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MET - 3.0 APPENDICES

3.1 Location of Canadian Weather Centres

There are now only two Weather Centres (Aviation Forecast) in Canada and they are located in Edmonton, Alberta, and in Montreal (Dorval), Quebec.

3.2 Canadian Weather Information

3.2.1 Aviation Forecasts and Charts

ITEM AND TYPE DESIGNATOR	TIME ISSUED	TIMES OR PERIODS OF COVERAGE	APPLICABLE LEVEL	REMARKS
Area Forecast Charts (GFA)	Approximately 30 min before beginning of coverage period	0000Z, 0600Z, 1200Z, 1800Z. Each new set of GFA charts replaces preceding ones.	Below 24 000 ft	Graphically depicts forecast weather elements affecting flight at a specific time over a particular area.
Aerodrome Forecast (TAF)	Approximately 30 min before beginning of coverage period	12 HOURS 0000Z–1200Z 0600Z–1800Z 1200Z–0000Z 1800Z–0600Z OR 0200Z–1400Z 0800Z–2000Z 1400Z–0200Z 2000Z–0800Z 24 HOURS 0000Z–0000Z 0600Z–0600Z 1200Z–1200Z 1800Z–1800Z Issue and update periods may vary. Next issue time is stated at the end of each TAF.	Surface (includes clouds at levels that can be seen from the surface)	Provides expected conditions for LANDING AND TAKEOFF at specific aerodromes.
Significant Meteorological Information (SIGMET) WSCN, WCCN, WVCN	A short-term weather warning is issued when hazardous conditions occur or are expected to occur.			

Winds and Temperatures Aloft (FD)	0320Z* 0330Z* 0720Z* 1520Z** 1530Z** 1920Z**	0500Z–0900Z 0900Z–1800Z 1800Z–0500Z 1700Z–2100Z 2100Z–0600Z 0600Z–1700Z	3 000 ft 6 000 ft 9 000 ft 12 000 ft 18 000 ft	Predicts upper winds and temperatures in numerical form at standard levels for a given time period and location.
	0440Z 0440Z 0440Z 1640Z 1640Z 1640Z	0500Z–0900Z 0900Z–1800Z 1800Z–0500Z 1700Z–2100Z 2100Z–0600Z 0600Z–1700Z	24 000 ft 30 000 ft 34 000 ft 39 000 ft 45 000 ft 53 000 ft	Upper level winds are issued by the National Meteorological Center, Washington.
Amended Forecast	Forecasts will be amended when significant changes in ceiling or visibility occur, or when freezing precipitation begins, or is expected to occur, although it was not previously predicted.			
Upper Level Forecast Chart - PROG	12 hours before valid time	0000Z 0600Z 1200Z 1800Z	FL 240 FL 340	Depicts forecast wind and temperatures for the chart level.
Surface Forecast Chart - PROG	48 hours before valid time	0000Z, 1200Z	Surface pressure patterns shown can be considered as representative of the atmosphere up to 3 000 ft.	Shows expected pressure pattern and frontal positions at the surface at a specific time in the future.
Significant Weather Forecast Chart - PROG	12 hours before valid time	0000Z 0600Z 1200Z 1800Z	FL 100–240 FL 250–630	Charts are for a specific flight level range. They indicate surface positions of lows and highs and any significant weather, such as thunderstorms, turbulence and mountain waves, applicable to the chart.

* based on upper atmosphere observations taken at 0000Z.

** based on upper atmosphere observations taken at 1200Z.

3.2.2 Aviation Weather Reports

ITEM AND	TIME	TIME	REMARKS

TYPEDESIGNATOR	OBSERVED	ISSUED	
Aviation RoutineWeather ReportMETAR	Every houron the hour24 hours a day	At once	Describes actual weather at a specific location and at aspecific time as observed from the ground.Specials are issued when required.
Pilot Report (PIREP)UA	As reported		Observations of actual conditions reported by pilotsduring flight.
Volcanic Ash ReportFV	As required	At once	Describes in graphical format the current and expectedash cloud dispersion and densities at various flight levels.

3.2.3 Weather Charts

ITEM AND TYPEDESIGNATOR	TIME OBSERVED	TIME ISSUED	REMARKS
Surface Weather Chart	0000Z 0600Z 1200Z 1800Z	2 or 3 hoursafterobservation	Analysis of MSL pressure pattern, surface location offronts, surface precipitation and obstructions to visionbased on reports. Surface pressure patterns can beconsidered as representative of the atmosphere up to3 000 ft. Weather visible from the surface at any level isincluded.
Upper Level Chart - ANAL	0000Z 1200Z	Over 3 hoursafterobservation	Charts prepared for following levels:850 mb (1 500 m / 5 000 ft)700 mb (3 000 m / 10 000 ft)500 mb (5 500 m / 18 000 ft)250 mb (10400 m / 34 000 ft)Charts show reported atmospheric conditions at thepressure levels, such as wind speed and direction,temperatures, and moisture content.

3.3 Graphic Area Forecast (GFA)

3.3.1 General

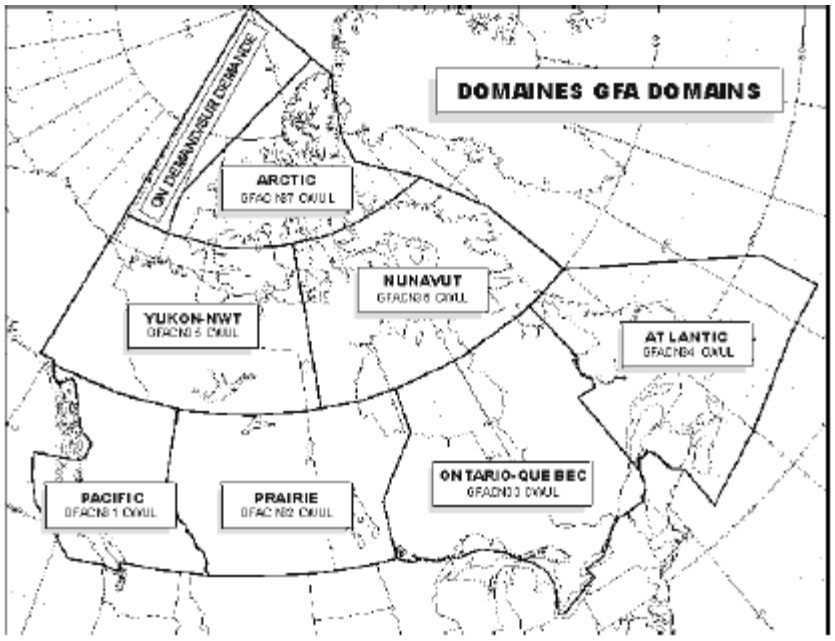
The GFA consists of a series of temporally adjusted weather charts, each depicting the most probable meteorological conditions expected to occur below 400 mb (24 000 ft) over a given area at a specified time. The GFA is primarily designed to meet general aviation and regional airline requirements for pre-flight planning in Canada.

3.3.2 Issue and Valid Times

GFA charts are issued four times daily, approximately 30 min before the beginning of the forecast period. The GFA is issued at approximately 2330, 0530, 1130 and 1730 UTC and is valid at 0000, 0600, 1200 and 1800 UTC respectively. Each issue of the GFA is really a collection of six charts; two charts valid at the beginning of the forecast period, two charts valid six hours into the forecast period and the final two charts valid twelve hours into the forecast period. Of the two charts valid at each of the three forecast periods, one chart depicts clouds and weather while the other chart depicts icing, turbulence and freezing level. An IFR outlook for an additional twelve-hour period will also be included in the final clouds and weather chart.

3.3.3 Coverage Area

There are seven distinct GFA areas, covering the entire CDA, over which Canada is responsible for the provision of ATC services. The following map illustrates the GFA coverage areas.



3.3.4 Units of Measure

Speeds in the GFA are expressed in knots (kt) and heights in hundreds of feet. Horizontal visibility is measured in statute miles (SM) and all times are stated in Co-ordinated Universal Time (UTC). A nautical-mile (NM) scale bar is included to assist in determining approximate distances on the chart. All heights are measured above sea level (ASL) unless otherwise noted.

3.3.5 Abbreviations and Symbols

Only standard meteorological abbreviations are used in the GFA. Symbols used in the GFA are consistent with those found on similar meteorological products already described in the TC A.I.M., such as significant weather prognostic charts (MET 3.14). The following is a list of common weather symbols that may be found on the GFA.

TS – Thunderstorm

PL – Ice Pellets

FZRA – Freezing Rain

FZDZ – Freezing Drizzle

3.3.6 Layout

Each GFA chart is divided into four parts: title box; legend box; comments box; and weather information section.

Weather Information Section	Title Box
	Legend Box
	Comments Box

3.3.7 Title Box

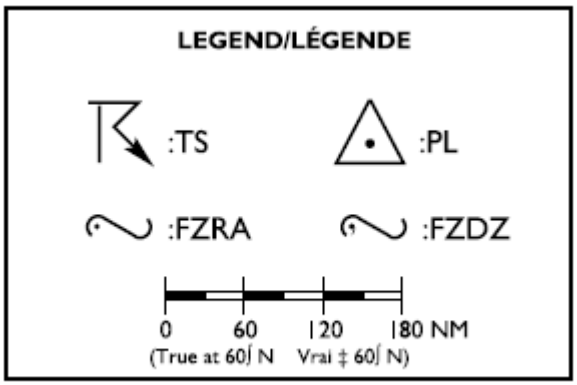
The title box includes the chart name, issuing office four-letter identification, name of the GFA region, chart type, the date/time of issue, and the valid date/time of the chart. The title box is found at the upper right corner of the GFA.

In the following example, the title box indicates the GFA name (GFACN33) and that it is issued by the Canadian Meteorological Centre in Montréal (CWUL). The GFA region for the sample chart is ONTARIO–QUÉBEC and the type of chart is the clouds and weather chart. The next section indicates the issue time of the GFA chart, which is 1130 UTC on September 17, 1999. The last section states the valid time for the GFA chart which, in this example, is 0000 UTC on September 18, 1999.

GFACN33 CWUL **REGIONONTARIO-QUÉBEC** **CLOUDS AND WEATHERNUAGES ET TEMPS**	
ISSUED ATÉMIS A	17/09/1999 1130Z
VLD:	18/09/1999 0000Z

3.3.8 Legend Box

The legend box includes weather symbols that may be used in the weather information part of the GFA chart. It also includes a nautical-mile scale bar to facilitate the determination of distances. Symbols used in the GFA are consistent with those used in a significant weather prognostic chart. In the following example, symbols for thunderstorm (TS), ice pellets (PL), freezing rain (FZRA) and freezing drizzle (FZDZ) are indicated in the legend box.



3.3.9 Comments Box

The comments box provides information that the weather forecaster considers important (e.g., formation or dissipation of fog, increasing or decreasing visibility). It is also used to describe elements that are difficult to render pictorially or, if added to the depiction, would cause the chart to become cluttered (e.g., light icing). The standard phrases "HGTS ASL UNLESS NOTED" and "CB TCU AND ACC IMPLY SIG TURBC AND ICG. CB IMPLIES LLWS" are also included in the comments box. An IFR outlook for an additional 12hr period is included in the comments box of the 12hr GFA clouds and weather chart.

COMMENTS/COMMENTAIRES

1. FG/BR DSIPTG AFT 14Z2. SC CIGS BECMG SCT AFT 15Z

HGTS ASL UNLESS NOTED CB TCU AND ACC IMPLY SIG TURBC AND ICG. CB IMPLIES LLWS

Environment Canada
Environnement Canada

IFR OTLK

IFR CIG/RA/BR S STLAWRC VLY. LCL IFR IN ONSHR/UPSLP NWLY FLO OFF JMSBA AND HSNBA.

In this example, the forecaster has added two comments. The first indicates that the Fog/ Mist will dissipate after 1400 UTC. The second comment advises that stratocumulus ceilings will become scattered after 1500 UTC.

The comments box of the 12-hr clouds and weather GFA chart also includes an IFR outlook for an additional 12-hr period in the lower section of the box. The IFR outlook is always general in nature, indicating the main areas where IFR weather is expected, the cause for the IFR weather and any associated weather hazards. In the example given, IFR conditions caused by low ceilings (CIG), rain (RA) and mist (BR) south of the St. Lawrence Valley are forecast. Also, local IFR conditions are forecast because of an onshore (ONSHR) and upslope (UPSLP) northwesterly flow of air from James Bay (JAMSBA) and Hudson's Bay (HSNBA).

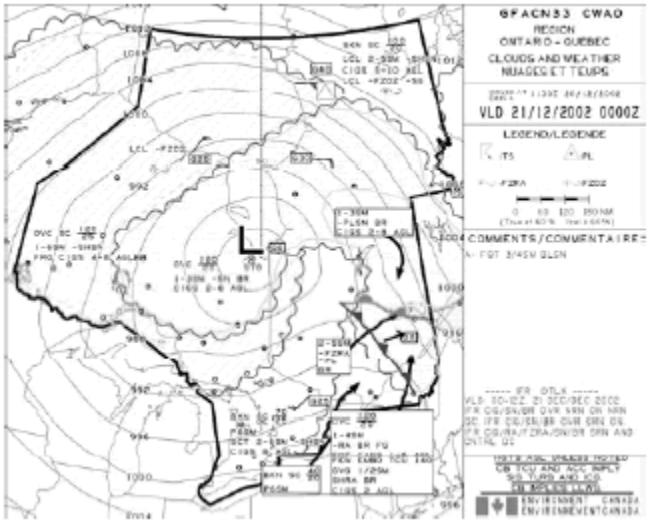
For meteorological purposes, the IFR outlook is based onthe following:

CATEGORY	CEILING		VISIBILITY
IFR	less than 1 000 ft AGL	and/or	less than 3 SM
MVFR	between 1 000 ft and 3 000 ft AGL	and/or	between3 and 5 SM
VFR	more than 3 000 ft AGL	and	more than 5 SM

3.3.10 Weather Information

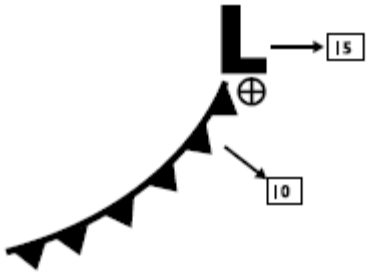
The weather information part of the chart depicts either a forecast of the clouds and weather conditions or a forecast of the icing, turbulence and freezing level conditions for a specified time.

3.3.11 Clouds and Weather Chart



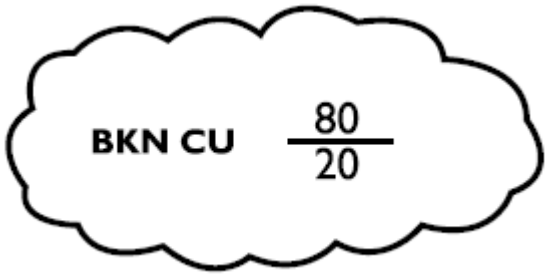
The GFA clouds and weather chart provides a forecast of cloud layers and/or surface-based phenomena, visibility, weather and obstructions to vision at the valid time of that particular chart. Lines joining points of equal surface pressure (isobars) are depicted at 4mb intervals. In addition, relevant synoptic features that are responsible for the portrayed weather are also depicted, with an indication of their speed and direction of movement at the valid time.

(a) ***Synoptic Features***: The motion of synoptic features when the speed of movement is forecast to be 5 KT or more will be indicated by an arrow and a speed value. For speeds less than 5 KT, the letters QS (quasistationary) are used. A lowpressure centre moving eastward at 15 KT with an associated cold front moving southeast at 10 KT would be indicated as follows:

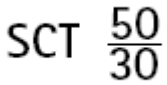


(b) ***Clouds***: The bases and tops of forecast clouds between the surface and 24 000 ft ASL will be indicated on the GFA clouds and weather chart. The tops of convective clouds (i.e. TCU, ACC, CB) are indicated, even if they extend above 24 000 ft ASL. Cirrus clouds are not depicted on the chart. The cloud type will be indicated if considered significant; however, convective clouds, such as CU, TCU, ACC and CB, will always be stated if forecast to be present.

