

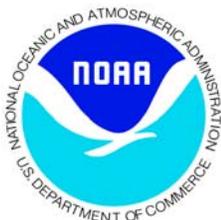
Distance Learning Aviation Course 2:

Producing Customer-Focused TAFs



Winter Weather Simulation Guide: *12/17/2008 Case*

Presented by the
Warning Decision Training Branch



Acknowledgments

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Cover photo courtesy of COMET

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Document History

The document history is provided to track updates and changes to the simulation guide. The version number, seen at the bottom of every page, will be updated as each significant change is made to the simulation guide.

Version	Date	Description
1.0	July 1, 2009	This is the third set of aviation simulations in support of COMET's DLAC-2 course.

To provide feedback, comments or ideas related to this document, please visit our web site at: <http://www.wdtb.noaa.gov>

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1: How to Use This Document

I. Introduction

Welcome to the *December 17, 2008 DLAC-2 Winter Weather* Simulation Guide! The purpose of this guide is to provide the training facilitator at a forecast office with case-specific materials needed to prepare and deliver effective simulations in support of the winter weather portion of the Distance Learning Aviation Course 2 (DLAC-2). The general approach for using these simulations is the same as with the simulation associated with the convective and wind shear DLAC-2 modules.

Since this document outlines the “answers” to the challenges of the event, it is specifically meant for the use of the training facilitator only.

In order to create effective simulations with this case, you will need to familiarize yourself with the details of this event. We recommend installing the case first, followed by reading each short section in order. See Table 1-1 for a description of the layout of this document.

Table 1-1: Simulation Guide Layout

1: How to Use This Document
The introduction describes the content of the simulation guide and how to use this document.
2: The December 17, 2008 Event Overview
The event overview provides a summary of the key components of this event.
3: Background Information
Read this section to become familiar with loading an aviation simulation, the data characteristics of this case, and information on WESSL.
4: Simulation Suggestions
Descriptions of each of the two simulations, including the performance objectives and evaluation criteria are contained in this section.

After reviewing the simulation guide and becoming familiar with the details of this event, the training facilitator will be ready to begin loading simulations for

the trainees. The training facilitator will need to understand the performance objectives associated with each simulation, which are directly tied to the DLAC-2 Module 4 training module. You will be able to evaluate a trainee's performance either during each simulation, or afterwards as all TAFs will be archived for each simulation. Each performance objective has a corresponding evaluation criteria to allow you to assess the trainee's performance, all of which are provided in Section 4 of this document.

This set of DLAC-2 simulations contains effective ways of incorporating immediate feedback to the trainee without training facilitator interaction, and it is possible for the trainee to start and complete the training without the training facilitator present. However, training research indicates that one-on-one training, where ***training facilitator and trainee participate together for the optimum learning experience***, is the most effective way to run a simulation. While time consuming, this can insure that:

1. the trainee remains focused on the objectives of the simulation,
2. the trainee receives essential feedback on performance, and
3. the training facilitator develops a solid understanding of how well the trainee comprehends the training and how well the trainee transfers the training to application.

In order to manage a simulation session, the training facilitator must be able to run a simulation as documented with the WES install and testing instructions included with the WES software. The simulations will be much more relevant if local AWIPS and AVNFPS customizations (e.g. preferences, procedures, color tables, etc.) are ported to the WES machine as outlined in the WES installation instructions. For more information on the WES, visit <http://www.wdtb.noaa.gov/tools/wes/index.htm>

2: The *December 17, 2008* Event Overview

The lower-lying portions of the Las Vegas CWA, which covers southern Nevada, eastern portions of southern California, and the northwest corner of Arizona, received a rare winter weather event on the afternoon of December 17. A low pressure system centered over Baja California, Mexico coupled with a cold front that pushed through the area set up a wintry scenario for southern Nevada and interior southern California and also allowed plentiful rainfall for the Colorado River valley. As a result, McCarran International Airport in Las Vegas received 3.6 inches of snow by midnight local time and areas from Barstow to Needles

