIGURE 15.—Terminal Aerodrome Forecasts (TAF).

285. PLT072 PVT
(Refer to figure 15.) What is the valid period for the TAF for KMEM?
A) 1200Z to 1200Z.
B) 1200Z to 1800Z.
C) 1800Z to 1800Z.

286. PLT072 PVT
(Refer to figure 15.) In the TAF from KOKC, the clear sky becomes
A) overcast at 2,000 feet during the forecast period between 2200Z and 2400Z.
B) overcast at 200 feet with a 40 percent probability of becoming overcast at 600 feet during the forecast period between 2200Z and 2400Z.
C) overcast at 200 feet with the probability of becoming overcast at 400 feet during the forecast period between 2200Z and 2400Z.

287. PLT072 PVT
(Refer to figure 15.) During the time period from 0600Z to 0800Z, what visibility is forecast for KOKC?
A) Greater than 6 statute miles.
B) Possibly 6 statute miles.
C) Not forecasted.

288. PLT072 PVT
(Refer to figure 15.) The only cloud type forecast in TAF reports is
A) Nimbostratus.
B) Cumulonimbus.
C) Scattered cumulus.

222. PLT163 PVT
What minimum visibility and clearance from clouds are required for VFR operations in Class G airspace at 700 feet AGL or below during daylight hours?
A) 1 mile visibility and clear of clouds.
B) 1 mile visibility, 500 feet below, 1,000 feet above, and 2,000 feet horizontal clearance from clouds.
C) 3 miles visibility and clear of clouds.

238. PLT163 PVT
Normal VFR operations in Class D airspace with an operating control tower require the ceiling and visibility to be at least
A) 1,000 feet and 1 mile.
B) 1,000 feet and 3 miles.
C) 2,500 feet and 3 miles.

224. PLT163 PVT
During operations within controlled airspace at altitudes of less than 1,200 feet AGL, the minimum horizontal distance from clouds requirement for VFR flight is
A) 1,000 feet.
B) 1,500 feet.
C) 2,000 feet.

300. PLT192 PVT
The suffix 'nimbus,' used in naming clouds, means
A) a cloud with extensive vertical development.
B) a rain cloud.
C) a middle cloud containing ice pellets.

301. PLT192 PVT
Clouds are divided into four families according to their
A) outward shape.
B) height range.
C) composition.

302. PLT192 PVT
An almond or lens-shaped cloud which appears stationary, but which may contain winds of 50 knots or more, is referred to as
A) an inactive frontal cloud.
B) a funnel cloud.
C) a lenticular cloud.

303. PLT192 PVT
Crests of standing mountain waves may be marked by stationary, lens-shaped clouds known as
A) mammatocumulus clouds.
B) standing lenticular clouds.
C) roll clouds.

305. PLT192 PVT
What clouds have the greatest turbulence?
A) Towering cumulus.
B) Cumulonimbus.
C) Nimbostratus.

131. PLT271 PVT
Risk management, as part of the aeronautical decision making (ADM) process, relies on which features to reduce the risks associated with each flight?
A) Application of stress management and risk element procedures.
B) Situational awareness, problem recognition, and good judgment.
C) The mental process of analyzing all information in a particular situation and making a timely decision on what action to take.

266. PLT290 PVT
Which in-flight advisory would contain information on severe icing not associated with thunderstorms?
A) Convective SIGMET.
B) SIGMET.
C) AIRMET.

268. PLT290 PVT
AIRMETs are advisories of significant weather phenomena but of lower intensities than Sigmets and are intended for dissemination to
A) only IFR pilots.
B) only VFR pilots.
C) all pilots.

133. PLT330 PVT
Which statement best defines hypoxia?
A) A state of oxygen deficiency in the body.
B) An abnormal increase in the volume of air breathed.
C) A condition of gas bubble formation around the joints or muscles.

137. PLT334 PVT
Pilots are more subject to spatial disorientation if
A) they ignore the sensations of muscles and inner ear.
B) visual cues are taken away, as they are in instrument meteorological conditions (IMC).
C) eyes are moved often in the process of cross-checking the flight instruments.

138. PLT334 PVT
The danger of spatial disorientation during flight in poor visual conditions may be reduced by
A) shifting the eyes quickly between the exterior visual field and the instrument panel.
B) having faith in the instruments rather than taking a chance on the sensory organs.
C) leaning the body in the opposite direction of the motion of the aircraft.

136. PLT194 PVT
How can you determine if another aircraft is on a collision course with your aircraft?
A) The other aircraft will always appear to get larger and closer at a rapid rate.
B) The nose of each aircraft is pointed at the same point in space.
C) There will be no apparent relative motion between your aircraft and the other aircraft.

87. PLT444 PVT
During the preflight inspection who is responsible for determining the aircraft is safe for flight?
A) The pilot in command.
B) The certificated mechanic who performed the annual inspection.
C) The owner or operator.

116. PLT444 PVT
Responsibility for collision avoidance in an alert area rests with
A) the controlling agency.
B) all pilots.
C) Air Traffic Control.

251. PLT444 PVT
As Pilot in Command of an aircraft, under which situation can you deviate from an ATC clearance?
A) When operating in Class A airspace at night.
B) If an ATC clearance is not understood and in VFR conditions.
C) In response to a traffic alert and collision avoidance system resolution advisory.

246. PLT444 PVT
What action, if any, is appropriate if the pilot deviates from an ATC instruction during an emergency and is given priority?
A) Take no special action since you are pilot in command.
B) File a detailed report within 48 hours to the chief of the appropriate ATC facility, if requested.
C) File a report to the FAA Administrator, as soon as possible.

223. PLT468 PVT
The minimum distance from clouds required for VFR operations on an airway below 10,000 feet MSL is
A) remain clear of clouds.
B) 500 feet below, 1,000 feet above, and 2,000 feet horizontally.
C) 500 feet above, 1,000 feet below, and 2,000 feet horizontally.

333. PLT492 PVT
What feature is associated with a temperature inversion?
A) A stable layer of air.
B) An unstable layer of air.
C) Chinook winds on mountain slopes.

343. PLT495 PVT
Which weather phenomenon signals the beginning of the mature stage of a thunderstorm?
A) The appearance of an anvil top.
B) Precipitation beginning to fall.
C) Maximum growth rate of the clouds.

345. PLT495 PVT
What conditions are necessary for the formation of thunderstorms?
A) High humidity, lifting force, and unstable conditions.
B) High humidity, high temperature, and cumulus clouds.
C) Lifting force, moist air, and extensive cloud cover.

346. PLT495 PVT
During the life cycle of a thunderstorm, which stage is characterized predominately by downdrafts?
A) Cumulus.
B) Dissipating.
C) Mature.

348. PLT495 PVT
Thunderstorms which generally produce the most intense hazard to aircraft are
A) squall line thunderstorms.
B) steady-state thunderstorms.
C) warm front thunderstorms.

349. PLT495 PVT
A nonfrontal, narrow band of active thunderstorms that often develop ahead of a cold front is a known as a
A) prefrontal system.
B) squall line.
C) dry line.

350. PLT495 PVT
If there is thunderstorm activity in the vicinity of an airport at which you plan to land, which hazardous atmospheric phenomenon might be expected on the landing approach?
A) Precipitation static.
B) Wind-shear turbulence.
C) Steady rain.

352. PLT495 PVT
What feature is normally associated with the cumulus stage of a thunderstorm?
A) Roll cloud.
B) Continuous updraft.
C) Frequent lightning.

353. PLT495 PVT
Which weather phenomenon is always associated with a thunderstorm?
A) Lightning.
B) Heavy rain.
C) Hail.

310. PLT511 PVT
One of the most easily recognized discontinuities across a front is
A) a change in temperature.
B) an increase in cloud coverage.
C) an increase in relative humidity.

311. PLT511 PVT
One weather phenomenon which will always occur when flying across a front is a change in the
A) wind direction.
B) type of precipitation.
C) stability of the air mass.

329. PLT511 PVT
What are characteristics of a moist, unstable air mass?
A) Cumuliform clouds and showery precipitation.
B) Poor visibility and smooth air.
C) Stratiform clouds and showery precipitation.

330. PLT511 PVT
What are characteristics of unstable air?
A) Turbulence and good surface visibility.
B) Turbulence and poor surface visibility.
C) Nimbostratus clouds and good surface visibility.

307. PLT512 PVT
If the temperature/dewpoint spread is small and decreasing, and the temperature is 62 °F, what type weather is most likely to develop?
A) Freezing precipitation.
B) Thunderstorms.
C) Fog or low clouds.

338. PLT512 PVT
Every physical process of weather is accompanied by, or is the result of, a
A) movement of air.
B) pressure differential.
C) heat exchange.

269. PLT514 PVT
When requesting weather information for the following morning, a pilot should request
A) an outlook briefing.
B) a standard briefing.
C) an abbreviated briefing.

290. PLT514 PVT
Which type weather briefing should a pilot request, when departing within the hour, if no preliminary weather information has been received?
A) Outlook briefing.
B) Abbreviated briefing.
C) Standard briefing.

355. PLT518 PVT
Where does wind shear occur?
A) Only at higher altitudes.
B) Only at lower altitudes.
C) At all altitudes, in all directions.

356. PLT518 PVT
When may hazardous wind shear be expected?
A) When stable air crosses a mountain barrier where it tends to flow in layers forming lenticular clouds.
B) In areas of low-level temperature inversion, frontal zones, and clear air turbulence.
C) Following frontal passage when stratocumulus clouds form indicating mechanical mixing.

UA/OV KOKC-KTUL/TM 1800/FL120/TP BE90//SK BKN018-TOP055/OVC072-
TOP089/CLR ABV/TA M7/WV 08021/TB LGT 055-072/IC LGT-MOD RIME 072-089

FIGURE 14.—Pilot Weather Report.

281. PLT061 PVT
(Refer to figure 14.) The base and tops of the overcast layer reported by a pilot are
A) 1,800 feet MSL and 5,500 feet MSL.
B) 5,500 feet AGL and 7,200 feet MSL.
C) 7,200 feet MSL and 8,900 feet MSL.

282. PLT061 PVT
(Refer to figure 14.) If the terrain elevation is 1,295 feet MSL, what is the height above ground level of the base of the ceiling?
A) 505 feet AGL.
B) 1,295 feet AGL.
C) 6,586 feet AGL.

73. PLT141 PVT
An airport's rotating beacon operated during daylight hours indicates
A) there are obstructions on the airport.
B) that weather at the airport located in Class D airspace is below basic VFR weather minimums.
C) the Air Traffic Control tower is not in operation.

124. PLT194 PVT
Prior to starting each maneuver, pilots should
A) check altitude, airspeed, and heading indications.
B) visually scan the entire area for collision avoidance.
C) announce their intentions on the nearest CTAF.

From these 50 questions how many do you think you answered correctly? _______

How confident are you with the answers you have provided?
Not Confident at All
Somewhat Unconfident
Neutral
Somewhat Confident
Very Confident

APPENDIX B

TESTIMONIALS AND FLIGHT SCENARIOS

Scenarios:

Things that are stable amongst all scenarios:

- The aircraft is in good working condition and passes a preflight inspection (Aircraft: 172S, G1000 and GFC700 A/P equipped, IFR approved)
- You are leaving on the 26^{th} of the month
- You as the pilot had good sleep the night before with no other physical issues
- YOU ARE A VFR PILOT
- Daylight Savings Time (+5 hours)

Place yourself in this scenario as a non-instrument private pilot:
You are reviewing the weather information in **packet #1** for a flight from ICT to PNC (Ponca City, OK, 58nm) leaving at 8am for breakfast.

Would you go or no-go? Go   No-Go

What would be your comfort rating of this scenario?

Accept Least Risk		Neutral		Accept Greatest Risk
1	2	3	4	5

Ranking of importance of information presented (1 for the most important, 2 for the next most important and so forth):

____ METAR
____ TAF
____ Graphical Weather Depiction

Biography of club member

Joe Smith is a casual private, non-instrument rated pilot with approximately 100 hours. He's been flying for about 18 months all in Kansas. Joe learned to fly from the same place you are flying and flies every so often. Joe's personal weather minimums are conservative.

Scenarios:

Things that are stable amongst all scenarios:
- The aircraft is in good working condition and passes a preflight inspection (Aircraft: 172S, G1000 and GFC700 A/P equipped, IFR approved)
- You are leaving on the 26^{th} of the month
- You as the pilot had good sleep the night before with no other physical issues
- YOU ARE A VFR PILOT
- Daylight Savings Time (+5)

Place yourself in this scenario as a non-instrument private pilot:
You are reviewing the weather information in **packet #2** for a flight from ICT to WDG (Enid, OK, 78nm) leaving at 8 am for breakfast. Joe, our private pilot, enters the pilot's room just returning from a flight. You ask him how it was out there, and he replies "Great, clear as can be. The winds weren't too bad. You should go on your trip."

Would you go or no-go? Go No-Go

What would be your comfort rating of this scenario?