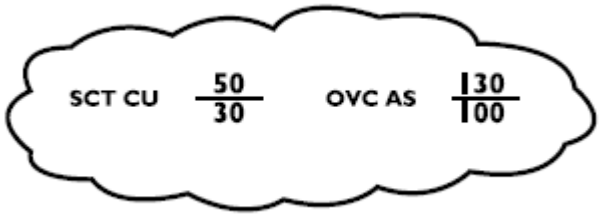
A scalloped border encloses organized areas of clouds where the sky condition is either broken (BKN) or overcast (OVC). An organized area of broken cumulus clouds based at 2 000 ft ASL with tops at 8 000 ft ASL would be indicated as follows:



Where organized areas of clouds are not forecast and the visibility is expected to be greater than 6 SM, a scalloped border is not used. In these areas, the sky condition is stated using the terms SKC, FEW or SCT. In the following example, unorganized scattered clouds are forecast based at 3 000 ft ASL with tops at 5 000 ft ASL:



When multiple cloud layers are forecast, the amount of cloud at each layer is based on the amount of cloud at that level, not on the summation amount. The bases and tops of each layer are indicated. For instance, a scattered layer of cumulus cloud based at 3 000 ft ASL with tops at 5 000 ft ASL and a higher overcast layer of altostratus cloud based at 10 000 ft ASL with tops at 13 000 ft ASL would be indicated as follows:



All heights are indicated in hundreds of feet ASL (2 means 200 ft, 45 means 4 500 ft, etc.) unless otherwise specified. Heights above ground level (AGL) are indicated by the abbreviation CIG (e.g. ST CIGS 5–10 AGL). A note to this effect is included in the comments box in the lower righthand corner of the chart.

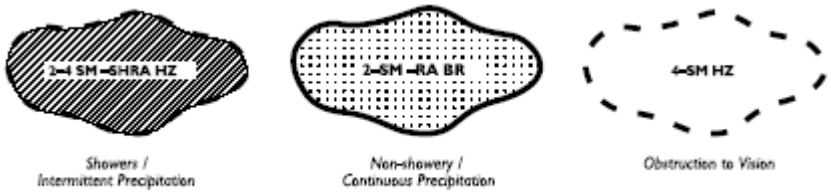
(c) ***Surface-based Layers***: The abbreviation OBSCD (obscured) is used to describe surfacebased layers. The vertical visibility into surfacebased layers is measured in hundreds of feet AGL. Local obscured ceilings with a vertical visibility of between 300 and 500 ft AGL would be indicated as follows:

LCL OBSCD CIG 3–5 AGL

(d) ***Visibility***: The forecast visibility is measured in statute miles (SM). When the visibility is expected to be greater than 6 SM, it is indicated as P6SM. A forecast visibility that is expected to vary between 2 and 4 SM with light rain showers would be indicated as:

2–4SM SHRA

(e) ***Weather and Obstructions to Vision***: Forecast weather is always included immediately after the visibility. Obstructions to vision are only mentioned when the visibility is forecast to be 6 SM or less (e.g. 2–4SM –RA BR). Only standard abbreviations are used to describe weather and obstructions to vision. Areas of showery or intermittent precipitation are shown as hatched areas enclosed by a dashed green line. Areas of continuous precipitation are shown as stippled areas enclosed by a solid green line. Areas of obstruction to vision not associated with precipitation, where visibility is 6 SM or less, are enclosed by a dashed orange line. Areas of freezing precipitation are depicted in red and enclosed by a solid red line.



Weather and obstructions to vision in the GFA may include spatial qualifiers, which describe the coverage of the depicted meteorological

phenomena.

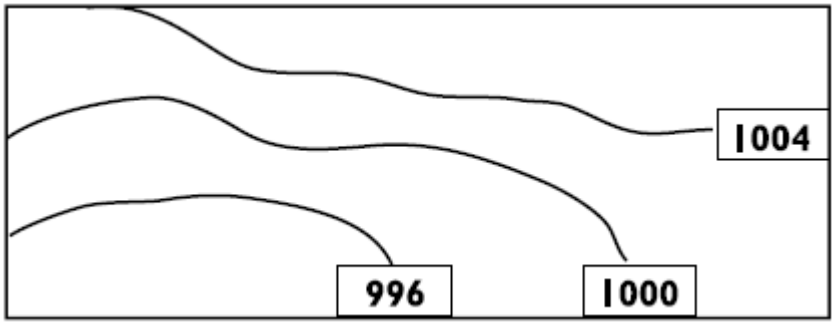
Convective clouds and showers:

Abbreviation	Description	Spatial Coverage
ISOLD	Isolated	Less than 25%
SCT	Scattered	25–50%
NMRS	Numerous	Greater than 50%

Non-convective clouds and precipitation, low stratus ceilings, precipitation ceilings, icing, turbulence, and restrictions to visibility:

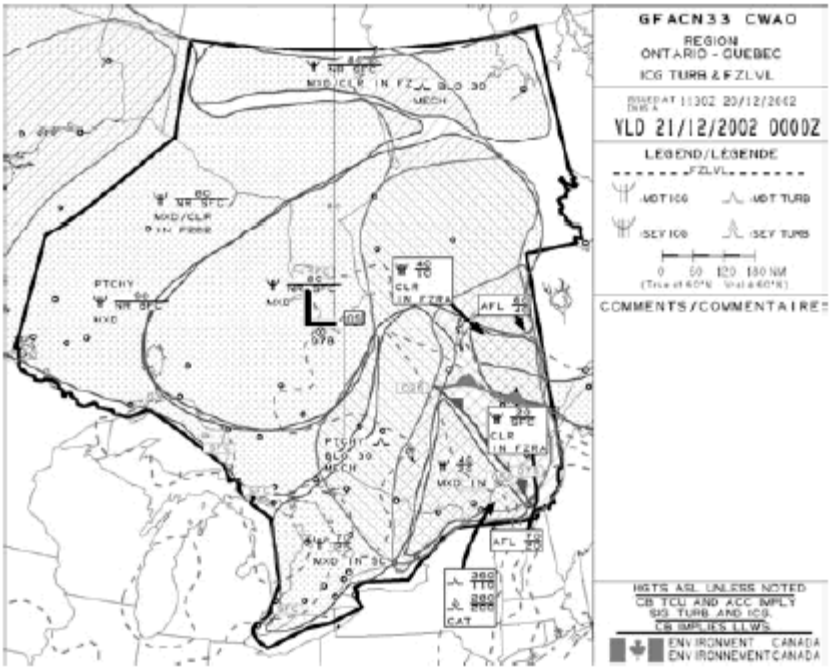
Abbreviation	Description	Spatial Coverage
LCL	Local	Less than 25%
PTCHY	Patchy	25–50%
XTNSV	Extensive	Greater than 50%

(f) ***Isobars***: Isobars, which are lines joining points of equal mean sea level (MSL) pressure, are depicted on the GFA clouds and weather chart. Isobars are drawn at 4mb intervals from a reference value of 1 000 mb.



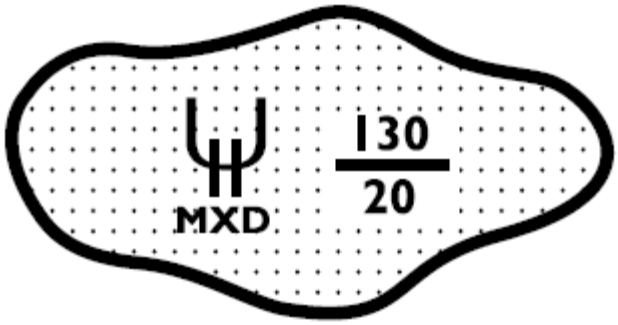
(g) ***Surface Winds***: The speed and direction of forecast surface winds with a sustained speed of at least 20 KT are indicated by wind barbs and an associated windspeed value. Wind gusts are indicated by the letter "G," followed by the peak gust speed in knots (kt). In the following example, the surface wind is forecast to be from the west (270˚ true) with a speed of 25 KT and a peak gust speed of 35 KT.

3.3.12 Icing, Turbulence and Freezing Level Chart



The GFA icing, turbulence and freezing level chart depicts forecast areas of icing and turbulence as well as the expected freezing level at a specific time. Included on the chart are the type, intensity, bases and tops for each icing and turbulence area. Surface synoptic features such as fronts and pressure centres are also shown. This chart is to be used in conjunction with the associated GFA clouds and weather chart issued for the same valid period.

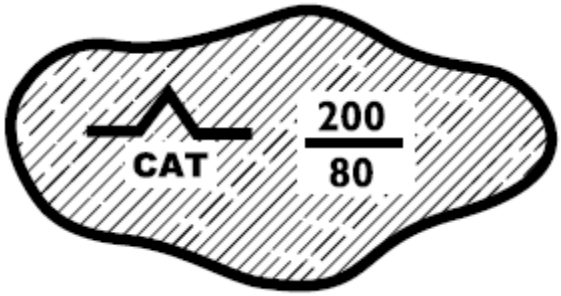
(a) ***Icing***: Icing is depicted whenever moderate or severe icing is forecast for the coverage area. The bases and tops of each icing layer, measured in hundreds of feet above mean sea level, as well as the type of icing [e.g., "RIME," "MXD" (mixed), "CLR" (clear)] will be indicted. Areas of light icing are described in the comments box. An area of moderate mixed icing based at 2 000 ft ASL with a top of 13 000 ft ASL would be indicted as follows:



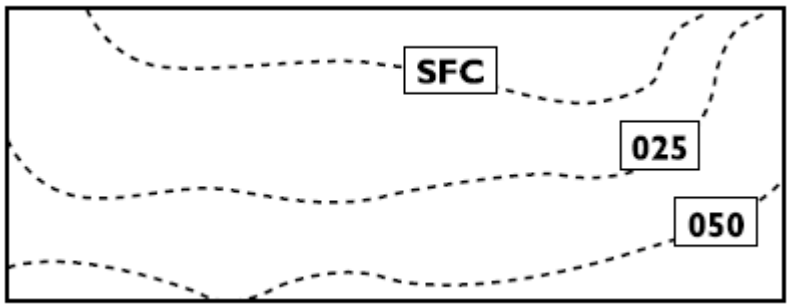
If icing is expected to be present during only part of the forecast period covered by the chart, the time of occurrence of the icing is indicated in the comments box.

(b) ***Turbulence***: Turbulence is depicted whenever moderate or severe

turbulence is forecast for the coverage area. The base and top of each turbulence layer is measured in hundreds of feet ASL. If the turbulence is due to mechanical turbulence, lowlevel wind shear, lee/mountain waves, a significant lowlevel jet or is in clear air, an abbreviation indicating the cause of the turbulence will be included (e.g., MECH, LLWS, LEE WV, LLJ or CAT). The following example indicates an area of moderate clear air turbulence (CAT) based at 8 000 ft ASL with a top at 20 000 ft ASL.



(c) ***Freezing Level***: Freezing level contours are indicated on the icing, turbulence and freezing level chart by dashed lines. The height of the freezing level is measured above sea level and the contour lines for the freezing level will be at 2 500ft intervals, starting at the surface. Modifications to the freezing level, such as above freezing layers aloft and temporal changes, are explained in the comments box for that chart.



3.3.13 GFA Amendments

The GFA is automatically amended by AIRMET bulletins whenever weather conditions that are considered significant to aviation have not been forecast and subsequently occur, or when they have been forecast but do not occur. Each AIRMET will indicate which GFA is being amended. In addition, the GFA is automatically amended by SIGMET bulletins, even though it is not explicitly stated in the SIGMET itself.

3.3.14 GFA Corrections

The GFA will be reissued in the event that one or more of the original GFA charts contains a significant error which, if left uncorrected, could result in an erroneous interpretation of the GFA. In this event, only the erroneous chart(s) is corrected and re-issued with an appropriate explanation in the

comments box.

When reissued, the correction code "CCA" is added to the first line of the title box to indicate the first correction, "CCB" for the second, "CCC" for the third, etc.

GFACN33 CWUL CCA REGIONONTARIO-QUÉBEC CLOUDS AND WEATHERNUAGES ET TEMPS	
ISSUED ATÉMIS A	17/09/1999 1211Z
VLD:	17/09/1999 1200Z

3.4 AIRMET

3.4.1 Definition

An AIRMET is a shortterm weather advisory intended primarily for aircraft in flight, to notify pilots of potentially hazardous weather conditions not described in the current graphic area forecast (GFA) and not requiring a SIGMET. Its purposes are to ensure dissemination of significant meteorological changes to pilots after briefing or departure and to automatically amend the GFA.

3.4.2 Criteria

The criteria for issuing an AIRMET are the unforeseen development, dissipation or non-occurrence of forecast:

(a) IMC conditions (broken or overcast cloud condition at less than 1 000 ft. AGL and/ or visibility less than 3 SM);

(b) freezing precipitation (not requiring a SIGMET);

(c) moderate icing;

(d) moderate turbulence;

(e) thunderstorms (isolated as opposed to a line);

(f) the surface mean wind over a large area increases to 20 KT. or more, or an increase in gusts to 30 KT. or more, when no winds were originally forecast; or

(g) the difference between the forecast and observed wind direction is greater than 60˚.

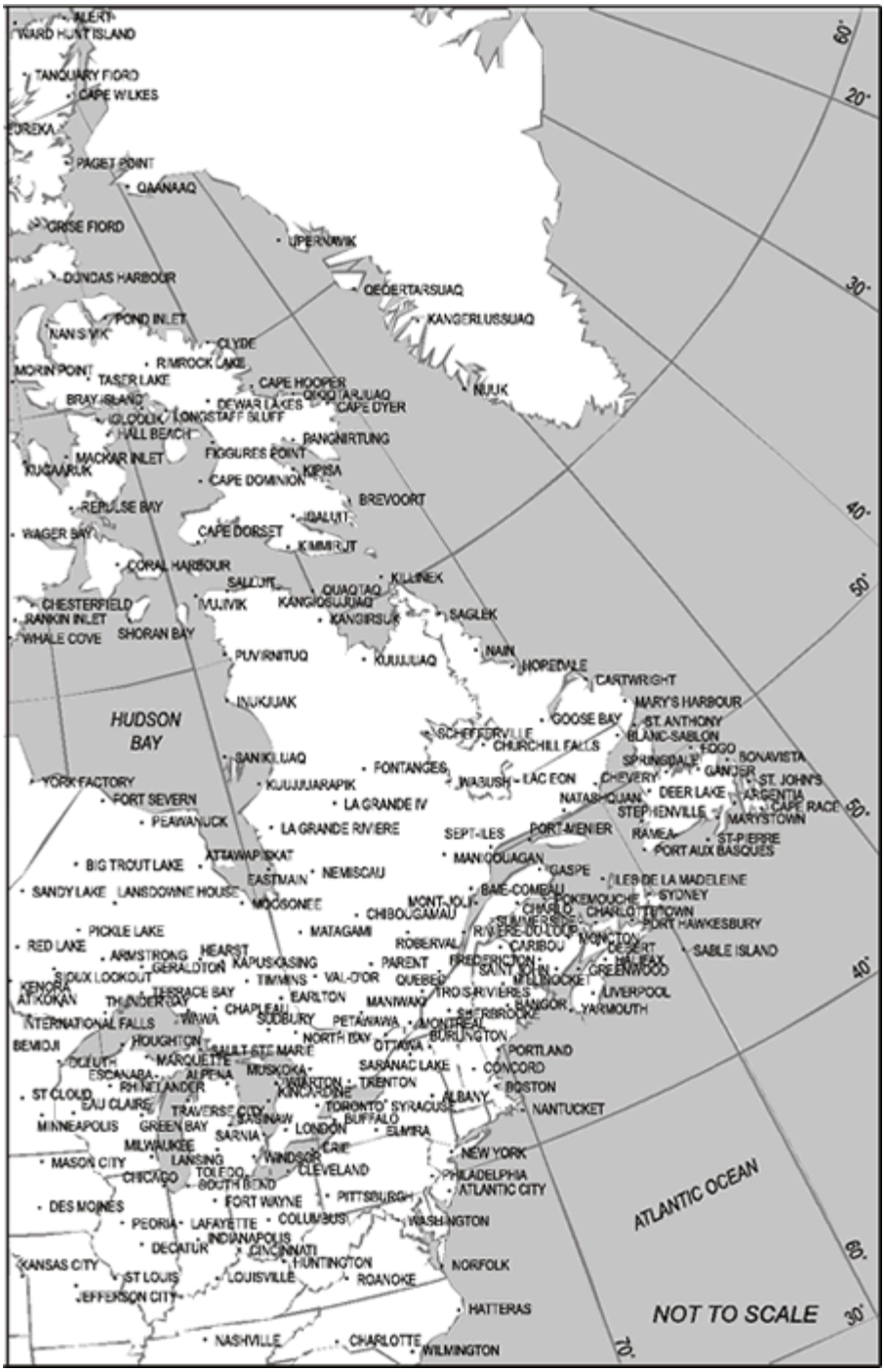
3.4.3 Validity

An AIRMET is valid upon receipt until it is updated or cancelled. It will also be superseded by the issue of the next regular GFA. When two or more phenomena requiring separate AIRMETs occur, separate AIRMETs with different alphanumeric identifiers (e.g., A1 for the first phenomenon, and B1 for the second) will be issued by the responsible weather centre. An alphanumeric identifier, such as A2 or B2, would indicate that a previously issued AIRMET (A1 or B1) had been amended. AIRMETs will be worded in abbreviated plain English using standard abbreviations. Units of measure will be stated.