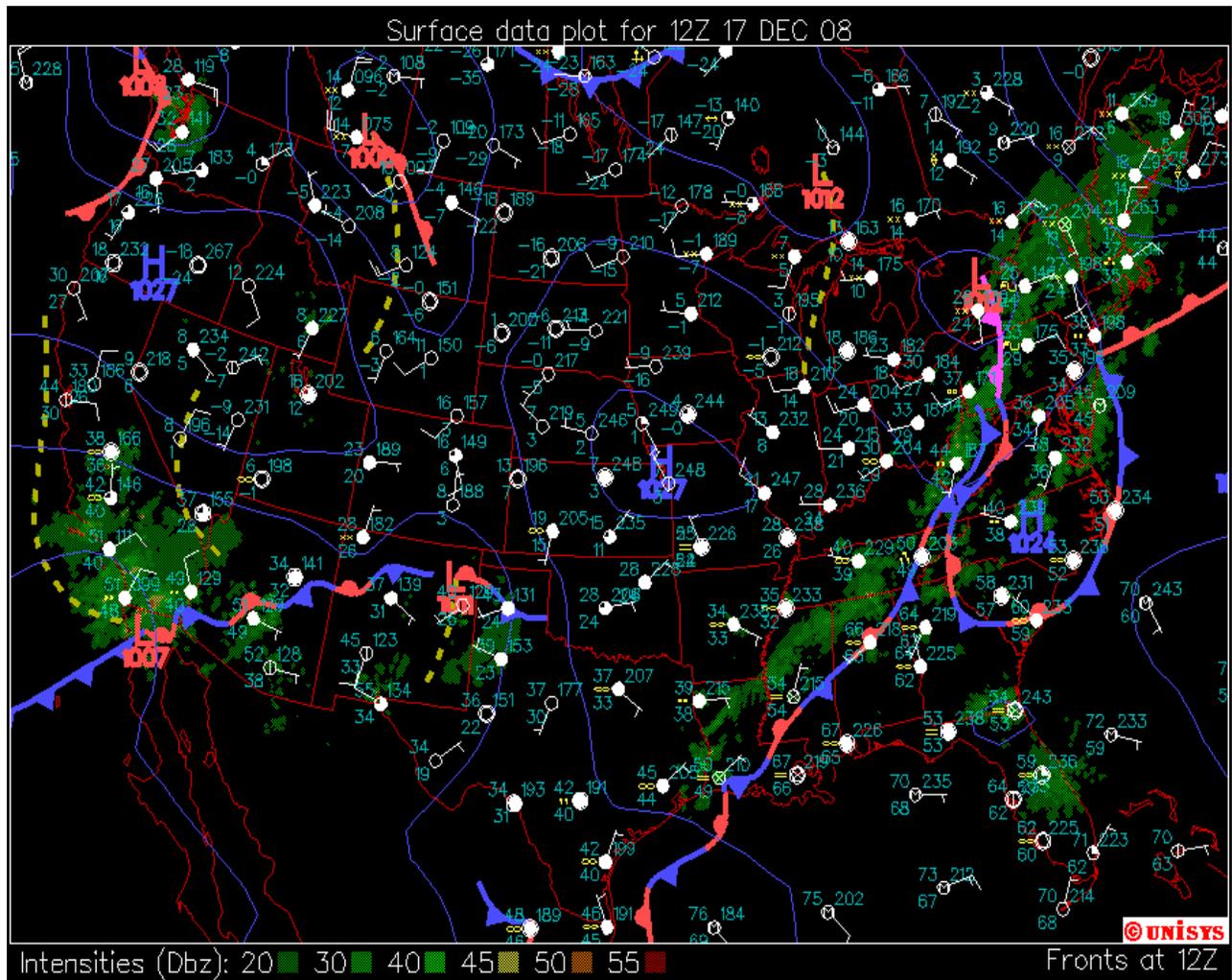


Figure 2-1. Composite map showing surface observations, position of fronts and weather systems, and radar overlay for 12Z on 17 December 2008.

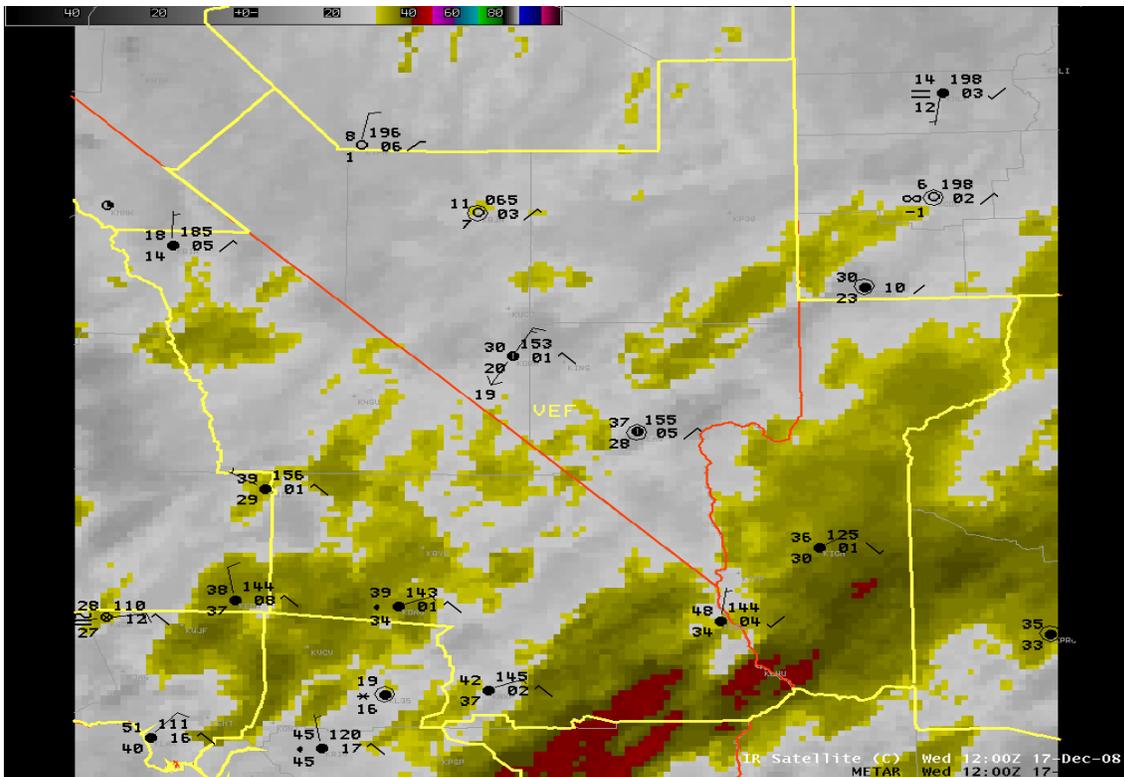


Figure 2-2. Conditions over the CWA at 12Z on 12/17/2008.

received almost an inch of rain. A challenging aspect of this event was determining precipitation type at each airport since temperatures remained at or above freezing during most of the event, thus providing a degree of uncertainty in creating the TAFs. Maps are provided to show the nationwide conditions several hours before the precipitation began in the CWA (see Fig. 2-1) and a close-up map of the CWA with satellite and surface obs at the same time (see Fig. 2-2).

The OPSNET Delays Report is also provided (see Fig. 2-3). Based upon the chart, 5% and 12% of the total operations out of McCarran International were delayed on the 17th and 18th respectively (using UTC). Each delay averaged approximately a half hour and almost half the delays were weather-related.

