Atmospheric Environment Service
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Dear Weather Net Member;

Enclosed is some information which you should find useful in making and reporting your weather observations for the Ham Radio Weather Network. Once again I would like to thank you for your participation in this program. The information which you provide to our office is very valuable to the forecast program and will definitely have a positive impact on the quality of forecasts.

Happy New Year! Best of luck and have fun with your new Ham Radio Weather Network.

Sincerely,

Richard Fleetwood
Supervisor

Procedures for Taking Weather Observations on the Ham Radio Weather Net

When taking weather observations for use in the forecast office it is important that certain procedures are followed so that the reports are reliable. In this set of instructions I will give some guidelines for setting up the equipment and taking observations. Each of you are encouraged to follow these guidelines as much as is possible.

1. Estimating Amount of Cloud Cover

Mentally divide the sky in halves and estimate the total amount of sky covered in 10ths by all layers of cloud. For example if the sky is mostly cloud covered in the north with very little cloud in the south then divide the sky into a northern half and a southern half then estimate the amount of sky that is covered.

2. Observing the Weather

2.1 Liquid Precipitation

2.1.1 Drizzle is composed of fine drops of liquid water that appear to almost float in the air. It generally falls from a continuous layer of dense low cloud which often times touches the ground (Fog).

2.1.2 Rain composed of larger drops than drizzle and do not appear to float in the air. Can fall from low or middle based cloud.

2.1.3 Rain Showers have similar size drops to rain but showers usually occur in periods of short duration, 15 minutes or so but can last much longer. Usually there are rapid fluctuations in the intensity with a noticeable brightening of the sky between showers. Showers fall from bumpy (cumulus) type cloud.

2.1.4 Thunderstorms are local small scale storms which are characterized by very bumpy (cumulonimbus) clouds of considerable vertical extent often with white flat tops. It is always accompanied by thunder and lightening and usually with strong gusts of wind, heavy showers and sometimes hail. Sometimes lightening can be seen but without the sound of thunder due to local noise levels. In addition thunder can be heard without seeing the lightening because it may for example be obscured by other clouds. Lightening causes thunder so one cannot occur without the other.

2.1.4.1 Tornadoes and/or Waterspouts can be observed with severe thunderstorms. These phenomenon are quite rare. They are characterized by violently rotating vertical column of air appended to the main thunderstorm cloud base. This violent whirlwind is observable as a narrow cloud column which touches the surface of the earth and is composed of water droplets, dust, sand or litter raised from the ground or just water droplets when over water. The

phenomenon is called a waterspout when over a water surface or a tornado when observed over the land.

2.2 Freezing Precipitation

2.2.1 Freezing Drizzle liquid drizzle drops which freeze on impact with the ground or other objects and forms an ice layer.

2.2.2 Freezing Rain liquid rain drops which freeze on impact with the ground or other objects and forms an ice layer.

In most cases the measured air temperature is at or below freezing when freezing precipitation occurs.

2.3 Frozen Precipitation

2.3.1 Snow is composed of star shaped ice crystals. At temperatures above -5°C the crystals are generally clustered to form larger snow flakes. Snow can fall at temperatures as much as 5°C above zero.

2.3.2 Snow Pellets are composed of white and opaque small spherical particles of ice which often bounce and break up when they hit the ground. They are usually showery in nature, ie fall from bumpy (cumulus) clouds and occur in periods of short duration with rapid changes in intensity.

2.3.3 Snow Grains are composed of very small white and opaque grains of ice that are usually flat or elongated. They do not bounce or shatter when they hit the ground. They fall from low cloud which may or may not touch the ground and are never showery in nature.

2.3.4 Ice Pellets are composed of small transparent or translucent pellets of ice usually spherical in shape. They usually bounce when hitting hard ground and make a sound on impact. Ice pellets usually fall in the form of continuous precipitation ie. not showery in nature.

2.3.5 Hail composed of spherical piece of almost exclusively transparent ice greater than 5 mm in diameter. Generally observed during heavy thunderstorms in the spring to fall period.

When precipitation is reported it should be reported with an and indication of the intensity. Precipitation should be reported as light, moderate or heavy. You can subjectively estimate the intensity based on your own experience of the varying ranges of intensity that you have seen.

2.4 Obstructions to Visibility

2.4.1 Fog is composed of very small water droplets which are suspended in the air and which reduce visibility at ground level. Another type of fog known as **Ice Fog** is composed of tiny ice particles. It usually occurs under clear skies and light winds when the temperature is below minus 30°C.

2.4.2 Blowing Snow when snow on the ground is raised by the wind to sufficient height to cause reduced visibility at eye level. Blowing snow may or may not occur with falling snow.