Accept Least Risk		Neutral		Accept Greatest Risk
1	2	3	4	5

Ranking of importance of information presented (1 for the most important, 2 for the next most important and so forth):

____ METAR
____ TAF
____ Graphical Weather Depiction
____ Testimonial

Biography of club member

Joe Smith is a casual private, non-instrument rated pilot with approximately 100 hours. He's been flying for about 18 months all in Kansas. Joe learned to fly from the same place you are flying and flies every so often. Joe's personal weather minimums are conservative.

Scenarios:

Things that are stable amongst all scenarios:

- The aircraft is in good working condition and passes a preflight inspection (Aircraft: 172S, G1000 and GFC700 A/P equipped, IFR approved)
- You are leaving on the 26th of the month
- You as the pilot had good sleep the night before with no other physical issues
- YOU ARE A VFR PILOT
- Daylight Savings Time (+5 hours)

Place yourself in this scenario as a non-instrument private pilot:
You are reviewing the weather information in **packet #3** for a flight from ICT to SLN (Salina, KS, 69nm) leaving at noon for lunch. Joe, our private pilot, enters the pilot's room just returning from a flight. You ask him how it was out there, and he replies "Had to go around several clouds on the way back to the airport, and didn't see the airport until we were close. The winds are picking up. You should just cancel your trip."

Would you go or no-go? Go No-Go

What would be your comfort rating of this scenario?

Accept Least Risk		Neutral		Accept Greatest Risk
1	2	3	4	5

Ranking of importance of information presented (1 for the most important, 2 for the next most important and so forth):

____ METAR
____ TAF
____ Graphical Weather Depiction
____ Testimonial

APPENDIX B (continued)

Biography of club member

Dan Jones is a CFII at your facility with approximately 5,000 hours. He's been flying for about 20 years, where the last 15 years were in Kansas. He received his private pilot's license in college and continued his ratings and licenses at the same place your flying. Dan flies frequently for work and pleasure. Dan's instructional specialty is working with new instrument rated pilots in the actual instrument conditions.

Scenarios:

Things that are stable amongst all scenarios:

- The aircraft is in good working condition and passes a preflight inspection (Aircraft: 172S, G1000 and GFC700 A/P equipped, IFR approved)
- You are leaving on the 26^{th} of the month
- You as the pilot had good sleep the night before with no other physical issues
- YOU ARE A VFR PILOT
- Daylight Saving Time (+5 hours)

Place yourself in this scenario as a non-instrument private pilot:
You are reviewing the weather information in **packet #4** for a flight from ICT to PTT (Pratt, KS, 62nm) leaving at noon for lunch. Dan, our CFII, enters the pilot's room just returning from a flight. You ask him how it was out there, and he replies "We saw a scatter layer in the area but not a big deal. You should go on your trip."

Would you go or no-go? Go No-Go

What would be your comfort rating of this scenario?

Accept Least Risk		Neutral		Accept Greatest Risk
1	2	3	4	5

Ranking of importance of information presented (1 for the most important, 2 for the next most important and so forth):

____ METAR
____ TAF
____ Graphical Weather Depiction
____ Testimonial

Biography of club member

Dan Jones is a CFII at your facility with approximately 5,000 hours. He's been flying for about 20 years, where the last 15 years were in Kansas. He received his private pilot's license in college and continued his ratings and licenses at the same place your flying. Dan flies frequently for work and pleasure. Dan's instructional specialty is working with new instrument rated pilots in the actual instrument conditions.

Scenarios:

Things that are stable amongst all scenarios:

- The aircraft is in good working condition and passes a preflight inspection (Aircraft: 172S, G1000 and GFC700 A/P equipped, IFR approved)
- You are leaving on the 26th of the month
- You as the pilot had good sleep the night before with no other physical issues
- YOU ARE A VFR PILOT
- Daylight Savings Time (+5 hours)

Place yourself in this scenario as a non-instrument private pilot:
You are reviewing the weather information in **packet #5** for a flight from ICT to EMP (Emporia, KS, 71nm) leaving at 8am for breakfast. Dan, our CFII, enters the pilot's room just returning from a flight. You ask him how it was out there, and he replies "The scatter layer appears to be getting thicker. You should cancel your trip."

Would you go or no-go? Go No-Go

What would be your comfort rating of this scenario?

Accept Least Risk		Neutral		Accept Greatest Risk
1	2	3	4	5

Ranking of importance of information presented (1 for the most important, 2 for the next most important and so forth):

____ METAR
____ TAF
____ Graphical Weather Depiction
____ Testimonial

APPENDIX C

INFORMATIONAL PACKETS

PACKET #1 ICT-PNC

```
PLAN 18098   *            *   JEPPESEN WEATHER   XX/26/09
---------------------------------**---------------------------------

                      ***************************
                      * NON-GRAPHIC INFORMATION *
                      ***************************

KICT 261143Z 2610/2709 16009G15KT P5SM SCT030 BKN050 FM270900 15012KT
 P6SM BKN080CB=

METAR KICT 261153Z 17010G15KT 5SM FEW032 SCT040 BKN080 22/19 A2980=

METAR KICT 261122Z 17015KT 6SM SCT032 SCT050 BKN080 22/19 A2980 RMK AO2
 SLP167 T02110172=

METAR KICT 261053Z 17017KT 5SM SCT020 BKN060 21/19 A2982 RMK
 AO2 SLP165 T01940167 10228 20194 53004=

METAR KICT 260953Z 16006KT 5SM SCT065 SCT080 19/16 A3005 RMK AO2
 SLP161 T01940161=

KICT FD DATA BASED ON 260600Z.
       6000    9000   12000   18000   24000   30000   34000   39000
18Z  1913P16 1909P12 2007P07 2306M04 2619M18 3415M32 3026M43 3031M55
00Z  1913P18 2112P12 2312P07 2313M03 2425M17 2410M32 2818M42 3039M53
```

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06Z  1921P18 2315P13 2413P08 2413M05 2520M18 2422M32 2620M41 2818M54

12Z  2028P18 2220P12 2317P06 2317M05 2415M17 2620M32 2521M42 2423M54



KPNC 261150Z 2615/2712 15010KT P5SM SCT030 BKN040 FM270100 13010KT

 P6SM SCT050 BKN070=



KPNC 261135Z AUTO 16008KT 5SM SCT020 BKN050 23/17 A3006 RMK AO2 SLP168

 T02280167=


KPNC 261035Z AUTO VRB04KT 4SM SCT030 BKN050 22/17 A3005 RMK AO2 SLP164

 T02170167 10228 20194 53005=


KPNC 260935Z AUTO VRB04KT 4SM FEW025 BKN050 22/17 A3004 RMK AO2 SLP159

 T02220167=



KPNC FD DATA BASED ON 260600Z.

