



Storm Spotter Pocket Guide

Las Vegas

Spotter Number
1-800-240-4932

General Reporting Procedures

Remember, if you see something weather-related that is unusual or out of the ordinary, the NWS would probably like to know!

- **IDENTIFY yourself and your location** – county and spotter number or name.
- **WHAT you have seen** – funnel cloud, heavy rain, etc.
- **WHERE you saw it** – direction and distance.
- **WHEN you saw it** – note the time it began and ended.
- **WHAT it was doing** – size and intensity, or any damage caused.



What to Report:

- ☑ **TORNADO** - Circulation in contact with the ground.
- ☑ **FUNNEL CLOUD** - Circulation NOT in contact with the ground.
- ☑ **WIND** - Causing damage (such as broken tree limbs or power lines) or greater than 40 MPH.
- ☑ **HAIL** - Any size. Remember to specify the largest stone.
- ☑ **THUNDERSTORMS** - With high winds and frequent cloud to ground lightning.
- ☑ **RAINFALL** - 1/4 of an inch or more per 1/2 hour, or any cumulative total over 1/2 inch.
- ☑ **FLOODING** - of ANY kind! Is the water rising or falling? Flowing or standing?
- ☑ **VISIBILITY** - Under 1/2 mile, caused by anything.
- ☑ **SNOWFALL** - Accumulating one inch or more per hour, or any depth on desert floors. What is your elevation?
- ☑ **ICING** - on road surfaces caused by anything.

High Winds

(Criteria- sustained winds over 35 MPH, gusts over 50 MPH, trees/powerlines knocked down, damage to homes, etc);

- If you don't have a weather station:
 - What is the Beaufort wind scale wind speed and corresponding number of the strongest wind you have observed? (SEE TABLE on page to the right)
- If you have a weather station:
 - What is the average wind speed right now (averaged over a minute)?
 - How high has it been gusting to in the past 10 minutes?
 - What is the highest gust that has taken place? And the time?
 - What is the average wind direction?
- Both:
 - Have you had any wind damage?
 - trees, branches, blown down and rough diameter of the tree branch? Any structural damage to surrounding buildings?
 - Have you heard of any damage or power outages elsewhere in your area and/or neighborhood?

Heavy Rain

(Criteria- 1/4 of an inch or more per 1/2 hour, or any cumulative total over 1/2 inch);

- How much rain has accumulated?
- Over what time period have you measured it (from when to when)?
- Is it still raining? And how hard is it raining (light, moderate, heavy)?
- Is there any flooding in or around your area?
- Have you heard of any damage from flooding? Any roads flooded?
- Have you heard of any mudslides or landslides?

Wind Force#	Description of Wind	Wind Effect Locally	Speed MPH
0	Calm	Smoke rises vertically.	1 mph
1	Light Air	Direction of wind shown by smoke drift, but not by wind or weather vanes.	1-3 mph
2	Light Breeze	Wind felt on face, leaves rustle, wind or weather vanes move.	4-7 mph
3	Gentle Breeze	Leaves and small twigs in constant motion, wind extends light flags.	8-12 mph
4	Moderate Breeze	Wind raises dust and loose paper, small branches move.	13-18 mph
5	Fresh Breeze	Small trees in leaf begin to sway.	19-24 mph
6	Strong Breeze	Large branches in motion, umbrellas used with some difficulty.	25-31 mph
7	Near Gale	Whole trees in motion, becoming difficult to walk against wind.	32-38 mph
8	Gale	Twigs break of trees, progress is impeded.	39-46 mph
9	Strong Gale	Slates and tiles may be blown off, other slight structural damage.	47-54 mph
10	Storm	Trees uprooted; considerable damage to buildings.	55-63 mph
11	Violent Storm	Widespread damage	64-72 mph
12	Hurricane	Severe destruction	≥ 73 mph

HAIL

(Criteria- 1 inch or larger):

- How big is the hail (diameter in inches?)

For more details see page to the right

- When did it start?
- Is it still hailing?
- If it is not hailing at the moment, when did it stop?
- Have you heard any thunder?
- Have you had any strong winds?
- Do you see any rotation in the clouds?

Lightning

(Criteria- Frequent: 4 or more per minute cloud-to-ground strikes):

- How frequent has the lightning been?
- Is it still going on right now, or did it end awhile ago?
- Where is the thunderstorm from where you are?
- Which direction is the thunderstorm moving?
- Have you had any hail? Heavy rain? Strong winds?
- Do you see any rotation in the clouds?

HAIL

- Hail is considered severe when it reaches 1" (or quarter size).
- Large hail in the southwest is a rare occurrence, but some storms in the area have produced hail of quarter-size or greater.
- When reporting hail, use the largest size seen.
- Report the actual size of the hail and not the descriptor.

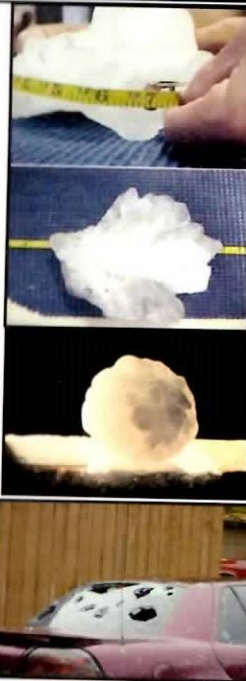
RULER LOCATED ON BACK OF GUIDE

Non-Severe Hail

Pea	1/4"
Mothball	1/2"
Dime	5/8"
Penny	3/4"
Nickel	7/8"

Severe Hail

Quarter	1"
Half-Dollar	1 1/4"
Ping-pong Ball	1 1/2"
Golf Ball	1 3/4"
Tennis Ball	2 1/2"
Softball	4 1/2"



Flooding

(Criteria- flooding of any kind):

- Where is the flooding?
- Are waters rising or falling? Flowing or standing?
- How deep is the water (don't measure, be safe and just estimate it)?
- Are there any roads flooded?
- Are there any mudslides or rock slides?
- Is there any damage from the flooding that you are aware of?

