BASICS FOR AIR TRAFFIC CONTROL – FORECASTS AND ADVISORIES

MODULE OVERVIEW

Purpose: The purpose of this module is to provide an overview of National Weather Service (NWS) forecasts and advisories.

MODULE OUTLINE

Lesson: Terminal Aerodrome Forecast (TAF)

Purpose: The purpose of this lesson is to decode the weather information recorded on a Terminal Aerodrome Forecast (TAF).

Objectives:

- Identify the purpose of a Terminal Aerodrome Forecast (TAF)
- Identify elements of a TAF
- Decode examples of a TAF

Topics:

- Terminal Aerodrome Forecast (TAF)
  - Purpose
- Elements
  - Type of Report
  - Location Identifier
  - Date and Time of Forecast
  - Valid Period
  - Wind Group
  - Visibility Group
  - Significant Weather Group
  - Cloud and Vertical Obscuration Groups
  - Non-Convective Low-Level Wind Shear (LLWS) Group
- Knowledge Check
  - FM ('From') Change Indicator Group
  - TEMPO Change Indicator Group
  - PROB30 Group
- Knowledge Check
- Review/Summary

Exercise – TAF Decoding

Lesson: In-Flight Advisories

Purpose: The purpose of this lesson is to explain the different in-flight weather advisories and how to decode them.

Objectives:

- Identify types of In-Flight Advisories
- Identify the purpose of a Significant Meteorological Information (SIGMET)
- Decode a SIGMET

- Identify the purpose of a Convective SIGMET (WST)
- Decode a Convective SIGMET (WST)
- Identify the purpose of Airmen's Meteorological Information (AIRMET)
- Decode an AIRMET

Topics:

- In-Flight Advisories
  - Standards
- Significant Meteorological Information (SIGMET)
  - Issuance
  - SIGMET Decoding
- Convective SIGMET (WST)
  - Issuance
  - Convective SIGMET Bulletin Decoding
- Airmen's Meteorological Information (AIRMET)
  - Issuance
  - AIRMET Bulletin Decoding
- Knowledge Check
- Review/Summary

Exercise – SIGMET and AIRMET Decoding

Lesson: Center Weather Advisory (CWA)

Purpose: The purpose of this lesson is to explain the Center Weather Advisory (CWA) and Meteorological Impact Statements (MIS) and how to decode them.

Objectives:

- Identify the purpose of a Center Weather Advisory (CWA)
- Decode a CWA
- Identify the purpose of a Meteorological Impact Statement (MIS)
- Decode an MIS

Topics:

- Center Weather Advisory (CWA)
  - Criteria
  - CWA Decoding
- Meteorological Impact Statement (MIS)
  - Air Traffic Weather Concerns
  - MIS Decoding
- Knowledge Check
- Review/Summary

Exercise – CWA and MIS Decoding

Lesson: Wind and Temperature Aloft Forecast (FB)

Purpose: The purpose of this lesson is to explain Wind and Temperatures Aloft Forecast (FB) and how to decode them.

Objectives:

- Identify the purpose of a Wind and Temperatures Aloft Forecast (FB)
- Decode an FB

Topics:

- Wind and Temperature Aloft Forecast (FB)
  - Format
  - FB Decoding
- Knowledge Check
- Review/Summary

Exercise – FB Decoding

Study Aid – Summary of Forecast Products

Study Aid – Hazard Matrix

Question and Answer Session – *Parking Lot*

End-of-Module (EOM) Test

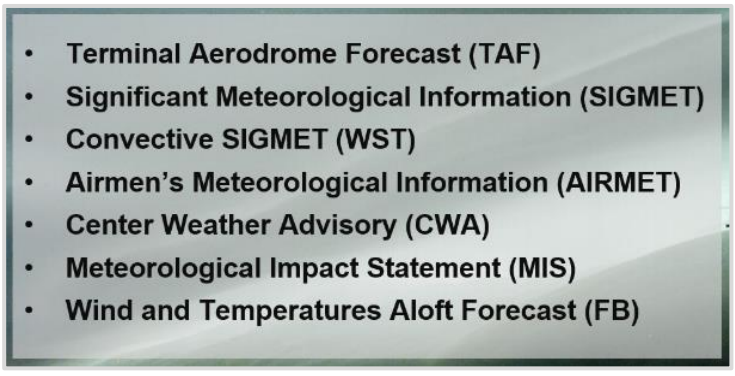
INTRODUCTION

LESSONS	■ Terminal Aerodrome Forecast (TAF) ■ In-Flight Advisories ■ Center Weather Advisory (CWA) ■ Wind and Temperature Aloft Forecast (FB)
TOTAL ESTIMATED RUN TIME	5 hrs. 17 mins.
MODULE CONTENT	■ Module Overview ■ Lesson: Terminal Aerodrome Forecast (TAF) ■ Exercise – TAF Decoding ■ Lesson: In-Flight Advisories ■ Exercise – SIGMET and AIRMET Decoding ■ Lesson: Center Weather Advisory (CWA) ■ Exercise – CWA and MIS Decoding ■ Lesson: Wind and Temperature Aloft Forecast (FB) ■ Exercise – FB Decoding ■ Study Aid – Summary of Forecast Products ■ Study Aid – Hazard Matrix ■ Q&A Session – Parking Lot ■ End-of-Module Test

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ Instruct students to select ***Forecasts and Advisories*** module link within Blackboard ■ Instruct students to read the module introduction and then wait quietly for additional instructions	Blackboard
	EST. RUN TIME
	2 mins.

Usually, the first notification a controller receives of hazardous weather developing or moving into their area is from a National Weather Service (NWS) forecast or advisory. It is essential that you know the purpose and contents of each product so that you can avoid directing air traffic into hazardous weather.

This module will teach you about NWS forecasts and advisories.



FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ **ENABLE *Terminal Aerodrome Forecast (TAF)*** lesson in Blackboard ■ Instruct students to navigate to the ***Terminal Aerodrome Forecast (TAF)*** lesson in Blackboard ■ Instruct students to work individually through the lesson content ■ Upon completion of the lesson, students should review previously introduced content or wait quietly until other students have completed	Blackboard **EST. RUN TIME** 30 mins.

TERMINAL AERODROME FORECAST (TAF)

Purpose: The purpose of this lesson is to decode the weather information recorded on a Terminal Aerodrome Forecast.

Objectives:

- Identify the purpose of a Terminal Aerodrome Forecast (TAF)
- Identify elements of a TAF
- Decode examples of a TAF

References for this lesson are as follows:

- AC 00-45, Aviation Weather Services

Terminal Aerodrome Forecast (TAF)

A TAF is a concise statement of the expected meteorological conditions significant to aviation for a specified time period within 5 SM of an airport that is used to anticipate weather changes that will affect aircraft operations at specified terminals.

TAF: Overview of Contents

TAFs issued by the National Weather Service (NWS) provide a forecast of the following meteorological elements:

- Wind
- Visibility
- Significant weather
- Cloud and vertical obscuration
- Non-convective low-level wind shear (LLWS)

```
TAF
KOKC 010534Z 0106/0206 15010G16KT 6SM BR SCT020 WS020/18040KT
     FM010930 07006KT 1 1/2SM BR OVC008
       TEMPO 0110/0114 1/2SM DZ FG VV005
     FM011600 11012KT 5SM BR SCT015 BKN030
     FM012100 09015KT 3SM -SHRA BR OVC010 PROB30 0121/0124
       VRB24G35KT 1SM +TSRA BR OVC008CB
     FM020100 02018G25KT 3/4SM -SN BR OVC008
     FM020300 34024G30KT 3SM BR BKN010
     FM020500 33016KT P6SM SKC
```

The wind, visibility, significant weather, cloud, and vertical obscuration groups follow the same basic format as an Aviation Routine/Special Weather Report (METAR/SPECI).

Note: *Temperature/dew point, altimeter, and remarks are not included in the forecast.*

Type of Report

The report type header always appears as the first element in the TAF and is produced in three forms:

- Routine forecast – **TAF**
  - Routine TAFs are issued four (4) times per day: 0000, 0600, 1200, and 1800Z
- Amended forecast – **TAF AMD**
  - TAFs are amended whenever they become, in the forecaster's judgment, unrepresentative of existing or expected conditions
- Corrected forecast – **TAF COR**

```
TAF
KOKC 010534Z 0106/0206 15010G16KT 6SM BR SCT020 WS020/18040KT
     FM010930 07006KT 1 1/2SM BR OVC008
       TEMPO 0110/0114 1/2SM DZ FG VV005
     FM011600 11012KT 5SM BR SCT015 BKN030
     FM012100 09015KT 3SM -SHRA BR OVC010 PROB30 0121/0124
       VRB24G35KT 1SM +TSRA BR OVC008CB
     FM020100 02018G25KT 3/4SM -SN BR OVC008
     FM020300 34024G30KT 3SM BR BKN010
     FM020500 33016KT P6SM SKC
```

Location Identifier

Location identifiers are decoded the same as the station identifier in METAR/SPECI.

```
TAF
KOKC 010534Z 0106/0206 15010G16KT 6SM BR SCT020 WS020/18040KT
```

REGION COUNTRY	ICAO PREFIX
Contiguous United States of America	K
Alaska	PA
Hawaii	PH
Marianas Islands (including Guam)	PG
Canada	C
Central America and Mexico	M
Caribbean	T

Date and Time of Forecast

The date and time of forecast are decoded the same as the date and time of report in METAR/SPECI.

```
TAF
KOKC 010534Z 0106/0206 15010G16KT 6SM BR SCT020 WS020/18040KT
```

010534Z	
01	Day of the month
05	Hour (UTC)
34	Minute (UTC)
Z	Universal Time Coordinated (UTC)

Valid Period

The valid period is the time period during which the TAF is valid. Routine TAFs are valid for either 24- or 30-hour time periods.