       6000    9000   12000   18000   24000   30000   34000   39000

18Z  1810P16 1708P12 1906P07 2506M04 2717M18 3613M33 3220M43 3132M55

00Z  1810P18 2008P13 2108P08 2310M03 2521M17 2509M32 2914M42 3138M53

06Z  1919P18 2313P13 2409P08 2408M04 2518M18 2622M32 2619M42 3018M54

12Z  2127P18 2317P12 2413P06 2312M04 2514M17 2618M32 2619M42 2513M54




END 0024 WEATHER/NOTAM REPORTS 000 GRAPHIC 024 NON-GRAPHIC 000 NOTAM

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END OF JEPPESEN DATAPLAN

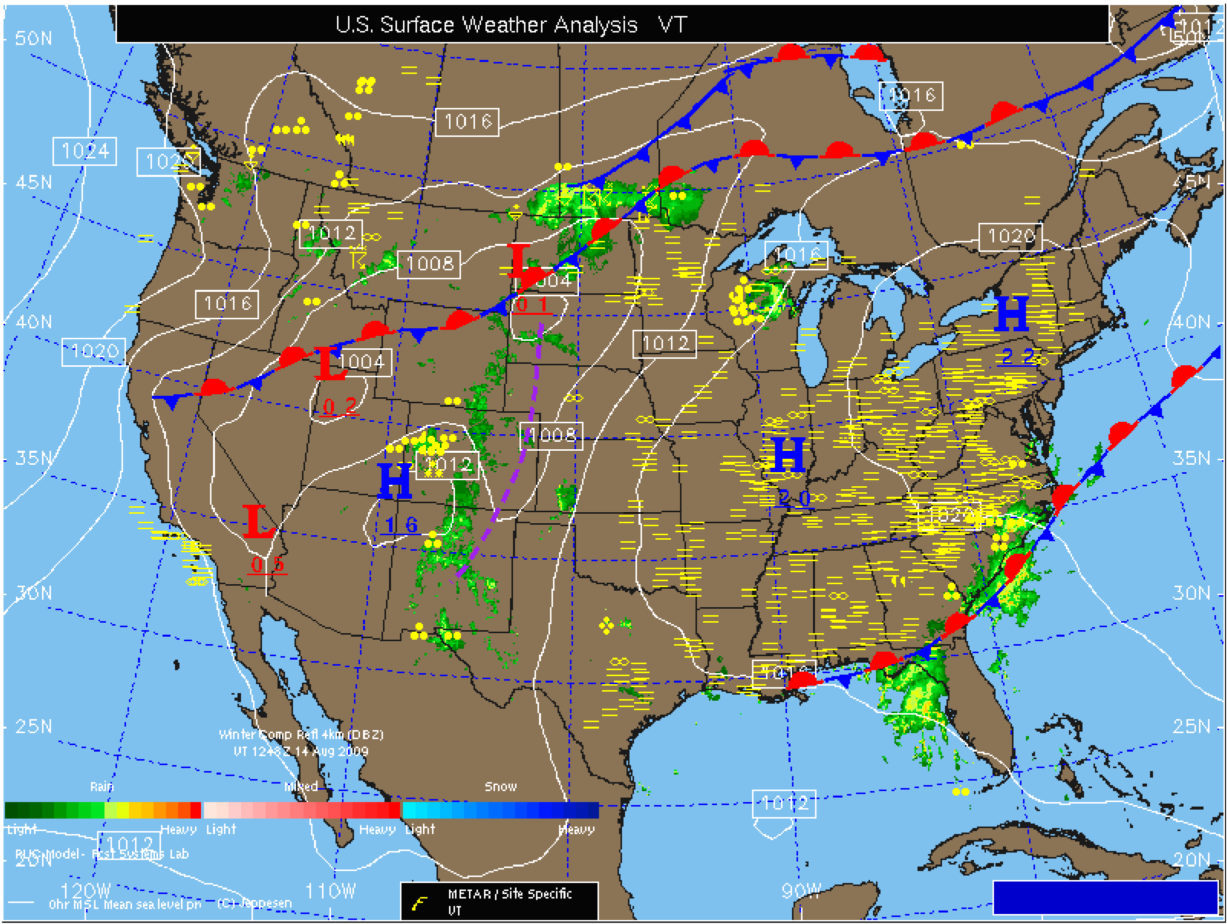

Figure C.1. Current surface weather for PNC flight scenario

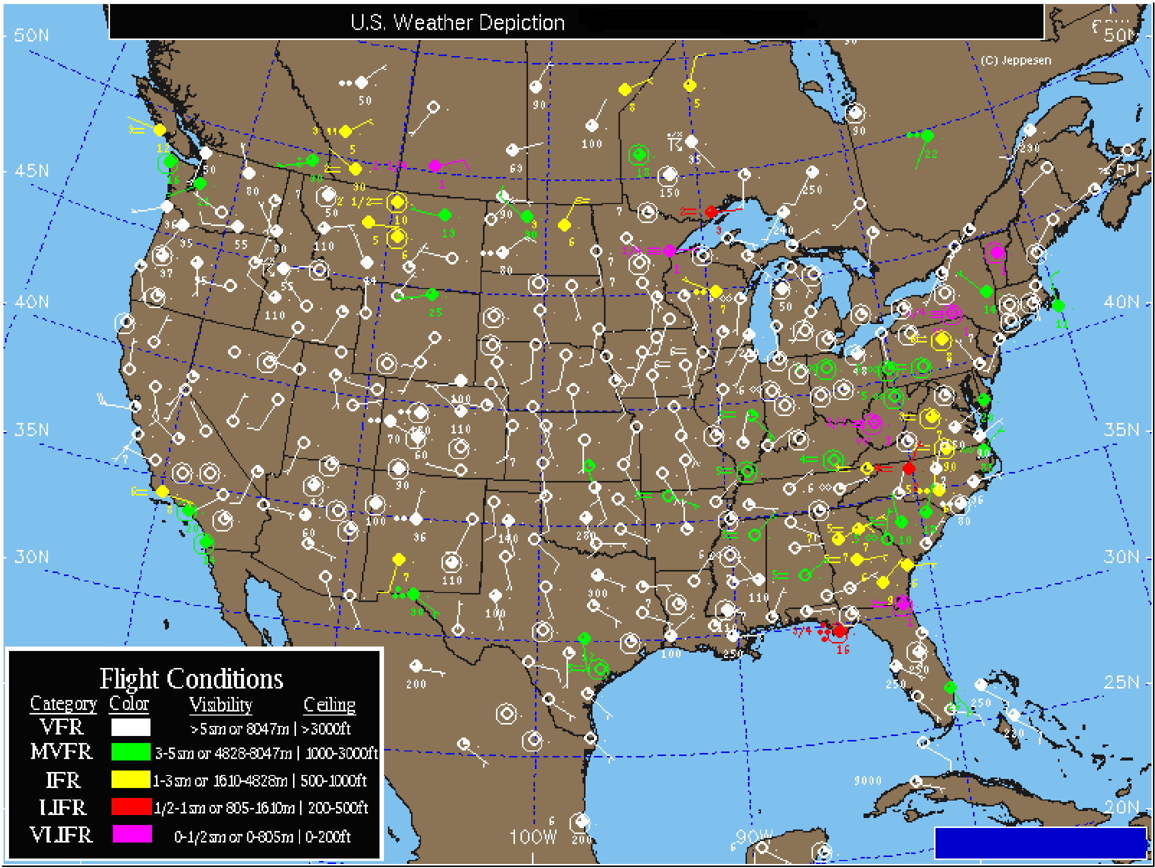

Figure C.2. Current weather depiction for PNC flight scenario

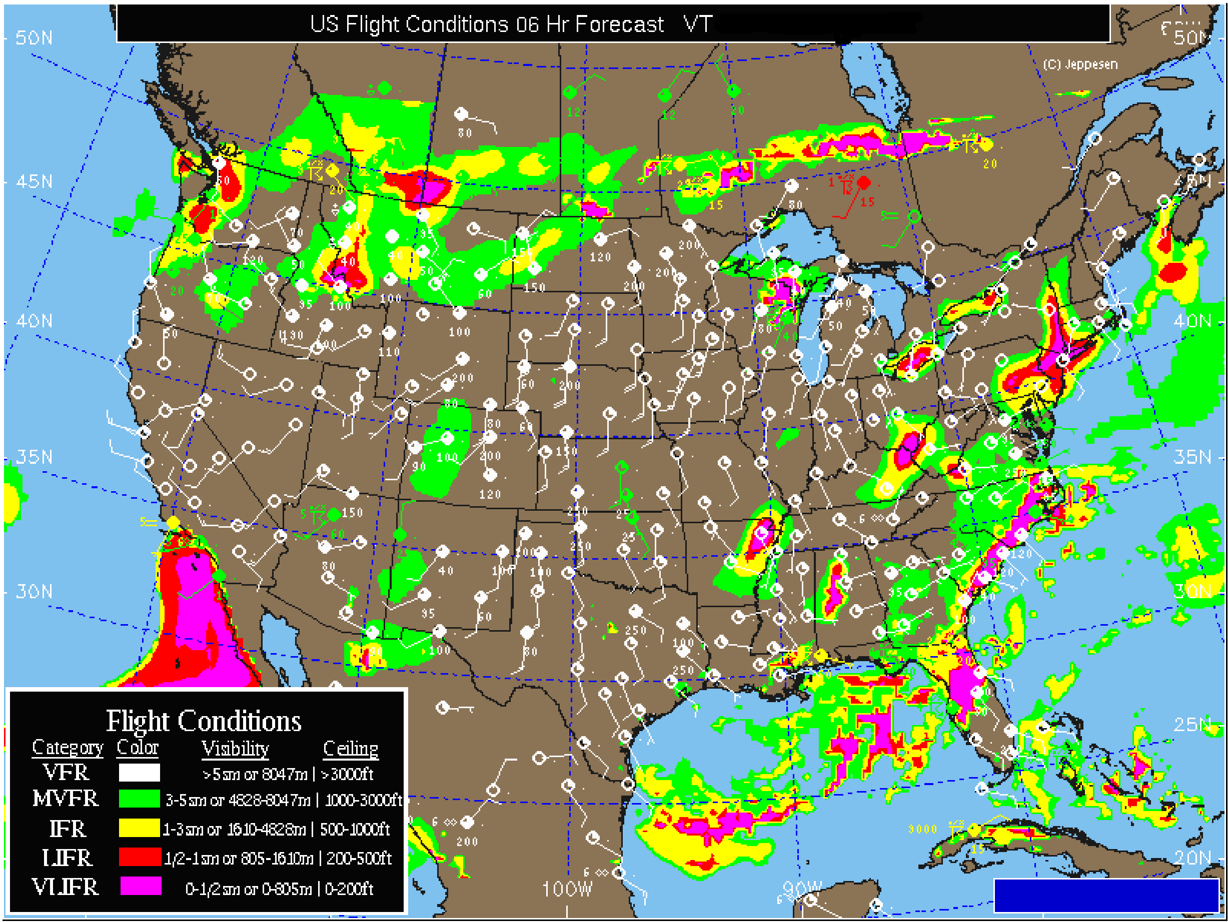

Figure C.3. Six hour forecast weather depiction for PNC flight scenario

PACKET #2 ICT-WDG

```
PLAN 18098   *            *   JEPPESEN WEATHER   XX/26/09

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                      ***************************

                      * NON-GRAPHIC INFORMATION *

                      ***************************


KICT 261143Z 2612/2709 16012KT P5SM SCT030 BKN050 FM270900 15012KT

 P6SM BKN080CB=


METAR KICT 261153Z 17010KT 5SM FEW032 SCT040 BKN080 22/19 A2980

 RMK AO2 PK WND 17030/1135 TSE36RAE19B36E42 SLP084=


KICT 261122Z 17015KT 5SM SCT032 SCT050 BKN080 22/19 A2980 RMK AO2

 SLP167 T02110172=


METAR KICT 261053Z 17017KT 5SM SCT030 BKN060 21/19 A2982 RMK

 AO2 SLP165 T01940167 10228 20194 53004=

METAR KICT 260953Z 16006KT 4SM SCT065 SCT080 19/16 A3005 RMK AO2

 SLP161 T01940161=


KICT FD DATA BASED ON 260600Z.

       6000    9000   12000   18000   24000   30000   34000   39000

18Z  1913P16 1909P12 2007P07 2306M04 2619M18 3415M32 3026M43 3031M55

00Z  1913P18 2112P12 2312P07 2313M03 2425M17 2410M32 2818M42 3039M53

06Z  1921P18 2315P13 2413P08 2413M05 2520M18 2422M32 2620M41 2818M54

12Z  2028P18 2220P12 2317P06 2317M05 2415M17 2620M32 2521M42 2423M54
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APPENDIX C (continued)

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KWDG 261150Z 2611/2712 09008KT P5SM OVC035 FM261600 08010KT P6SM
 BKN015 FM261800 07008KT P6SM SCT045 FM270200 09005KT P6SM SKC TEMPO
 2709/2712 6SM HZ=

KWDG 261135Z 10004KT 4SM SCT018 BKN035 26/23 A3018 RMK AO2 SLP208
 T02560228 51012=

KWDG 261035Z 08008KT 4SM SCT018 OVC040 25/22 A3018 RMK AO2=

KWDG 260935Z 08009KT 4SM SCT006 OVC025 24/22 A3016 RMK AO2 SLP204 T02390217=


KWDG FD DATA BASED ON 260600Z.
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18Z  1810P17 1807P12 1906P07 2406M03 2616M18 0110M33 3118M43 3031M55
00Z  1810P19 2007P13 2207P08 2311M03 2423M17 2010M32 2810M42 3135M53
06Z  1920P19 2413P13 2509P08 2406M04 2518M17 2420M32 2620M42 3015M54
12Z  2128P18 2318P12 2413P07 2311M04 2515M17 2619M32 2621M41 2514M54


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END OF JEPPESEN DATAPLAN
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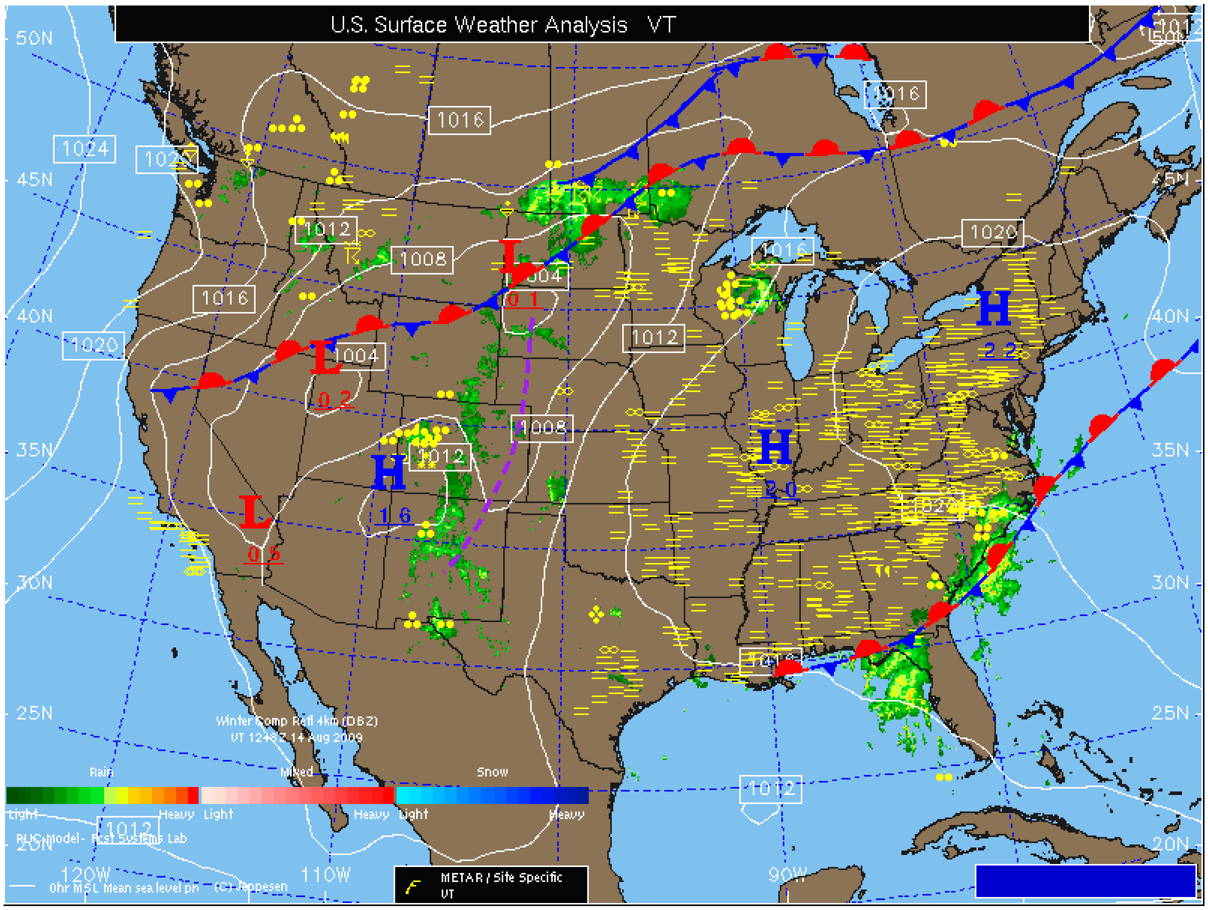