Two simulations, intended to be taken sequentially, are available to the trainee. The first one begins at 05Z on December 17 and the second one begins at 17Z on December 17. In both simulations, the trainee will create an Aviation Fore-

OPSNET : Delays : Standard Report

From 12/17/2008 To 12/18/2008 | Facility=LAS

System Impact Delays								
Date	Total Ops	Total Delays	TMI To	Occurred At Delays			Total Occ At	Abrn Dest To Delays
				Dep	Abrn	TMI From		
12/17/2008	598	29	21	8	0	6	14	12
12/18/2008	1154	143	49	94	0	5	99	0
Total :	1752	172	70	102	0	11	113	12

System Impact Delays											
Date	By Class				By Cause					Time	
	AC	AT	GA	Mil	Wx	Vol	Equip	Rwy	Other	Avg (Min)	Total (Min)
12/17/2008	25	1	3	0	29	0	0	0	0	32.00	928
12/18/2008	135	3	5	0	48	95	0	0	0	29.00	4147
Total :	160	4	8	0	77	95	0	0	0	29.51	5075

Figure 2-3. A list of the delays for KLAS on 12/17-18/2008 (UTC-based).

cast Discussion and the accompanying TAFs for the Las Vegas CWA. The next section of this guide details how to load the data and run the simulator.

3: Background Information

I. WES9.0 AVNFPS

These simulations require that you have WES9.0 AVNFPS loaded on your WES machine. Do not continue with these simulations until you have successfully installed and tested AVNFPS in a simulation. Full information on this can be found at <http://www.wdtb.noaa.gov/tools/wes/wes90.htm>

II. Loading the Case from DVD

There are 2 install discs for the December 17, 2008 case. Two DVDs were shipped to each DLAC-2 facilitator. **The case occupies ~ 26GB of disk space when converted to DRT**, so please plan accordingly. For details on how to load the case, see the README on the install discs.

III. AVNFPS Customization

There are several easy ways to customize AVNFPS on your WES machine. Prior to starting these DLAC-2 winter weather simulations, be sure NOT to modify any of the site-specific AVNFPS localization files in /awips/adapt/avnfps/etc. What you can do (and what is recommended) is to copy your forecaster IDs file into the /awips/adapt/avnfps/etc directory. This will overwrite a link to the default forecaster ID file, which contains 5 default IDs. Also, you are encouraged to insert your office's AVNFPS preferences into /awips/adapt/avnfps/etc/app-resources directory. All 5 default preference files are identical.

IV. Starting WES-AVNFPS for a Simulation

Starting an aviation simulation is done exactly the same way as any other WES simulation, other than the fact that you need to input a "TAFs directory" (See Fig. 3-1.). Macro files are accessed from the "Load Saved Settings", and should be used for each of the simulations. The simulation suggestions section details which macro goes with a particular simulation. **You must input a TAFs Directory** to be able to launch AVNFPS after starting the simulation, and the TAFs contained in the specified directory will be initialized into AVNFPS. You have two

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Simulation Entry

Please Enter:

FXA_DATA (i.e. case location): /data/awips/2008Dec17

FXA_INGEST_SITE: VEF

Case Start Time: 200812171700

Case End Time: 200812171740

WESSL Script (optional): /data/awips/2008Dec17/wessl/sim2.wessl

WESSL Case Flags (optional):

GFE Directory:

GFE Grid:

TAFs Directory: vef_12z

Figure 3-1. Simulation Entry window for the 2nd simulation. Pay particular attention to the bottom and “TAF Directory”. You must select either a directory with default TAFs for the time-frame of the simulation, or a previously run simulation from the same trainee.

options for loading TAFs: Default TAFs and previous simulation forecaster-issued TAFs.

Default TAFs:

Default TAFs are available for both simulations. You **MUST** ensure that a default TAF directory appears when the simulation macro loads so that AVNFPS will have TAFs to process when it starts. The default TAFs for the simulations are located in the following directories in /data/awips/2008Dec17/avn-fps/archived_TAFs:

- vef_00Z (for simulation #1)
- vef_12Z (for simulation #2)

Sending TAFs:

Once the trainee has created their TAFs in AVNFPS, you will want to check for Syntax and QC by clicking those respective buttons. Doing so will cause the

TAFs to be highlighted in a yellow-orange color. However, not to worry as the QC results are purely advisory/informational, not indicating anything wrong with the TAFs; it is just merely informing the forecaster or potential impacts to planning/airport operations, like the Fuel-Alternate rule or LIFR conditions, or flagging something climatologically rare.

Once the TAFs are ready, click the “Send” button only; **DO NOT CLICK THE “SAVE” BUTTON.**

TAFs from Previous Simulations:

Since the two scheduled simulations are 12 hours apart for the VEF simulations, this section will not be of use unless the trainee chooses to create