2.4.3 Liquid, Freezing or Solid Precipitation will cause a reduction to visibility.

An estimate of visibility should be made whenever possible. The visibility can be determined by selecting a view where objects can be viewed at a distance against the horizon. By knowing the distance to these objects you can make and estimate of the visibility. Visibility should be reported in miles as follows <1/2, 1/2, 1, 2, 3, 4, 5, 6, 6+. If desired a subjective estimate of visibility can be made and reported as **good, fair** or **poor** based on your own experience and the varying ranges of visibility that you have seen.

3. Temperature

3.1 Current Temperature

Measure the current temperature to the nearest .5°C on your thermometer. Hold the thermometer as far from your body as is consistent with making an accurate reading and at 90 degrees to your line of sight with the top of the mercury in the thermometer. Temperature can also me measured with an electronic digital thermometer.

3.2 24 Hour Maximum and Minimum Temperature

The maximum and minimum temperatures which occurred in the preceding 24 hours can be measured using special mercury thermometers known as Maximum and Minimum Thermometers or with an electronic digital thermometer. In each case follow the instructions which come with your equipment.

All thermometers should be located properly so that the readings are reasonably accurate and consistent. Thermometers should be placed at a height of between 1 and 2 meters above a flat surface and located far enough from heated buildings such that the measurement will not be affected. Generally it should be located at a distance of at least 2 times the height of the building. For example if your house is 5 metres high the thermometer should be at least 10 metres from your house. The thermometer should not be

exposed to direct sun light as this will cause large errors in the measurement. For anyone who is interested, a device called a Stevenson Screen can be built or purchased to house the thermometers. This will allow you to make very accurate measurements of temperature, more accurate than we require. Please contact me at the office if you are interested in obtaining more information about building or purchasing a Stevenson Screen. As a suggestion a good place to locate your thermometers would be on the north side (True North) of a post or unheated building 30 feet or so from the house at a height of 1 to 2 metres.

4. Wind Speed and Direction

This is one of the least important weather observations because early in the morning winds are generally calm and not particularly representative of what they will be a few hours later. For anyone who does not have wind measuring equipment I would recommend that you not purchase any except for your own interest. Subjective reports of wind direction and speed are all that is necessary for you to give.

Wind direction is the direction with respect to True North from which the wind is blowing. The direction can be reported as one of 8 points on the compass ie. North, Northeast, East, Southeast, South, Southwest, West and Northwest. The direction can be judged by looking at a wind vane, a wind cone, the drift of smoke or by facing directly into the wind.

Wind speed can be reported in knots, miles per hour or kilometres per hour or subjectively as calm, light, moderate or strong based on your own experience with the variability of wind in your area. For those who have wind velocity instruments the reported speed should be the average speed over a two minute period. Follow the directions for installing and correctly locating your equipment. Wind speed can also be estimated by observing its effect on the environment around you. This is known as the Beaufort Scale of Wind Measurement. The attached copy of the scale can be used to estimate the wind speed in knots. One knot is very close to one mile per hour.

Wind speeds and directions should be measured in open areas well away from buildings and other obstacles that will affect the direction and speed of the wind.

5. 24 Hour Precipitation Amounts

Liquid precipitation amounts over a 24 hour period should be measured with a rain gauge and reported in millimetres. Precipitation to be measured with the rain gauge includes Rain, Drizzle, Freezing Rain and Freezing Drizzle. Small amounts of precipitation which are too small to be measured with the rain gauge should be reported as a **trace**. If freezing precipitation freezes in the funnel of the rain gauge bring it inside to melt the

frozen liquid then take the measurement.

Frozen Precipitation amounts over a 24 hour period should be measured with a ruler and reported in centimetres. Solid precipitation to be measured in this way includes Snow, Snow Pellets, Snow Grains and Ice Pellets. The 24 hour solid precipitation amount is determined by measuring the amount of newly fallen snow. This can be determined by sweeping clean an area on the ground after each time a measurement has been taken. Take your measurement in several locations and then determine an average snow amount from the measurements. If the snow has drifted, measure the depth of snow in the drifted and exposed areas and then estimate the amount of snowfall that would have resulted had no drifting occurred.

When a **mixture of rain and snow** falls or snow falls and then turns to rain it is desirable to report the snowfall and rainfall amounts separately. This can be done by melting the snow that has fallen into the rain gauge by bringing it indoors. This will give the total amount of liquid and equivalent solid amounts of precipitation in millimetres. Make an estimate of the amount of snow in centimetres that fell before melting occurred. Convert the snowfall amount into its water equivalent in millimetres. This is quite easy. For example 5 cm of snow has a liquid equivalent of 5 mm or in other words if 5 cm of snow had fallen as rain the rainfall amount would be 5 mm. Subtract the water equivalent of the snowfall from the total amount in the rain gauge. This gives the amount of liquid precipitation that fell. Here is an example that should make this a little clearer. You determine that about 5 cm of snow fell last night before turning to rain. You check the total liquid contents of your rain gauge after melting a small amount of snow that still remains in the funnel of the gauge. The total amount you measure is 10.0 mm. The amount of snow that has fallen is 5.0 cm which is equal to 5.0 mm of rain. The total amount of rain is then equal to 10.0 mm - 5.0 mm = 5.0 mm of rain. You then give your report as 5.0 mm of rain and 5.0 cm of snow.