Figure C.4. Current surface weather for WDG flight scenario

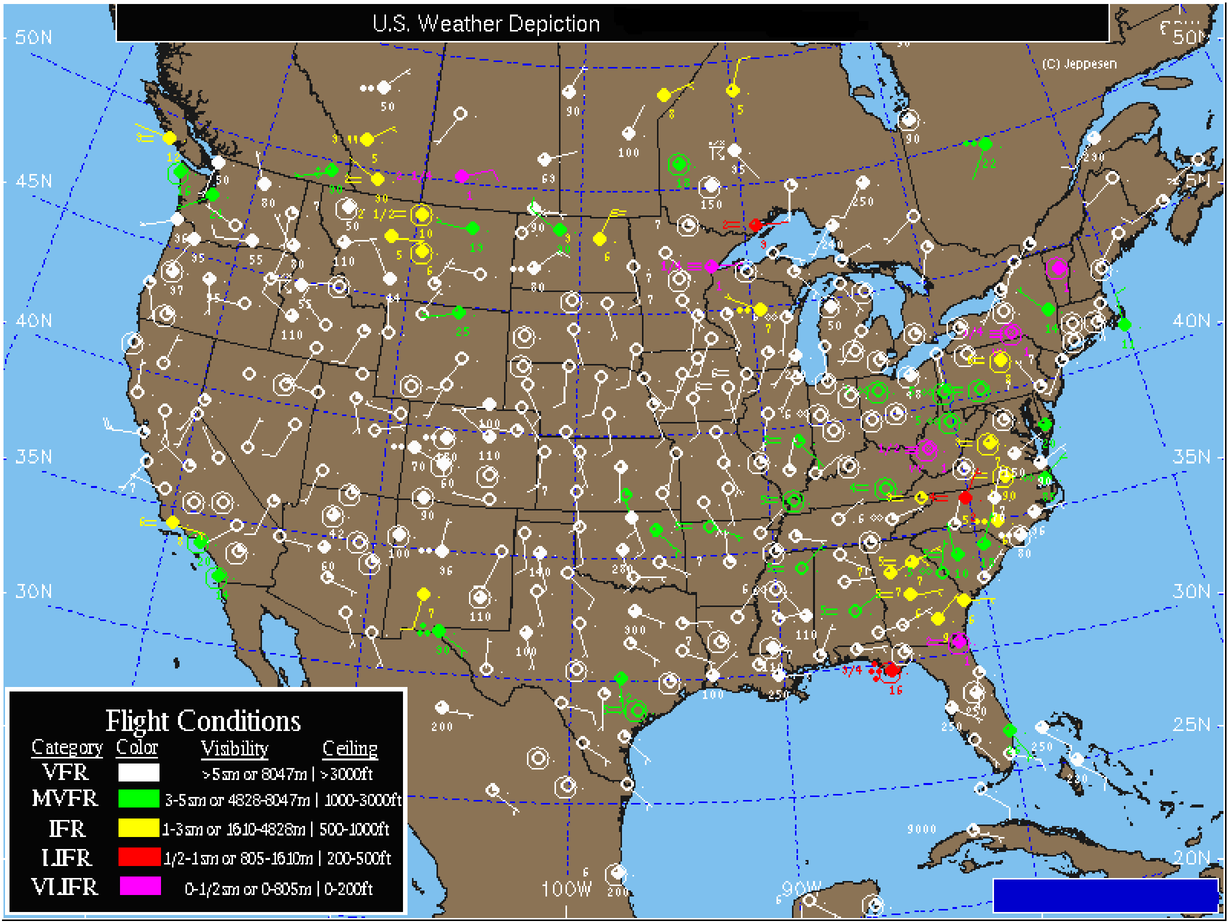

Figure C.5. Current weather depiction for WDG flight scenario

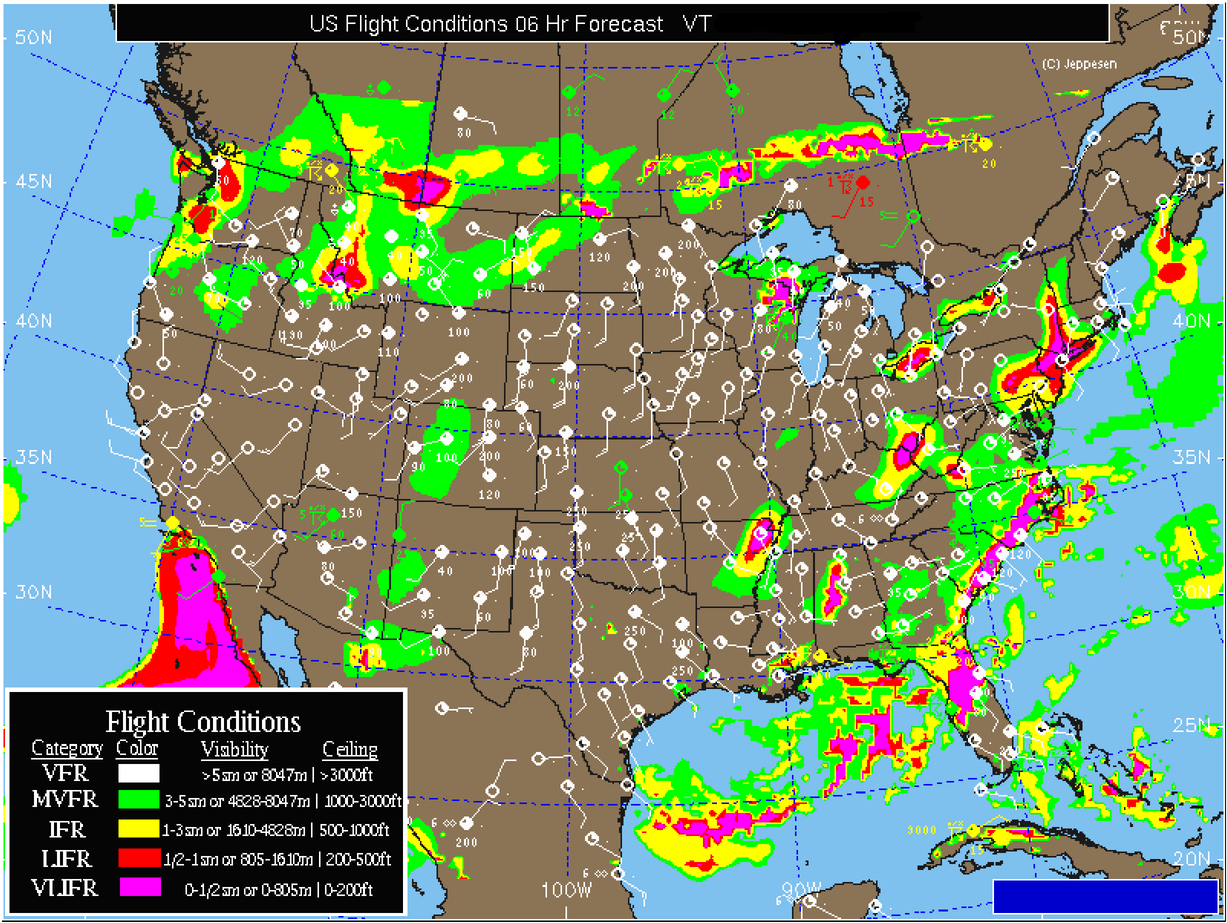

Figure C.6. Six hour forecast weather depiction for WDG flight scenario

PACKET #3 ICT-SLN

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PLAN 18098   *            *   JEPPESEN WEATHER   XX/26/09
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                      ***************************
                      * NON-GRAPHIC INFORMATION *
                      ***************************

KICT 261643Z 2615/2712 16008KT P6SM  FEW015 BKN030 TEMPO
 2619/2620 6SM BR BKN025 FM261600 17015KT P6SM=

METAR KICT 261653Z 17018KT 7SM FEW032 SCT120 BKN150 22/19 A2980=
METAR KICT 261642Z 17020KT 7SM SCT032 SCT120 BKN150 22/19 A2980 =

METAR KICT 261628Z 17021KT 7SM SCT020 SCT032 BKN120 21/19 A2980 RMK
 AO2 PK WND 18029/1512 RAE19 OCNL LTGIC VC SE TS VC SE MOV SE P0003=

METAR KICT 261553Z 17017KT 8SM -RA BKN018 OVC022 21/19 A2982 RMK
 AO2 PK WND 18027/1421 TSB44RAB44 SLP091 OCNL LTGICCC OHD-SW-NW TS
 OHD-SW-NW MOV NE P0000 60000 T02110189 51010=

METAR KICT 261453Z 17018KT 9SM OVC021 21/18 A2981 RMK AO2 PK WND
 16029/1313 SLP087 T02060178=

KICT FD DATA BASED ON 261200Z.
       6000    9000   12000   18000   24000   30000   34000   39000
00Z  1951P12 2144P08 2245P02 2254M12 2260M25 2169M40 2173M50 2171M60
06Z  2150P12 2339P08 2339P02 2250M14 2163M27 2075M41 2081M51 2177M58
```

```
12Z  2337P12 2333P07 2336P01 2351M15 2356M29 2262M44 2271M53 2269M60

18Z  2517P10 2426P05 2435M00 2453M13 2361M27 2363M42 2267M51 2169M62


KSLN 261640Z 2618/2718 03010KT P5SM BKN030 FM262000 05007KT P6SM
 SCT050 FM270700 06007KT P6SM SCT080CB=


METAR KSLN 261653Z VRB06G15KT 5SM HZ 23/20 A3004 RMK AO2 PK WND
 02025/1655 TSE1657RAE18 SLP160 P0001 60149 T02330200 10267 20172
 58003=
KSLN 261614Z 02013KT 10SM -RA SCT027 OVC100 22/20 A3006 RMK AO2 PK
 WND 02031/1655 TSE1657 P0001=


KSLN 261603Z 03017KT 9SM -RA BKN020 BKN110 21/19 A3007 RMK AO2 PK
 WND 02031/1655 TSE1657 P0001=


METAR KSLN 261553Z 02022KT 4SM BR SCT001 OVC016 19/18 A3007
 RMK AO2 PK WND 30069/1620 WSHFT 1632 RAB15 PRESFR SLP172 P0147
 T01940183=
KSLN 261518Z 30020KT 1 1/2SM BR FEW004 SCT015 BKN055 21/19
 A3013 RMK AO2 PK WND 29051/1618 RAB15 P0014=
METAR KSLN 261453Z 02007KT 10SM VCTS BKN100 24/21 A3005 RMK AO2 TSB48
 SLP164 T02390211=
SLN UA /OV MPR018011 /TM 1505 /FL150 /TP PA30 /SK TOP150 /TB NEG /RM
 CB N=


KSLN FD DATA BASED ON 261200Z.
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00Z  3308P18 2509P12 2213P06 2628M06 2535M20 2545M34 2552M43 2660M54
06Z  1013P17 0120P12 3226P06 3041M08 2640M20 2348M34 2453M43 2564M55
```

```
12Z  0208P17 3606P12 3410P05 3232M09 2840M21 2858M34 2866M45 2860M55

18Z  0515P16 3411P11 3010P05 3316M09 3141M22 2953M34 2651M43 2946M55

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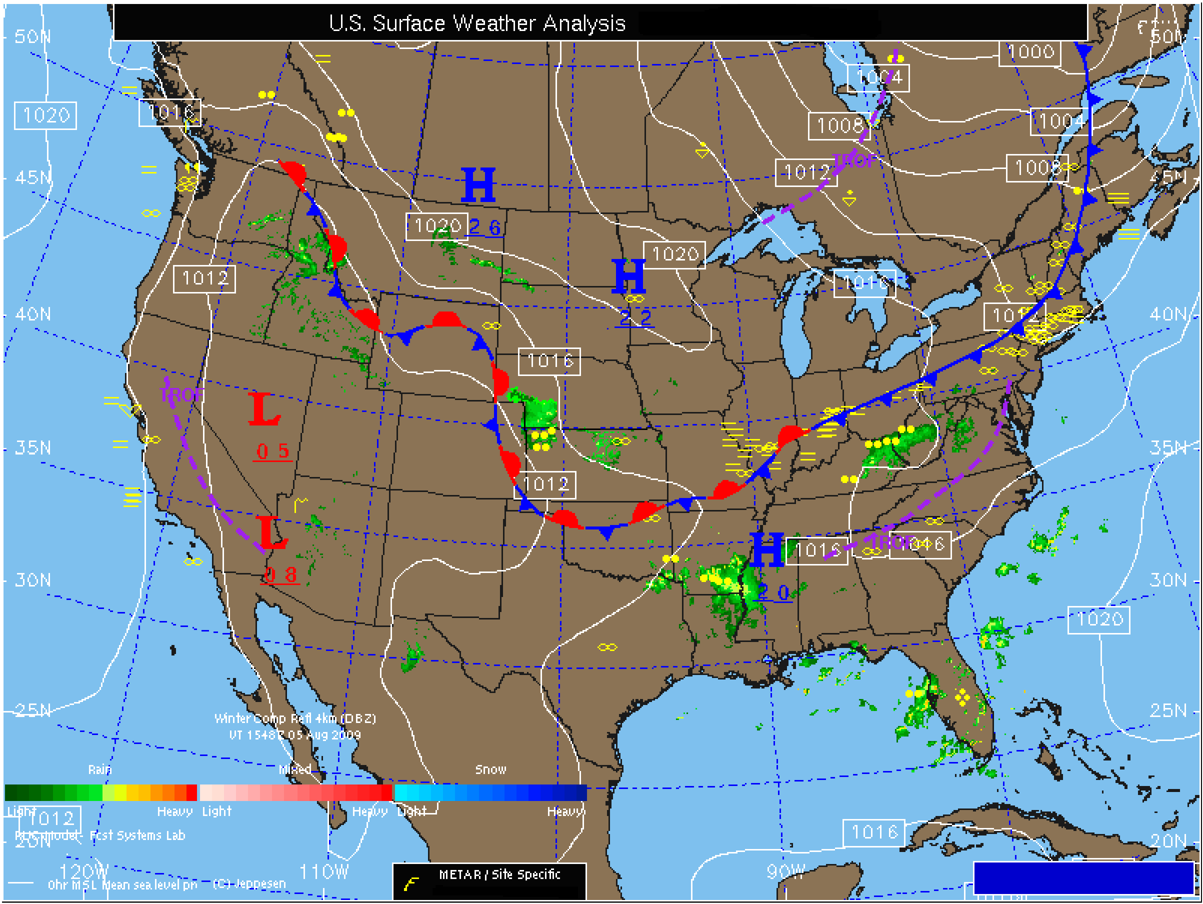

Figure C.7. Current surface weather for SLN flight scenario