Note: *In the U.S., 30-hour TAFs are only issued for airports with significant international traffic.*

```
TAF
KOKC 010534Z 0106/0206 15010G16KT 6SM BR SCT020 WS020/18040KT
```

0106/0206	
01	Beginning day of the month
06	Beginning hour (UTC)
/	Solidus
02	Ending day of the month
06	Ending hour (UTC) *(If the ending hour is midnight UTC, it's coded as "24")*

Examples of Valid Periods

Examples of valid periods are shown.

1512/1612	Valid from the 15th at 12Z until the 16th at 12Z.
2306/2412	Valid from the 23rd at 06Z until the 24th at 12Z.
0121/0218	Valid from the 1st at 21Z until the 2nd at 18Z.
0600/0624	Valid from the 6th at 00Z until the 6th at 24Z.

Wind Group

The wind group is decoded the same as the wind group in METAR/SPECI.

```
TAF
KOKC 010534Z 0106/0206 15010G16KT 6SM BR SCT020 WS020/18040KT
```

15010G16KT	
150	Wind direction (relative to true north)
10	Wind speed
G16	Maximum instantaneous wind speed gust
KT	Units of measurement (knots)

Visibility Group

The visibility group is decoded the same as the visibility group in METAR/SPECI, except "**P6SM**" indicates visibility more than six (6) statue miles (SM).

```
TAF
KOKC 010534Z 0106/0206 15010G16KT 6SM BR SCT020 WS020/18040KT
```

6SM	
6	Prevailing visibility
SM	Units of measurement

Examples

6SM	Visibility six
P6SM	Visibility more than six

Significant Weather Group

The significant weather group is decoded the same as the present weather group in METAR/SPECI, except "**NSW**" – no significant weather – indicates significant weather from a previous period is expected to end.

```
TAF
KOKC 010534Z 0106/0206 15010G16KT 6SM BR SCT020 WS020/18040KT
```

Cloud and Vertical Obscuration Groups

The cloud and vertical obscuration groups are decoded the same as the sky condition group in METAR/SPECI.

```
TAF
KOKC 010534Z 0106/0206 15010G16KT 6SM BR SCT020 WS020/18040KT
     FM010930 07006KT 1 1/2SM BR OVC008
       TEMPO 0110/0114 1/2SM DZ FG VV005
     FM011600 11012KT 5SM BR SCT015 BKN030
     FM012100 09015KT 3SM -SHRA BR OVC010 PROB30 0121/0124
       VRB24G35KT 1SM +TSRA BR OVC008CB
     FM020100 02018G25KT 3/4SM -SN BR OVC008
     FM020300 34024G30KT 3SM BR BKN010
     FM020500 33016KT P6SM SKC
```

SCT020	SCT	Amount of sky cover (FEW, SCT, BKN, or OVC)
	020	Height of the layer (hundreds of feet above ground level [AGL])
VV005	VV	Indicates vertical visibility ("indefinite ceiling")
	005	Vertical visibility (hundreds of feet AGL)
SKC	SKC	Sky clear

Non-Convective Low-Level Wind Shear (LLWS) Group

The non-convective LLWS group is included whenever LLWS is expected within 2,000 feet of the surface. LLWS is always assumed with convective activity. The group is omitted if LLWS is not expected to occur.

```
TAF
KOKC 010534Z 0106/0206 15010G16KT 6SM BR SCT020 WS020/18040KT
```

WS020/18040KT	
WS	Indicator for wind shear
020	Height of the top of the WS layer in hundreds of feet AGL (can be up to 2,000 feet AGL)
/	Solidus
180	Wind direction at top of wind shear layer relative to true north at the indicated height in hundreds of feet AGL
40	Wind speed in knots at top of wind shear layer at the indicated height in hundreds of feet AGL
KT	Units of measurement (knots)

Note: *LLWS can severely impact airplanes, especially within 2,000 feet AGL, because of limited vertical airspace for recovery. The impact is most significant for low-powered, general aviation (GA) aircraft.*

Examples of Non-Convective LLWS Group

Examples of non-convective LLWS groups are shown below.

WS020/12035KT	Low-level wind shear, wind at two thousand, one two zero at three five.
WS020/35040KT	Low-level wind shear, wind at two thousand, three five zero at four zero.
WS015/27055KT	Low-level wind shear, wind at one thousand five hundred, two seven zero at five five.
WS015/17060KT	Low-level wind shear, wind at one thousand five hundred, one seven zero at six zero.

Knowledge Check A

REVIEW what you have learned so far about Terminal Aerodrome Forecasts (TAFs). ANSWER the questions listed below.

1. A TAF is a concise statement of the expected meteorological conditions significant to aviation for a specified time period within _____. *(Select the correct answer.)*
   - ❑ **5 SM of an airport**
   - ❑ 30 SM of an airport
   - ❑ An ARTCC's airspace

2. Which statement concerning the KRWF TAF is correct? *(Select the correct answer.)*

```
TAF
KRWF 091724Z 0918/1018 13017G25KT 2SM –RA BR 0VC005 WS020/18050KT
```

- ❑ Amended TAF valid from the 9th at two zero Zulu to the 10th at one eight Zulu
- ❑ Ceiling five thousand overcast
- ❑ **Low-level wind shear, wind at two thousand, one eight zero at five zero**

FM ('From') Change Indicator Group

The FM ("from") change indicator group is used to indicate a significant and rapid change to a new set of prevailing conditions. Each FM group starts on a new line of forecast text.

All elements of the TAF are included in each FM group regardless of whether they are forecast to change or not.

- Exception: the significant weather and non-convective LLWS groups are omitted if not expected to occur
- All forecast conditions listed before an FM group are superseded by those within the FM group at the indicated time

```
TAF
KOKC 010534Z 0106/0206 15010G16KT 6SM BR SCT020 WS020/18040KT
     FM010930 07006KT 1 1/2SM BR OVC008
```

FM010930	
FM	FM change indicator group identifier
01	Day of the month the change is expected to occur
09	Hour (UTC) the change is expected to occur
30	Minute (UTC) the change is expected to occur

Examples of FM Change Indicators

```
FM312100 05010KT 2SM DZ BR OVC008
FM010100 17012KT P6SM BKN050
```

From the 31st at 2100Z, wind zero five zero at one zero, visibility two, drizzle, mist, ceiling eight hundred overcast; from the 1st at 0100Z, wind one seven zero at one two, visibility more than six, ceiling five thousand broken.

```
FM242300 19012KT P6SM SCT050
FM250030 26030G40KT 1/4SM BLDU VV003
```

From the 24th at 2300Z, wind one niner zero at one two, visibility more than six, five thousand scattered; from the 25th at 0030Z, wind two six zero at three zero gusts four zero, visibility one-quarter, blowing dust, indefinite ceiling three hundred.

TEMPO Change Indicator Group

The TEMPO change indicator group is used to indicate temporary fluctuations to forecast meteorological conditions. Each TEMPO group is placed on a new line in the TAF. Only those weather elements forecast to temporarily change are required to be included in the TEMPO group.

```
TAF
KOKC 010534Z 0106/0206 15010G16KT 6SM BR SCT020 WS020/18040KT
     FM010930 07006KT 1 1/2SM BR OVC008
       TEMPO 0110/0114 1/2SM DZ FG VV005
```

TEMPO 0110/0114	
TEMPO	TEMPO change indicator group identifier
01	Day of the month the temporary condition is expected to begin
10	Hour (UTC) temporary condition is expected to begin
/	Solidus
01	Day of the month the temporary condition is expected to end
14	Hour (UTC) temporary condition is expected to end

Examples of TEMPO Change Indicator Group

```
FM180300 05022G34KT 3/4SM BLSN VV006
    TEMPO 1805/1809 1/4SM SN BLSN VV002
FM181200 35012KT P6SM BKN006
```

From the 18th at 0300Z, wind zero five zero at two two gusts three four, visibility three-quarters, blowing snow, indefinite ceiling six hundred; temporarily between the 18th at 05Z and the 18th at 09Z, visibility one-quarter, snow, blowing snow, indefinite ceiling two hundred.

From the 18th at 1200Z, wind three five zero at one two, visibility more than six, ceiling six hundred broken.