EXAMPLES	DECODE OF EXAMPLES
WACN34 CYQX 200720 AIRMET A1 ISSUEDAT 0720Z CYQX AMEND GFACN34 CWUL200530 ISSUE	AIRMET Header for Newfoundland Weather Centre, time 0720 UTC on the20th of the month. AIRMET A1 issued at 0720 UTC by the NewfoundlandWeather Centre, which amends GFACN34 issued at 0530 UTC.
WTN AREA /4607N06441W/MONCTON - /4428N06831W/BANGOR - /4459N06455W/GREENWOOD— /4607N06441W/MONCTON	Within an area bounded by co-ordinates/Lat: 46˚07'N Long: 64˚41'W (Moncton) to/Lat: 44˚28'N Long: 68˚31'W (Bangor) to/Lat: 44˚59'N Long:64˚55'W (Greenwood) to/Lat: 46˚07'N Long: 64˚41'W (Moncton)
DC9 RPRTD MDT RIME ICG IN FZDZ AT 07Z.FZDZ XPCD TO CONT UNCHGD TO 14Z.	A DC9 aircraft reported moderate rime icing in freezing drizzle at 0700 UTC.The freezing drizzle is expected to continue unchanged until 1400 UTC.

3.5 Meteorological Reference Points Map


ARCTIC OCEAN
PACIFIC OCEAN
NOT TO SCALE
70°
180°
150°
140°
130°
120°
110°
170°
50°
40°
CAPE BOURNE
EUREKA
CAPE LISBURNE
POINT BARROW
ISACHSEN
HYDERITE POINT
NOME
KOTZEBUE
CASTLE BUTTE
KING CHRISTIAN
MOULD BAY
DRAKE POINT
PRUDHOE BAY
CAPE PRINCE ALFRED
REA POINT
CAPE VERA
POLARIS
BARTER ISLAND
BETTLES
RESOLUTE
BETHEL
KOMAKUK
JOHNSON POINT
PEEL POINT
CAPE CLARENCE
CAPE EDEN
MCGRATH
SACHS HARBOUR
ELVINA ISLAND
FORT YUKON
TUKTOYAKTUK
KUJJUAN LAKE
HARVEY POINT
FAIRBANKS
OLD CROW
JAS OLSON POINT
HOLMAN
FORT ROSS
INUVIK
WOODWARD POINT
MIDWAY
PAULATUK
ZETA LAKE
POINT EDWARDS
EAGLE PLAINS
CLINTON POINT
ANCHORAGE
BLUENOSE LAKE
CAPE YOUNG
CULKANA
HOGAN LAKE
LADY FRANKLIN POINT
ALDYDAK
DAWSON
COLVILLE LAKE
CAMBRIDGE
SHEPARD BAY
VALDEZ
NORTHWAY
FORT GOOD HOPE
KODIAK
BEAVER CREEK
BYRON BAY
JENNY LIND
GLADMAN POINT
CORDOVA
MAYO
FOURWAY
KUGLUKTUK
NORMAN WELLS
MIDDLETON ISLAND
PASS
TULITA
BACK RIVER
BURWASH
MACMILLAN PASS
GAMBELL RIVER
BATHURST INLET
FARO
STEWART LAKE
LUPIN
ARMARK LAKE
YAKUTAT
RAE LAKES
ROBERTSON LAKE
WHITEHORSE
WRIGLEY
EKATI
TUNGSTEN
ABERDEEN LAKE
BAKER LAKE
SKAGWAY
WEKWETI
TESLIN
VIRGINIA FALLS
HANBURY RIVER
HORN PLATEAU
YELLOWKNIFE
DUBAWNT LAKE
JUNEAU
WATSON LAKE
FORT SIMPSON
FORT RELIANCE
YATHKYED LAKE
FORT LIARD
FORT PROVIDENCE
SITKA
DEASE LAKE
FORT RESOLUTION
HENIK LAKE
MUCHO LAKE
JARVIS LAKE
HAY RIVER
PETERSBURG
FORT SMITH
ENNADAI
ARVAD
FORT NELSON
KASBA LAKE
DUNCAN LAKE
NEJANILINI LAKE
STEWART
WARE
HIGH LEVEL
STORY RAPIDS
ANNETTE ISLAND
SIKANNI CHIEF
CHURCHILL
LANGARA
PRINCE RUPERT
GERMANSEN LANDING
JEAN LAKE
COLLINS
TADOULE LAKE
SMITHERS
FORT ST JOHN
BROCHET
SANDSPIT
ST RACE
MACKENZIE
PEACE RIVER
DUNNING LAKE
KEY LAKE
MISSI FALLS
BURNS LAKE
GRANDE PRAIRIE
FORT MCMURRAY
LYNN LAKE
CAPE ST JAMES
PRINCE GEORGE
SLAVE LAKE
SOUTHEND
GILLAM
MCINNES ISLAND
GRANDE CACHE
BUFFALO NARROWS
BELLA COOLA
QUESNEL
WHITECOURT
LA RONGE
THOMPSON
PUNTZI MOUNTAIN
EDSON
COLD LAKE
FLIN FLON
PORT HARDY
WILLIAMS LAKE
JASPER
EDMONTON
MEADOW LAKE
NORWAY HOUSE LAKE
ISLAND
CLINTON
BLUE RIVER
LLOYDMINSTER
PAS
PRINCE ALBERT
NIPAWIN
WHISTLER
KAMLOOPS
RED DEER
NORTH BATTLEFORD
GRAND RAPIDS
BANFF
CORONATION
TOFINO
REVELSTOKE
SASKATOON
SWAN RIVER
VANCOUVER
HOPE
KELOWNA
CALGARY
KINDERSLEY
BERENS RIVER
SELLINGHAM
OLIVER
CRANBROOK
EMPRESS
YORKTON
VICTORIA
MEDICINE HAT
SWIFT CURRENT
DAUPHIN
OMAK
CASTLEGAR
REGINA
BROADVIEW
GIMLI
HOQUIAM
SEATTLE
LETHBRIDGE
ASSINIBOIA
WINNIPEG
KALISPELL
SHAUNAVON
BRANDON
ASTORIA
SPOKANE
HAVRE
ESTEVAN
MORDEN
YAKIMA
GLASGOW
MINOT
PORTLAND
LEWISTON
GREAT FALLS
WILLISTON
GRAND FORKS
NEWPORT
PENDLETON
MILES CITY
DICKINSON
FARGO
EUGENE
NORTH BEND
BISMARCK
JAMESTOWN
DILLON
BILLINGS
BOISE
BURNS
MEDFORD
GILLETTE
PIERRE
HURON
JACKSON
POCATELLO
CASPER
RAPID CITY
RED BLUFF
SIOUX CITY
RENO
SALT LAKE CITY
NORTH PLATTE
OMAHA
SAN FRANCISCO
ELY
DENVER
GRAND JUNCTION
FRESNO
DODGE CITY
LAS VEGAS
TULSA



3.6 Abbreviations – Aviation Forecasts

CONTRACTION	PLAIN LANGUAGE
ABV	above
ACCAS	altocumulus castellanus
ACRS	across
ACSL	standing lenticular altocumulus

ACT	active
AFT	after
AFL	above freezing layer
AHD	ahead
ALF	aloft
ALG	along
ALT	altitude
AIRMS	air mass
APCH	approach
APCHG	approaching
ASL	above sea level
BECMG	becoming
BFR	before
BGN	begin
BGNG	beginning
BHND	behind
BKN	broken
BL	blowing
BLDG	building
BLO	below
BLZD	blizzard
BDRY	boundary
BR	mist
BRF	brief
BRFLY	briefly
BRKS	breaks
BTN	between
CAT	clear air turbulence
CAVOK	ceiling and visibility OK
CB	cumulonimbus
CIG	ceiling
CLD	cloud
CLR	clear
CLRG	clearing
CNTR	centre
CNTRD	centred
CONDS	conditions
COTRAILS	condensation trails
CONTUS	continuous
CONTG	continuing
CST	coast
CU	cumulus
DCRG	decreasing
DEG	degree
DFUS	diffuse

DIST	distant
DNS	dense
DNSLP	downslope
DP	deep
DPNG	deepening
DRFTG	drifting
DURG	during
DVLPG	developing
DZ	drizzle
E	east
ELSW	elsewhere
ELY	easterly
EMBD	embed
ENDG	ending
ENTR	entire
FCST	forecast
FEW	few clouds
FG	fog
FILG	filling
FLWD	followed
FLWG	following
FM	from
FNT	front
FRQ	frequent
FZLVL	freezing level
FROIN	frost on indicator
FROPA	frontal passage
FRQ	frequent
FT	feet, foot
FU	smoke
FZ	freezing
GND	ground
GRAD	gradient
GRDLY	gradually
HGT	height
HI	high
HLTP	hilltop
HND	hundred
HR	hour
HVY	heavy
ICG	icing
ICGIC	icing in cloud
ICGIP	icing in precipitation
IMDTLY	immediately
INCRG	increasing

INDEF	indefinite
INSTBY	instability
INTMT	intermittent
INTS	intense
INTSFY	intensify
ISLD	island
ISOL	isolate(d)
KT	knot(s)
LCL	local
LFTG	lifting
LGT	light
LIFR	low IFR
LK	lake
LLJ	low level jet stream
LLWS	low level wind shear
LN	line
LO	low
LTL	little
LVL	level
LWIS	limited weather information system
LWR	lower
LWRG	lowering
LYR	layer
MDFYD	modified
MDT	moderate
MI	shallow
MID	middle
MOVG	moving
MPH	miles per hour
MRNG	Morning
MRTM	maritime
MSTR	moisture
MTS	mountains
MVFR	marginal VFR
MXD	mixed
MXG	mixing
N	north
NE	northeast
NELY	northeasterly
NGT	night
NLY	northerly
NM	nautical mile(s)
NMRS	numerous
NR	near
NRLY	nearly

NSW	no significant weather
NW	northwest
NWLY	northwesterly
OBSC	obscure(d)
OCLD	occlude
OCLDG	occluding
OCLN	occlusion
OCNL	occasional
OCNLY	occasionally
OFSHR	offshore
ONSHR	onshore
ORGPHC	orographic
OTLK	outlook
OTWZ	otherwise
OVC	overcast
OVR	over
OVRNG	overrunning
PCPN	precipitation
PD	period
PL	ice pellets
PRECDD	preceded
PRECDS	precedes
PRES	pressure
PROG	prognostic, prognosis
PRSTG	persisting
PSG	passage, passing
PSN	position
PTCHY	patchy
PTLY	partly
RA	rain
RDG	ridge
RFRMG	reforming
RGN	region
RMNG	remaining
RPDLY	rapidly
RPRT	report
RSG	rising
RUF	rough
RVR	river
S	south
SCT	scattered
SCTR	sector
SE	southeast
SELY	southeasterly
SFC	surface

SH	shower
SHFT	shift
SHFTG	shifting
SHLW	shallow
SKC	sky clear
SLO	slow
SLOLY	slowly
SLY	southerly
SM	statute mile(s)
SML	small
SN	snow
SNRS	sunrise
SNST	sunset
SPECI	special
SPRDG	spreading
SQ	squall
STBL	stable
STG	strong
STGTN	strengthen
STNRY	stationary
SEV	severe
SVRL	several
SW	southwest
SWLY	southwesterly
SXN	section
SYS	system
T	temperature
TCU	towering cumulus
TEMPO	temporary
THK	thick
THKNG	thickening
THN	thin
THNC	thence
THNG	thinning
THRU	through
THRUT	throughout
THSD	thousand
TILL	until
TRML	terminal
TROF	trough
TROWAL	trough of warm air aloft
TRRN	terrain
TS	thunderstorm
TURB	turbulence
TWD	toward

UNSTBL	unstable
UPR	upper
UPSLP	upslope
UTC	coordinated universal time
VC	vicinity
VLY	valley
VRB	variable
VIS	visibility
VV	vertical visibility
W	west
WDLY	widely
WK	weak
WLY	westerly
WND	wind
WRM	warm
WS	wind shear
WV	wave
WX	weather
XCP	except
XT	extend
XTDG	extending
XTRM	extreme
XTSV	extensive
Z	ZULU (or UTC)

3.7 Turbulence Reporting Criteria Table

INTENSITY	AIRCRAFT REACTION	REACTION INSIDE AIRCRAFT
LIGHT	Turbulence that momentarily causes slight, erratic changes inaltitude and/or attitude (pitch, roll, yaw).Report as “Light Turbulence”.ORTurbulence that causes slight, rapid and somewhat rhythmicbumpiness without appreciable changes in altitude or attitude.Report as “Light Chop”.	Occupants may feel a slight strainagainst seat belts or shoulder straps.Unsecured objects may be displacedslightly. Food service may beconducted and little or no difficulty isencountered in walking.
MODERATE	Turbulence that is similar to Light Turbulence but of greaterintensity. Changes in altitude and/or attitude occur but the aircraftremains in positive control at all times. It usually causes variationsin indicated airspeed. Report as “Moderate Turbulence”.ORTurbulence that is similar to Light Chop but of greater intensity. Itcauses rapid bumps or jolts without appreciable changes in aircraftaltitude or attitude. Report as “Moderate Chop”.	Occupants feel definite strainsagainst seat belts or shoulder straps.Unsecured objects are dislodged.Food service and walking are difficult.

SEVERE	Turbulence that causes large, abrupt changes in altitude and/orattitude. It usually causes large variations in indicated airspeed.Aircraft may be momentarily out of control.Report as “Severe Turbulence”.	Occupants are forced violentlyagainst seat belts or shoulder straps.Unsecured objects are tossed about.Food service and walking impossible.