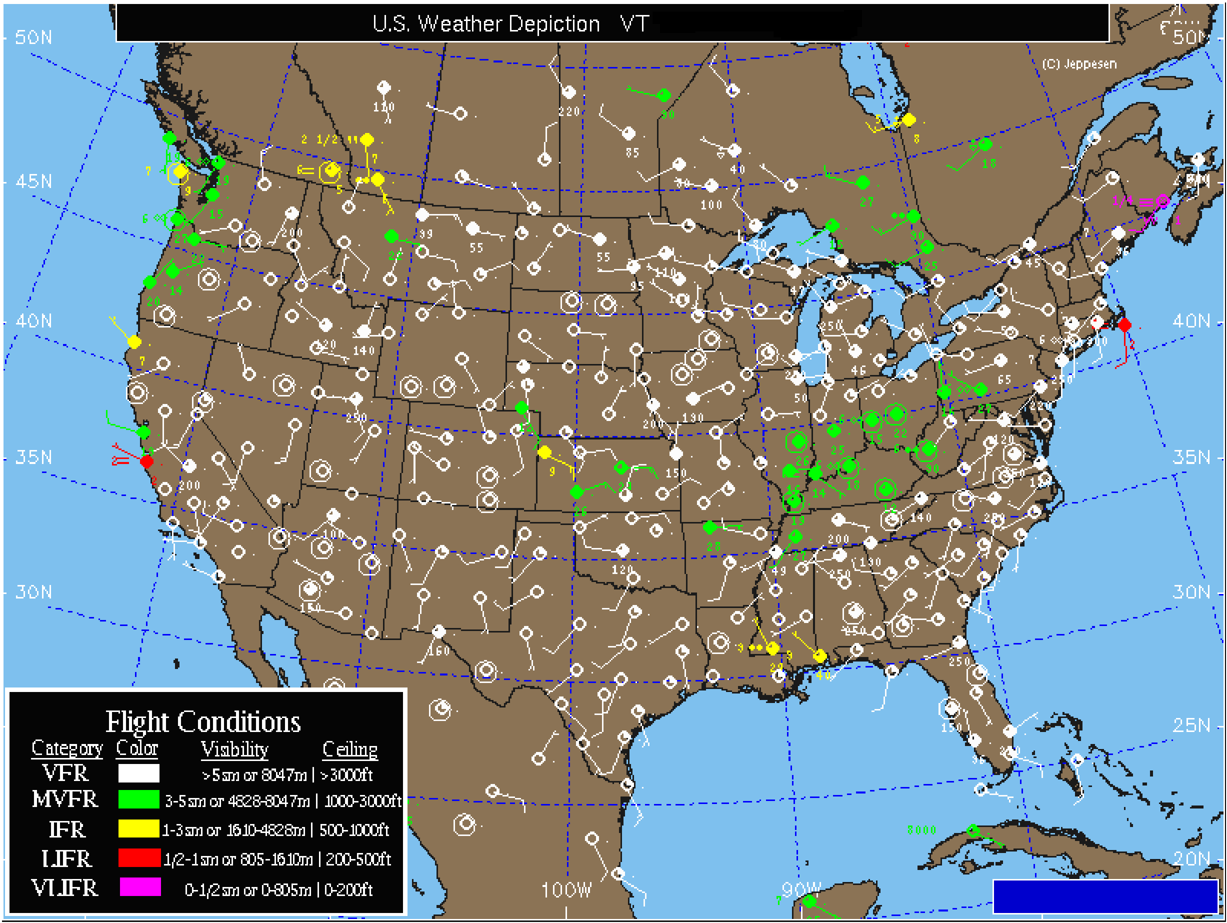

Figure C.8. Current weather depiction for WDG flight scenario

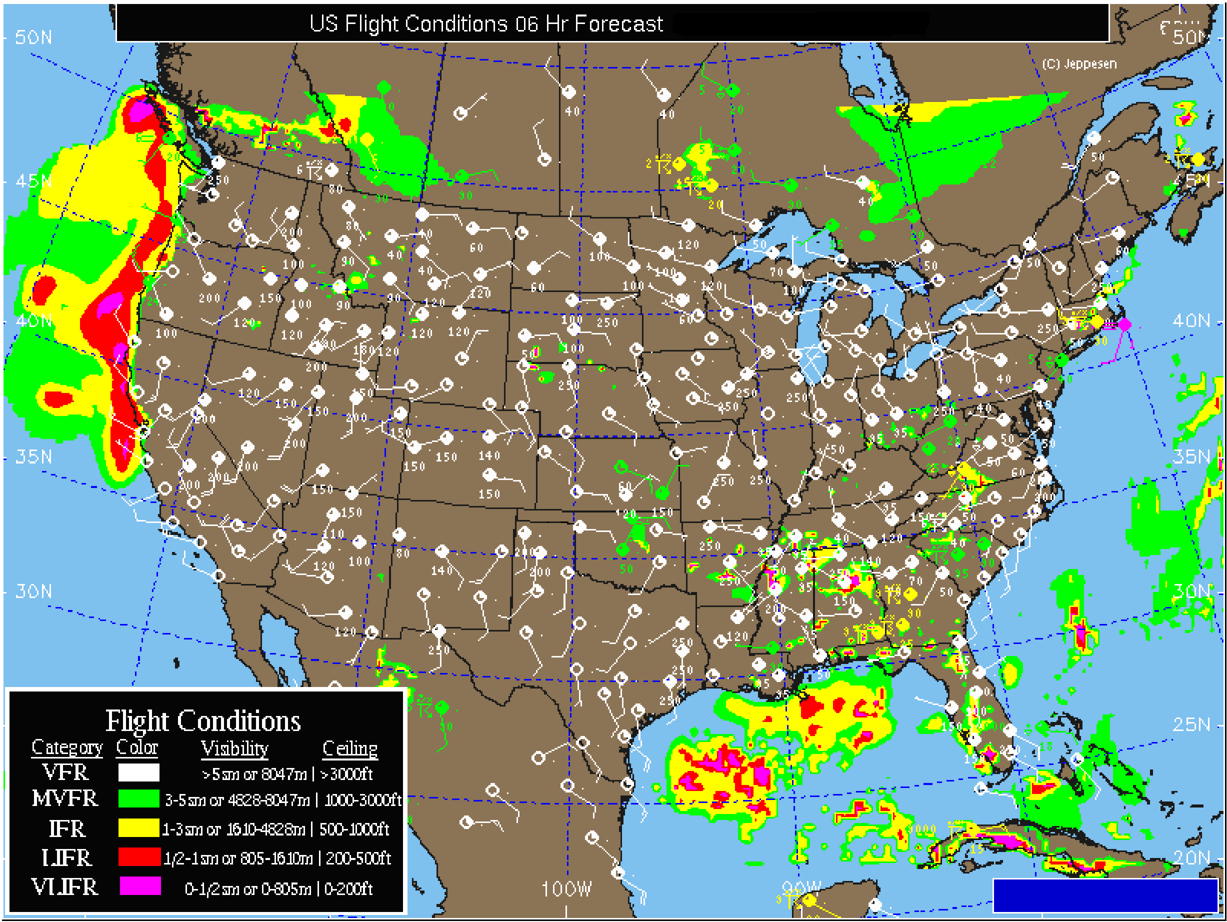

Figure C.9. Six hour forecast weather depiction for SLN flight scenario

PACKET #4 ICT-PTT

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PLAN 18098   *            *   JEPPESEN WEATHER   XX/26/09
---------------------------------**---------------------------------

                      ***************************
                      * NON-GRAPHIC INFORMATION *
                      ***************************
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 2619/2621 6SM SCT030 OVC060=

METAR KICT 261553Z 15005KT 7SM -RA SCT017 OVC030 16/14 A3023 RMK AO2
 RAB1455 SLP150 P0001 T01610139=

METAR KICT 261447Z 15010G20 8SM -RA BKN007 OVC014 16/14 A3022 RMK AO2
 RAB1455 CIG 006V012 P0000=

METAR KICT 261415Z 35005KT 8SM BKN025 OVC040 16/14 A3022 RMK AO2 RAE53
 SLP151 P0002 60017 T01560139 51008=

METAR KICT 261353Z 02008KT 7SM -RA OVC028 15/14 A3022 RMK AO2 RAE35B53
 SLP140 P0005 T01500139=

KICT FD DATA BASED ON 261200Z.
       6000    9000   12000   18000   24000   30000   34000   39000
00Z  1816P18 2114P12 2212P07 2107M04 2423M17 2523M32 2927M41 3134M55
06Z  2023P18 2216P12 2214P07 2018M04 2321M17 2824M31 2927M41 2822M55
12Z  2028P18 2120P12 2217P06 2321M04 2424M17 2523M31 2318M41 2423M54
```

```
18Z  1925P17 2022P12 2121P07 2524M05 2428M17 2336M30 2138M41 2028M53


KPTT 261650Z AUTO 18014KT 5SM SCT020 OVC060 25/17 A3005 RMK AO2=

KPTT 261630Z AUTO 18015KT 4SM SCT025 OVC060 25/16 A3005 RMK AO2 LTG DSNT SW

 AND W=

KPTT 261530Z AUTO 18018G21KT 4SM FEW010 SCT025 OVC060 23/16 A3006 RMK AO2=


KPTT FD DATA BASED ON 261200Z.

       6000    9000   12000   18000   24000   30000   34000   39000

00Z  1819P19 2216P12 2414P07 2313M04 2330M17 2527M31 2724M41 2930M54

06Z  1927P18 2123P12 2221P06 2221M05 2325M17 2729M31 2722M41 2521M55

12Z  2130P18 2222P12 2219P07 2322M05 2327M17 2331M31 2230M42 2331M53

18Z  2022P18 2120P12 2320P07 2523M04 2427M17 2240M31 2137M41 2229M52


END 0024 WEATHER/NOTAM REPORTS 000 GRAPHIC 024 NON-GRAPHIC 000 NOTAM

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END OF JEPPESEN DATAPLAN
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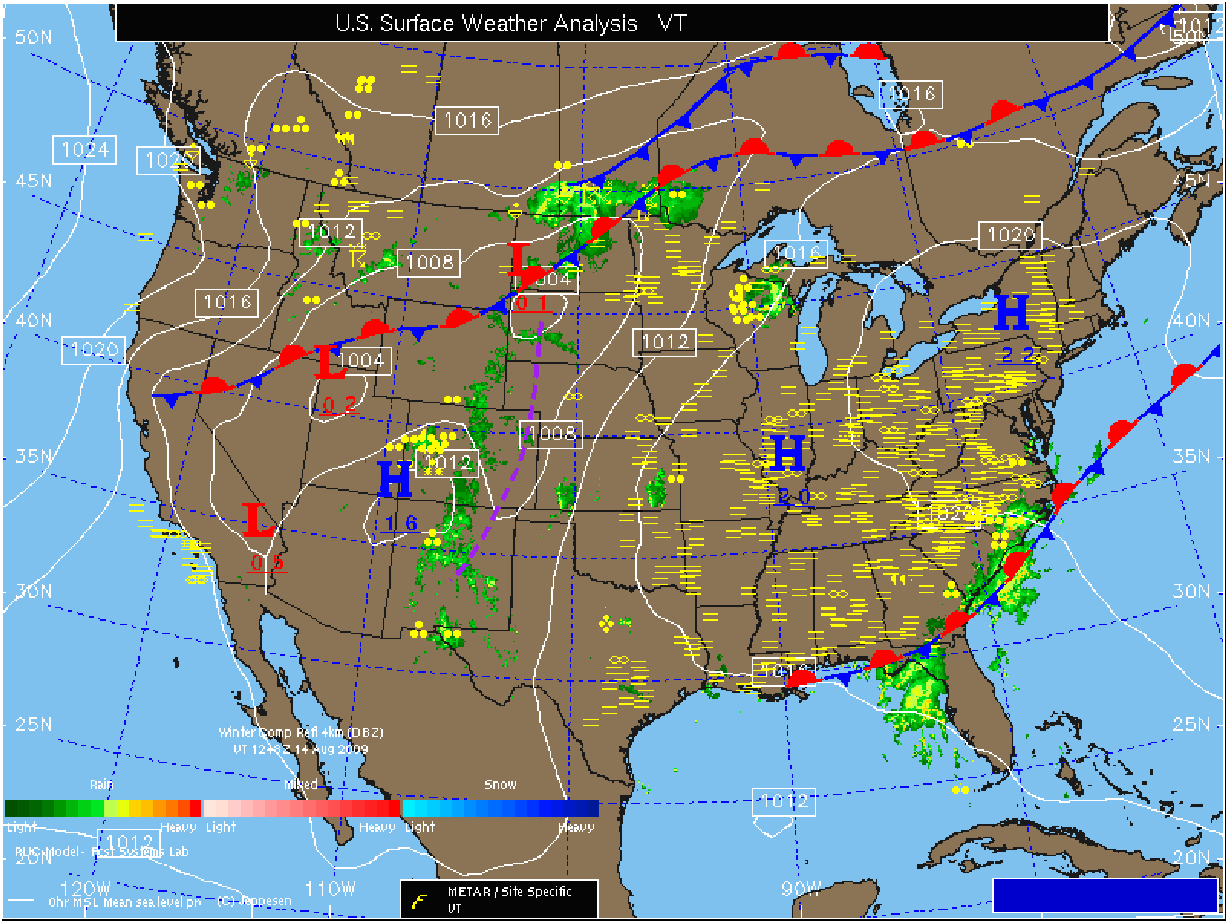

Figure C.10. Current surface weather for PTT flight scenario

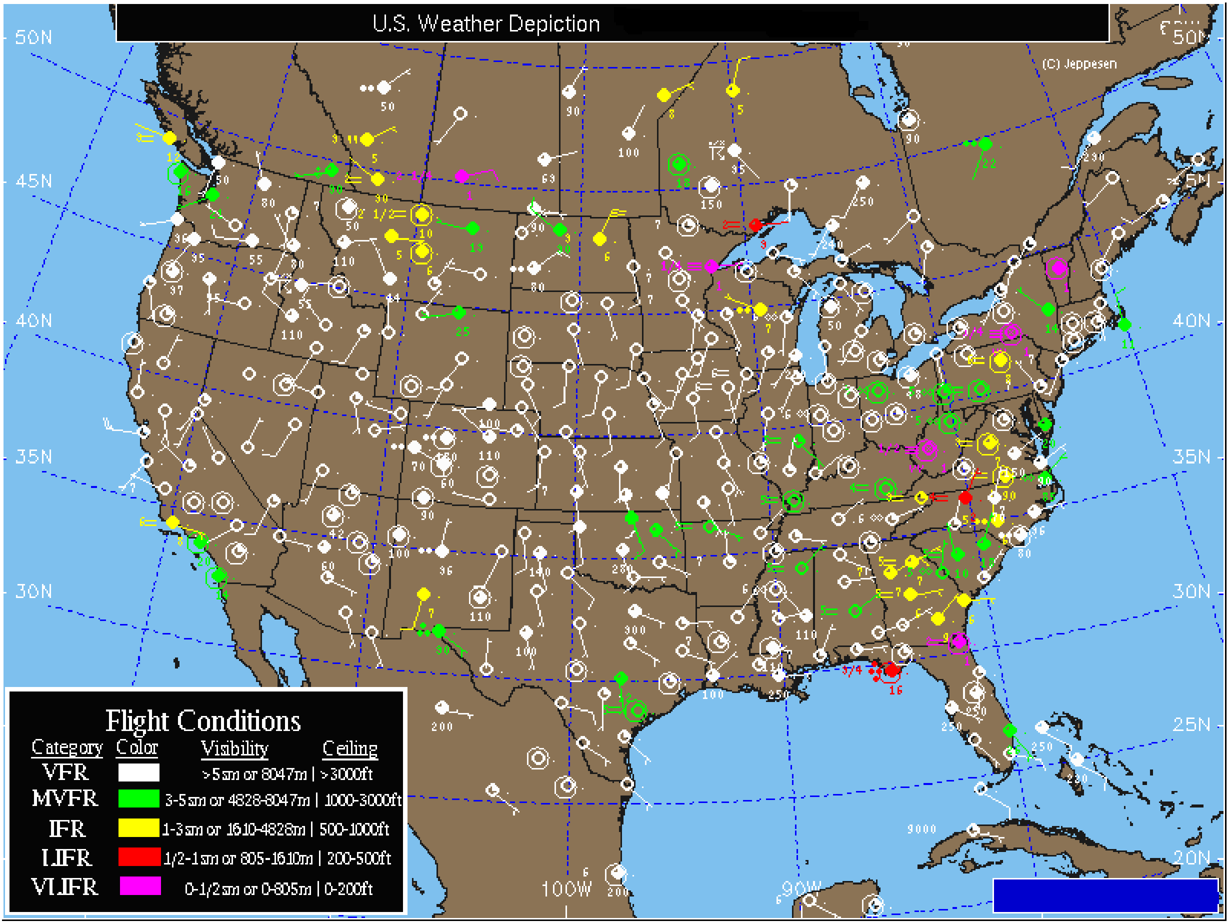

Figure C.11. Current weather depiction for PTT flight scenario

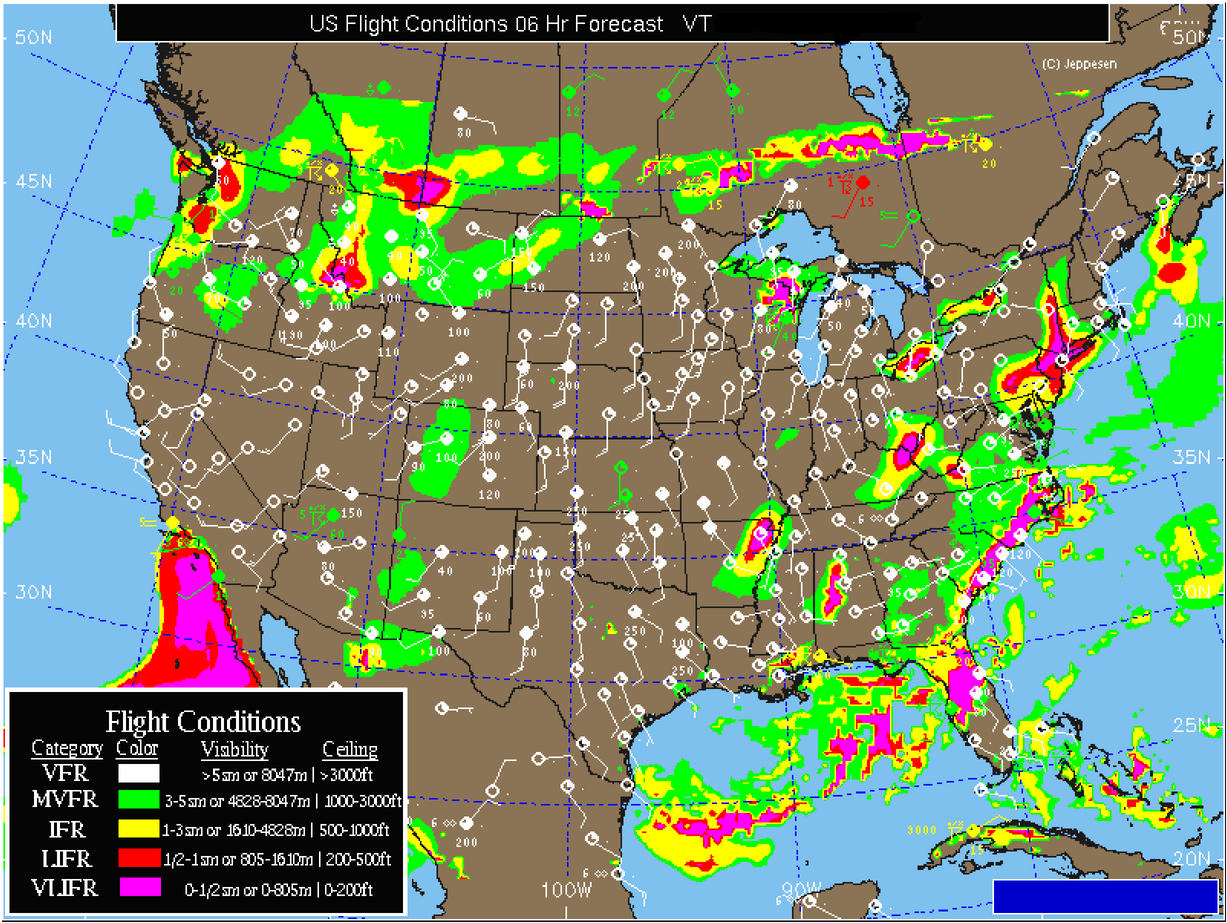

Figure C.12. Six hour forecast weather depiction for PTT flight scenario

PACKET #5 ICT-EMP

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PLAN 18098   *            *   JEPPESEN WEATHER   XX/26/09
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                      ***************************
                      * NON-GRAPHIC INFORMATION *
                      ***************************

KICT 261143Z 2610/2709 16015KT P6SM SCT017 BKN035 TEMPO
 2615/2617 5SM BKN020 FM261400 17018KT P6SM BKN025 FM270100
 17018KT P6SM VCTS BKN035CB=