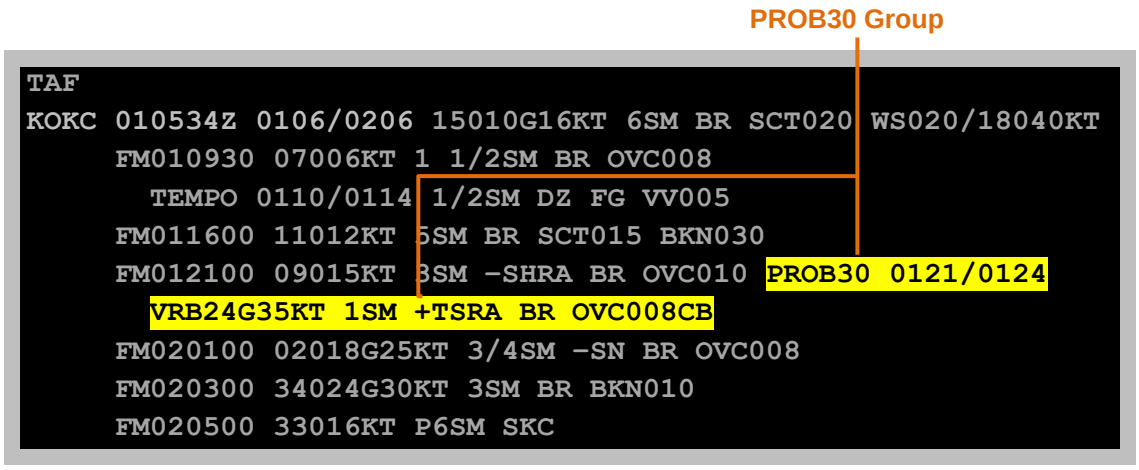
```
FM271900 15008KT P6SM SCT020
  TEMPO 2722/2801 6SM -SHRA BKN020
FM280100 34014KT P6SM SKC
```

From the 27th at 1900Z, wind one five zero at eight, visibility more than six, two thousand scattered; temporarily between the 27th at 22Z and the 28th at 01Z, visibility six, light rain shower, ceiling two thousand broken.

From the 28th at 0100Z, wind three four zero at one four, visibility more than six, sky clear.

PROB30 Group

The PROB30 group is used to forecast a low probability (30 percent chance) of a thunderstorm or precipitation event and its associated weather elements (wind, visibility and/or sky condition). The group is located within the same line as the prevailing condition (i.e., FM) group, continuing on the line below if necessary.



PROB30 0121/0124	
PROB30	PROB30 group identifier
01	Day of the month 30% probability is expected to begin
21	Hour (UTC) 30% probability is expected to begin
01	Day of the month 30% probability is expected to end
24	Hour (UTC) 30% probability is expected to end

Examples of PROB30 Group

```
FM050130 07017G25KT P6SM OVC020 PROB30 0506/0510
  2SM –SHSN OVC008
```

From the 5th at 0130Z, wind zero seven zero at one seven gusts two five, visibility more than six, ceiling two thousand overcast; a 30 percent probability between the 5th at 06Z and the 5th at 10Z, visibility two, light snow showers, ceiling eight hundred overcast.

```
FM121600 13010KT P6SM SCT030 PROB30 1219/1222
          VRB25G35SKT 1 1/2SM TSRA OVC010CB
```

From the 12th at 1600Z, wind one three zero at one zero, visibility more than six, three thousand scattered; a 30 percent probability between the 12th at 19Z and the 12th at 22Z, wind variable at two five gusts three five, visibility one and one-half, thunderstorm, rain (shower), ceiling one thousand overcast cumulonimbus.

Knowledge Check B

REVIEW what you have learned so far about Terminal Aerodrome Forecasts (TAFs). ANSWER the questions listed below.

1. Which TAF would indicate a rapid fluctuation occurring on the 12th day of the month at 1115 UTC? *(Select the correct answer.)*
   - ❑ FM111512
   - ❑ **FM121115**
   - ❑ FM1211:15

2. In a TAF, what does "TEMPO 1911/1915" indicate is occurring on the 19th day of the month between 11-15 UTC? *(Select the correct answer.)*
   - ❑ Rapid fluctuation
   - ❑ **Temporary fluctuations**
   - ❑ A 30% probability

3. In a TAF, "PROB30 1416/1420" indicates a 30% probability occurring on the 14th day of the month _____ UTC. *(Select the correct answer.)*
   - ❑ At 1420
   - ❑ Between 14-20
   - ❑ **Between 16-20**

Terminal Aerodrome Forecast (TAF) Summary

Keeping informed about weather conditions is a major part of your job. Just as METAR and SPECI reports reveal the current weather conditions, terminal aerodrome forecasts reveal future weather conditions. These forecasts allow you to be one step ahead of the situation so you can direct your aircraft accordingly.

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ Instruct students to locate student exercise ***TAF Decoding*** in the printed ***Student Guide*** ■ The exercise will be performed individually ■ Instruct students to answer each question ■ At the end of the exercise, the exercise will be evaluated during discussion	Exercise **EST. RUN TIME** 20 mins.

EXERCISE: TAF DECODING

Purpose

This exercise will allow you to practice decoding a Terminal Aerodrome Forecast (TAF).

Detailed Facilitator Instructions: *Direct students to work individually to answer the following questions. Inform students to reference the sample graphic to locate answers. After completion, select students randomly to provide answers orally while other students assess their own answers. Encourage student discussion with this exercise and resolve any questions the students may have on the exercise.*

Directions

Using the sample Oklahoma City, OK, (KOKC) TAF below, fill in the blanks to complete each question.

```
TAF
KOKC 010534Z 0106/0206 15010KT 6SM BR SCT020 WS020/18040KT
     FM010930 07006KT 1 1/2SM BR OVC008
      TEMPO 0110/0114 1/2SM DZ FG VV005
     FM011600 11012KT 5SM BR SCT015 BKN030
     FM012100 09015KT 3SM -SHRA BR OVC010 PROB30 0121/0124
      VRB24G35KT 1SM +TSRA BR OVC008CB
     FM020100 02018G25KT 3/4SM -SN BR OVC008
     FM020300 34024G30KT 3SM BR BKN010
     FM020500 33016KT P6SM SKC
```

Questions

1. The TAF was issued on the **1st** day of the month at **0534**Z.
2. The TAF is valid from the **1st** day of the month at **06**Z until the **2nd** day of the month at **06**Z.
3. On the 1st at 0600Z, wind at the top of the low-level wind shear layer is forecast to be **180** degrees at **40** knots.
4. On the 1st at 1300Z, the wind is forecast to be **070** degrees at **6** knots.
5. The flying category is forecast to deteriorate to IFR due to a low ceiling and mist on the **1st** day of the month at **0930**Z.
6. IFR due to drizzle and fog is expected to end on the **1st** day of the month at **1400**Z.
7. On the 1st at 2300Z, visibility is forecast to be **3** SM due to **light rain showers, mist** with a **30** percent probability of a thunderstorm or precipitation event.

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ **ENABLE *In-Flight Advisories*** lesson in Blackboard ■ Instruct students to navigate to the ***In-Flight Advisories*** lesson in Blackboard ■ Instruct students to work individually through the lesson content ■ Upon completion of the lesson, students should review previously introduced content or wait quietly until other students have completed	Blackboard **EST. RUN TIME** 45 mins.

IN-FLIGHT ADVISORIES

Purpose: The purpose of this lesson is to explain the different types of in-flight weather advisories and how to decode them.

Objectives:

- Identify types of In-Flight Advisories
- Identify the purpose of a Significant Meteorological Information (SIGMET)
- Decode a SIGMET
- Identify the purpose of a Convective SIGMET (WST)
- Decode a Convective SIGMET (WST)
- Identify the purpose of Airmen's Meteorological Information (AIRMET)
- Decode an AIRMET

References for this lesson are as follows:

- AC 00-45, Aviation Weather Services
- FAA Order JO 7110.10, Flight Services

In-Flight Advisories

SIGMETs, Convective SIGMETs, and AIRMETs are "in-flight advisories." Controllers use in-flight advisories to alert pilots of the existence of hazardous weather and to maintain situational awareness of hazardous weather.

Standards

All in-flight advisories follow these standards:

- All heights are mean sea level (MSL) unless otherwise noted in hundreds of feet, consisting of three digits (e.g., 040)
  - "FL" denotes flight levels (e.g., FL 180)
- Contractions follow FAA Order JO 7340.2, Contractions
- Weather and obstructions to visibility formats are identical to the Aviation Routine Weather Report (METAR) and the Aviation Selected Special Weather Report (SPECI)

Significant Meteorological Information (SIGMET)

A SIGMET is a weather advisory concerning weather significant to the safety of all aircraft.

SIGMET Issuance

A SIGMET may be issued when specified conditions are affecting or in the judgment of the forecaster, are expected to affect an area of at least 3,000 square miles or an area judged to have a significant impact on the safety of aircraft operations.

Within the conterminous U.S. (CONUS), SIGMETs are issued for the following weather phenomena:

- Severe or greater turbulence
- Severe icing
- Widespread duststorms
- Widespread sandstorms
- Volcanic ash

Outside of the CONUS (OCONUS), U.S. SIGMETs are issued for the following weather phenomena (in addition to those listed above).

- Thunderstorm of the following types: obscured, embedded, widespread, squall line, and isolated severe
- Tropical cyclone
- Radioactive cloud

Note: *Convective activity in the conterminous U.S. will be forecast in a Convective SIGMET (WST), which is covered in the next section of this lesson.*

A SIGMET is an unscheduled weather report issued any time conditions reaching SIGMET criteria are occurring or expected to occur within a 4-hour period.

A SIGMET can have a maximum valid period of 4 hours, except for volcanic ash (VA) and/or tropical cyclone (TC) SIGMETs outside the conterminous U.S., which can be valid up to 6 hours.

If conditions are expected to persist after the SIGMET's valid period, a statement to that effect is included in the last line of the text.