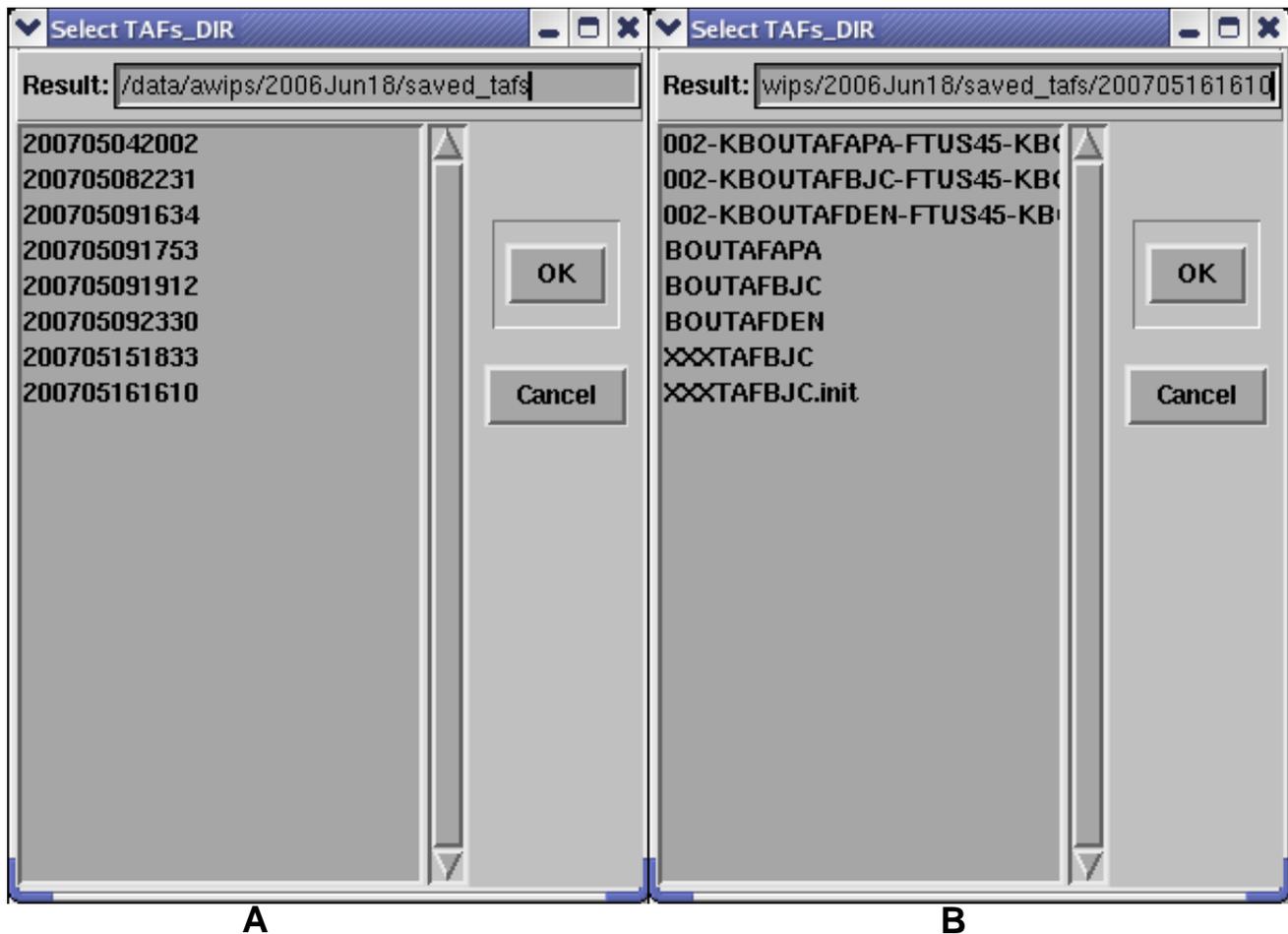


Figure 3-2. The “Select TAFs_DIR” GUI. A) is the location of all saved TAFs from all previous simulations, containing a time-stamped directory of each simulation. B) is the result of clicking on one of the time stamped directories. This is what you want to select as the final input into to the TAFs Directory prior to starting the simulation.

their own 12Z TAFs, which is in no way required. However, if they do so, be advised that they will be “on their own” as no WESSL script has been created. For the special case when you have the same trainee running back-to-back simulations, just select TAFs Directory as /data/awips/2008Dec17/avnfps/archived_TAFs/previous_simulation. However, if you want to start up a simulation for a particular trainee who was not going through back-to-back sequential simulations, and you wanted to ingest that trainee’s TAFs from his or her previous simulation, the following must be done:

- Start by entering the directory /data/awips/2008Dec17/saved_tafs into the selection window (similar to Fig. 3-2-A). If you have previously run a simulation, you’ll notice a time stamped directory.
- Next, if you know the date and time of the trainee’s previous simulation, select that directory.
- If you are unsure about the date/time of the trainee’s previous simulation, click into the directories to check (Fig. 3-2-B). Inside each saved, time-stamped directory are TAFs beginning with a number, which is the forecaster ID number. If you customized the avnfps/etc/forecaster file, you would then be able to match the previous TAFs to the proper trainee. Otherwise, the numbers will be one of the five defaults.

Launching the AVNFPS GUI and D2D

After successfully setting up a simulation, and after clicking “Run Simulation”, in a separate window in the monitor of your choosing, you will need to run separate commands to load D2D and to load AVNFPS. You can load from any command line these two separate commands:

- start_awips (this starts D2D)
- start_avnfps (this starts AVNFPS)

When the AVNFPS GUI loads, choose a proper username.

NOTE: If you use default username and configurations for your WES AVNFPS (one of the 5), remind the trainee to remember which default user they select in the AVNFPS startup window. This will allow for quicker identification of their saved TAFs.

V. Localizations:

OB9.0 localizations for VEF are included with the case. We encourage you to customize your WES from your AWIPS. For information on customizing WES, please see the WES users guide available with the WES release.

VI. WESSL:

The WESSL script for each of the two simulations will contain an introductory Articulate presentation that loads immediately after a simulation starts. These presentations provide an overview of the simulation, a list of what is expected from the trainee, a detailed overview of climatology, airport specific criteria, and other bits of important information. The WESSL script will also have many different pop-up windows: some will require a response from the student, some will have useful reports and information, and some will pause the simulation. The NWSSChat pop-up that occurs a few minutes after the simulation starts is optional. After the second simulation, there will be an Articulate debrief of the entire event along with TAFs created by aviation forecasting experts designed to provide instant feedback to the trainee. **Loading the appropriate saved settings macro from the simulation setup window will automatically insert the correct WESSL files for each simulation.**

VII. Data Characteristics

The original data set came from the VEF office archives, and most all data is accessible during the simulations. While there may be some incomplete or missing data due to the archiving process, there is enough data that the trainee should be able to satisfy the learning objectives. The details of the data sets are included below:

Model Data:

The following model data exists in this dataset: GFS40, NAM40, NAM80, RUC13, and RUC40.

Bufkit Data:

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Each simulation will have a Bufkit window pop up approximately one minute into the simulation that will contain NAM model data from the most recent run. Verify that the local time is set to Pacific Standard Time (GMT - 8 hours). If the time needs to be changed, click the “Adjust Time” button at the bottom of the Overview window.