That is all the information that we require from you. If you have no weather observing equipment except for a thermometer it is perfectly alright to report only the information which you can give. Any information, as along as it is reasonably accurate is quite useful to us in the forecast office.

For anyone who is interested in purchasing some equipment, I will be forwarding some brochures from a company in Nova Scotia that supplies good quality instruments. Some of the instruments like rain gauges can be purchased for a little as $20.00.

7.6 BEAUFORT SCALE OF WINDS

Descriptive Term	Beaufort Force	Speed Range	Knots Average	Specification for Estimating Speed
Calm	0	Less Than 1		Smoke rises vertically.
Light Air	1	1–3	2	Direction of wind shown by smoke drift but not wind vanes.
Light Breeze	2	4–6	5	Wind felt on face; leaves rustle; ordinary vane moved by wind.
Gentle Breeze	3	7–10	9	Leaves and small twigs in constant motion; wind extends light flag.
Moderate Breeze	4	11–16	14	Raises dust and loose paper; small branches are moved.
Fresh Breeze	5	17–21	19	Small trees in leaf begin to sway; crested wavelets form on inland waters.
Strong Breeze	6	22–27	25	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.
Near Gale	7	28–33	31	Whole trees in motion; inconvenience felt in walking against wind.
Gale	8	34–40	37	Breaks twigs off trees; generally impedes progress.
Strong Gale	9	41–47	44	Slight structural damage occurs, e.g., to roofing shingles, TV antennae, etc.
Storm	10	48–55	52	Seldom experienced inland; trees uprooted; considerable structural damage occurs.
Violent Storm	11	56–63	60	Very rarely experienced; accompanied by widespread damage.
Hurricane	12	above 63		

Weather Reporting Codes

The following is a list of codes you can use to make your weather report for the Weather Net. When possible these codes should be used when you give your weather report to the Weather Net Controller. As a suggestion it would be a good idea when you go out to make your observation to write it down using the codes, then you can pass the coded information directly to the Net Controller. The codes will make it easier and quicker for the Net Controller to collect the information and pass it on to the forecast office. Have your coded report ready before you pass on the information.

1. Cloud Cover

Cloud should be reported in **10ths.** For example if half the sky is covered with cloud report it as **5/10ths.**

2. Precipitation

Precipitation should be reported with the appropriate code followed by an intensity indicator. For light intensity the code is followed by a minus sign (-), for heavy intensity the code is followed by a plus sign (+) and for moderate intensity just report the precipitation code. For example the code for rain is **R.** Light rain is coded as **R-**, heavy rain as **R+** and moderate rain as simply **R.** Other codes for precipitation follow. Remember to include the appropriate intensity code with each one.

Phenomenon	**Code**
Drizzle	**L**
Rain	**R**
Rain Showers	**RW**
Thunderstorm	**TRW**
Freezing Drizzle	**ZL**
Freezing Rain	**ZR**
Snow	**S**
Snow Pellets	**SP**
Snow Grains	**SG**
Ice Pellets	**IP**
Hail	**A**

Tornado or Waterspout: **Please Phone the Office Collect at (506) 451-6009 or 451-6011.**

If you are unsure of the precipitation type just make your best guess, we will usually be able to tell what type of precipitation you are getting from other reports in the area and our knowledge of the current weather situation.

3. Obstructions to Visibility

These are coded without an intensity indicator.

Phenomenon	**Code**
Fog	**F**
Blowing Snow	**BS**
Haze	**H**

Report the **visibility** in miles. Your reported visibility should fall into one of the following categories:
<1/2, 1/2, 1, 2, 3, 4, 5, 6, 6+.

It should be noted that more than one type of precipitation and/or obstruction to visibility are possible at one time. For example it is not uncommon to have a mixture of rain drizzle and fog. In this case your reported weather could be **R-L-F.**

4. Temperature

Reported the Maximum, Minimum and Current temperature in Degrees Celsius to the nearest .5°C. No special codes are required.

5. Wind Speed and Direction

Report the speed in kilometres per hour, miles per hour or knots. Specify the direction as per the information sheet ie. the eight points of the compass. No special codes are required.

6. Precipitation Amounts

Report liquid amounts in millimetres and solid amounts in centimetres. No special codes are required.