SIGMETs for continuing phenomena will be reissued at least every 4 hours as long as SIGMET conditions are expected to continue.

SIGMET Decoding

This is a SIGMET. Review each line number and associated breakdown for that line.

1.	**BOSR WS 050600**
2.	**SIGMET ROMEO 2 VALID UNTIL 051000**
3.	**ME NH VT**
4.	**FROM CAR TO YSJ TO CON TO MPV TO CAR**
5.	**SEV TURB OBS AND FCST BLW 080. CONDS CONTG BYD 1000Z.**

Line	Content	Description
1.	BOS	SIGMET area identifier
	R	SIGMET series
	WS	SIGMET product identifier (WS/UWS)
	050600	Issuance date/time
2.	SIGMET	Product identifier
	ROMEO 2	Series name and issuance number
	VALID UNTIL 051000	Ending valid date/time
3.	ME NH VT	List of affected states
4.	FROM CAR TO YSJ TO CON TO MVP TO CAR	Location of phenomenon delineated by high-altitude Very High Frequency Omnidirectional Range (VORs)
5.	SEV TURB OBS AND FCST BLW 080. CONDS CONTG BYD 1000Z.	Phenomenon description and ending time

Decoded SIGMET*: "SIGMET Romeo two from Caribou to St. John's to Concord to Montpelier to Caribou, severe turbulence observed and forecast below eight thousand, conditions continuing beyond one zero zero zero Zulu."*

Convective SIGMET (WST)

A Convective SIGMET (WST) is a weather advisory concerning convective weather significant to the safety of all aircraft. Convective SIGMETs are ONLY issued for the conterminous U.S. instead of SIGMETs for thunderstorms.

Convective SIGMET Issuance

A Convective SIGMET is issued when any of the following conditions are occurring or, in the judgment of the forecaster, are expected to occur.

- A severe thunderstorm is forecast; a severe thunderstorm has:
  - Winds of 50 knots or greater
  - Hail ¾ inch or greater in diameter
  - Tornadoes
- A line of thunderstorms is at least 60 miles long with thunderstorms affecting 40% of its length
- An active area of thunderstorms affecting 3,000 square miles covers at least 40% of the area concerned
- Embedded or severe thunderstorm(s) expected to occur for more than 30 minutes during the valid period regardless of the size of the area

***Note**: Weather phenomena meeting these criteria that are NOT within the conterminous U.S. would result in a SIGMET being issued.*

Convective SIGMET bulletins for the Eastern (E), Central (C), and Western (W) regions of the conterminous U.S. are issued hourly at 55 minutes past the hour.

Convective SIGMETs are valid for 2 hours or until superseded by the next hourly issuance.

When conditions do not meet or are not expected to meet Convective SIGMET criteria within a region at the scheduled time of issuance, a “CONVECTIVE SIGMET...NONE” message is transmitted.

A 2-to-6-hour outlook is included at the end of each bulletin.

Convective SIGMET Decoding

This is a Convective SIGMET. Review each line number and associated breakdown for that line.

1.	MKCC WST 091855
2.	CONVECTIVE SIGMET 21C
3.	VALID UNTIL 2055Z
4.	AR OK
5.	FROM 20S RZC-40SSW FSM
6.	DMSHG LINE TS 25 NM WIDE MOV FROM 27025KT. TOPS TO FL320.
7.	OUTLOOK VALID 092055-100055
8.	FROM 40NE BUM-60SE SGF-50WSW LIT-40W GGG-60ENE ABI-ADM-50WNW BUM-40NE BUM
9.	WST ISSUANCES EXPD. REFER TO MOST RECENT ACUS01 KWNS FROM STORM PREDICTION CENTER FOR SYNOPSIS AND METEOROLOGICAL DETAILS.

Line	Content	Description
1.	MKC	Issuance office
	C	Region (East, Central, or West)
	WST	Product identifier
	091855	Issuance date/time
2.	CONVECTIVE SIGMET	Product type
	21	Issuance number
	C	Region (East, Central, or West)
3.	VALID UNTIL 2055Z	Valid ending time (UTC)
4.	AR OK	Listed of affected states
5.	FROM 20S RZC-40SSW FSM	Location of phenomenon delineated by high-altitude VORs
6.	DMSHG LINE TS 25 NM WIDE MOV FROM 27025KT. TOPS TO FL320	Phenomenon description, movement, cloud top, remarks
7.	OUTLOOK VALID 092055-100055	Outlook valid period date/time
8.	FROM 40NE BUM-60SE SGF-50WSW LIT-40W GGG-60ENE ABI-ADM-50WNW BUM-40NE BUM	Location of phenomenon delineated by high-altitude VORs
9.	WST ISSUANCES EXPD. REFER TO MOST RECENT ACUS01 KWNS FROM STORM PREDICTION CENTER FOR SYNOPSIS AND METEOROLOGICAL DETAILS.	WST issuances possible/expected, Synopsis

Decoded Convective SIGMET: *"Convective SIGMET two one Central-from two zero south of Razorback to four zero south-southwest of Fort Smith, diminishing line of thunderstorms two five miles wide moving east at two five knots. Tops to flight level three two zero."*

"Convective SIGMET outlook valid from the 9th at two zero five five Zulu to the 10th at zero zero five five Zulu-from four zero northeast of Butler to six zero southeast of Springfield to five zero west-southwest of Little Rock to four zero west of Longview to six zero east-northeast of Abilene to Ardmore to five zero west-northwest of Butler to four zero northeast of Butler, Convective SIGMET issuances expected."

Airmen's Meteorological Information (AIRMET)

An AIRMET is an in-flight advisory concerning weather phenomena that are of operational interest to all aircraft and potentially hazardous to aircraft having limited capability because of lack of equipment, instrumentation, or pilot qualifications.

AIRMETs concern weather of less severity than that covered by SIGMETs or Convective SIGMETs.

AIRMET Issuance

AIRMET bulletins, each containing all valid AIRMET messages, are issued on a scheduled basis for each forecast region.

- Bulletins are named according to the alphabetic designator that indicates the forecast hazard(s)
  - AIRMET Sierra for Instrument Flight Rules (IFR) and extensive mountain obscuration
  - AIRMET Tango for moderate turbulence, sustained surface winds greater than 30 knots, and non-convective low-level wind shear (LLWS) potential
  - AIRMET Zulu for moderate icing and freezing levels
- A negative statement is issued if no AIRMET messages are valid
- AIRMET messages are valid for no more than 6 hours
  - If conditions are expected to persist after the AIRMET's valid period, a statement to that effect is included in the last line of the text
  - Bulletins will contain an outlook whenever hazardous weather meeting AIRMET criteria is expected during the 6-hour period after the valid time of the AIRMET message

AIRMET Decoding

This is an AIRMET. Review each line number and associated breakdown for that line.

1.	CHIZ WA 091445
2.	AIRMET ZULU UPDT 4 FOR ICE AND FRZLVL VALID UNTIL 092100 .
3.	...SEE SIGMET QUEBEC SERIES... .
4.	AIRMET ICE...KS IA MO IL
5.	FROM FOD TO DBQ TO 50NW DEC TO 50SW FAM TO OSW TO MCI TO FOD
6.	MOD ICE BTN FRZLVL AND FL200. FRZLVL 060-100. CONDS ENDG BY 21Z.
7.	OTLK VALID 2100-0300Z...ICE IA MO WI IL IN KY
8.	BOUNDED BY BAE-BVT-PXV-50SW FAM-50NW DEC-DBQ-BAE
9.	MOD ICE BTN 080 AND FL200. CONDS CONTG THRU 03Z. .
10.	FRZLVL...RANGING FROM SFC-120 ACRS AREA
11.	MULT FRZLVL 015-085 BOUNDED BY INL-YQT-SSM-ASP-FWA-BJI-INL SFC ALG 50NNW ISN-70W FAR-GFK-40NE ODI-40SW DXO 040 ALG ISN-70S BIS-30W ABR-30E ABR-60S FAR-30SW BRD-30NE FWA 080 ALG GLD-SLN-30W BDF-50S JOT-40SE IND-30SW CVG-40SW LOZ

Line	Content	Description
1.	CHIZ	Forecast area (CHI) and alphabetic designator (Z)
	WA	AIRMET product identifier
	091445	Issuance day of the month (09) and time (1445Z)
2.	AIRMET ZULU	Product identifier
	UPDT 4	Update number (reset to zero at 00z each day)
	FOR ICE AND FRZLVL	Weather phenomena
	VALID UNTIL 092100	Ending valid day of the month (09) and time (2100Z)
3.	…SEE SIGMET…	Reference to active SIGMETs at time of issuance
4.	AIRMET ICE…KS IA MO IL	AIRMET name and list of affected states
5.	FROM FOD TO DBQ…	Location using high-altitude VORs or other geographic features
6.	MOD ICE BTN…	Phenomenon description and ending time
7.	OTLK VALID…	Outlook identifier, valid period, phenomenon, and list of states affected
8.	BOUNDED BY BAE…	Location using VORs or other geographic features
9.	MOD ICE BTN…	Phenomenon description and ending time
10.	FZLVL…RANGING…	Freezing level range across the forecast area
11.	MULT FRZLVL…	Freezing levels

***Note**: Freezing levels are only found in AIRMET Zulu bulletins.*

***Decoded AIRMET:** "AIRMET Zulu update four for icing-from Fort Dodge to Dubuque to five zero northwest of Decatur to five zero southwest of Farmington to Oswego to Kansas City to three zero west-southwest of Fort Dodge, moderate icing between the freezing level and flight level two zero zero. Freezing level between six thousand and one zero thousand. Conditions ending by two one zero zero Zulu."*

"AIRMET Zulu update four, outlook valid from two one zero zero Zulu to zero three zero zero Zulu-bounded by Milwaukee to Lafayette to Pocket City to five zero southwest of Farmington to five zero northwest of Decatur to Dubuque to Milwaukee. Moderate icing between the freezing level and flight level two zero zero. Freezing level between eight thousand and one zero thousand. Conditions continuing through zero three zero zero Zulu."