Radar Data:

8-bit data exists for KESX and the surrounding radars. However, some elevation angles are missing.

Other Data:

VWPs, wind profilers, and MDCARS are available for this event.

4: Simulation Suggestions

I. Introduction

Two simulation descriptions are included in this section for the December 17, 2008 case, and they are intended to be taken sequentially. Simulation 1 focuses on writing the routine 06Z TAFs for the 17th (for five of the six TAF sites in the VEF CWA [KVGX omitted]) and accompanying Aviation Forecast Discussion. Simulation 2 focuses on writing the routine 18Z TAFs for the 17th (for the same sites as Simulation 1) and accompanying AFD.

WESSL files are provided to help pace each simulation and provide extra data sets. The WESSL file response boxes are also used to document information that can be accessed after the simulation is over.

II. Simulations

Simulation 1 (17 December 0500Z - 0540Z) Issuing AFD and TAFs

WES Macro: sim1_2008Dec17

*****NOTE: Be aware that the simulation may take several minutes to prepare once the OK button has been clicked in the Simulation Entry window due to the total amount of data.*****

AVNFPS Directory: Make sure the directory vef_00z is selected as the TAF directory

Summary:

In this simulation, the trainee will be writing the 06Z AFD for the VEF CWA as well as the TAFs for KBIH, KDAG, KDRT, KEED, and KLAS (note KVGX is omitted due to proximity to KLAS). The simulation start time is 0500Z on December 17, 2008, at which time it is necessary to begin looking at model data

and other data found in AWIPS to write an AFD for the Las Vegas CWA as well as the TAFs.

The simulation occurs prior to the beginning of the winter storm of interest that will affect the Las Vegas CWA.

Simulation 1 is designed to be taken before Simulation 2, therefore at the conclusion of Simulation 1, you are advised not to reveal any information regarding the event beyond 0540Z.

Schedule for trainee:

- 0500 (Pause): Articulate introduction to simulation with objectives and other useful information (approx 5 minutes).
- 0500-0520 (20 min): Become familiar with CWA, evaluate data and respond accordingly to any WESSL pop-ups. The NWSSChat pop-up that occurs a few minutes after the simulation starts is optional.
- 0520 (Pause): Trainee will write an AFD for the Las Vegas CWA to be consistent with the criteria given in the simulation. Trainee will resume simulation after writing the AFD.
- 0520-0540 (20 min): Trainee will create TAFs for the five specified TAF sites in the Las Vegas CWA. The simulation can be ended as soon as the forecasts are submitted in AVNFPS.
- 0540 (or when trainee is finished): Simulation will automatically end. However, **as soon as trainee issues TAFs, stop simulation and in a new terminal window, load the debrief presentation from the command line using: [firefox file:///data/awips/2008Dec17/wessl/Debrief_Sim1/player.html](file:///data/awips/2008Dec17/wessl/Debrief_Sim1/player.html).**

Performance Objective 1. Demonstrate the ability to assess potential aviation hazards and their impacts to TAF sites.

Evaluation Criteria 1. The trainee should attempt to properly assess any possible weather threat that will disrupt aviation activity based upon the available data. Feedback will be provided at the end of this simulation on what an “expert” would have written in his/her TAF, and this should be the basis for evaluation of the trainee’s TAFs. As facilitator, you have access to the trainee’s TAFs (located

in /data/awips/2008Dec17/avnfps/archived/_TAFs/previous_simulation immediately after the simulation has ended). The trainee's TAFs are also permanently archived in /data/awips/2008Dec17/saved_tafs/ in the directory time-stamped with the actual date and time when the trainee completed the simulation. It may be a good idea to go over them with the student at the completion of this first simulation.

Performance Objective 2. Demonstrate the effective use of aviation forecasting tools.

Evaluation Criteria 2. The trainee should be able to effectively use such tools as BUFKIT, AWIPS model soundings, aircraft data, surface observations and analyses, satellite and radar, and local climatology. This objective may be evaluated in person as you monitor which tools the trainee uses during this simulation. Also, the trainee will be writing an aviation forecast discussion where it is appropriate for the trainee to mention the tools used in the forecast preparing process. The trainee's AFD is available in the /data/awips/2008Dec17/wessl/ directory, as a current date/time stamped file with the format sim1.log.YYYYMMDD_HHMM". It is a text file, and the HHMM time stamp is LOCAL TIME that the AFD was issued.

Performance Objective 3. Effectively articulate forecast logic and uncertainty with an Aviation Forecast Discussion.

Evaluation Criteria 3. The trainee will write an AFD in a WESSL window which will be in the same format as one written operationally. For comparison, the debrief Articulate presentation will contain an AFD written by an expert. A saved copy of the trainee's AFD may be retrieved; see Evaluation Criteria 2 above for information on how to do so.

Performance Objective 4. Produce a practically perfect TAF for winter weather and its related hazards:

- Write to the flight categories first, establish trends
- Add specific ceiling and visibility details for the first 6 hours only (the critical TAF period)
- Limit TEMPOs to first 6 hours and avoid use of PROB groups

- Review for consistency and make sure you have addressed the expected flight category changes

Evaluation Criteria 4. This is the most important of the four criteria. The guidelines above will be in the pre-brief for the trainee. The trainee should use these guidelines as much as possible when writing the TAFs. During the Articulate debrief, the PPTAFs written by experts will be shown along with the reasoning for their forecast. As facilitator, you are encouraged to discuss the trainee's TAFs with them, and information on how to retrieve their TAFs is included in Evaluation Criteria 1.

Simulation 1 Debrief

As discussed previously, at the end of the simulation a short Articulate debrief will be launched manually after the TAFs have been sent. From a new terminal window, enter the following command:

[firefox file:///data/awips/2008Dec17/wessi/Debrief_Sim1/player.html](firefox:file:///data/awips/2008Dec17/wessi/Debrief_Sim1/player.html)

The debrief will discuss the expert 06Z TAFs and the aviation forecast discussion. There also will be instructions on how to start Simulation 2.