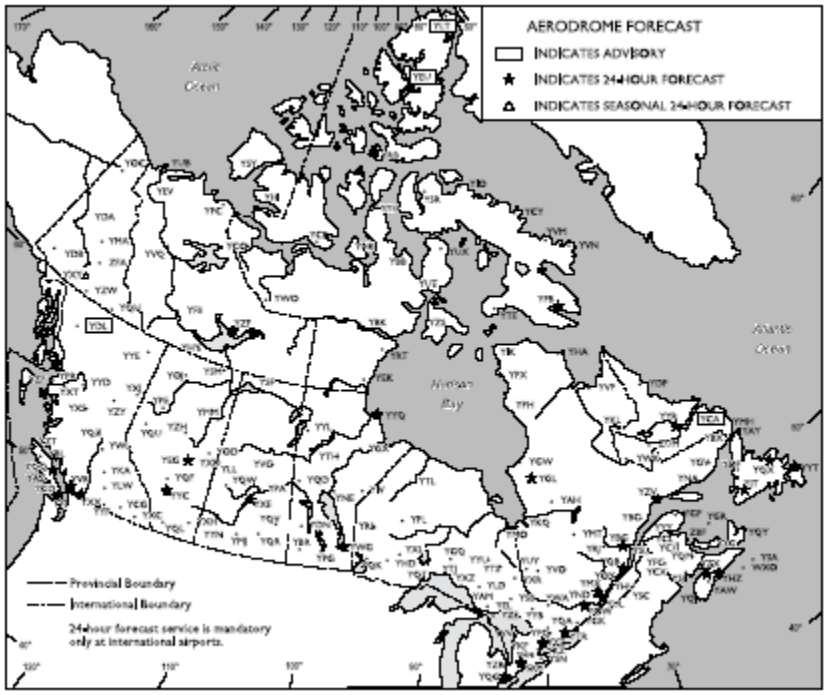
NOTES 1: Occasional: Less than 1/3 of the time.Intermittent: 1/3 to 2/3.Continuous: More than 2/3.
2: Pilots should report location(s), time (UTC), intensity, whether in or near clouds, altitude, type of aircraft and, when applicable, duration of turbulence. Duration may be based on time between two locations or over a single location. All locations should be readily identifiable.
3: High level turbulence (normally above 15 000 feet ASL) not associated with cumuloform clouds, including thunderstorms, should be reported as CAT (clear air turbulence) preceded by the appropriate intensity, or light or moderate chop.

Examples

1. Over REGINA 1232Z, moderate turbulence, in cloud FL310, B737.

2. From 50 NM EAST of WINNIPEG to 30 NM WEST of Brandon 1210 to 1250Z occasional moderate chop, FL330, AIRBUS.

3.8 Aerodrome Forecast Locations



3.9 Aerodrome Forecast – TAF

3.9.1 General

TAF is the name of the international meteorological code for an aerodrome forecast which is a description of the most probable weather conditions expected to occur at an aerodrome together with their most probable time of occurrence. It is designed to meet the preflight and inflight requirements of flight operations. The abbreviations of expected weather conditions will follow the same form and order of the METAR reports (see MET 3.15), and will have the same meaning.

Aerodrome forecasts are intended to relate to weather conditions for flight operations within 5 NM of the centre of the runway complex depending on local terrain. A regular and complete observation program that meets Environment Canada standards is a prerequisite for the production of an aerodrome forecast. Aerodrome (terminal) advisories are issued when this observation program prerequisite cannot be completely satisfied.

Aerodrome (terminal) advisories are identified by the word "ADVISORY" appearing after the date/time group, followed by one of the qualifying reasons listed below. Advisories are formatted in the same manner as TAFs.

OFFSITE – the advisory is based on an observation that is not taken at or near the airport. In normal situations, an observation is considered representative of the specific weather conditions at the aerodrome if it is taken within 1.6 NM (3 km) of the geometric centre of the runway complex. "OFFSITE" is added after the word "ADVISORY", followed by one space, if an observation is considered not to be representative. It is intended to indicate to the users that the observations do not necessarily reflect the actual conditions at the aerodrome.

In cases where the 1.6NM (3km) criteria does not apply because of local characteristics, the representativeness of the observations shall be determined and approved by the Regional Director of Environmental Services of Environment Canada (EC).

OBS INCOMPLETE or NO SPLS – the advisory is based on incomplete data, either because the observations could not be completed or the aerodrome does not have an ongoing weather watch in order to produce special weather reports (SPECI). "OBS INCOMPLETE" or "NO SPLS" shall be added after the word "ADVISORY", followed by one space.

3.9.2 National Variations

As with the METAR code, even though TAF is an international code, there are national variations. For example, "CAVOK" is not authorized for use in Canadian TAFs, while "RMK" is used but is not part of the international code. The references as to Canadian differences may be found in the section dealing with METAR.

3.9.3 Sample Message

TAF CYXE 281139Z 281212 24010G25KT WS011/ 27050KT 3SM –SN BKN010 OVC040 TEMPO 1801 1 1/2SM –SN BLSN BKN008 PROB30 2022 1/2SM SN VV005 FM0130Z 280010KT 5SM –SN BKN020 BECMG 0608 000000KT P6SM SKC RMK NXT FCST BY 18Z

(a) **Sample Message Decoded**: Aerodrome Forecast; Saskatoon, Saskatchewan; issued on the 28th day of the month at 1139Z; covers the period from 1200Z on the 28th to 1200Z the following day; surface wind 240˚ true at 10 KT, gusting to 25 KT; wind shear is forecast to exist in the layer from the surface to 1 100 feet AGL, with the wind at the shear height of 270˚ true at 50 KT; forecast prevailing visibility is 3 SM in light snow; forecast cloud layers are broken at 1 000 ft and overcast at 4 000 ft; between 1800 and 0100Z there will be a temporary change to the prevailing visibility to 1 1/2 SM in light snow and moderate blowing snow with a broken cloud layer at 800 ft; there is a 30% probability between 2000 and 2200Z that the prevailing visibility will be 1/2 SM in moderate snow and create an obscuring phenomena resulting in a vertical visibility of 500 ft; at 0130Z there will be a permanent change, the wind is forecast to be 280˚ true at 10 KT with a prevailing visibility of 5 SM in light snow and a broken cloud layer at 2 000 ft; between 0600 and 0800Z there will be a gradual change in the weather to calm winds and a forecast visibility greater than 6 SM, and the sky will be clear of clouds; Remarks: the next routine aerodrome forecast for this site will be issued by 1800Z.

(b) **Report Type**: The code name "TAF" is given in the first line of text. It may be followed by "AMD" for amended or corrected forecasts.

(c) **Station Indicator**: A fourletter ICAO station indicator is used, as in METARs.

(d) **Date/Time of Origin**: As with the METAR format, the date (day of the month) and time (UTC) of origin are included in all forecasts. Aerodrome forecasts are issued approximately 30 min before the coverage period. Some forecasts have update cycles as frequent as every three hours; however, the next issue time will always be indicated in the "Remarks section".

(e) **Period of Coverage**: The normal period of coverage is 12 h beginning at 0000Z, 0600Z, 1200Z, and 1800Z or 0200Z, 0800Z, 1400Z and 2000Z; however, some forecasts have a 24h coverage period. As well, there are forecasts with staggered issue times and more frequent update cycles, which will affect their periods of coverage.

(f) **Wind**: This group forecasts the 2min mean wind direction and speed to the nearest 10 degrees true, and speed to the nearest whole knot. "KT" is used to indicate the speed units. If the maximum gust speed is forecast to exceed the mean speed by 10 KT or more, the letter G and the value of the gust speed in knots is added between the mean wind and the units indicator (KT). "VRB" is normally coded for variable direction only if the wind speed is 3 KT or less; however, it may also be coded with higher speeds when it is impossible to forecast a single direction (e.g., when a thunderstorm passes). A north wind of 20 KT would be coded as 36020KT, while calm wind is coded as "00000KT".

(g) **Low Level Wind Shear**: This group is used if the forecaster has strong evidence to expect significant, nonconvective wind shear which could adversely affect aircraft operation within 1 500 ft AGL over the aerodrome. The height of the top of the shear layer (in hundreds of feet AGL) is given followed by the forecast wind speed and direction at that

height.

While the main effect of turbulence is related to erratic changes in altitude and/or attitude of the aircraft, the main effect of wind shear is the rapid gain or, more critical, loss of airspeed. Therefore, for forecasting purposes, any cases of strong, nonconvective low level wind shear within 1 500 ft AGL will be labelled as "WS".

To a large extent, wind shear is an element which, for the time being, cannot be satisfactorily observed from the ground. As a result, aircraft observations and radiosonde reports represent the only available evidence. However, the following guidelines are used to establish whether significant nonconvective wind shear hazardous to aircraft exists:

(i) Vector magnitude exceeding 25 knots within 500 feet AGL.

(ii) Vector magnitude exceeding 40 knots within 1 000 feet AGL.

(iii) Vector magnitude exceeding 50 knots within 1 500 feet AGL.

(iv) A pilot report of loss or gain of indicated airspeed of 20 knots or more within 1 500 feet AGL.

(h) **Prevailing Visibility**: The horizontal prevailing visibility shall be indicated in statute miles and fractions up to 3 miles, then in whole miles up to 6 miles. Visibilities greater than 6 statute miles shall be indicated as P6SM. The letters SM (statute miles) shall be added without a space to each forecast visibility to identify the unit.

(i) **Significant Weather**: Forecast significant weather may be decoded using the list of significant weather given in the METAR section, WMO Table 4678. Intensity and proximity qualifiers, descriptors, precipitation, obscurations and other phenomena are included as required. A maximum of three significant weather groups is allowed per forecast period. If more than one group is used they are considered one entity. When one of the significant weather groups is forecast to change, all the significant weather groups that will apply after the change are indicated following the change group. Details on the specific effects of change groups on significant weather will be addressed under the change group headings.

NOTE: The meaning of the proximity qualifier, vicinity (VC), in the TAF code differs slightly from that in the METAR. In the METAR code, "VC" means elements observed within 5 miles, but not at the station. In the TAF code, "VC" means between 5 to 10 NM from the centre of the runway complex.

(j) **Sky Condition**: Sky condition is decoded as in a METAR. Possible codes for sky cover amounts are SKC, FEW, SCT, BKN, OVC and VV.

The same rules associated with changes are used in the forecast sky conditions as were used with the significant weather group, as they apply to significant changes to the forecast, the use of "BECMG" or

"TEMPO", and for different sky conditions.

CB layers are the only forecast layers to have cloud type identified, e.g., "BKN040CB".

(k) **Change Groups**: In all change groups, multiple elements within a significant weather and/or sky condition group are considered as single entities for the purposes of revising their elements, i.e., a forecast of "SCT030 BKN050 OVC080....change indicator....BKN050" would indicate that there is only a single cloud layer forecast after the change indicator and the other three cloud layers forecast prior to the change indicator will no longer exist.

FM – Permanent Change Group (Rapid): FM is the abbreviation for "from". It is used for a permanent change to the forecast which will occur rapidly. All forecast conditions given before this group are superseded by the conditions indicated after the group. In other words, a complete forecast will follow and all elements must be indicated, including those for which no change is forecast. The time group represents hours and minutes in UTC.

Example: "FM0945Z" would decode as the beginning of a new part period forecast from 0945Z.

NOTE: Where the permanent change group indicator (FM) indicates a change after the beginning of a whole hour, as in the example above, any subsequent use of a gradual change group (BECMG) or transitory change group (TEMPO) shall indicate changes after the time indicated in hours and minutes in the "from" (FM) indicator. Using the above example, if there was a subsequent use of "TEMP0 0911", the temporary change would be between 0945Z and 1100Z.

BECMG — Permanent Change Group (Gradual): If a permanent change in a few weather elements is forecast to occur gradually, with conditions evolving over a period of time (normally one to two hours, but not more than four hours), the new conditions which differ from those immediately prior are indicated following "BECMG." The time period is indicated by the four digits following "BECMG" indicating two groups of whole UTC hours.

As a general rule, to keep the forecast clear and unambiguous, the use of this change group is kept to a minimum and confined to those cases where only one, or at most two, weather groups are expected to change while all the others stay the same. In those cases where more than two groups are expected to change, the permanent change group "FM" will be used to start a new selfcontained part period.

For the purposes of flight planning, and specifically the selection of IFR alternate aerodromes, if forecast conditions are improving, the new conditions will apply when the change period is complete, and if the conditions are deteriorating, the new conditions will apply at the beginning of the period.

Example: "BECMG 0809 OVC030" would decode as a change towards

overcast sky conditions at 3 000 ft AGL occurring gradually between 0800Z and 0900Z; and

(a) if the previous sky condition forecast was for better than overcast conditions at 3 000 ft AGL, then the change would apply as of 0800Z; or

(b) if the previous sky condition forecast was for worse than overcast conditions at 3 000 ft AGL, then the change would apply as of 0900Z.

If a significant change in weather or visibility is forecast, all weather groups are indicated following "BECMG," including those which are unchanged. When the ending of significant weather is forecast, the abbreviation "NSW" (no significant weather) is used.

Any forecast weather element not indicated as part of the "BECMG" group remains the same as in the period prior to the onset of change.

TEMPO — Transitory Change Group: If a temporary fluctuation in some or all of the weather elements is forecast to occur during a specified period, the new conditions which differ from those immediately prior are indicated following "TEMPO." In other words, when an element is not indicated after "TEMPO," it shall be considered to be the same as that for the prior period. The time period, as with "BECMG," is indicated by the four digits following "TEMPO" indicating two groups of whole UTC hours.

Example: …FM1100Z VRB03KT 3SM RA BR OVC020 TEMPO 1215 1SM RA BR FM1500Z…

In this example, the cloud group "OVC020" is not repeated after "TEMPO" because it is forecast to remain unchanged. On the other hand, the weather group " RA BR" is repeated after "TEMPO" because a significant change in visibility is forecast.

When a significant change in weather or visibility is forecast, all weather groups are indicated following "TEMPO," including those which are unchanged, and any weather element not indicated is forecast to remain the same as in the period prior to the temporary fluctuation. When the ending of significant weather is forecast, the abbreviation "NSW" (no significant weather) is used.

"TEMPO" is only used when the modified forecast condition is expected to last less than one hour in each instance, and if expected to recur, the total period of the modified condition will not cover more than half of the total forecast period. The total period of the modified condition is the time period during which the actual modified weather condition is expected to occur, and not the total time stated for the "TEMPO" time period. When the modified forecast condition is expected to last more than one hour, either "FM" or "BECMG" must be used.

PROB—Probability Group: In order to indicate the probability of occurrence of alternative values of forecast groups, PROB30 (a 30% probability) or PROB40 (a 40% probability) is placed directly before the change group's coverage time and alternative value(s) to indicate that different conditions will occur within the specified time period. The time period is given in whole

UTC hour values. For example, "PROB30 1721" would indicate that between 1700Z and 2100Z there is a 30% probability that the indicated weather will occur. The weather elements used in the PROB group are restricted to hazards to aviation, which include but are not limited to the following:

- thunderstorms;
- freezing precipitation;
- low level wind shear below 1 500 ft AGL; or
- ceiling and visibility values important to aircraft operations (e.g., threshold such as alternate limits, lowest approach limits).

A probability of less than 30% of actual values deviating from those forecasts is not considered to justify the use of the PROB group. When the possibility of an alternative value is 50% or more, this shall be indicated by the use of BECMG, TEMPO or FM, as appropriate. The PROB group will not be used in combination with the TEMPO or BECMG groups.

IFR Alternate Selection: The following criteria apply to the selection of alternate IFR aerodromes and are also published in the "General Pages" of the Canada Air Pilot, as well as in RAC 3.14 of the TC A.I.M.

(l) **Remarks**: Remarks will appear in aerodrome forecasts (TAF) from Canada, prefaced by "RMK." Currently, the following remarks are allowed:

(i) "FCST BASED ON AUTO OBS"
This remark indicates that the TAF is based on observations taken by an AWOS.

(ii) "NXT FCST BY XXZ""XX"
is the whole hour UTC of the time of issue of the next regular TAF, which will correspond to the beginning of its new period of coverage when issued. This remark will normally mark the end of the TAF.

(iii) PARTIAL PROGRAM NOTICES
For aerodromes with a partial observing program (e.g., no nighttime observations are taken), a remark is included in the last regular TAF issue of the day to indicate when forecast coverage will resume, e.g., "NXT FCST BY 291045Z," "NO FCST COVERAGE 20–11Z," or "NO FCST ISSUED UNTIL FURTHER NOTICE."