"Freezing level ranging from the surface to one two thousand across the area. Multiple freezing levels between one thousand five hundred and eight thousand five hundred, bounded by International Falls to Thunder Bay to Sault Ste Marie to Oscoda to Fort Wayne to Bemidji to International Falls. At the surface along a line from five zero north-northwest of Williston to seven zero west of Fargo to Grand Forks to four zero northeast of Nodine to four zero southeast of Detroit. At four thousand along a line from Williston to seven zero south of Bismarck to three zero west of Aberdeen to three zero east of Aberdeen to six zero south of Fargo to three zero southwest of Brainerd to three zero northeast of Fort Wayne. At eight thousand along a line from Goodland to Salina to three zero west of Bradford to five zero south of Joliet to four zero southeast of Indianapolis to three zero southwest of Covington to four zero southwest of New London."

Knowledge Check C

REVIEW what you have learned so far about in-flight advisories. ANSWER the questions listed below.

1. Which weather report would provide a forecast of severe icing over Kentucky? *(Select the correct answer.)*
   - ❑ AIRMET Tango
   - ❑ AIRMET Zulu
   - ❑ **SIGMET**

2. Which weather report would provide a forecast of sustained surface wind greater than 30 knots over Minnesota and Iowa? *(Select the correct answer.)*
   - ❑ **AIRMET Tango**
   - ❑ AIRMET Zulu
   - ❑ SIGMET

3. Which weather report would provide a forecast of IFR over Georgia and Alabama? *(Select the correct answer.)*
   - ❑ **AIRMET Sierra**
   - ❑ AIRMET Zulu
   - ❑ SIGMET

4. Which weather report would be used to forecast an isolated severe thunderstorm 25 miles west of Hill City, Kansas (HLC)? *(Select the correct answer.)*
   - ❑ AIRMET
   - ❑ SIGMET
   - ❑ **Convective SIGMET**

5. Which weather report would provide a forecast of freezing levels over New England? *(Select the correct answer.)*
   - ❑ AIRMET Sierra
   - ❑ **AIRMET Zulu**
   - ❑ SIGMET

6. Which weather report would provide a forecast for a squall line over the New York Oceanic Flight Information Region (FIR)? *(Select the correct answer.)*
   - ❑ AIRMET Tango
   - ❑ **SIGMET**
   - ❑ Convective SIGMET

In-Flight Advisories Summary

You will be providing in-flight advisories to alert pilots to hazardous weather conditions. Learning the types of advisories and how to decode them will allow you to assist pilots.

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ Instruct students to locate student exercise ***SIGMET and AIRMET Decoding*** in the printed ***Student Guide*** ■ The exercise will be performed individually ■ Instruct students to answer each question ■ At the end of the exercise, the exercise will be evaluated during discussion	Exercise **EST. RUN TIME** 25 mins.

EXERCISE: SIGMET AND AIRMET DECODING

Purpose

This exercise reinforces your ability to use the correct phraseology for Significant Meteorological Information (SIGMET), Convective SIGMET.

Detailed Facilitator Instructions: *Direct students to work individually to answer the following questions. Instruct students to reference the sample graphic to locate answers. After completion, select students randomly to provide answers orally while other students assess their own answers. Encourage student discussion with this exercise and resolve any questions the students may have on the exercise.*

SIGMET Decoding Directions

Use the following SIGMET issued for the San Francisco (SFO) flight information region (FIR) to fill in the blanks.

```
SFOQ WS 031850
SIGMET QUEBEC 2 VALID UNTIL 032250
WA OR CA AND CSTL WTRS
FROM YDC TO 40SSE LKV TO 30SSW FOT TO ONP TO 40N HQM TO YDC
OCNL SEV TURB BLW 120 DUE TO STG LOW LVL WNDS OVR RUFF TRRN AND
CDFNT MOVG INTO AREA. CONDS RPRTD BY ACFT NR OED. CONDS MOVG EWD
AND CONTG BYD 2250Z.
```

"SIGMET **Quebec two**-from Princeton to four zero south-southeast of Lakeview to three zero south-southwest of Fortuna to Newport to four zero north of Hoquiam to Princeton, occasional **severe turbulence** below **one two thousand** due to **strong low-level winds** over rough terrain and a cold front moving into the area, conditions reported by aircraft near Medford, conditions moving **eastward** and continuing beyond **two two five zero** Zulu."

Convective SIGMET Decoding Directions

Use the following Convective SIGMET bulletin to fill in the blanks.

```
MKCC WST 021355
CONVECTIVE SIGMET 35C
VALID UNTIL 1555Z
NE SD
FROM 50NE ONL-10NW OBH
DMSHG LINE EMBD TS 30 NM WIDE MOV FROM 28020KT. TOPS TO FL380.

OUTLOOK VALID 021555-021955
FROM FAR-60ESE SGF-30W LIT-TXK-ADM-ICT-GLD-40SSW DIK-FAR
WST ISSUANCES POSS. REFER TO MOST RECENT ACUS01 KWNS FROM STORM
PREDICTION CENTER FOR SYNOPSIS AND METEOROLOGICAL DETAILS.
```

"Convective SIGMET **three five Central**–from five zero northeast of O'Neill to one zero northwest of Walbach, diminishing **line** of embedded thunderstorms **three zero** miles wide moving from **two eight zero** degrees at **two zero** knots, tops to **flight level three eight zero**."

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ **ENABLE *Center Weather Advisory (CWA)*** lesson in Blackboard ■ Instruct students to navigate to the ***Center Weather Advisory (CWA)*** lesson in Blackboard ■ Instruct students to work individually through the lesson content ■ Upon completion of the lesson, students should review previously introduced content or wait quietly until other students have completed	Blackboard
	EST. RUN TIME
	20 mins.

CENTER WEATHER ADVISORY (CWA)

Purpose: The purpose of this lesson is to explain what center weather advisories and meteorological impact statements are used for and how to interpret them.

Objectives:

- Identify the purpose of a Center Weather Advisory (CWA)
- Decode a CWA
- Identify the purpose of a Meteorological Impact Statement (MIS)
- Decode an MIS

References for this lesson are as follows:

- AC 00-45, Aviation Weather Services

Center Weather Advisory (CWA)

A CWA is an unscheduled weather advisory issued by Center Weather Service Unit (CWSU) meteorologists for Air Traffic Control (ATC) use to alert pilots of existing or anticipated adverse weather conditions within the next two hours. A CWA is NOT a flight planning product because of its short lead time and duration.

Criteria

CWA criteria include:

- Thunderstorms
  - Severe (SEV TS)
  - Embedded (EMBD TS)
  - Line (LN TS)
  - Area (AREA TS)
- Icing
  - Moderate (MOD ICE)
  - Severe (SEV ICE)
- Turbulence
  - Moderate (MOD TURB)
  - Severe (SEV TURB)

CWA criteria also include:

- Heavy precipitation (HVY PCPN)
- Freezing precipitation (FZ PCPN)
- Low Instrument Flight Rules (LOW IFR)
- Surface wind greater than or equal to 30 knots (STG SFC WND)
- Non-convective low-level wind shear (LLWS) (surface – 2,000 feet AGL)
- Duststorm (DS)
- Sandstorm (SS)
- Volcanic ash (VA)

Note: *Low Instrument Flight Rules (IFR) is defined as ceiling less than 500 feet Above Ground Level (AGL) and/or visibility less than one statute mile.*

CWA Decoding

This is a CWA. Review each line number to review a breakdown for that line.

1.	**ZNY5 CWA 021400**
2.	**ZNY CWA 502 VALID TIL 021600**
3.	**FROM BGM TO 18WNW JFK TO HAR TO SLT TO BGM**
4.	**NUMEROUS ACFT REP SEV TURB AND WS BLW 020. CONDS EXP TO CONT AFT 16Z.**

Line	Content	Description
1.	ZNY	ARTCC identification
	5	Phenomenon number (1-6)
	CWA	Product identifier (CWA/UCWA)
	021400	Beginning/issuance date/time
2.	ZNY	ARTCC identification
	CWA	Product identifier
	5	Phenomenon number (1-6)
	02	Issuance number
	VALID TIL 021600	Ending valid date/time
3.	FROM BGM TO 18WNW JFK TO HAR TO SLT TO BGM	Location of phenomenon delineated by high-altitude Very High Frequency Omnidirectional Range (VORs)
4.	NUMEROUS ACFT REP SEV TURB AND WS BLW 020. CONDS EXP TO CONT AFT 16Z	Phenomenon description

Decoded CWA*: "New York Center Weather Advisory five, issuance two-from Binghamton to one eight northwest of New York/JF Kennedy to Harrisburg to Slate Run to Binghamton, numerous aircraft report severe turbulence and wind shear below two thousand, conditions expected to continue after one six Zulu."*

Meteorological Impact Statement (MIS)

An MIS is an unscheduled discussion product issued by CWSU meteorologists that summarizes anticipated weather conditions with potential impact on air traffic flow control and flight operations in an Air Route Traffic Control Center's (ARTCC's) area of responsibility. The MIS provides a unique plain language, non-technical description of weather expected to occur over an extended period ranging from several hours up to about two (2) days.