Simulation 2 (17 December 1700Z - 1740Z) Issuing 18Z AFD and TAFs

WES Macro: `sim2_2008Dec17`

*****NOTE: Be aware that the simulation may take several minutes to prepare once the OK button has been clicked in the Simulation Entry window due to the total amount of data.*****

AVNFPS Directory: Make sure the directory `vef_12z` is selected as the TAF directory, or select `previous_simulation` or `time-stamped` directory from same forecaster using the steps previously mentioned on page 3-4.

Summary:

In this simulation, the trainee will be writing the 18Z AFD for the VEF CWA as well as the TAFs for KBIH, KDAG, KDRT, KEED, and KLAS (note KVGT is omitted due to proximity of KLAS). The Simulation 2 start time is 1700Z on

December 17, 2008, at which time it is necessary to begin looking at model data and other data found in AWIPS to write an AFD for the Las Vegas CWA as well as the TAFs.

The simulation occurs while the winter storm of interest is ongoing in the Las Vegas CWA.

Schedule for trainee:

- 1700 (Pause): Articulate introduction to simulation with objectives and other useful information (approx 5 minutes).
- 1700-1720 (20 min): Evaluate new data and respond accordingly to any WESSL pop-ups. The NWSChat pop-up that occurs a few minutes after the simulation starts is optional.
- 1720 (Pause): Trainee will write an AFD for the Las Vegas CWA to be consistent with the criteria given in the simulation. Trainee will resume simulation after writing the AFD.
- 1720-1740 (20 min): Trainee will create TAFs for the five specified TAF sites in the Las Vegas CWA. The simulation can be ended as soon as the forecasts are submitted in AVNFPS.
- 1740 (or when trainee is finished): Simulation will automatically end. However, **as soon as trainee issues TAFs, stop simulation and in a new terminal window, load the debrief presentation from the command line using: [firefox file:///data/awips/2008Dec17/wessl/Debrief_Sim2/player.html](file:///data/awips/2008Dec17/wessl/Debrief_Sim2/player.html).**

Performance Objective 1. Demonstrate the ability to assess potential aviation hazards and their impacts to TAF sites.

Evaluation Criteria 1. The trainee should attempt to properly assess any possible weather threat that will disrupt aviation activity based upon the available data. Feedback will be provided at the end of this simulation on what an “expert” would have written in his/her TAF, and this should be the basis for evaluation of the trainee’s TAFs. As facilitator, you have access to the trainee’s TAFs (located in /data/awips/2008Dec17/avnfps/archived/_TAFs/previous_simulation immediately after the simulation has ended). The trainee’s TAFs are also permanently archived in /data/awips/2008Dec17/saved_tafs/ in the directory time-stamped

with the actual date and time when the trainee completed the simulation. It may be a good idea to go over them with the student at the completion of this first simulation.

Performance Objective 2. Demonstrate the effective use of aviation forecasting tools.

Evaluation Criteria 2. The trainee should be able to effectively use such tools as BUFKIT, AWIPS model soundings, aircraft data, surface observations and analyses, satellite and radar, and local climatology. This objective may be evaluated in person as you monitor which tools the trainee uses during this simulation. Also, the trainee will be writing an aviation forecast discussion where it is appropriate for the trainee to mention the tools used in the forecast preparing process. The trainee's AFD is available in the /data/awips/2008Dec17/wessl/ directory, as a current date/time stamped file with the format sim2.log.YYYYMMDD_HHMM". It is a text file, and the HHMM time stamp is LOCAL TIME that the AFD was issued.

Performance Objective 3. Effectively articulate forecast logic and uncertainty with an Aviation Forecast Discussion.

Evaluation Criteria 3. The trainee will write an AFD in a WESSL window and will be in the same format as one written operationally. For comparison, the debrief Articulate presentation will contain an AFD written by an expert. A saved copy of the trainee's AFD may be retrieved; see Evaluation Criteria 2 above for information on how to do so.

Performance Objective 4. Produce a practically perfect TAF for winter weather and its related hazards:

- Write to the flight categories first, establish trends
- Add specific ceiling and visibility details for the first 6 hours only (the critical TAF period)
- Limit TEMPOs to first 6 hours and avoid use of PROB groups
- Review for consistency and make sure you have addressed the expected flight category changes

Evaluation Criteria 4. This is the most important of the four criteria. The guidelines above will be in the pre-brief for the trainee. The trainee should use these guidelines as much as possible when writing the TAFs. During the Articulate debrief, the PPTAFs written by experts will be shown along with the reasoning for their forecast. As facilitator, you are encouraged to discuss the trainee's TAFs with them, and information on how to retrieve their TAFs is included in Evaluation Criteria 1.

Simulation 2 Debrief

As discussed previously, at the end of the simulation a short Articulate debrief will be launched manually after the TAFs have been sent. From a new terminal window, enter the following command:

[firefox file:///data/awips/2008Dec17/wessl/Debrief_Sim2/player.html](file:///data/awips/2008Dec17/wessl/Debrief_Sim2/player.html)

The debrief will discuss the expert 18Z TAFs, the aviation forecast discussion, and the impacts at Las Vegas McCarran International Airport due to this event.

Appendix A: Storm Reports

I. VEF CWA Storm Data entries

<u>NEVADA: Counties</u>	<u>Time (UTC)</u>	<u>Storm Characteristic</u>
Clark	17 December 1800 UTC- 18 December 0500 UTC	Heavy Snow

Description

Heavy snow fell over much of the southeast half of the Las Vegas Valley. The highest total was 8 inches, measured on the south side of Henderson (approx. elevation 1130 feet MSL). Many cars slid off roads, and others were abandoned at the bottoms of hills. At an apartment complex, a large carport collapsed under the weight of the snow, damaging several vehicles parked underneath. Many trees were bent down to the ground, or snapped in two due to the weight of the snow, blocking roads. The Clark County School District closed schools due to snow for the first time in 30 years. In addition, a measured 16 inches of snow fell at Mount Charleston (station elevation approx 7600 feet MSL).