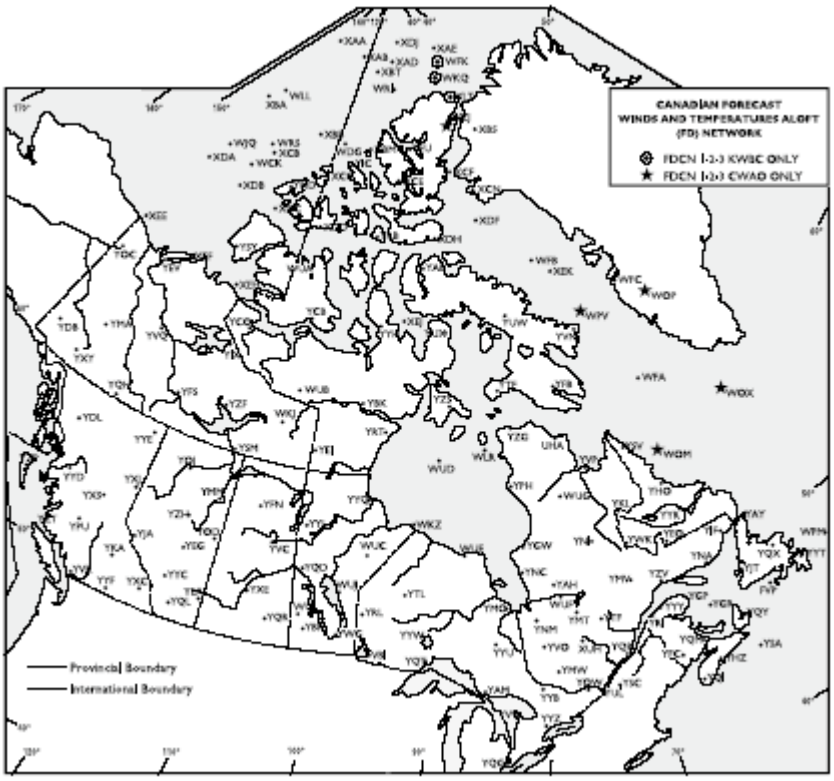
(iv) POSSIBLE DISCREPANCIES
Forecasters will use remarks to explain possible discrepancies between an AWOS and a TAF if the forecasters have reason to believe that the AWOS observations are non−representative of the actual weather at the aerodrome. For example, the remarks could be “RMK AUTO OBS REPG NON-REPRESENTATIVE WND SPD.” or “RMK AUTO OBS REPG NON-REPRESENTATIVE VIS.”

3.9.4 Aerodrome Forecasts from AWOS Sites

At some sites equipped with Automated Weather Observation Systems (AWOS), Environment Canada forecasters will issue a TAF based in part on the AUTO (or AUTOA) observations made by AWOS at the aerodrome. The only visible distinction between this forecast and a normal TAF will be the comment at the end of the TAF "FCST BASED ON AUTO OBS". The TAF based on automated observations, like the TAF based on human observations, provides a description of the most probable weather conditions expected to occur at an aerodrome together with the most probable time of occurrence.

The abbreviated comment "FCST BASED ON AUTO OBS" at the end of the TAF is meant to inform pilots that the forecast has been developed from an automated weather observation. The pilot using this forecast should be familiar with the characteristics of AWOS weather observations and the comparison of automated and human observations contained in MET 3.15.5, e.g., AWOS cloud height sensor tends to underread during precipitation events. The forecaster is also familiar with AWOS characteristics and has taken time to analyze not only AWOS data, but additional information such as satellite and radar imagery, lightning data, remote video imagery, pilot reports and observations from surrounding stations. Based on integration of this data, the forecaster may have inferred actual weather conditions which differ slightly from the AWOS report. On those few occasions when there are differences between an AWOS report and a TAF, it may not imply that the TAF is inaccurate, nor that an amendment is required. In the event that an AWOS sensor is missing, inoperative or functioning below standards, the forecaster will attempt to infer the value of the missing weather element from other available data. If the forecaster is unable to infer the weather conditions, a decision may be made to cancel the TAF pending correction of the problem. The decision to cancel will depend on the weather conditions prevailing at the time and how critical the missing information is to the issuance of a credible TAF based on the automated data that is available.

3.10 Canadian Forecast Winds and Temperatures Aloft Network



3.11 Upper Level Wind and Temperature Forecasts

Upper level wind and temperature forecasts (FD) are upper level forecasts of wind velocity in KTs, to the nearest 10˚ true and temperature ˚C. Temperatures are not forecast for 3 000 feet and, in addition, this level is omitted if the terrain elevation is greater than 1 500 feet. Data for the production of FDs is derived from a variety of atmospheric data sources, including upper air soundings of pressure, temperature, relative humidity and wind velocity, taken at 32 sites, twice daily at 0000Z and 1200Z. Following the computer run of a subsequent numeric weather model, FDs are available at the times issued or periods of coverage indicated in MET 3.2.1.

Upper Wind and Temperature Forecasts

FDCN01 CWAO 071530
FCST BASED ON 071200
DATA VALID 080000 FOR USE 2106

	3000	6000	9000	12000	18000
YVR	9900	2415-07	2430-10	2434-10	2542-26
YYF	2523	2432-04	2338-08	2342-13	2448-24
YXC		2431-02	2330-06	2344-11	2352-22
YYC		2426-03	2435-06	2430-12	2342-22
YQL		2527-01	2437-05	2442-10	2450-21

FDCN1 KWBC 080440

DATA BASED ON 080000Z
VALID 091200Z
FOR USE 09001800Z.
TEMPS NEG ABV 24000

FT	24000	30000	34000	39000
YVR	2973-24	293040	283450	273763
YYF	3031-24	314041	304551	204763
YXC	3040-27	315143	316754	306761
YYC	3058-29	317246	317855	306358
YQL	2955-28	306845	307455	791159

When the forecast speed is less than 5 KT, the coded group is "9900", which reads "light and variable".

Encoded wind speeds from 100 to 199 KT have 50 added to the direction code and 100 subtracted from the speed. Wind speeds that have had 50 added to the direction can be recognized when figures from 51 to 86 appear in the code. Since no such directions exist, (i.e., 510˚ to 860˚) obviously they represent directions from 010˚ to 360˚.

Should the forecast wind speed be 200 KT or greater, the wind group is coded as 199 KT, that is, 7799 is decoded 270˚ at 199 KT or greater.

Examples of decoding FD winds and temperatures are as follows:

EXAMPLE	DECODED
9900 + 00	Wind light and variable, temperature 0˚C
2523	250˚ true at 23 KT
791159	290˚ true (79 50 = 29) at 111 KT (11 + 100 = 111), temperature 59˚C
859950	350˚ true (85 50 = 35) at 199 KT or greater, temperature 50˚C

3.12 Upper Level Charts – PROG

Upper level charts depict two forms of data: Actual and Forecast. Actual measured conditions are represented on analysed charts (ANAL) (see MET 3.20). These charts show conditions as they were at a specific time in the past. The other charts prognosis (PROG), show forecast conditions for a specific time in the future. Always check the map label for the type, date and valid time of the chart.

Forecast Charts – PROG

Upper Level Winds and Temperature Charts

Upper level wind and temperature charts are issued by the Regional Area Forecast Centre (RAFC), Washington, D.C. Winds are depicted for FL240, 340 and 450 using arrow shafts with pennants (50 KT each), full feathers (10 KT each) and half feathers (5 KT each). The orientation of the shaft indicates wind direction (degree true) and a small number at pennant end

gives the 10's digit of the wind direction.

Temperatures (˚C) are presented in circles at fixed grid points for the flight level. All temperatures are negative unless otherwise noted.

Wind and temperature information from these charts, in conjunction with the FD and significant weather charts, can be used to determine wind shear and other salient information such as the probability of clear air turbulence (CAT) over given points. Remember, the wind speed is normally highest at the tropopause and decreases above and below at a relatively constant rate.

3.13 Significant Weather Prognostic Charts – RAFC

These charts, produced for the mid and high levels, show occurring or forecast weather conditions considered to be of concern to aircraft operations. The Regional Area Forecast Centre (RAFC) issues a chart depicting forecast weather conditions between FL250 and FL630. The meteorological conditions depicted and the symbols used are:

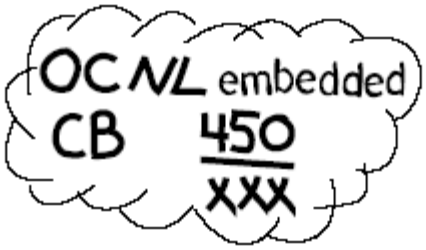
(a) ***active thunderstorms*** — the CB symbol is used when thunderstorms occur or are forecast over a widespread area, along a line, embedded in other cloud layers, or when concealed by a hazard. The amounts are indicated as:

ISOL (isolated) – for individual CBsOCNL (occasional) – for wellseparated CBsFRQ (frequent) – for CBs with little or no separation

Embedded CBs may or may not be protruding from the cloud or haze layer. The following abbreviations are used to indicate the presence of CBs: ISOL embedded CB, OCNL embedded CB, FRQ embedded CB and FRQ CB. All other clouds are depicted using OKTA amounts, followed by the cloud type. In certain cases the abbreviation LYR (layer or layered) is used to indicate cloud structure.

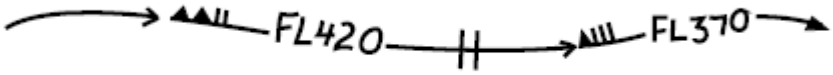
(b) ***cloud heights*** — When cloud tops or bases exceed the upper or lower limits of a significant weather prognostic chart, an XXX symbol is used on the appropriate side of the dividing line. Consider for example, the significant weather prognostic chart which extends from FL250 to FL630. If well separated embedded CBs based below FL250 and topped at FL450 were present, this would be depicted as follows:

The scalloped line indicates the area in which the conditions written inside apply.

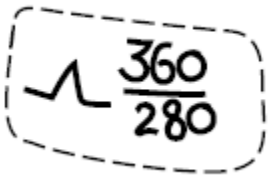


(c) **tropopause heights** — tropopause heights are depicted as flight levels, except when defining areas of very flat slope, and are enclosed in a rectangular box. The centre of the box represents the grid point being forecast.

(d) **jet streams** — the height and speed of jet streams having a core speed of 80 KT or more are shown oriented to true north using arrows with pennants and feathers for speed, and spaced sufficiently close to give a good indication of speed and/or height changes. A doublehatched line across the jet stream core indicates a speed increase or decrease. The doublehatched line indicates 20 KT changes at 100 kt, 120 kt. 140 kt. or higher. For example, a 120 kt jet stream initially at FL420 dropping to 80 kt at FL370 would be depicted as:



(e) **turbulence** — areas of moderate or severe turbulence in cloud or clear air are depicted using heavy dashed lines, height symbols, a for moderate turbulence and a for severe. wind shear and mountain wave turbulence are included, convective type or not. For example, an area of moderate turbulence between FL280 and FL360 would be shown as:



(f) **severe squall lines** — severe squall lines are depicted using the symbol and are oriented to true north with a representative length. An area of frequent CBs associated with a squall line would be shown as:

(g) **icing and hail** — icing and hail are not specifically noted but rather the following statement is included in the label on each chart:

SYMBOL CB IMPLIES HAIL, MODERATE OR GREATER TURBULENCE AND ICING

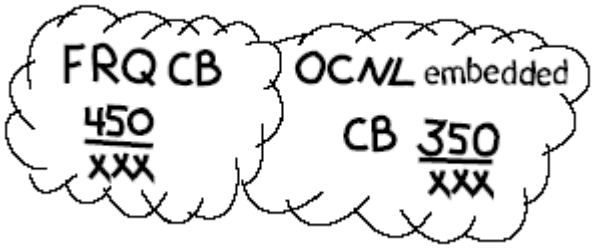
(h) **widespread sandstorm or duststorm** — areas of these conditions are shown using a scalloped line, height symbol and a . For example:

(i) **tropical cyclones** — the symbol is used to depict tropical cyclones and, if any of the previous criteria are met, these will be included. For example, an area of frequent CBs between 10 000 ft and 50 000 ft with an associated tropical storm named "William" would be shown as:

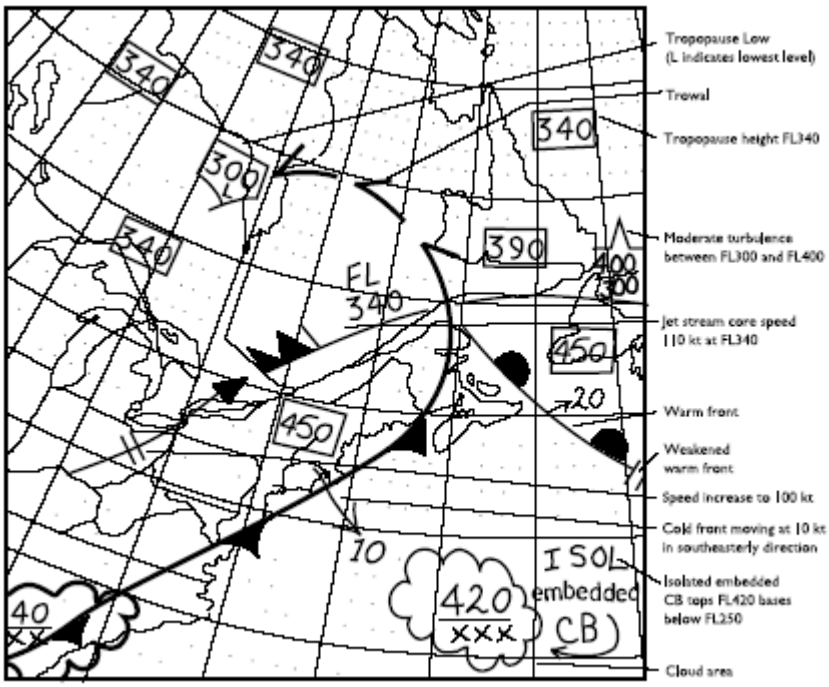
Significant weather prognostic charts depicting the tropical cyclone symbol will have a statement to the effect that the latest tropical cyclone advisory, rather than the tropical cyclone's prognostic position on the chart, is to be given public dissemination.

j) **convergence zones** — well-defined intertropical convergence zones with other associated conditions meeting the previously stated conditions will be shown within scalloped lines. For example, a convergence zone with one area having frequent CBs topped at FL450 with bases below FL250, and the other area having occasional

embedded CBs topped at FL350 and based below the chart level would be shown as:



(k) **frontal positions**—the surface positions of frontal systems associated with significant weather phenomena are shown for the validity period of the chart using standard frontal symbology and given the speed and direction of movements oriented to true north.



3.14 Significant Weather Prognostic Charts — CMC

The Canadian Meteorological Centre (CMC) issues a series of significant weather prognostic charts for the lower levels 700 to 400 mb (FL100 to FL240). They use the same criteria as above, plus the following:

(a) moderate to severe icing;

(b) cloud layers of significance;

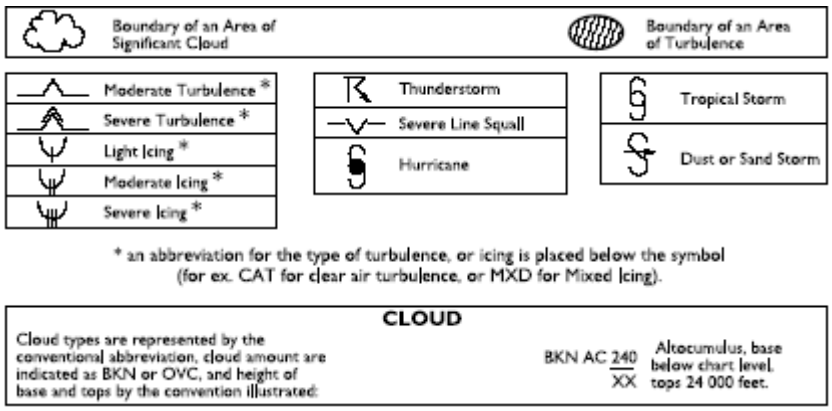
(c) marked mountain waves;

(d) freezing level line (0˚C) at 5 000ft intervals, and labeled in hundreds of feet; and/ or

(e) surface positions and direction of motion (in kt) of highs, lows, and other significant features (front, trough).