MIS Distribution

An MIS is distributed to:

- ARTCC personnel, including Traffic Management Unit (TMU) personnel
- Other supported centers

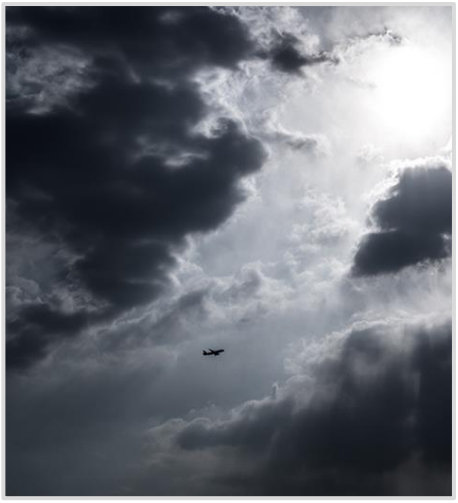
An MIS is NOT intended to be used by pilots.

Air Traffic Weather Concerns

An MIS enables ATC personnel to include the impact of specific weather conditions in their flow control decision making.

Air traffic weather concerns include but are not limited to:

- Thunderstorms
  - Timing
  - Tops
  - Movement
  - Intensity
  - Character (such as broken lines or large clusters)
- Operationally significant ceilings/visibility



Air traffic weather concerns also include:

- Cloud tops
- Wind and temperatures (surface and aloft)
- Wind shear
- Operationally significant pressure changes
- Precipitation
- Turbulence
- Icing
- Duststorm, sandstorm, and volcanic ash

MIS Decoding

This is a MIS. Review each line number to review a breakdown for that line.

1.	ZNY MIS 02 VALID 151700-160230
2.	...FOR ATC PLANNING PURPOSES ONLY...
3.	REROUTE IS EXPECTED AFTER 17Z. SCATTERED LINE OF TS WILL DEVELOP FROM WEST VIRGINIA NORTHEAST TO CENTRAL NY STATE. JET ROUTES MOST LIKELY AFFECTED WILL BE J60 THROUGH J6; LATER J95 AND J36

Line	Content	Description
1.	ZNY	ARTCC identification
	MIS	Product identifier
	02	Issuance number
	VALID 151700-160230	Valid period dates/times
2.	...FOR ATC PLANNING PURPOSES ONLY...	Product use statement
3.	REROUTE IS EXPECTED…	Phenomenon description including height, extent, and movement.

Decoded MIS: *"Meteorological Impact Statement two-Reroute program is expected after one seven Zulu. Scattered line of thunderstorms will develop from West Virginia northeast to central New York state. Jet routes most likely affected will be J sixty through J six; later J ninety five and J thirty six."*

Knowledge Check D

REVIEW what you have learned so far about the Center Weather Advisory (CWA). ANSWER the questions listed below.

1. An unscheduled aviation weather report issued by CWSU meteorologists for ATC use to alert pilots of existing or anticipated adverse weather conditions within the next two hours is _____. *(Select the correct answer.)*
   - ❑ **A Center Weather Advisory (CWA)**
   - ❑ A Meteorological Impact Statement (MIS)
   - ❑ An Airman's Meteorological Information (AIRMET)

2. Which weather report would the Cleveland CWSU (ZOB) issue due to winds gusting greater than 45 knots in the wake of a cold front expected to enter the ZOB ARTCC airspace in six hours? *(Select the correct answer.)*
   - ❑ AIRMET Tango
   - ❑ Center Weather Advisory (CWA)
   - ❑ **Meteorological Impact Statement (MIS)**

Center Weather Advisory (CWA) Summary

Severe weather can impact flying and the safety of those flying. Learning how to decode weather advisories will allow you to relay the potential impacts to pilots.

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ Instruct students to locate student exercise ***CWA and MIS Decoding*** in the printed ***Student Guide*** ■ The exercise will be performed individually ■ Instruct students to answer each question ■ At the end of the exercise, the exercise will be evaluated during discussion	Exercise **EST. RUN TIME** 25 mins.

EXERCISE: CWA AND MIS DECODING

Purpose

This exercise reinforces your ability to use the correct phraseology for a Center Weather Advisory (CWA) and Meteorological Impact Statement (MIS).

Detailed Facilitator Instructions: *Direct students to work individually to answer the following questions. Instruct students to reference the sample graphic to locate answers. After completion, select students randomly to provide answers orally while other students assess their own answers. Encourage student discussion with this exercise and resolve any questions the students may have on the exercise.*

CWA Decoding Directions

Use the following CWA issued by the Jacksonville (ZJX) Center Weather Service Unit (CWSU) to fill in the blanks.

```
ZJX CWA 101 VALID UNTIL 271620
FROM 60NE CEW-30N TLH-35SW AMG
LN...25NM WIDE...SCT SHRA/ISOLD TS WITH HVY PCPN MOV FM
11015KT. TS TOPS FL400. EXP GRAD INCR IN CVRG THRU PD.
```

"Jacksonville Center Weather Advisory **one,** issuance **one**-from six zero northeast of Crestview to three zero north of Tallahassee to three five southwest of Alma, a line **two five** nautical miles wide of scattered rain showers/isolated thunderstorms with heavy precipitation moving from **one one zero** at **one five** knots, thunderstorm tops to **flight level four zero zero**, expect a gradual increase in coverage through the period."

MIS Decoding Directions

Use the following MIS issued by the Memphis (ZME) CWSU to fill in the blanks.

```
ZME MIS 02 VALID 141800-150230
...FOR ATC PLANNING PURPOSES ONLY...
ICING AND TURB AHEAD OF APPROACHING COLD FRONT WILL SPREAD
ACROSS ZME, MOSTLY AFFECTING LEVELS 100-320. SOME TURB IS JET
STREAM INDUCED ACROSS THE SOUTHERN PORTIONS OF ZME.
```

"Memphis Meteorological Impact Statement **two**-**Icing** and **turbulence** ahead of approaching cold front will spread across the Memphis control area, mostly affecting one zero zero to flight level three two zero. Some **turbulence** is jet stream induced across the southern portions of the Memphis control area."

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ **ENABLE *Wind and Temperature Aloft Forecast (FB)*** lesson in Blackboard ■ Instruct students to navigate to the ***Wind and Temperature Aloft Forecast (FB)*** lesson in Blackboard ■ Instruct students to work individually through the lesson content ■ Upon completion of the lesson, students should review previously introduced content or wait quietly until other students have completed	Blackboard **EST. RUN TIME** 20 mins.

WIND AND TEMPERATURE ALOFT FORECAST (FB)

Purpose: The purpose of this lesson is to explain what Wind and Temperature Aloft Forecasts are used for and how to decode them.

Objectives:

- Identify the purpose of a Wind and Temperatures Aloft Forecast (FB)
- Decode an FB

References for this lesson are as follows:

- AC 00-45, Aviation Weather Services

Wind and Temperature Aloft Forecast (FB)

An FB is a computer-generated forecast of wind direction, wind speed, and temperature at selected times, altitudes, and locations. FBs are used by Air Traffic Control (ATC) to help avoid clear air turbulence.

Forecast Element Format

The format of an FB forecast element is:

```
FD1US1
DATA BASED ON 091200Z
VALID 091800Z   FOR USE 1400-2100Z. TEMPS NEG ABV 24000
FT  3000    6000    9000   12000   18000   24000  30000  34000  39000
BIH         2910 2920-10 3121-18 3019-32 9900-43 252648 273447 283946
BLH 2326 2437-01 2435-07 2541-13 2683-23 2694-35 760050 269855 269651
FAT 3106 3406-06 3313-13 3115-20 2828-33 2732-44 293745 294046 294647
ONT 2414 2627-04 2637-10 2643-16 2785-25 7706-36 269948 277951 278150
...
```

2785-25 The first two digits represent the wind direction in tens of degrees relative to true north.

2785-25 The next two digits indicate the wind speed in knots.

- 9900 indicates wind light and variable
- If the coded wind direction is greater than "36," 50 must be subtracted from the wind direction and a one must be added to the hundreds digit for wind speed
  - Example: 6825 is decoded as wind 180 degrees at 125 knots
- Wind is not forecast for any altitude within 1,500 feet of station elevation in the contiguous U.S. or Alaska

2785-25 Plus (+) or minus (–) sign for temperature as required.

- Temperature sign is omitted at altitudes above 24,000 feet

2785-25 The final two digits indicate the temperature in whole degrees Celsius.

- Temperature is not forecast at 3,000 feet or any altitude within 2,500 feet of station elevation

2785-25	
27	Wind direction (tens of degrees)
85	Wind speed (knots)
-25	Temperature (°C)

FB Decoding

This is an FB. Review each line number to review a breakdown for that line.