Appendix B: METAR Observations for TAF sites

METARs for KBIH:

KBIH 162356Z AUTO 14005KT 10SM BKN095 M01/M05 A2990
KBIH 170056Z AUTO 00000KT 10SM SCT110 M01/M06 A2991
KBIH 170156Z AUTO 00000KT 10SM CLR M04/M06 A2993
KBIH 170256Z AUTO 31005KT 10SM CLR M06/M08 A2994
KBIH 170356Z AUTO 33005KT 10SM SCT050 BKN120 M06/M08 A2996
KBIH 170456Z AUTO 35003KT 10SM OVC055 M07/M08 A2997
KBIH 170556Z AUTO 00000KT 10SM OVC060 M06/M08 A2998
KBIH 170656Z AUTO 00000KT 10SM SCT065 OVC080 M07/M09 A2999
KBIH 170756Z AUTO 00000KT 10SM BKN075 OVC095 M06/M08 A3000
KBIH 170856Z AUTO 32004KT 10SM BKN075 OVC100 M07/M09 A3000
KBIH 170956Z AUTO 32005KT 10SM SCT070 M08/M11 A3000
KBIH 171056Z AUTO 33005KT 10SM OVC075 M09/M11 A3002
KBIH 171156Z AUTO 36005KT 10SM BKN070 OVC095 M08/M10 A3001
KBIH 171256Z AUTO 35006KT 10SM FEW055 M10/M12 A3001
KBIH 171356Z AUTO 33006KT 10SM CLR M09/M12 A3002
KBIH 171456Z AUTO 33006KT 10SM CLR M09/M12 A3002
KBIH 171556Z AUTO 02003KT 10SM CLR M09/M12 A3003
KBIH 171656Z AUTO 01007KT 10SM CLR M05/M09 A3003
KBIH 171756Z AUTO 34008KT 10SM CLR M02/M09 A3003
KBIH 171856Z AUTO 31007KT 10SM CLR 00/M09 A3001
KBIH 171956Z AUTO 29007KT 10SM CLR 00/M09 A2997
KBIH 172056Z AUTO VRB03KT 10SM CLR 01/M09 A2993
KBIH 172156Z AUTO 31004KT 10SM CLR 01/M08 A2990
KBIH 172256Z AUTO 30005KT 10SM CLR 01/M08 A2986

METARs for KDAG:

KDAG 162351Z AUTO 06004KT 10SM FEW060 08/01 A2995
KDAG 170051Z AUTO 06004KT 10SM SCT047 06/02 A2995
KDAG 170151Z AUTO 10003KT 10SM FEW055 OVC070 07/02 A2996
KDAG 170251Z AUTO 08005KT 10SM FEW065 06/01 A2997
KDAG 170351Z AUTO 09003KT 10SM CLR 06/01 A2998
KDAG 170451Z AUTO 13005KT 10SM CLR 05/01 A2998
KDAG 170551Z AUTO 13004KT 10SM FEW110 04/01 A2997
KDAG 170651Z AUTO 08004KT 10SM CLR 04/00 A2996
KDAG 170751Z AUTO 16003KT 10SM BKN060 OVC085 04/00 A2998
KDAG 170851Z AUTO 14005KT 10SM SCT060 04/00 A2996
KDAG 170951Z AUTO 13004KT 10SM SCT065 OVC085 04/00 A2997
KDAG 171122Z AUTO 08007KT 10SM -RA BKN029 OVC050 04/01 A2997

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KDAG 171151Z AUTO 07007KT 10SM -RA OVC027 04/01 A2996
KDAG 171317Z AUTO 07008KT 10SM -RA SCT017 BKN026 OVC032 04/01 A2996
KDAG 171443Z AUTO 06013KT 6SM -RA BR BKN014 BKN018 OVC023 03/01 A2998
KDAG 171451Z AUTO 05012KT 6SM -RA BR BKN012 BKN018 OVC023 03/01 A2998
KDAG 171640Z AUTO 06009KT 7SM -RA FEW008 SCT013 OVC018 02/01 A2996
KDAG 171748Z AUTO 01003KT 7SM -RA BKN009 OVC017 03/02 A2997
KDAG 171751Z AUTO 01004KT 6SM RA BR BKN007 OVC011 03/02 A2998
KDAG 171940Z AUTO 07006KT 1/2SM SN FG OVC004 01/00 A2993
KDAG 172003Z AUTO 10003KT 1/2SM SN FG OVC004 01/00 A2993
KDAG 172051Z AUTO 09003KT 1/4SM +SN FG OVC002 01/00 A2988
KDAG 172226Z AUTO 13006KT 1/2SM SN FG OVC004 01/00 A2984
KDAG 172326Z AUTO 12005KT 1/4SM +SN FG VV004 01/M01 A2981

METARs for KDRA:

KDRA 162353Z 03009KT 10SM BKN039 04/M02 A2992
KDRA 170153Z AUTO 04007KT 10SM CLR 02/M02 A2995
KDRA 170153Z AUTO 04007KT 10SM CLR 02/M02 A2995
KDRA 170253Z AUTO 03009KT 10SM CLR 01/M03 A2995
KDRA 170453Z AUTO 00000KT 10SM FEW039 M01/M03 A2998
KDRA 170553Z AUTO 04003KT 10SM OVC110 01/M04 A2999
KDRA 170653Z AUTO 03013KT 10SM CLR M01/M04 A2998
KDRA 170753Z AUTO 04004KT 10SM CLR M01/M04 A2998
KDRA 170753Z AUTO 04004KT 10SM CLR M01/M04 A2998
KDRA 170953Z AUTO 03013KT 10SM OVC100 M01/M05 A3000
KDRA 170953Z AUTO 03013KT 10SM OVC100 M01/M05 A3000
KDRA 171153Z 03016G19KT 10SM SCT085 SCT110 BKN200 M01/M07 A2998
KDRA 171153Z 03016G19KT 10SM SCT085 SCT110 BKN200 M01/M07 A2998
KDRA 171253Z 03017KT 10SM OVC075 M01/M07 A2998
KDRA 171353Z 03016G21KT 10SM BKN110 OVC200 M02/M07 A3000
KDRA 171453Z 03017KT 10SM OVC120 M01/M07 A2998
KDRA 171553Z AUTO 03013KT 10SM OVC110 M01/M08 A2999
KDRA 171753Z AUTO 03015KT 10SM CLR 01/M07 A3000
KDRA 171853Z AUTO 07012G18KT 10SM CLR 01/M07 A2998
KDRA 171953Z AUTO 06007KT 10SM CLR 01/M07 A2994
KDRA 171953Z AUTO 06007KT 10SM CLR 01/M07 A2994
KDRA 172153Z 09012G18KT 10SM OVC036 02/M06 A2988
KDRA 172253Z 09013KT 4SM -SN OVC026 02/M04 A2985
KDRA 172353Z 10009KT 1 1/4SM -SN BR OVC014 00/M02 A2985

METARs for KEED:

KEED 162356Z AUTO 04007KT 10SM CLR 13/M01 A2994
KEED 170056Z AUTO 03004KT 10SM BKN070 12/02 A2995
KEED 170156Z AUTO 02003KT 10SM CLR 11/01 A2996
KEED 170256Z AUTO 01003KT 10SM CLR 10/01 A2998

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KEED 170356Z AUTO 28003KT 10SM CLR 10/01 A2999
KEED 170456Z AUTO 30004KT 10SM CLR 09/02 A3000
KEED 170556Z AUTO 34005KT 10SM CLR 10/M01 A2998
KEED 170656Z AUTO 00000KT 10SM CLR 10/M02 A2998
KEED 170756Z AUTO 34007KT 10SM BKN120 09/M02 A2998
KEED 170856Z AUTO 35009KT 10SM BKN100 OVC110 09/M02 A2997
KEED 170956Z AUTO 01007KT 10SM OVC070 09/01 A2997
KEED 171056Z AUTO 35007KT 10SM -RA OVC050 09/01 A2998
KEED 171156Z AUTO 01005KT 10SM OVC048 09/01 A2998
KEED 171256Z AUTO 01010KT 10SM OVC055 08/02 A2998
KEED 171356Z AUTO 02009KT 10SM -RA OVC039 08/04 A2999
KEED 171456Z AUTO 02008KT 10SM -RA OVC035 07/04 A2999
KEED 171556Z AUTO 35007KT 10SM -RA OVC033 07/04 A3000
KEED 171656Z AUTO 36013KT 10SM -RA SCT031 OVC039 07/04 A2998
KEED 171756Z AUTO 01013G19KT 7SM RA OVC033 06/04 A2996
KEED 171939Z AUTO 36015KT 7SM RA OVC030 06/04 A2990
KEED 172049Z AUTO 01015KT 6SM RA BR BKN028 OVC047 06/04 A2986
KEED 172056Z AUTO 01014G22KT 7SM -RA BKN030 OVC045 06/04 A2985
KEED 172247Z AUTO 01018G23KT 10SM -RA BKN025 OVC034 04/03 A2982
KEED 172346Z AUTO 01020G26KT 8SM -RA FEW025 BKN030 OVC036 04/02 A2982

METARs for KLAS:

KLAS 162356Z 00000KT 10SM FEW050 SCT120 BKN200 08/M03 A2990
KLAS 170056Z 33005KT 10SM FEW050 SCT120 BKN200 07/M02 A2991
KLAS 170156Z 29005KT 10SM FEW050 SCT120 BKN200 07/M02 A2993
KLAS 170256Z 36004KT 10SM SCT080 BKN200 06/00 A2994
KLAS 170356Z 00000KT 10SM SCT080 BKN200 06/01 A2996
KLAS 170456Z 00000KT 10SM SCT120 BKN200 05/00 A2997
KLAS 170556Z 28003KT 10SM FEW120 BKN200 04/M01 A2997
KLAS 170656Z 00000KT 10SM FEW120 BKN200 03/M02 A2998
KLAS 170756Z 26003KT 10SM FEW120 BKN200 03/M02 A2998
KLAS 170856Z 28003KT 10SM SCT120 BKN200 02/M02 A2996
KLAS 170956Z 00000KT 10SM BKN120 BKN200 02/M02 A2997
KLAS 171056Z 00000KT 10SM BKN120 BKN200 02/M02 A2998
KLAS 171156Z 00000KT 10SM BKN120 BKN200 03/M02 A2998
KLAS 171256Z 00000KT 10SM FEW120 BKN140 02/M02 A2997
KLAS 171356Z 08005KT 10SM SCT120 BKN140 OVC180 03/M02 A2998
KLAS 171456Z 08003KT 10SM BKN110 OVC200 03/M02 A3000
KLAS 171556Z 06003KT 10SM BKN070 OVC130 03/M03 A3001
KLAS 171656Z 05006KT 10SM SCT070 BKN100 BKN200 04/M03 A2999
KLAS 171756Z 06005KT 10SM SCT070 BKN100 OVC200 04/M04 A2999
KLAS 171935Z 02003KT 10SM FEW018 BKN029 OVC100 04/M05 A2995
KLAS 172032Z 03010KT 1 1/2SM -SN FEW005 OVC013 03/M02 A2992
KLAS 172144Z 00000KT 1/2SM SN FG FEW003 BKN007 OVC013 01/M01 A2990

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KLAS 172232Z COR 09003KT 3/4SM -SN BR BKN003 OVC008 00/M01 A2988
KLAS 172343Z 00000KT 1/4SM +SN FG VV002 00/M01 A2987