Symbols used on the Significant Weather Prognostic Charts by the CMC:

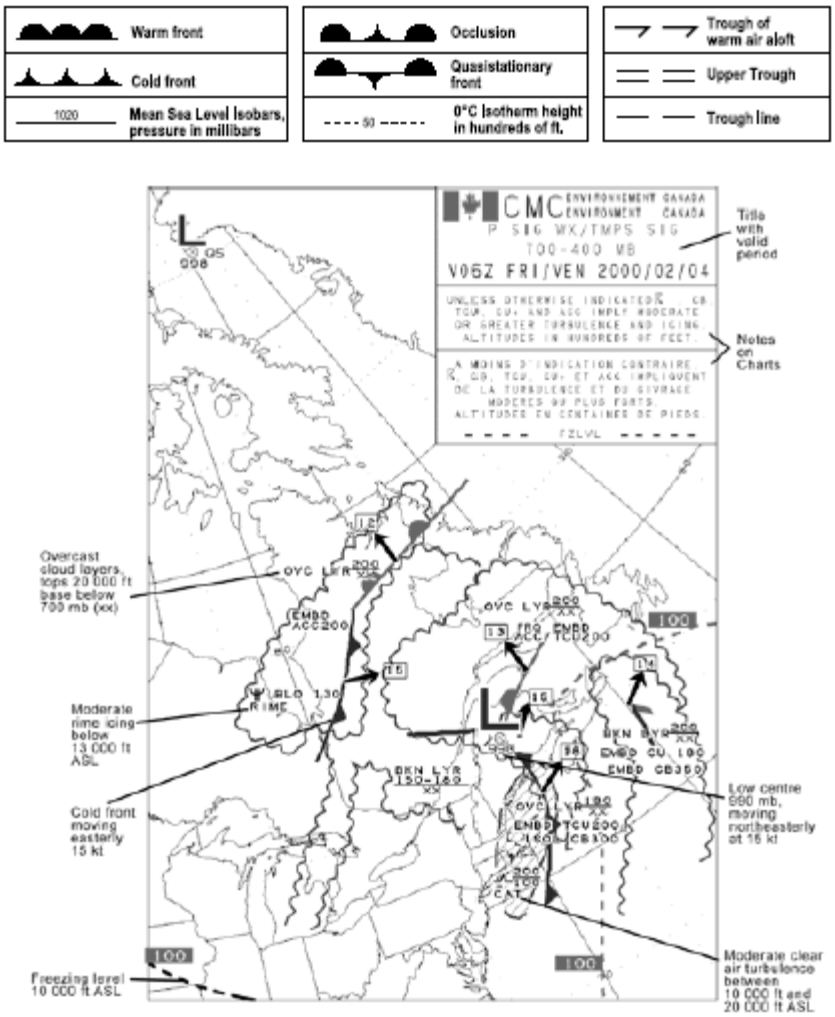
SIGNIFICANT WEATHER SYMBOLS



*** ABBREVIATIONS**

CAT	clear air turbulence
ISOL	isolated
FRQ	frequent
LYR	layers
MXD	mixed
OCNL	occasional
LEE WV	lee/mountain waves
CLR	clear
FZLVL	freezing level

FRONTS AND OTHER CONVENTIONS



3.15 Aviation Routine Weather Report METAR

3.15.1 The METAR Code

An aviation report describes the actual weather conditions at a specified location and at a specified time as observed from the ground. METAR is the name of the international meteorological code for an aviation routine weather report. METAR observations are normally taken and disseminated on the hour. A SPECI, the name of the code for an aviation selected special weather report, will be reported when weather changes of significance to aviation are observed (see MET 3.15.4).

In Canada, METAR and SPECI reports are not encoded by the observer, but are generated by computer software, based on hourly or special observations taken at either staffed or automatic sites.

The code is composed of several groups which are always in the same relative position to one another. When a weather element or phenomenon

does not occur, the corresponding group (or extension) is omitted. Certain groups may be repeated.

3.15.2 National Variations

Despite the fact that METAR is an international code, there are some national variations. For example, wind speed may be reported in different units; however, the units are always appended to the values to avoid any misunderstanding. A detailed account of the differences that Canada has filed with the World Meteorological Organization (WMO) may be found in the WMO Manual on Codes, Volume II, Regional Codes and National Coding Practises (No. 306). (See MET 1.1.7 for ordering.)

3.15.3 Sample Message

METAR CYXE 292000Z CCA 30015G25KT 3/4SM R33/4000FT/D -SN BLSN BKN008 0VC040 M05/M08 A2992 REFZRA WS RWY33 RMK SF5 SC3 VIS 3/8 TO NW SLP134

(a) ***Decode of Example***: Aviation Routine Weather Report; Saskatoon, Saskatchewan, issued on the 29th day of the month at 2000 UTC; first correction to the original observation; wind 300˚ true, 15 KT with gusts to 25 KT; visibility 3/4 SM; runway visual range for Runway 33 is 4000 feet and has had a downward tendency; present weather is light snow and moderate blowing snow; broken clouds at 800 feet AGL, and combined with the lower layer, overcast clouds at 4000 feet; temperature minus 5˚C; dew point minus 8˚C; altimeter setting 29.92 inches; recent freezing rain; recent wind shear Runway 33; Remarks, stratus fractus 5/8, stratocumulus 3/8, visibility to the northwest 3/8 SM, sea level pressure 1013.4 hPa.

(b) ***Report Type***: The code name METAR (or SPECI), is given in the first line of text. A "SPECI" report is issued only when significant changes in weather conditions occur off the hour.

(c) ***Station Indicator***: Canadian aviation weather reporting stations are assigned fourletter ICAO indicators commencing with C and followed by either W, Y, or Z. These stations are normally located within 1.6 NM (3 km) of the geometric centre of the runway complex. Aviation weather reporting sites are listed in the Canada Flight Supplement (CFS).

(d) ***Date/Time of Observation***: The date (day of the month) and time (UTC) of the observation is included in all reports. The official time of the observation (on the hour) is used for all METAR reports that do not deviate from the official time by more than 10 minutes. In SPECI reports, the time refers to the time of occurrence (hours and minutes) of the change(s) which required the issue of the report.

(e) ***Report Modifier***: This field may contain two possible codes; they are "AUTO" or "CCA". Both codes may also appear simultaneously, i.e., "AUTO CCA". "AUTO" will be used when data for the primary report is gathered by an AWOS. Should a human observer augment the AWOS, additional information will be coded into the remarks section. See MET 3.15.5 for more information about autostation reports. "CCA" is

used to indicate corrected reports; the first correction as CCA, the second as CCB, etc.

(f) ***Wind***: This group reports the 2minute mean wind direction and speed, along with gusts. Wind direction is always three digits, given in degrees (true) but rounded off to the nearest 10 degrees (the third digit is always a "0"). Wind speeds are two digits (or three digits if required), in knots. Calm is encoded as "00000KT". In Canada the unit for wind speed is knots (nautical miles per hour) and is indicated by including "KT" at the end of the wind group. Other countries may use kilometres per hour (KMH), or metres per second (MPS).

(i) *Wind Gusts*: Gust information will be included if gust speeds exceed the average wind speed by 5 knots or more in the 10minute period preceding the observation and the peak gust reaches a maximum speed of 15 knots or more. "G" indicates gusts and the peak gust is reported, using two or three digits as required.

(ii) *Variations in Wind Direction*:

Example: METAR CYWG 172000Z 30015G25KT 260V340

This group reports variations in wind direction. It is only included if, during the 10minute period preceding the observation, the direction varies by 60 degrees or more and the mean speed exceeds 3 knots. The two extreme directions are encoded in clockwise order. In the example above, the wind is varying from 260 degrees (true) to 340 degrees (true).

(g) ***Prevailing Visibility***: The prevailing visibility is reported in statute miles and fractions. There is no maximum visibility value reported. Lower sector visibilities which are half or less of the prevailing visibility are reported as remarks at the end of the report.

(h) ***Runway Visual Range***: The runway visual range for the touchdown zone of up to four available landing runways is reported as a 10minute average, based on the operational runway light settings at the time of the report. It is included if the prevailing visibility is 1 statute mile or less, and/or the runway visual range is 6000 feet or less. "R", the group indicator, is followed by the runway designator (e.g., "06"), to which may be appended the letters "L", "C", or "R" (left, centre, or right) if there are two or more parallel runways. The value of runway visual range is then reported in hundreds of feet, using three or four digits. FT indicates the units for runway visual range are feet. "M" preceding the lowest measurable value (or "P" preceding the highest) indicates the value is beyond the instrument range. The runway visual range trend is then indicated if there is a distinct upward or downward trend from the first to the second 5minute partperiod such that the runway visual range changes by 300 feet or more (encoded "/U" or "/D" for upward or downward) or if no distinct change is observed, the trend "/N" is encoded. If it is not possible to determine the trend the field will be left blank.

(i) **Variations in Runway Visual Range**: Two runway visual range values may be reported, the minimum and maximum oneminute

mean runway visual range values during the 10minute period preceding the observation, if they vary from the 10minute mean by at least 20% (and by 150 feet).

Example:"R06L/1000V2400FT/U" decodes as:the minimum runway visual range for Runway 06 Left is 1000 feet; the maximum runway visual range is 2400 feet; and the trend is upward.

(i) **N/A**

(j) ***Present Weather***: The present weather is coded in accordance with the World Meteorological Organization (WMO) Code, Table 4678, which follows. As many groups as necessary are included, with each group containing from 2 to 9 characters.

Present weather is comprised of weather phenomena, which may be one or more forms of precipitation, obscuration, or other phenomena. Weather phenomena are preceded by one or two qualifiers; one of which describes either the intensity or proximity to the station of the phenomena, the other of which describes the phenomena in some other manner.

WMO Code, Table 4678(incorporating Canadian differences)

SIGNIFICANT PRESENT WEATHER CODES

QUALIFIER					WEATHER PHENOMENA			
INTENSITY or PROXIMITY 1	DESCRIPTOR 2		PRECIPITATION 3		OBSCURATION 4		OTHER 5	
Note: Precipitation intensity refersto all formscombined.	**MI**	Shallow	**DZ**	Drizzle	**BR**	Mist (Vis ≥ 5/8 SM)	**PO**	Dust/ sandWhirls (DustDevils)
	BC	Patches	**RA**	Rain	**FG**	Fog (Vis < 5/8 sm)	**SQ**	Squalls
	PR	Partial	**SN**	Snow	**FU**	Smoke (Vis ≤ 6 SM)	**+FC**	Tornado or Waterspout
	DR	Drifting	**SG**	Snow Grains				
- Light	**BL**	Blowing	**IC**	Ice Crystals (Vis ð 6 SM)	**DU**	Dust (Vis ≤ 6 SM)	**FC**	Funnel Cloud
	SH	Shower(s)						
Moderate (no qualifier)	**TS**	Thunderstorm	**PL**	Ice Pellets	**SA**	Sand (Vis ≤ 6 SM)	**SS**	Sandstorm (Vis < 5/8 SM) (+SS Vis < 516 SM)
			GR	Hail				
+Heavy	**FZ**	Freezing	**GS**	Snow Pellets	**HZ**	Haze (Vis ≤ 6 SM)	**DS**	Duststorm (Vis < 5/8 SM) (+DS Vis < 516 SM)
VCIn the vicinity			**UP**	Unknown precipitation (AWOS only)	**VA**	Volcanic Ash (with anyvisibility)		

(i) *Qualifiers*:

Intensity (–) light (no sign) moderate (+) heavy

If the intensity of the phenomena being reported in a group is either light or heavy, this is indicated by the appropriate sign. No sign is included if the intensity is moderate, or when an intensity is not relevant. If more than one type of precipitation is reported together in a group, the predominant type is given first; however, the reported intensity represents the “overall” intensity of the combined types of precipitation.

Proximity:

The proximity, qualifier "VC", is used in conjunction with the following phenomena:

SH	(showers);
FG	(fog);
BLSN, BLDU, BLSA	(blowing snow, blowingdust, blowing sand);
PO	(dust/sand whirls);
DS	(duststorm);
SS	(sandstorm)

"VC" is used if these phenomena are observed within 5 SM, but not at the station. When VC is associated with "SH", the type and intensity of precipitation is not specified because it cannot be determined.

Descriptor:No present weather group has more than one descriptor.

The descriptors MI (shallow), BC (patches) and PR (partial) are used only in combination with the abbreviation FG (fog), e.g., "MIFG".

The descriptors DR (drifting) and BL (blowing) are used only in combination with SN (snow), DU (dust) and SA (sand). Drifting is used if the snow, dust or sand is raised less than two metres above ground; if two metres or more, blowing is used. If blowing snow (BLSN) and snow (SN) are occurring together, both are reported but in separate present weather groups, e.g., "SN BLSN".

SH (shower) is used only in combination with precipitation types RA (rain), SN (snow), PL (ice pellets), GR (hail) and GS (snow pellets) if occurring at the time of observation, e.g., "SHPL" or "–SHRAGR".

TS (thunderstorm) is either reported alone or in combination with one or more of the precipitation types. The end of a thunderstorm is the time at which the last thunder was heard, followed by a 15minute period with no further thunder.

NOTE: TS and SH are not used together, since present weather groups can have only one descriptor.

FZ (freezing) is used only in combination with the weather types DZ (drizzle), RA (rain) and FG (fog).

(ii) Weather Phenomena:

Different forms of precipitation are combined in one group, the predominant form being reported first. The intensity qualifier selected represents the overall intensity of the entire group, not just one component of the group. The one exception is freezing precipitation (FZRA or FZDZ), which is always reported in a separate present weather group.

Obstructions to vision are generally reported if the prevailing visibility is 6 SM or less, with some exceptions.

Any obscuration occurring simultaneously with one or more forms of precipitation is reported in a separate present weather group.

Other phenomena are also reported in separate groups, and, when funnel clouds, tornados or waterspouts are observed, they will be coded in the present weather section, as well as being written out in their entirety in remarks.

(k) ***Sky Conditions***: This group reports the sky condition for layers aloft. A vertical visibility (VV) is reported in hundreds of feet when the sky is obscured. All cloud layers are reported based on the summation of the layer amounts as observed from the surface up, reported as a height above the station elevation in increments of 100 feet to a height of 10 000 feet, and thereafter in increments of 1 000 feet. The layer amounts are reported in eighths (oktas) of sky coverage as follows:

SKC	– “sky clear”	– no cloud present
FEW	– “few”	– >0 to 2/8 summation amount
SCT	– “scattered”	– 3/8 to 4/8 summation amount
BKN	– “broken”	– 5/8 to <8/8 summation amount
OVC	– “overcast”	– 8/8 summation amount
CLR	– “clear”	– clear below 10 000 feet as interpreted by an autostation

Significant convective clouds (CB or TCU only), if observed, are identified by the abbreviations CB (Cumulonimbus) or TCU (Towering Cumulus) appended to the cloud group without a space, e.g., "SCT025TCU". Where observed, other cloud types and their layer opacity’s are reported in the remarks.

AWOS cannot report cloud types; cloud layers are limited to four, and will report clear (CLR) when no layers exist below 10 000 feet.

A *cloud ceiling* is said to exist at the height of the first layer for which a coverage symbol of BKN or OVC is reported. The existence of a vertical

visibility constitutes an obscured ceiling.

(l) ***Temperature and Dew Point***: This group reports the air temperature and the dew point temperature, rounded to the nearest whole Celsius degree (e.g., +2.5˚C would be rounded to +3˚C). Negative values are preceded by the letter M, and values with a tenths digit equal to precisely 5 (e.g., 2.5, –0.5, –1.5, –12.5 etc.) are rounded to the warmer whole degree.

(m) ***Altimeter Setting***: This group reports the altimeter setting. A is the group indicator, followed by the altimeter setting indicated by a group of four figures representing tens, units, tenths and hundredths of inches of mercury. To decode, place a decimal point after the second digit (e.g., A3006 becomes 30.06).

(n) ***Recent Weather***: This group reports recent weather of operational significance. The group indicator RE is followed, without a space, by the appropriate abbreviation(s) for weather observed during the period since the last (scheduled) routine report ("METAR"), but not observed at the time of observation. Recent weather is included in "METAR" and "SPECI" reports.

The following may be reported as recent weather phenomena:

- freezing precipitation;
- moderate or heavy drizzle, rain or snow;
- moderate or heavy ice pellets, hail or snow pellets;
- moderate or heavy blowing snow;
- sandstorm or duststorm;
- tornado, waterspout or funnel cloud;
- thunderstorm; or
- volcanic ash.