1.	FD1US1
2.	DATA BASED ON 091200Z
3.	VALID 091800Z FOR USE 1400-2100Z. TEMPS NEG ABV 24000
4.	FT 3000 6000 9000 12000 18000 24000 30000 34000 39000
5.	BIH 2910 2920-10 3121-18 3019-32 9900-43 252648 273447 283946
6.	BLH 2326 2437-01 2435-07 2541-13 2683-23 2694-35 760050 269855 269651
7.	FAT 3106 3406-06 3313-13 3115-20 2828-33 2732-44 293745 294046 294647
8.	ONT 2414 2627-04 2637-10 2643-16 2785-25 7706-36 269948 277951 278150
	...

Line	Content	Description
1.	FD1US1	World Meteorological Organization (WMO) Bulletin designator
2.	DATA BASED ON 091200Z	Data based on date and time (UTC)
3.	VALID 091800Z	Valid date and time (UTC)
	FOR USE 1400-2100Z	For use time period (UTC)
	TEMPS NEG ABV 24000	Temperatures are negative for levels above 24,000 feet
4.	FT 3000 6000 9000…	Forecast levels in feet. <18000=true altitude; ≥18000=pressure altitudes
5.	BIH…	Forecast location
	2910 2920-10…	Coded forecast wind/temperatures
6.	BLH…	Forecast location
	2326 2437-01…	Coded forecast wind/temperatures
7.	FAT…	Forecast location
	3106 3406-06…	Coded forecast wind/temperatures
8.	ONT…	Forecast location
	2414 2627-04…	Coded forecast wind/temperatures

FB Example

```
FD1US1
DATA BASED ON 041800Z
VALID 051800Z   FOR USE 1200-0000Z. TEMPS NEG ABV 24000
FT  3000    6000    9000   12000   18000   24000  30000  34000  39000
SBA 9900 3609+22 9900+15 1807+07 2112-06 2619-17 283934 284343 274754
WJF      3107+24 2806+16 9900+08 1907-07 2816-18 293734 273543 274554
LKV              2231+12 2242+04 2237-10 2436-22 252438 262947 263857
PDX 2313 2323+07 2333+01 2247-03 2175-16 2383-25 750436 750047 258052
```

Location	Level (ft)	Coded	Decoded
SBA	3000	9900	“Three thousand, light and variable”
WJF	9000	2806+16	“Niner thousand, two eight zero at six, temperature one six”
LKV	18000 (FL 180)	2237-10	“Flight level one eight zero, two two zero at three seven, temperature minus one zero”
PDX	34000 (FL 340)	750047	“Flight level three four zero, two five zero at one zero zero, temperature minus four seven”

Note: *A high-level forecast product for FL 450 and FL 530 is also issued.*

Knowledge Check E

REVIEW what you have learned so far about Wind and Temperature Aloft Forecasts (FBs). ANSWER the question listed below.

1. The FB is used by ATC to help _____. *(Select the correct answer.)*
   - ❑ **Avoid clear air turbulence**
   - ❑ Calculate density altitude
   - ❑ Calculate fog and cloud formation potential

Wind and Temperature Aloft Forecast (FB) Summary

Wind and temperature are factors that affect flying and the comfort and safety of those flying. Learning how to decode the Wind and Temperature Aloft Forecasts will help you avoid clear air turbulence created by crosswinds to the flight paths of those aircraft under your direction.

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ Instruct students to locate student exercise ***FB Decoding*** in the printed ***Student Guide*** ■ The exercise will be performed individually ■ Instruct students to answer each question ■ At the end of the exercise, the exercise will be evaluated during discussion	Exercise **EST. RUN TIME** 20 mins.

EXERCISE: FB DECODING

Purpose

This exercise reinforces your ability to decode a Wind and Temperature Aloft Forecast (FB).

Detailed Facilitator Instructions: *Direct students to work individually to answer the following questions. Instruct students to reference the sample graphic to locate answers. After completion, select students randomly to provide answers orally while other students assess their own answers. Encourage student discussion with this exercise and resolve any questions the students may have on the exercise.*

Directions

Use the following FB to fill in the blanks.

```
FD3US3
DATA BASED ON 041200Z
VALID 050000Z   FOR USE 2100-0600Z. TEMPS NEG ABV 24000
FT  3000    6000    9000   12000   18000   24000  30000  34000  39000
BDL 9900 0305+12 2914+07 2712+03 2418-10 2439-20 246834 239142 730054
BGR 3308 3410+10 3116+05 2719+03 2722-10 2629-22 256536 259344 259454
CAR 3416 2717+07 2827+02 2931+01 2935-09 2838-23 264540 266148 257852
PWM 3410 3615+11 9900+07 2812+04 2621-10 2537-21 258134 740143 750754
```

1. **Windsor Locks, CT, (BDL) at 3,000 feet:** Three thousand, wind **light and variable**.
2. **Windsor Locks, CT, (BDL) at 6,000 feet:** Six thousand, wind **zero three zero** at **five**, temperature **one two**.
3. **Bangor, ME, (BGR) at 12,000 feet:** One two thousand, wind **two seven zero** at **one niner**, temperature **three.**
4. **Caribou, ME, (CAR) at FL 300:** Flight level three zero zero, wind **two six zero** at **four five**, temperature **minus four zero**.
5. **Portland, ME, (PWM) at FL 390:** Flight level three niner zero, wind **two five zero** at **one zero seven**, temperature **minus five four**.

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ This portion of training will be conducted by the facilitator ■ Instruct students to navigate to the study aids ***Summary of Forecast Products*** and ***Hazard Matrix*** in ***Student Guide*** ■ Facilitator will review content presented in the study aids ■ Navigate to the ***Parking Lot*** link within Blackboard and review any student questions ■ Address ***Parking Lot*** questions and facilitate a brief discussion of the lesson content ■ Instruct students to prepare for the End-of-Module test by putting away their Student Guides	Study Aid and Facilitated Discussion **EST. RUN TIME** 15 mins.

STUDY AID: SUMMARY OF FORECAST PRODUCTS

PRODUCT	PURPOSE	ISSUANCE TIMES	VALID PERIOD
Terminal Aerodrome Forecast (TAF)	Concise statement of the expected meteorological conditions significant to aviation for a specified time period within 5 SM of an airport.	00Z, 06Z, 12Z, 18Z	24 or 30 hours
Significant Meteorological Information (SIGMET)	Weather advisory concerning weather significant to the safety of all aircraft.	Un-scheduled	Up to 4 or 6 hours
Convective SIGMET (WST)	Weather advisory concerning convective weather significant to the safety of all aircraft.	Hourly at H+55	2 hrs; 2-6 hours for outlook
Airman's Meteorological Information (AIRMET)	Advisory concerning weather phenomena that are of operational interest to all aircraft and potentially hazardous to aircraft having limited capability because of lack of equipment, instrumentation, or pilot qualifications. AIRMETs concern weather of less severity than that covered by SIGMETs or Convective SIGMETs.	Varies (4 times per day)	6 hrs
Center Weather Advisory (CWA)	Unscheduled weather advisory issued by CWSU meteorologists for ATC use to alert pilots of existing or anticipated adverse weather conditions within the next 2 hours.	Un-scheduled	Up to 2 hours
Meteorological Impact Statement (MIS)	Discussion product that summarizes weather conditions with potential impact on flow control and flight operations planning in an ARTCC's area of responsibility.	Un-scheduled	Up to 2 days
Wind and Temperature Aloft Forecast (FB)	Computer-generated forecast of wind and temperature at selected times, altitudes, and locations.	00Z, 06Z, 12Z, 18Z,	7, 9, or 12 hours

STUDY AID: HAZARD MATRIX

		TAF	AIRMET (WA)			SIGMET (WS)	Con-vective SIGMET (WST)	Center Weather Advisory (CWA)	Meteoro-logical Impact Statement (MIS)
			Sierra	Tango	Zulu				
IFR		X	X						
Low IFR[1]		X						X	X
Mountain Obscuration (MTN OBSCN)			X						
TURB	**MOD**			X				X	X
	SEV					X		X	X
STG SFC WND (≥ 30KT)		X		X				X	X
Low-level Wind Shear Potential (LLWS POTENTIAL)		X		X				X	X
ICE	**MOD**				X			X	X
	SEV					X		X	X
Thunderstorm (TS)		X				X[2]	X	X	X
Widespread Duststorm (WDSPR DS)						X		X	X
Widespread Sandstorm (WDSPR SS)						X		X	X
Volcanic Ash (VA)		X				X		X	X
Tropical Cyclone (TC)						X			

1. Low IFR is defined as ceilings less than 500 feet AGL and/or visibility less than 1SM.
2. A Convective SIGMET (WST) is issued instead of a SIGMET (WS) for thunderstorms which occur over the contiguous U.S.

SUMMARY

The purpose of this module was to provide an overview of National Weather Service (NWS) forecasts and advisories.