METAR KICT 261153Z 17015KT 6SM FEW032 SCT120 BKN150=

METAR KICT 261142Z 17020KT 6SM SCT032 SCT120 BKN150 22/19 A2980 RMK AO2 PK WND 17025/1535=

METAR KICT 261128Z 17021KT 7SM TS SCT020CB SCT032 BKN120 21/19 A2980 RMK
 AO2 PK WND 18025/1512 RAE19 OCNL LTGIC VC E TS VC E MOV E P0003=

METAR KICT 261053Z 17017KT 8SM -RA BKN018CB OVC022 21/19 A2982 RMK
 AO2 PK WND 18025/1421 TSB44RAB44 SLP091 OCNL LTGICCC OHD-SW-NW TS
 OHD-SW-NW MOV E P0000 60000 T02110189 51010=

METAR KICT 260953Z 17018G25KT 9SM OVC021 21/18 A2981 RMK AO2 PK WND
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KICT FD DATA BASED ON 261200Z.

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06Z  1609P19 0707P12 0105P06 2603M07 2808M21 3017M34 3123M43 3018M54

12Z  2311P18 3208P12 3506P06 3005M07 3108M21 3221M34 3229M44 3021M54

18Z  1511P18 0607P12 3605P06 2906M07 3013M20 3325M35 3224M45 3020M54


KEMP 261150Z VRB06KT 5SM OVC030 FM261600 VRB06KT 6SM BR

 OVC040 FM261800 VRB06KT P6SM OVC050 FM262000 VRB06KT P6SM BKN020CB

 FM270000 02012KT P6SM OVC020CB FM270300 02016G23KT P6SM OVC020=


KEMP 261135Z AUTO 31007KT 6SM BKN015 BKN100 OVC120 11/08 A2976 RMK

 AO1=

KEMP 261035Z AUTO 34005KT 6SM FEW004 SCT075 OVC110 09/08 A2976 RMK

 AO1=

KEMP 260935Z AUTO 31009KT 2 1/2SM OVC003 08/08 A2976 RMK AO1=


KEMP FD DATA BASED ON 261200Z.

       6000    9000   12000   18000   24000   30000   34000   39000

00Z  1807P18 0807P11 0006P06 2605M06 2407M21 2315M35 2617M44 3025M54

06Z  1708P18 1007P12 1006P06 2205M06 2510M21 2713M35 3019M44 3020M54

12Z  1710P17 0809P11 0008P06 2306M07 2707M21 2908M36 3017M44 3022M54

18Z  1610P17 0607P12 3506P06 2408M07 2711M21 3120M35 3121M45 3018M54


END 0015 WEATHER/NOTAM REPORTS 000 GRAPHIC 015 NON-GRAPHIC 000 NOTAM

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END OF JEPPESEN DATAPLAN
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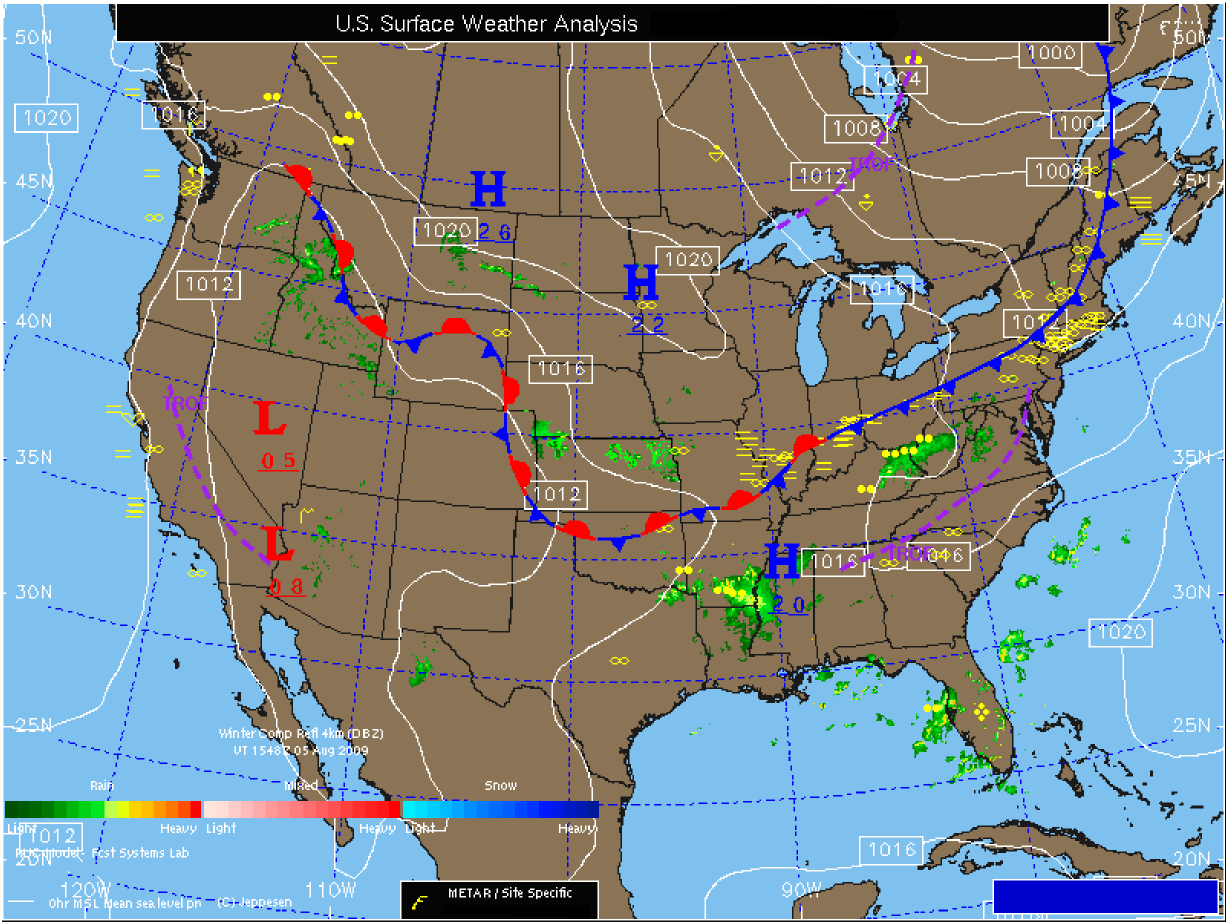

Figure C.13. Current surface weather for EMP flight scenario

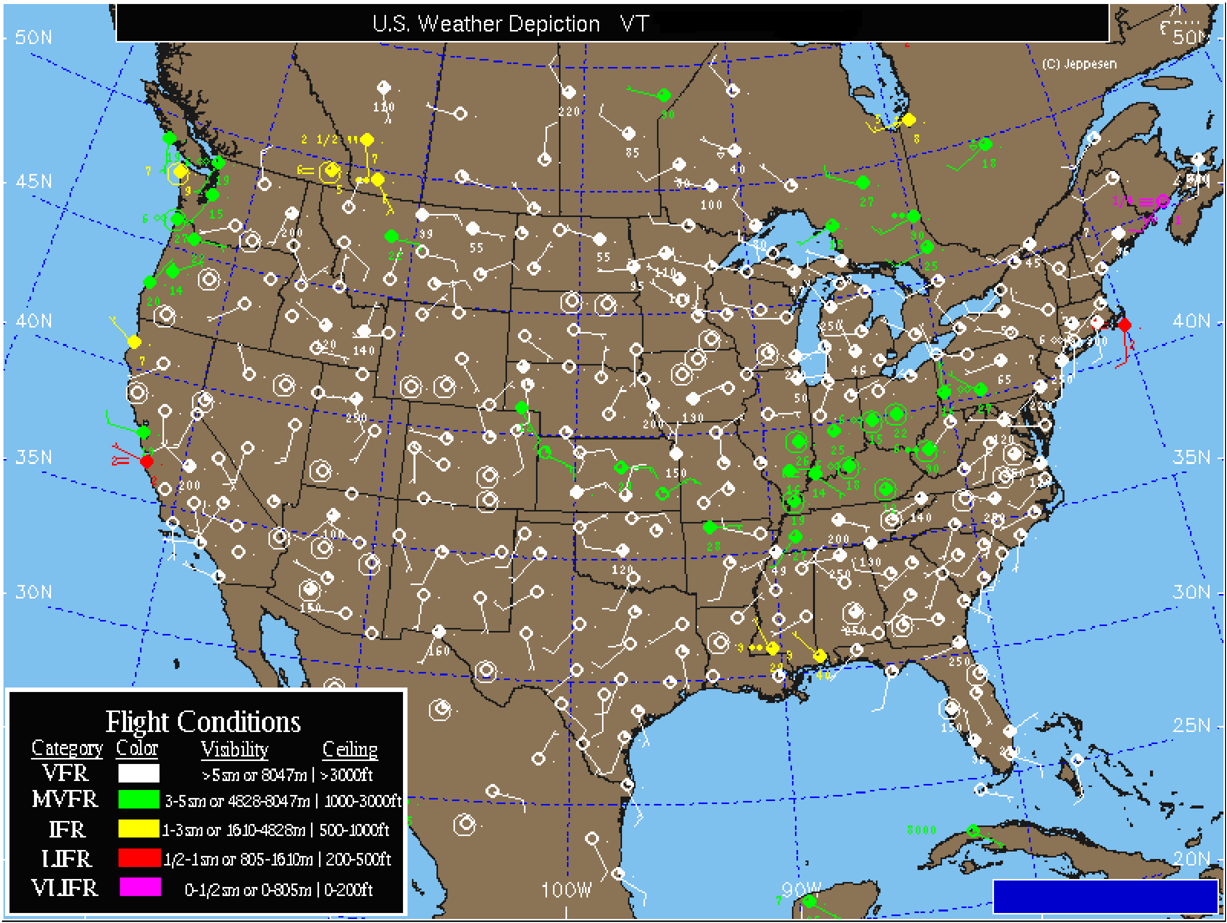

Figure C.14. Current weather depiction for EMP flight scenario

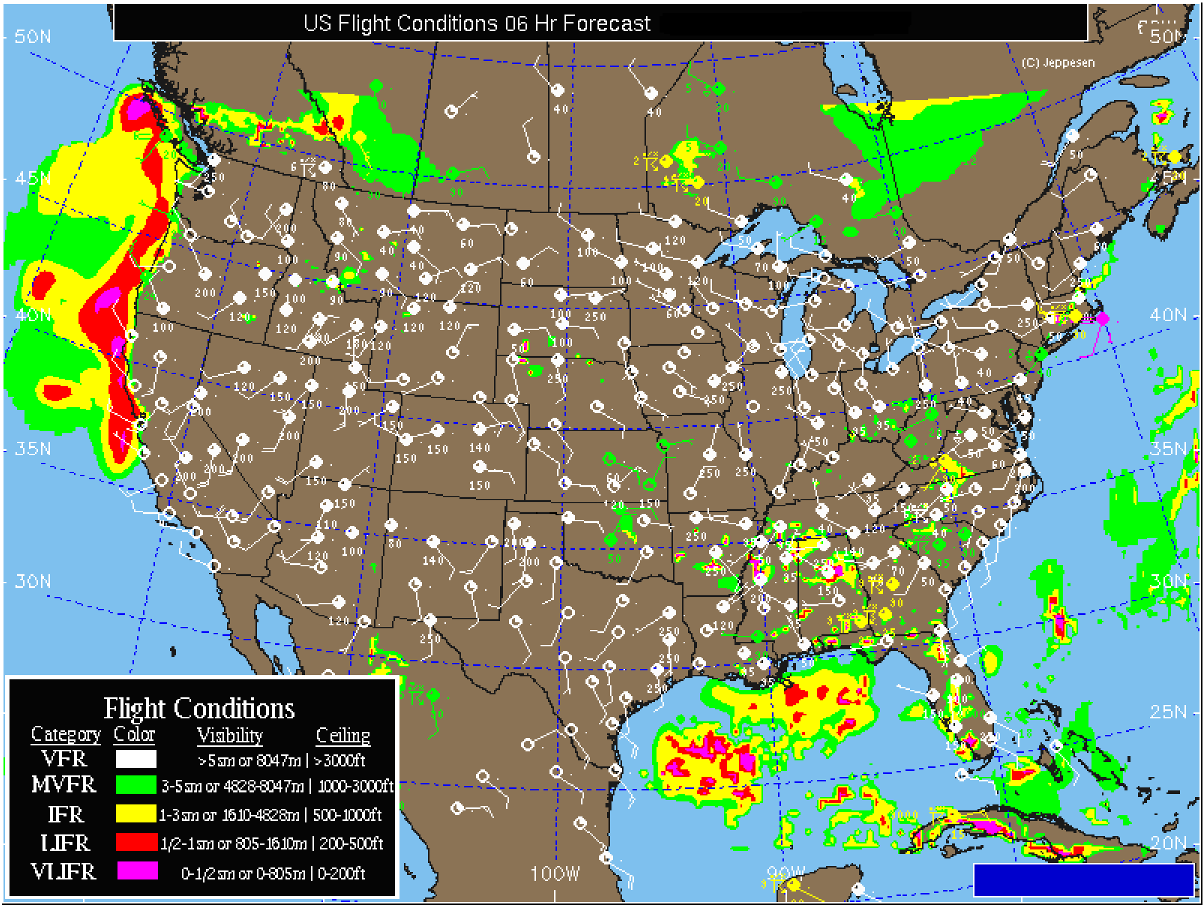

Figure C.15. Six hour forecast weather depiction for EMP flight scenario

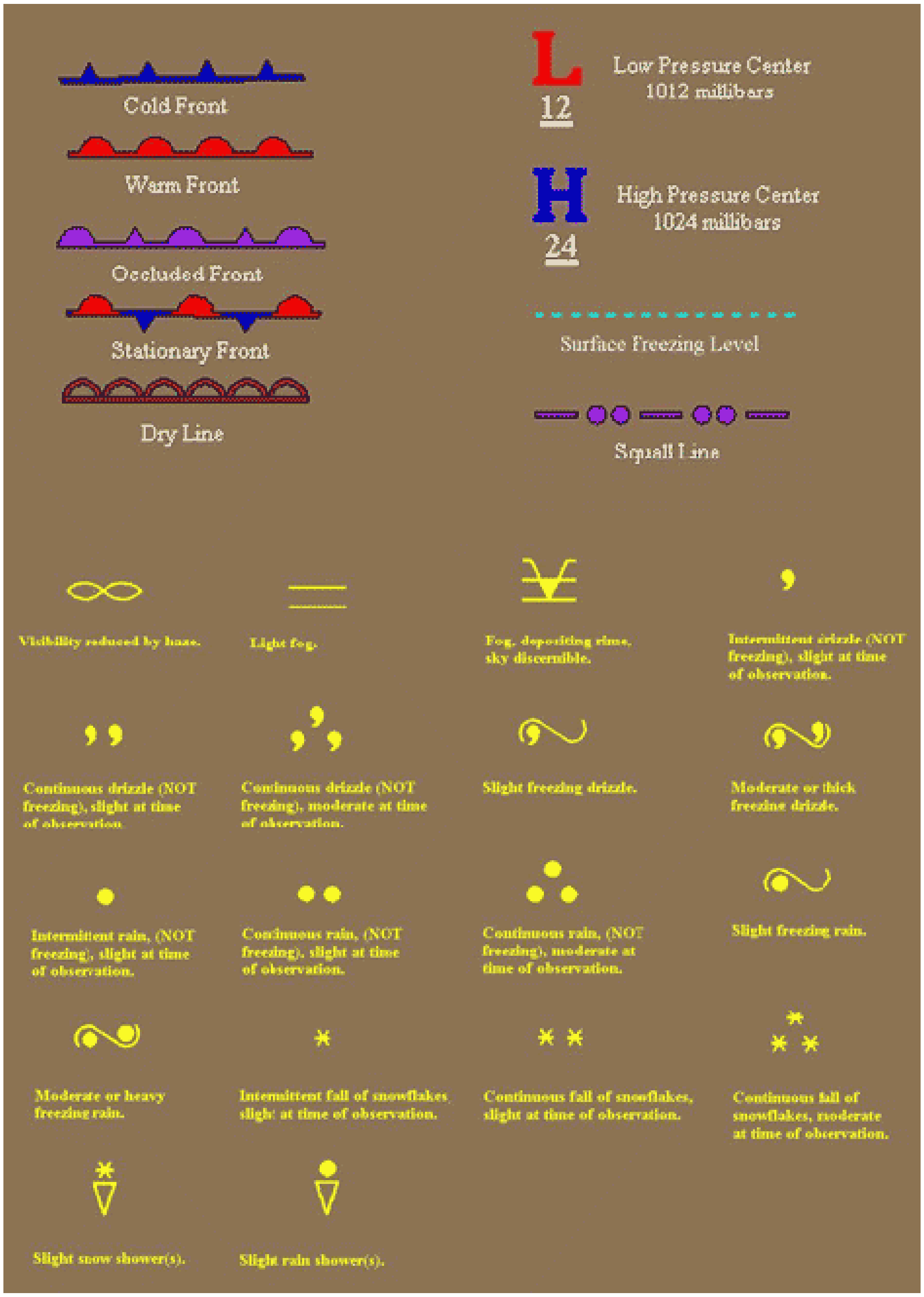

Figure C.16. Legend for surface weather graphics

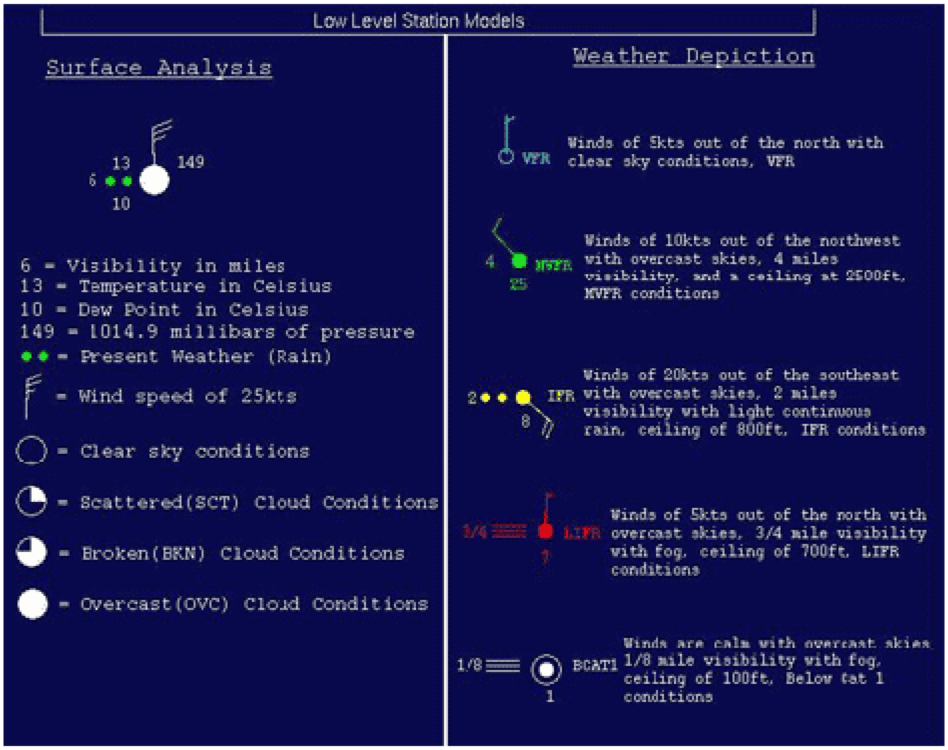

Figure C.17. Legend for weather depiction graphics

APPENDIX D

DEFINITIONS

Reference information is taken from Manual of Flight. (1996). Jeppesen Sanderson, Inc. unless otherwise noted

Instrument Flight Rules – IFR – Rules that govern the procedure for conducting flight in instrument weather conditions. When weather conditions are below the minimums prescribed for VFR, only instrument-rated pilots may fly in accordance with IFR.

Instrument Meteorological Conditions – IMC – weather condition that requires use of aircraft instruments for reference.

Marginal Visual Meteorological Conditions – MVMC – defined as ceilings of 1,000 to 3,000 feet, visibility off 3 statute miles to 5 statute miles.