The same phenomenon is only reported as present weather and recent weather if it was of greater intensity during the period since the last routine report. For example, with a moderate rainshower at 1800Z and a heavy rainshower at 1700Z (or later), the 1800Z METAR would report "SHRA" in present weather and "RERA" in the recent weather group.

(o) ***Wind shear***: This group contains reports of low level wind shear (within 1600 feet AGL) along the takeoff or approach path of the designated runway. The two number runway identifier is used, to which the letters "L", "C", or "R" may be appended. If the existence of wind shear applies to all runways, "WS ALL RWY" is used.

(p) ***Remarks***: Remarks will appear in reports from Canada, prefaced by RMK. Remarks will include, where observed, layer type and opacity in eighths of sky concealed (oktas) of clouds and/or obscuring phenomena, general weather remarks, and sea level pressure, as required. The sea level pressure, indicated in hectopascals, will always

be the last field of the METAR report, prefixed with "SLP".

Abbreviations for cloud types:

CI = cirrus	NS = nimbostratus
CS = cirrostratus	ST = stratus
CC = cirrocumulus	SF = stratus fractus
AS = altostratus	SC = stratocumulus
AC = altocumulus	ACC = altocumulus castellanus
CU = cumulus	CUFRA = cumulus fractus
TCU = towering cumulus	CB = cumulonimbus

3.15.4 Special Weather Reports (SPECI)

Criteria for Taking Special Weather Reports

Special observations will be taken promptly to report changes that occur between scheduled transmission times, whenever one or more of the following elements has changed in the amount specified. The amount of change is with reference to the preceding routine or special observation.

(a) *Ceiling*: The ceiling decreases to less than, or increases to equal or exceed the following values of height:

(i) 1 500 ft

(ii) 1 000 ft

(iii) 500 ft

(iv) 400 ft*

(v) 300 ft

(vi) 200 ft*

(vii) 100 ft*

(viii) the lowest published minimum

(b) *Sky condition*: A layer aloft is observed below 1 000 ft and no layer aloft was reported below this height in the report immediately previous, or below the highest minimum for IFR straight-in landing or takeoff, and no layer was reported below this height in the report immediately previous.

(c) *Visibility*: Prevailing visibility decreased to less than, or increases to equal or exceed:

(i) 3 SM

(ii) 1 1/2 SM

(iii) 1 SM

(iv) 3/4 SM

(v) 1/4 SM*

(vi) the lowest published minimum

Criteria marked with an asterisk (*) are applicable only at aerodromes with precision approach equipment (i.e. ILS, MLS, ground controlled approach [GCA]), and only down to and including the lowest published minima for these aerodromes.

(d) Tornado, waterspout or funnel cloud:

(i) is observed;

(ii) disappears from sight; or

(iii) is reported by the public (from reliable sources) to have occurred within the preceding six hours and not previously reported by another station.

(e) *Thunderstorm*:

(i) begins;

(ii) intensity increases to become “heavy” thunderstorm; or

(iii) ends (SPECI shall be made when 15 min have elapsed without the occurrence of thunderstorm activity).

(f) *Precipitation*:

(i) hail begins or ends.;

(ii) freezing rain, freezing drizzle or non-showery ice pellets begin, end or change intensity;

(iii) rain, drizzle, snow, snow grains, snow pellets, showery ice pellets or ice crystals begin or end;

(iv) special observations shall be taken as required to report the beginning and ending of each individual type of precipitation, regardless of simultaneous occurrences of other types. A leeway of up to 15 min is allowed after the ending of precipitation before an SPECI is mandatory;

(v) changes in character of precipitation do not require a special observation if the break in precipitation does not exceed 15 min.

Example: *–RA to RASH, SPECI not required.*

(g) *Wind*:

(i) speed (two-minute mean) increases suddenly to at least double the previously reported value and exceeds 30 kt;

(ii) direction changes sufficiently to fulfil criteria required for a “wind shift.”

(h) *Temperature*:

(i) increases by 5°C or more from the previous reported value and the previous reported value was 20°C or higher; or

(ii) decreases to a reported value of 2°C or lower.

Local Criteria

The officerincharge may temporarily establish local criteria for special observations to meet local requirements. However, approval from EC Headquarters is required before such criteria are permanently established.

Observer’s Initiative

The criteria specified in the preceding paragraphs shall be regarded as the minimum requirements for taking special observations. In addition, any weather condition that, in the opinion of the observer is important for the safety and efficiency of aircraft operations or otherwise significant, shall be reported by a special observation.

Check Observations

Check observations are taken between regular hourly observations to ensure that significant changes in weather do not remain unreported. If such an observation does not reveal a significant change, it is designated as a "check observation". If a significant change has occurred, the report is treated as a "special observation".

A check observation shall be taken whenever a PIREP is received from an aircraft within 1 1/2 SM of the boundary of an airfield, and the PIREP indicates that weather conditions, as observed by the pilot, differ significantly from those reported by the current observation (i.e., the PIREP indicated that a special report may be required). This check observation should result in one of the following:

(a) transmission of a special observation over regular communications channels; or

(b) if no special observation is warranted, transmission of the check observation, together with the PIREP, to local airport agencies.

The following airports have been identified for SPECI criteria:

- Calgary Intl, Alta.
- Edmonton Intl, Alta.
- Gander Intl, N.L.
- Moncton/Greater Moncton Intl, N.B.
- Montréal/Pierre Elliott Trudeau Intl, Que.
- Montréal Intl (Mirabel), Que.
- Ottawa/Macdonald-Cartier Intl, Ont.
- St. John's Intl, N.L.
- Toronto/Lester B. Pearson Intl, Ont.
- Vancouver, B.C.
- Victoria Intl, B.C.
- Halifax Intl, N.S.
- London, Ont.
- Québec/Jean Lesage Intl, Que.
- Whitehorse Intl, Y.T.
- Winnipeg Intl, Man.
- Yellowknife, N.W.T.
- Charlottetown, P.E.I.
- Fredericton, N.B.
- Prince George, B.C.
- Regina Intl, Sask.
- Saint John, N.B.
- Saskatoon/John G. Diefenbaker Intl, Sask.
- Thunder Bay, Ont.

3.15.5 Reports from Automated Weather Observation Systems (AWOS)

Various combinations of automated meteorological sensors have been generating weather observation data in Canada since 1969. Most of the early autostations had characteristics that did not permit use of their reports for aviation.

AWOS was developed to provide an alternative method of collecting and disseminating weather observations from sites where human observation programs could not be supported. AWOS provides highly accurate and reliable data, but it does have limitations and idiosyncrasies that are important to understand when using the information.

The aviation AWOS is a modular system that currently incorporates sensors

capable of measuring cloudbase height (up to 10 000 ft AGL); sky cover; visibility; temperature; dew point; wind velocity; altimeter setting; precipitation occurrence, type, amount, and intensity; and the occurrence of icing. It incorporates failsafe dual atmospheric pressure sensors for determining altimeter setting that will shut down if there are significant discrepancies between the two sensors. Some systems are equipped with a voice generator module (VGM) and VHF transmitter.

The AWOS observations, which use the word "AUTO" to indicate an automated observation, are reported in the normal METAR/SPECI format. "METAR AUTO" observations are reported on the hour and "SPECI AUTO" observations are issued to report significant changes in cloud ceiling, visibility and wind velocity, as well as the onset and cessation of precipitation or icing.

The AWOS sensors sample the atmosphere and prepare a data message every minute. If the weather conditions have changed significantly enough to meet the SPECI criteria, and subject to the various processing algorithms, a SPECI will be issued. Human observers view the entire celestial dome and horizon; this results in a naturally smoothed and more representative value for ceiling and visibility. Because of the precise measurement, continuous sampling and unidirectional views of the AWOS, it will produce more SPECI observations than staffed sites (5%–6% of the time AWOS SPECI counts exceed 6 per hour). In cases where there are several AWOS reports issued over a short period of time, it is important to summarize the observations to gain an appreciation of the weather trend. One report in a series should not be expected to represent the prevailing condition. There are other peculiarities of the AWOS observation. A comparison of human observations and AWOS appears in the table below.

OBSERVATION COMPARISON TABLE		
WX ReportParameter	Human Observation	AWOS Observation
Report type	METAR or SPECI	METAR or SPECI
Stationindicator	Four-letter indicator (e.g., CYQM, CYVR).	No difference.
	At stations where the observer is not on the aerodrome,(beyond 1.6 NM (3 km) of the geometric centre of therunway complex) the Wx report indicator differs fromthe aerodrome indicator, e.g., Dease Lake aerodrome isCYDL; the Wx report is identified as CWDL.	All AWOS are located on aerodromes.
Report time	Date and time in UTC, followed by a “Z”, e.g. 091200Z.	No difference.
AWOS indicator		AUTO
Correctionsindicator	Corrections can be issued, e.g., “CCA”, the “A” indicatesthe first correction.	No difference.
Wind	A two-minute average direction in degrees true,	No difference.

	speed inkt, “G” represents a gust, e.g. 12015G25KT.	
	If wind information is missing, five forward slashes (/) areplaced in the wind field, e.g., /////.	No difference.NOTE: When a VGM is installed, the winddirection will be broadcast in degreesMagnetic if the AWOS is located inSouthern Domestic Airspace, elsewhereit will be broadcast in degrees true.
Variable windgroup	Wind direction variation of 60˚ or greater	Not reported in the AWOS METARor SPECI message.
Visibility	Reported in statute miles (SM) up to 15 miles. After 15miles, it is reported as 15+, e.g., 10SM.	Reported in statute miles (SM) up to 9 miles.
	Fractional visibilities are reported.	No difference.
	Visibility is prevailing visibility, i.e., common to at leasthalf the horizon circle.	Visibility is measured using fixed, unidirectional,forward scatter techniques. .
		Reported visibilities tend to be comparable to(especially with visibility less than 1 SM) or higherthan human observations in precipitation.
		Reported visibilities at night are the same as theday and tend to be comparable to or higher thanhuman observations.
Runway visualrange	Runway direction, followed by the visual range in feet,followed by a trend. Runway visual range will be reportedwhere equipment is available.	Not currently reported by AWOS.
Weather group	See the table following MET 3.15.3(j) for the symbolsused for obstructions to visibility (e.g., smoke, haze).	Obstructions to visibility are not identifiedin the AWOS reports; therefore, the reasonfor reduced visibility may not be apparent.Consult the graphic area forecast (GFA) or areaforecast (TAF).
	See the table following MET 3.15.3(j) for the symbolsused for the description of weather.	AWOS will report weather phenomena usingthe following symbols:RA, DZ—rain, drizzleFZRA—freezing rain,FZDZ—freezing drizzleGR—hailSN—snowUP—unknown precipitation type
	“+” or “–” is used to indicate weather intensity.	No difference. Squalls are not reported.AWOS does not report “in thevicinity” phenomena.
		AWOS may sporadically report freezingprecipitation at

		temperatures above 0 andbelow +10 degrees Celsius, during periods ofeither wet snow, rain, drizzle or fog.
Cloud amountand skyconditions	Observer views entire celestial dome and determinescloud-base height, layer amounts and opacity, andcumulative amount and opacity.	Laser ceilometer views one point directly overthe station. It measures the cloud-base height,then uses time integration to determinelayer amounts.
	SKC or height of cloud base plus FEW, SCT, BKN, OVC.	Height of cloud base plus FEW, SCT, BKN, OVC.Cloud-height measurement is possible only to10 000 ft AGL. “CLR” is reported if nocloud below 10 000 ft AGL is detected.
	Surface-based layers are prefaced by “VV” and athree-figure vertical visibility.	No difference.
	The cloud layer amounts are cumulative.	No difference.
		Ceilometer may occasionally report the trueoccurrence of multiple overcast layers.
		Multiple overcast layers can be detected andreported by the ceilometer.
		Ceilometer may occasionally detect ice crystalsor strong temperature inversion aloft andreport them as cloud layers. Check GFA andTAF for further information.
		Reported cloud layers in precipitationare comparable to or lower than humanobservations.
		On rare occasions, the laser ceilometer mayreport CLR during reduced visibility andprecipitation situations—a report of sky CLRmay be false.
		Check the TAF and the GFA for furtherinformation.
Temperatureand dew point.	Temperature then dew point expressed as a two-digitnumber in degrees Celsius, separated by a forwardslash (/) and preceded by an “M” for below freezingtemperatures, e.g., 03/M05.	No difference.
Altimetersetting	An “A” followed by a four-digit number in inches ofmercury. e.g., A2997.	No difference.

Recent weather	Recent weather of operational significance, but notoccurring at the time of the observation, shallbe reported.	Not reported in the AWOS METAR or SPECImessage. The VGM is capable of reporting recentfreezing precipitation.
Wind shear	Existence in the lower layers shall be reported	Not reported by AWOS.
Supplementaryinformation (Remarks)	See the table in MET 3.15.3 (j) for the symbols used todescribe clouds and obscuring phenonmena.	Clouds and obscuring phenomena are notdescribed in METAR AUTO orSPECI AUTO reports.
	Significant weather or variation not reported elsewherein the report.	Currently, “Remarks” are limited. When thevisibility is variable, the remark “VIS VRB”followed by the limits will appear, e.g., VIS VRB0.5V3.0 (visibility reported in tenths).When icing is detected, “ICG”, “ICG INTMT”or “ICG PAST HR” will appear. Remarks onprecipitation amount, rapid changes in pressuremay also appear.
Barometricpressure	The last remark in the METAR or SPECI is the mean sealevel pressure in hectopascals, e.g., SLP127 (1012.7 hPa).	No difference.

The following compares a routine observation made from a human observer with the equivalent observation that might have been made by an AWOS.

Human METAR/SPECI Observation
METAR CYEG 151200Z CCA 12012G23KT 3/4SM R06R/4000FT/D –RA BR
FEW008 SCT014 BKN022 OVC035 10/09 A2984 RETSRA RMK SF1SC2SC4SC1 VIS W2 SLP012=

AWOS METAR AUTO/SPECI AUTO Observation
METAR CYEG 151200Z AUTO CCA 12012G23KT 3/4SM –RA FEW008 SCT014 BKN022 OVC035 10/09 A2984 RMK SLP012=

NOTES

1. In the event of a discrepancy between AWOS ceiling or visibility and that observed by aircraft in the vicinity, aircraft operations should be based on the ceiling, runway visibility or flight visibility as provided by PIREP.
2. If an AWOS sensor is malfunctioning or has shut down, that report parameter will be missing from the METAR AUTO or SPECI AUTO.

3.15.6 Other Automated Reports

3.15.6.1 Limited Weather Information System (LWIS)

The LWIS is for use at aerodromes where provision of a full surface weather observation program is not justified, but full or parttime support for a Canada Air Pilot approach is required.

A LWIS comprises a subset of the usual automated meteorological sensors, a data processing system, a communication system and, at some sites, a voice generator module (VGM) with VHF transmitter. The onthehour data collection is coded and disseminated as an hourly, limited weather observation. No special (SPECI) observations are issued by LWIS.

LWIS reports wind direction, speed and gust; temperature; dew point; and altimeter setting, which has failsafe sensors. The wind direction is reported in degrees true, unless using the VGM, which is reported in degrees Magnetic in Southern Domestic Airspace.

An example of a LWIS message is:

LWIS CWDL 291700Z AUTO 25010G15KT 03/M02 A3017=

3.15.6.2 Voice Generator Module Reports

Where a VGM, VHF radio and/or telephone are connected to the AWOS or LWIS, the most recent data gathered once each minute will be broadcast to pilots on the VHF frequency and/or by calling the telephone number published in the Canada Flight Supplement (CFS). A pilot with a VHF receiver should be able to receive the VGM transmission at a range of 75 NM from the site at an altitude of 10 000 ft AGL. Weather data will be broadcast in the same sequence as that used for METARs and SPECIs.

The humanobserved METAR or SPECI shall take priority over the AWOS or LWIS VGM report. During the hours when a human observation program is operating and there is no direct VHF communication between the pilot and weather observer, the VGM VHF transmitter will normally be off. This will eliminate the risk of a pilot possibly receiving two contradictory and confusing weather reports.

In variable weather conditions, there may be significant differences between broadcasts only a few minutes apart. It is very important during these conditions to obtain several broadcasts of the minutely data for comparison to develop an accurate picture of the actual conditions to be expected at the location.