In accordance with AC 00-45, Aviation Weather Services; and FAA Order JO 7110.10, Flight Services; you should now be able to:

- Identify the purpose of a Terminal Aerodrome Forecast (TAF)
- Identify elements of a TAF
- Decode examples of a TAF
- Identify types of In-Flight Advisories
- Identify the purpose of a Significant Meteorological Information (SIGMET)
- Decode a SIGMET
- Identify the purpose of a Convective SIGMET (WST)
- Decode a Convective SIGMET (WST)
- Identify the purpose of Airmen's Meteorological Information (AIRMET)
- Decode an AIRMET
- Identify the purpose of a Center Weather Advisory (CWA)
- Decode a CWA
- Identify the purpose of a Meteorological Impact Statement (MIS)
- Decode an MIS
- Identify the purpose of a Wind and Temperatures Aloft Forecast (FB)
- Decode an FB

FACILITATOR INSTRUCTIONS	DELIVERY METHOD
■ **ENABLE *Forecasts and Advisories End-of-Module Test*** link in Blackboard ■ Instruct students: ○ Clear desks ○ Do not write anything during or after the test ○ Navigate to the ***Forecasts and Advisories End-of-Module Test*** link in Blackboard ○ Once they are satisfied with their responses, click "Save and Submit;" do not click "OK" to review results until directed to do so ○ Choose "Cancel" if they receive a warning message that the test has unanswered questions; choosing OK will submit the test and not allow them to go back and answer the questions ○ Leave the room after submitting the test and return at the "Be Back" time ■ ***Note:*** *This test is scored but not graded* ■ During test, monitor students to ensure a secure testing environment ■ Identify the most commonly missed questions by reviewing student statistics in Blackboard ■ Instruct students to click "View Results" when ready to review commonly missed questions ■ Review commonly missed questions with students	Blackboard Assessment **EST. RUN TIME** 45 mins.

END-OF-MODULE TEST (ANSWER KEY)

Note: *Test questions in Blackboard are presented to the students in random order. Please be aware the test key question order will not match the student version.*

1. When a TAF is issued, where does it apply? *(Select the correct answer.)*
   - ❑ **5 SM of an airport**
   - ❑ 500 feet AGL
   - ❑ FL 180
   - ❑ 3,000 SM of adverse weather

   Reference(s): AC 00-45, Sec. 7

2. A forecast of non-convective LLWS would be found in what NWS product? *(Select the correct answer.)*
   - ❑ **TAF**
   - ❑ SIGMET
   - ❑ Convective SIGMET
   - ❑ SPECI

   Reference(s): AC 00-45, Sec. 7

3. What is the prevailing visibility indicated to occur at 1700Z? *(Select the correct answer.)*

   - ❑ **Visibility more than six**
   - ❑ Visibility more than two
   - ❑ Visibility six
   - ❑ Visibility two

   Reference(s): AC 00-45, Sec. 7

4. Which in-flight advisory would provide a forecast of embedded thunderstorms over Hawaii? *(Select the correct answer.)*
   - ❑ **SIGMET**
   - ❑ AIRMET
   - ❑ Convective SIGMET
   - ❑ TAF

   Reference(s): AC 00-45, Sec. 6

5. A SIGMET in the conterminous U.S. can have a maximum valid period of how many hours? *(Select the correct answer.)*
   - ❑ **Four**
   - ❑ Two
   - ❑ Six
   - ❑ Eight

   Reference(s): AC 00-45, Sec. 6

6. What is the area identifier of this SIGMET? *(Select the correct answer.)*

```
BOSU WS 251615
SIGMET UNIFORM 1 VALID UNTIL 252015
NY LO VT PA FROM 30W YSC TO 30S ETX TO 30E JST TO YOW TO 30W YSC
OCNL SEV TURB BTN FL290 AND FL360. RPRTD BY ACFT. CONDS CONTG
BYD 2015Z.
```

   - ❑ **BOS**
   - ❑ BOSU
   - ❑ WS
   - ❑ 251615

   Reference(s): AC 00-45, Sec. 6

7. Convective SIGMETs _____. *(Select the correct answer.)*
   - ❑ **Are only issued for the conterminous U.S.**
   - ❑ Are issued every half hour on the half and full hour mark
   - ❑ Are valid for four hours
   - ❑ Are issued for ice warnings

   Reference(s): AC 00-45, Sec. 6

8. Which of these conditions is **NOT** identified in the WST shown? *(Select the correct answer.)*

```
MKCE WST 211355
CONVECTIVE SIGMET 1E
VALID UNTIL 1555Z
NC SC FL GA AND CSTL WTRS
FROM 30SSE CLT-160SE ILM-140ENE OMN-60E TLH-ABY-30SSE CLT
AREA SEV EMBD TS MOV FROM 21015KT. TOPS ABV FL450.
TORNADOES...WIND GUSTS TO 60KT POSS.
TS ASSOCD WITH TROPICAL STORM ALBERTO.
.
OUTLOOK VALID 211555-211955
<snip>
```

   - ❑ **Hail**
   - ❑ Tornadoes
   - ❑ Thunderstorms
   - ❑ Wind gusts

   Reference(s): AC 00-45, Sec. 6

9. Which of the following regarding AIRMETs is true? *(Select the correct answer.)*
   - ❑ **AIRMETs concern weather of less severity than SIGMETs**
   - ❑ Weather phenomena detailed in AIRMETs are those potentially hazardous to all aircraft
   - ❑ Three types of AIRMETs are AIRMET Alpha, AIRMET Bravo, and AIRMET Zulu
   - ❑ AIRMETs are valid for eight hours

   Reference(s): AC 00-45, Sec. 6

10. Which hazards are forecast for Kentucky (KY) at 1700Z? *(Select the correct answer.)*

```
DFWT WA 191445
AIRMET TANGO UPDT 2 FOR TURB AND LLWS VALID UNTIL 192100
.
AIRMET TURB...OK AR TN MS AL KS IA MO LM MI IL IN KY
FROM DXO TO FWA TO CVG TO HNN TO HMV TO GQO TO LIT TO OSW TO 20WNW DSM
TO 30NNW BDF TO ORD TO DXO
MOD TURB BLW 100. CONDS CONTG BYD 21Z ENDG 00-03Z.
.
LLWS POTENTIAL...TN AL MI IL IN KY
BOUNDED BY 20ENE DXO-FWA-CVG-HNN-HMV-GQO-60SSE DYR-DEC-GIJ-20ENE DXO
LLWS EXP. CONDS ENDG 18-21Z.
```

   - ❑ **Moderate turbulence below 10,000 feet; low-level wind shear**
   - ❑ IFR; strong surface winds greater than 30 knots
   - ❑ IFR; moderate turbulence below 1,000 feet
   - ❑ Moderate turbulence below 1,000 feet; low-level wind shear

   Reference(s): AC 00-45, Sec. 6

11. CWAs are issued for existing or anticipated adverse weather conditions within what period of time? *(Select the correct answer.)*
   - ❑ **Two hours**
   - ❑ Four hours
   - ❑ Six hours
   - ❑ Eight hours

   Reference(s): AC 00-45, Sec. 6

12. Which phenomenon number is this CWA? *(Select the correct answer.)*

```
ZJX CWA 105 VALID UNTIL 191605
FROM 80WSW CEW-40NW CEW-25N ABY-80S TLH-80WSW CEW
AREA LIFR CIGS BLW 005 AND VIS BLW 1/2SM IN FG. CONDS
SLOLY IMPRG TO MVFR BY 1605Z.
.
...PR...
```

   - ❑ **1**
   - ❑ 5
   - ❑ 8
   - ❑ 4

   Reference(s): AC 00-45, Sec. 6

13. An MIS is issued by which entity? *(Select the correct answer.)*
    - ❑ **CWSU**
    - ❑ ARTCC
    - ❑ TMU
    - ❑ ATC

    Reference(s): AC 00-45, Sec. 9

14. Which statement is true concerning the weather report below? *(Select the correct answer.)*

```
ZOB MIS 03 VALID 010200-030200
...FOR ATC PLANNING PURPOSES ONLY...
COLD FRONT CROSSING UPPER MIDWEST TO REACH ZOB LATE SUNDAY
AFTERNOON. STRONG NW WINDS EXPECTED WITH RAINSHOWERS.
```

    - ❑ **The product is valid until the 3rd day of the month at 0200Z**
    - ❑ A warm front will reach the Cleveland control area by late Sunday afternoon
    - ❑ Icing is forecast between the surface and 12,000 feet
    - ❑ Pilots and dispatchers are the primary users of this product

    Reference(s): AC 00-45, Sec. 9

15. Wind and Temperatures Aloft Forecasts (FBs) are used by _____. *(Select the correct answer.)*
    - ❑ **Air Traffic Control**
    - ❑ Airport dispatchers
    - ❑ Ground crew
    - ❑ Airport management

    Reference(s): AC 00-45, Sec. 7

16. What is the forecast wind and temperature at Alamosa, CO, (ALS) at FL 340? *(Select the correct answer.)*

```
FD1US1
DATA BASED ON 081800Z
VALID 090000Z FOR USE 2000-0300Z. TEMPS NEG ABV 24000
FT  3000    6000    9000   12000   18000   24000  30000  34000  39000
PHX 2009 2108+21 2805+13 3406+07 9900-08 2608-19 212035 222644 242454
PRC              2211+14 2209+05 9900-08 2414-19 211736 222144 232554
TUS      2909+21 2907+12 9900+05 9900-07 9900-18 251034 242244 242654
ALS                      3407+11 9900-09 2809-20 252235 232645 243656
DEN              0906+17 9900+09 2819-09 2624-20 243636 244247 254356
```

    - ❑ **Wind two three zero at two six, temperature minus four five**
    - ❑ Wind two three two at two six, temperature four five
    - ❑ Wind two three two at six, temperature minus four five
    - ❑ Wind two three zero at two six, gusts four five

    Reference(s): AC 00-45, Sec. 7