Aviation Routine Weather Report – METAR – An observation of surface weather which is reported and transmitted.

Example METAR
METAR KPTA 122150Z AUTO 08020G38KT 1/2 SM R36L/ 2400FT
+TSRA SCT008 OVC012CB 20/18 A2995 RMK A02 TSB24RAB24 SLP134

METAR – type of report
KPTA 122150Z – station designator and date/time; four letter ICAO location identifier and date/time in Zulu (UTC)
AUTO – modifier, automated or corrected
08020G38KT – first three digits is the direction or VRB (variable), next two digits is speed in knots (KT), G is gust, followed by speed
1/2 SM R36L/ 2400FT – prevailing visibility in statute miles (SM), and runway visual range
+TSRA – present weather, -light or +heavy for intensity, and the descriptor
SCT008 OVC012CB – sky conditions descriptor, height and type
20/18 – temperature and dew point in Celsius
A2995 – altimeter in inches of mercury
RMK A02 TSB24RAB24 SLP134 - remarks

Sectional Chart – shows topographical information, airport depictions, aeronautical information pertaining to navigation and communication facilities, airspace and obstructions.

Figure D.1: Example of a sectional chart. Image from: www.aopa.org

Terminal Aerodrome Forecast - TAF – A prediction of surface weather expected at an airport.

Example TAF
TAF
KOKC 051130Z 051212 14008KT 5SM BR BKN30 TEMPO 1316 1 1/2 SM BR
FM1600 16010KT P6SM SKC BECMG 2224 20013G20KT 4SM SHRA OVC020
PROB40 0006 2SM TSRA OVC008CB BECMG 0608 21015KT P6SSM NSW=

TAF – type of report
OKC - four letter ICAO location identifier
051130Z – two digit day of the month and time in Zulu (UTC)
051212 – valid period two digit date followed by the beginning and ending hours in Zulu
14008KT – wind, first three digits is the direction, next two digits is speed in knots (KT)
5SM – visibility in statute miles (SM)
BR – significant weather and obstructions to visibility
BKN030 – sky condition, amount, height or vertical visibility
TEMPO 1316 1 1/2 SM BR – temporary conditions
FM1600 16010KT P6SM SKC BECMG 2224 20013G20KT 4SM SHRA OVC020 – forecast change group
PROB40 0006 2SM TSRA OVC008CB – probability forecast

Visual Flight Rules – VFR – Rules that govern the procedures for conducting flight in visual conditions. The term “VFR” is also used to indicate weather conditions that comply with specified VFR requirements.

Visual Meteorological Conditions – VMC – conditions exist to allow the pilot to maintain visual separation of traffic and terrain.

Figure D.2: VFR in VMC

Figure D.3: VFR in MVMC

Figure D.4: VFR in Barely VMC

APPENDIX E

OTHER SURVEY RESPONSES

Table E.1

Pilot Ratings	Frequency	Percent
Instrument	20	32.8%
Multi Engine (ME)	14	23.0%
Multi Engine Instructor (MEI)	3	4.9%

Table E.2
How often do you fly in IMC?

Response	Frequency	Percent
Extremely rarely	6	10.0%
Very rarely	8	13.0%
Somewhat rarely	11	18.3%
Somewhat often	11	18.3%
Very often	5	8.3%
Extremely often	2	3.3%
N/A	17	28.3%

Table E.3
How often do you fly in marginal VMC?

Response	Frequency	Percent
Extremely rarely	17	28.3%
Very rarely	9	15.0%