Below is the typical format of an AWOS VGM message:

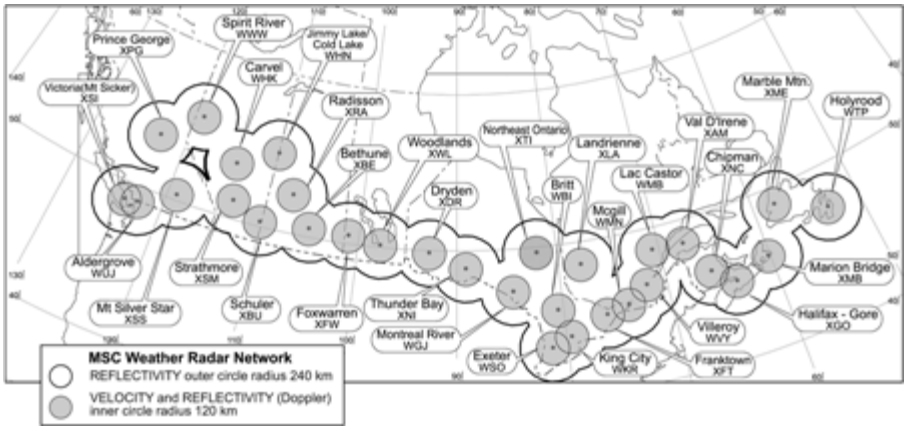
"(site name) AUTOMATED WEATHER OBSERVING SYSTEM— CURRENT OBSERVATION TAKEN AT (time) UNIVERSAL — WIND (direction) (MAGNETIC/TRUE) (speed) KNOTS — VISIBILITY (visibility data) STATUTE MILES — (present weather data) — (sky condition/cloud data) — TEMPERATURE (temperature data) CELSIUS — DEW POINT (dew point data) CELSIUS — ALTIMETER (altimeter data) INCHES"

Below is an example of the LWIS VGM message:

"(site name) LIMITED WEATHER INFORMATION SYSTEM—CURRENT OBSERVATION TAKEN AT (time) UNIVERSAL — WIND (direction) (MAGNETIC/TRUE) (speed) KNOTS — TEMPERATURE (temperature data) CELSIUS — DEW POINT (dew point data) CELSIUS — ALTIMETER (altimeter data) INCHES"

NOTE: Missing data or data that has been suppressed is transmitted as "MISSING"

3.16 EC/DND Weather Radar Network



3.17 PIREP

General

PIREPs are reports of weather conditions encountered by aircraft during flight. PIREPs are extremely useful to other pilots, aircraft operators, weather briefers and forecasters, as they supplement weather information received from meteorological observing stations. Pilots are encouraged to file brief reports of weather conditions when giving position reports, especially reports of any significant atmospheric phenomena. PIREPs received by flight service personnel are immediately disseminated on meteorological communications circuits and provided to other ATS units and the Canadian Meteorological Aviation Centres (CMAC).

Example:

UACN10 CYXU 032133 YZ UA /OV YXU 090010 /TM 2120 /FL080 /TP PA31 /SK 020BKN040 110OVC /TA 12 /WV 030045 /TB MDT BLO 040 /IC LGT RIME 020040 /RM NIL TURB CYYZ-CYHM

PIREPEXAMPLE	DECODED EXAMPLE
UACN10	Message Type: Regular PIREP. Urgent PIREPsare encoded as UACN01.
CYXU	Issuing office: London flight informationcentre (FIC).
032133	Date/Time of Issue: 3rd day of the month,at 2133Z.

YZ	Flight Information Region (FIR): Toronto FIR.If the PIREP extends into an adjacent FIR,both FIRs will be indicated.
UA /OV YXU090010	Location: London VOR 090˚ radial, 10 NM.PIREP location will be reported withreference to a NAVAID, airport or geographiccoordinates (latitude/ longitude).
/TM 2120	Time of PIREP: 2120Z
/FL080	Altitude: 8 000 ft ASL. Altitude may alsobe reported as “DURD” (during descent),“DURC” (during climb) or “UNKN”(unknown).
/TP PA31	Aircraft Type: Piper Navajo (PA31).
/SK 020BKN040 110OVC	Sky Cover: First layer of cloud based at2 000 ft with tops at 4 000 ft ASL. Secondlayer of cloud based at 11 000 ft ASL.
/TA -12	Air Temperature: -12ºC.
/WV 030045	Wind Velocity: Wind direction 030 degreestrue, wind speed 45 kt. Wind directionreported by pilots in degrees magnetic willsubsequently be converted to degrees truefor inclusion in PIREP.
/TB MDTBLO 040	Turbulence: Moderate turbulence below4 000 ft ASL.
/IC LGT RIME020-040	Icing: Light rime icing (in cloud) between2 000 ft ASL and 4 000 ft ASL.
/RM NIL TURBCYYZ-CYHM	Remarks: No turbulence encounteredbetween Toronto and Hamilton.

NOTE: Supplementary information for any of the PIREP fields may be included in the remarks (RM) section of the PIREP.

3.18 SIGMET

General

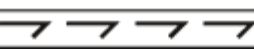
These messages are intended to provide shortterm warnings of certain potentially hazardous weather phenomena. The list of phenomena is limited by international agreement to the more serious hazards which are important to all types of aircraft.

Warnings are issued for active thunderstorm areas, lines of thunderstorms, heavy hail, severe turbulence or icing, marked mountain waves, hurricanes, widespread sand or dust storms, volcanic ash, and low level windshear. SIGMETs are broadcast on the appropriate IFR and VFR ATS frequencies upon receipt. Each SIGMET weather phenomenon is coded with a letter and number that is unique to the SIGMETs issued by that regional weather forecast centre. Successively higher numbers supersede SIGMETs previously issued by that weather forecast centre for a given letter code.

EXAMPLE	DECODE OF EXAMPLE
WSCN33 CWTO171805	This SIGMET was issued by theToronto Forecast Centre to describeweather phenomena in the graphicarea forecast area 33 (GFACN 33)on the 17th day of the month at1805 UTC.
SIGMET A5 VALID 171805/172205 CWTO	This SIGMET (Alfa 5) supersedesits predecessor (Alfa 4), which wasissued by the same weather centreto describe the same weatherphenomenon within that GFA area.The SIGMET is valid from 1805 to2205 UTC.

WTN 30 NM OF LN /4622N 07925W/ NORTH BAY–/ 4458N07918W/ MUSKOKA– /4302N08109W/ LONDON. TS MAXTOPS 300 OBSD ON RADAR. LN MOVGEWD AT 20 KT. LTLCHG IN INTSTY.	Thunderstorms have been observedon weather radar within 30 NM ofa line from North Bay to Muskokato London. The maximum topsof the line of thunderstorms isexpected to be 30 000 ft. The lineis moving in an eastward directionat 20 kt. Little change in intensity isexpected in the development of thethunderstorms during thevalid period.

3.19 Surface Weather Maps

COLOUR	SYMBOL	DESCRIPTION
BLUE	H	High pressure centre
RED	L	Low pressure centre
BLUE		Cold front
BLUE		Cold front aloft
RED		Warm front
RED		Warm front aloft
RED / BLUE		Stationary front
PURPLE		Occluded front
BLUE		Cold frontogenesis
RED		Warm frontogenesis
RED / BLUE		Stationary frontogenesis
BLUE		Cold frontolysis
RED		Warm frontolysis
RED / BLUE		Stationary frontolysis
PURPLE		Occluded frontolysis
PURPLE		Squall Line
PURPLE		Trough
BLUE / RED		Trowal

1. Check the time of the map, make sure that it is the latest one available.
2. Always remember that weather moves. A map gives you a static picture of weather conditions over a large area at a specific time. Always use a map along with the latest reports and forecasts.
3. The curving lines on the map which form patterns like giant thumbprints are called isobars. Joining points of equal sea level pressure, isobars outline the areas of High and Low pressure, marked H and L, respectively.
4. The winds at 2000 feet AGL blow roughly parallel to the isobars – in a clockwise direction around Highs and counterclockwise around Lows. Wind speeds vary with the distance between isobars. Where the lines are close together, one can expect moderate to strong

winds; where they are far apart, expect light variable winds.

5. The red and blue lines are called Fronts. These lines indicate the zones of contact between large air masses with differing physical properties – cold vs. warm, dry vs. moist, etc. Blue lines are for cold fronts – cold air advancing. Red lines are for warm fronts – warm air advancing. Alternate red and blue lines are for quasistationary fronts – neither warm air nor cold air advancing. Hook marks in red and blue are for trowalstrough of warm air aloft. A purple line is called an Occluded Front – where a cold front has overtaken a warm front. Solid coloured lines are fronts which produce air mass changes at the ground level as well as in the upper air. Dashed coloured lines represent "upper air" fronts – they also are important. Along all active fronts one usually encounters clouds and precipitation.
6. When colours cannot be used to distinguish the various kinds of fronts, monochromatic symbols are used.

3.20 Upper Level Charts – ANAL

Analysed Charts (ANAL)

Meteorological parameters in the upper atmosphere are measured twice a day (0000Z and 1200Z). The data are plotted and analysed on constant pressure level charts. These charts always indicate past conditions. The 850 mb (5 000 feet), 700 mb (10 000 feet), 500 mb (18 000 feet), and 250 mb (34 000 feet) analysed charts are available in Canada and are generally in weather offices about three hours after the data are recorded.

The maps have various fields analysed.

(a) **Height**: The solid lines (contours) on all the charts represent the approximate height of the pressure level indicated by the map. The contours are labelled in decametres (10's of metres) such that on a 500 mb map, 540 means 5 400 m and on a 250 mb map, 020 means 10 200 m. Contours are spaced 60 m (6 decametres) apart except at 250 mb where the spacing is 120 m.

(b) **Temperature**: Temperature is analysed on the 850 and 700 mb charts only. Dashed lines are drawn at 5˚C intervals and are labelled 5, 0, 5, etc. Temperatures at 500 and 250 mb are obtained by reading the number in the upper left corner of each of the station plots.

(c) **Wind Direction**: Wind direction may be determined at any point by using the height contours. The wind generally blows parallel to the contours and the direction is determined by keeping the "wind at your back with low heights to the left". The plotted wind arrows also provide the actual wind direction at the stations.

(d) **Wind Speed**: Wind speed is inversely proportional to the spacing of the height contours. (If the contours are close together, the winds are strong; if far apart, the winds are light.) The plotted wind arrows also provide the wind speed.

On the 250 mb chart, wind speeds are analysed using dashed lines for

points with the same wind speed (isotachs). The isotachs are analysed by a computer and are drawn at 30 KT intervals starting at 30 KT. (NOTE: Computer analysed charts have the analysed parameters smoothed to some extent.)

3.21 Volcanic Ash Prognostic Charts

(a) **Availability and Coverage**: These charts are produced by Environment Canada (EC) only when volcanic ash threatens Canadian domestic airspace or adjacent areas. They are normally available 1 hour after the execution of the Canadian Meteorological Centre (CMC) computer model which generates them. The results are based on the execution of the last global numerical weather prediction model using either 0000 or 1200 UTC data. The areas normally covered are Alaska, Canada, United States, the North Atlantic and Northwest Pacific Oceans.

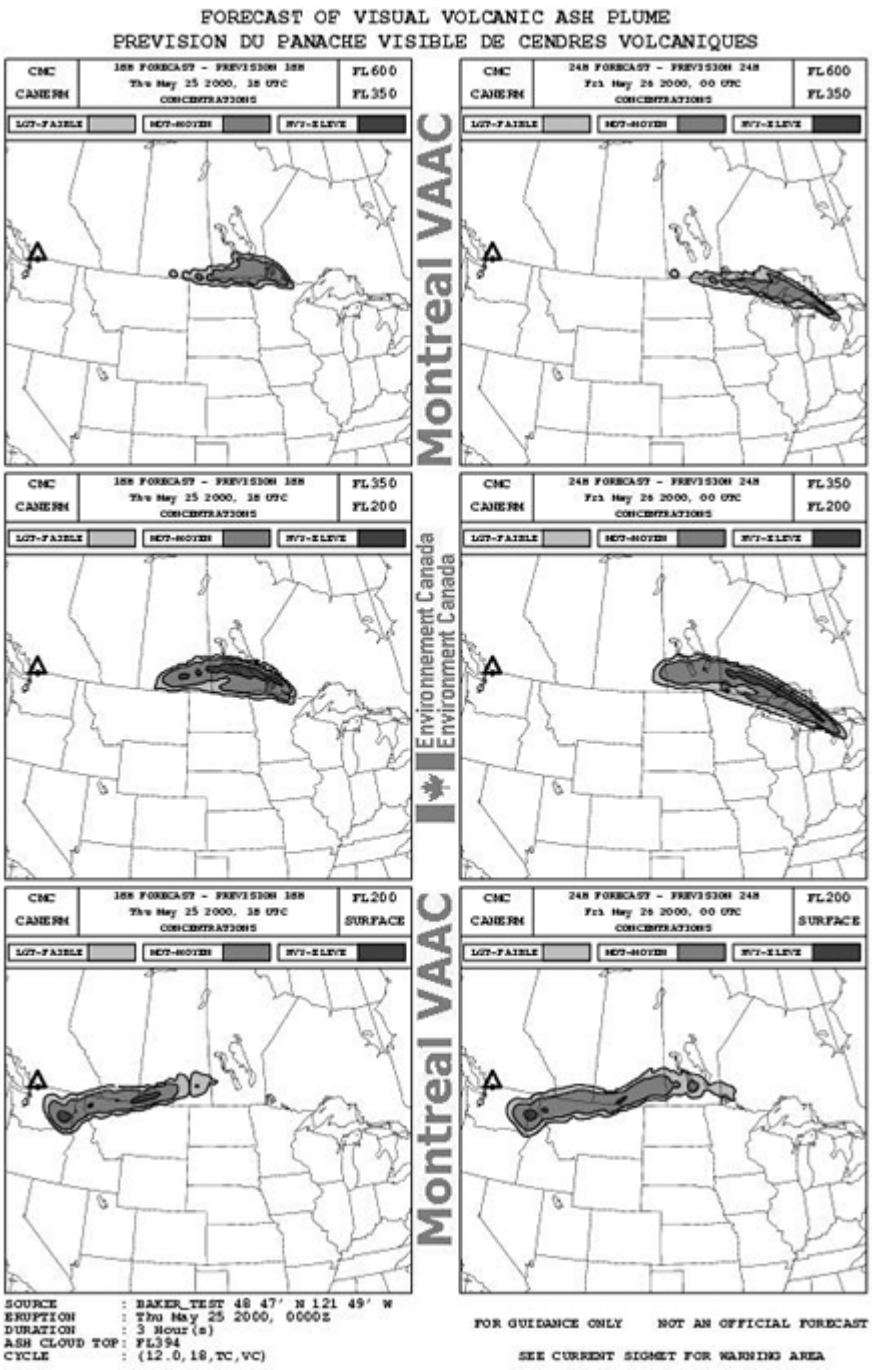
(b) **Description**: Each prognostic chart consists of six panels. Each panel depicts the average ash density forecast for an atmospheric layer at a specific time. The layers are surface to FL200, FL200 to FL350, and FL350 to FL600. The first chart depicts a 6 and 12 hour prognostic; the second extends the forecast out to 18 and 24 hours. Additional charts covering a time period of up to 72 hours ahead may sometimes be produced.

The location of the volcano is indicated by the symbol "s". The average volcanic ash density in the atmospheric layer is depicted as light, moderate or heavy. The isolines are for 10, 100 and 1000 micrograms per cubic metre. The areas between the isolines are enhanced as follows:

10 – 100	Light stippling (LGT)
100 – 1000	Dark stippling (MDT)
> 1000	No enhancement (HVY)

CAUTION: Users are reminded to consult the latest SIGMET for updates on the position and vertical extent of the volcanic ash warning area. Even light (LGT) concentrations constitute a potential danger to aviation. Turbine engine flameouts have been attributed to light volcanic ash clouds located up to 1 000 NM from the source (see AIR 2.6).

Example of a Forecast of Visual Volcanic Ash Plume



Last updated: Important Notices