Somewhat rarely	14	23.3%
Somewhat often	15	25.0%
Very often	2	3.3%
Extremely often	2	3.3%
Missing data	1	1.7%

Table E.4
How often do you fly in VMC?

Response	Frequency	Percent
Extremely rarely	2	3.3%
Very rarely	1	15.0%
Somewhat rarely	5	1.7%
Somewhat often	27	8.3%
Very often	24	45.0%
Extremely often	59	40.0%
Missing data	1	1.7%

Table E.5
How often do you fly with an active VFR flight plan?

Response	Frequency	Percent
Extremely rarely	21	35.0%
Very rarely	8	13.3%
Somewhat rarely	9	15.0%
Somewhat often	12	20.0%
Very often	5	8.3%
Extremely often	2	3.3%
N/A	2	3.3%
Missing data	1	1.7%

Table E.6
How often do you fly with an active IFR flight plan?

Response	Frequency	Percent
Extremely rarely	3	5.0%
Very rarely	3	5.0%
Somewhat rarely	4	6.7%
Somewhat often	4	6.7%
Very often	9	15.0%
Extremely often	16	26.7%
N/A	20	33.3%
Missing data	1	1.7%

Table E.7
When you fly, how often do you stay in the pattern or fly in a local practice area?

Response	Frequency	Percent
Extremely rarely	2	3.3%
Very rarely	9	15.0%
Somewhat rarely	10	16.7%
Somewhat often	21	35.0%
Very often	17	28.3%
Extremely often	1	1.7%

Table E.8
How often do you take cross country flights?

Response	Frequency	Percent
Extremely rarely	2	3.3%
Very rarely	6	10.0%
Somewhat rarely	12	20.0%
Somewhat often	25	41.7%
Very often	11	18.3%
Extremely often	4	6.7%

Table E.9
What is the typical duration of those cross country flights?

Response	Frequency	Percent
Less than one hour	3	5.0%
An hour to three hours	50	83.3%
5+ hours	6	10.0%
9+ hours	1	1.7%

Table E.10
How Confident are you with the answers you have provided?

Response	Frequency	Percent
Not Confident at all	2	3.3%
Somewhat Unconfident	5	8.3%
Neutral	9	15.0%
Somewhat Confident	29	48.3%
Very Confident	15	25.0%

APPENDIX F

ADDITIONAL STATISTICAL ANALYSIS FOR KNOWLEDGE

Table F.1
Descriptives for Knowledge Data (N=14)

	Mean	SD
Low-Knowledge		
AcTS	34.7	2.4
PerTS	34.8	7.1
Difference	-0.1	7.1
High-Knowledge		
AcTS	47.0	46.7
PerTS	1.7	2.3
Difference	0.3	2.4

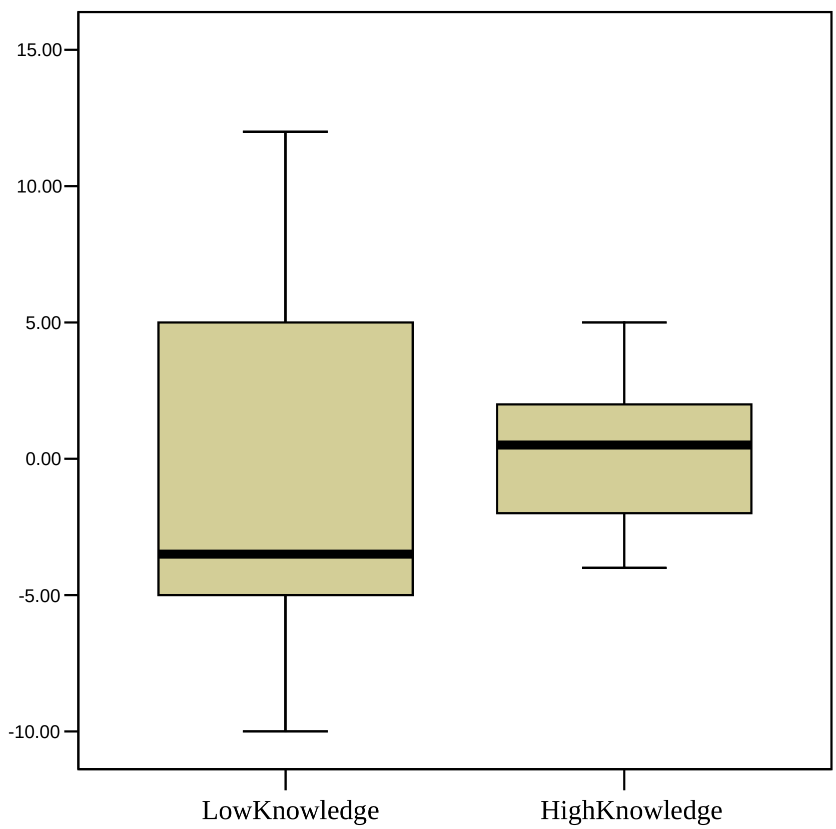

Figure F.1. Box-Plot of Knowledge Level by Difference Data

APPENDIX G

ADDITIONAL STATISTICAL ANALYSIS FOR RANKING TESTIMONIALS

Table G.1
Nemenyi's Procedure on PNC Flight Scenario (N=60)
Critical Difference = 0.45

	Mean Difference	Significant (*)
METAR-TAF	-0.29	
METAR-GRAPH	-0.52	*
TAF-GRAPH	-0.23	

Table G.2
Nemenyi's Procedure on WDG Flight Scenario (N=60)
Critical Difference = 0.66

	Mean Difference	Significant (*)
METAR-TAF	0.00	
METAR-GRAPH	-0.55	
METAR-TESTM	-1.65	*
TAF-GRAPH	-0.55	
TAF-TESTM	-1.65	*
GRAPH-TESTM	-1.10	*

Table G.3
Nemenyi's Procedure on SLN Flight Scenario (N=60)
Critical Difference = 0.66

	Mean Difference	Significant (*)
METAR-TAF	-0.35	
METAR-GRAPH	-1.12	*
METAR-TESTM	-1.60	*
TAF-GRAPH	-0.77	*
TAF-TESTM	-1.25	*
GRAPH-TESTM	-0.48	

Table G.4
Nemenyi's Procedure on PTT Flight Scenario (N=60)
Critical Difference = 0.66

	Mean Difference	Significant (*)
METAR-TAF	-0.46	
METAR-GRAPH	-0.93	*
METAR-TESTM	-1.35	*
TAF-GRAPH	-0.47	
TAF-TESTM	-0.89	*
GRAPH-TESTM	-0.42	