Snowfall

(Criteria- Accumulating one inch or more per hour, or any depth on desert floors. Knowing your elevation is very helpful):

- For New Snow Events:
 - How much snow is on the ground in inches (for new events?)
 - When did the snow start and stop? Exact times?
 - What elevation are you located at?
 - Is it still snowing?
 - How hard is it snowing?
 - What is the current temperature?
 - What is the current dew point temperature (if you have a weather station)?
- For on-going snow events where you already had old snow on the ground:
 - How much *NEW* snow have you had?
 - What is your total snow depth?
 - How hard is it snowing?
 - What is the current temperature?
 - What is the current dew point temperature (if you have a weather station)?

How to Measure Snow

❖ **Snowboard:**

- ❖ a piece of plywood or flat plastic board painted white. A snowboard should be about 2 feet wide by 2 feet long and about a half of an inch thick.
- ❖ Snowboards should be cleaned off after each observation of snowfall is taken and set level on top of the existing snow surface.
- ❖ A small flag may be needed to locate the snow board if more than a foot of snow is expected.

❖ **Measuring tool:**

- ❖ A metal ruler or yardstick is best since it can be pushed into the snow easier. If you live in an area that gets snowfall totals over a foot frequently, a yardstick is suggested.
- ❖ At some official cooperative weather stations, observers are provided with a snow measuring stick, which is essentially a ruler with each inch divided into tenths



- ❖ Remember to measure only the amount of **new snow** that has fallen on the ground.

- ❖ This can be at a set time once a day or since the start time of the snow event.
- ❖ Snow does settle and melt with time, so try to **take a measurement once every six hours.**
- ❖ If you measure all the snow on the ground, including old snow, this is not snowfall but rather **snow depth.**

- ❖ Measurements should be taken on a **snowboard.**
- ❖ If you don't have a snowboard, use a level surface of dirt or grass.
- ❖ **Do not measure snow** on paved surfaces, sidewalks or gravel surfaces. These are sources of heat and will cause snow to be under measured.
- ❖ Snow should be measured in an area as far away as possible (at least 20 feet) from obstructions such as buildings, trees and fences.
- ❖ Watch for areas where snow has drifted.
- ❖ In events where drifting took place, measure the snow in several spots (not including large drifts) to obtain an average reading.
- ❖ Avoid measuring snow in areas where human or animal activity has disturbed the snowpack.

Types of Weather During the Mature Stage

- ✓ **Tornado** – A violent rotating column of air attached to a thunderstorm and *in contact with the ground*.



- ✓ **Funnel Cloud** – A rotating, funnel shaped cloud extending downward from the base of a thunderstorm, *not touching the ground*.



- ✓ **Flash Flood** – A rapid rise in water usually associated with moderate to heavy rains.



- ✓ **Downbursts** – A strong downdraft with an outrush of damaging winds on or near the ground. Swath of damaging winds less than 2.5 miles is a microburst, 2.5 miles or greater is a macroburst.



- ✓ **Strong Winds** - Wind gusts of 58 mph or greater is considered severe.

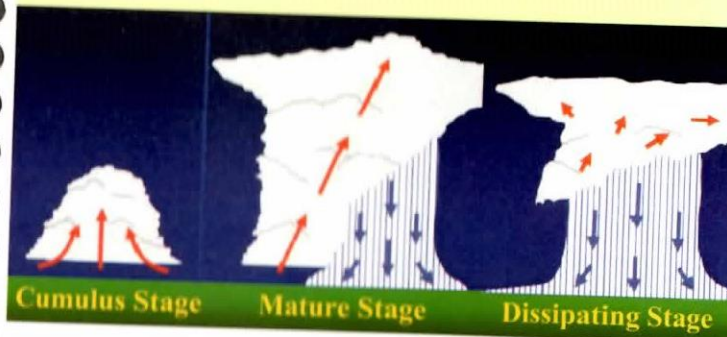


- ✓ **Hail** – Hail at least 1 inch in diameter is considered severe.

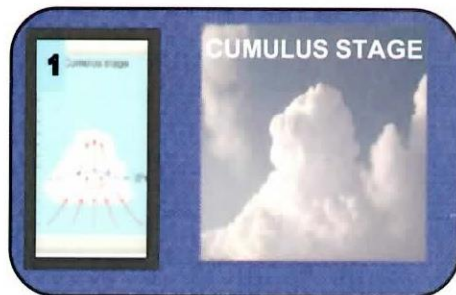


THUNDERSTORM INGREDIENTS

- Ample supply of moisture to form clouds
 - Gulf of California – Local Monsoon (typically begins second week of July through mid September).
 - Pacific Ocean.
- Lift
 - Differential Heating (heat from the sun).
 - Orographics.
 - Frontal Boundaries/Drylines.
- Sufficient Instability
 - When an airmass is given an initial push upwards, it will continue accelerating upwards in that direction without additional force.

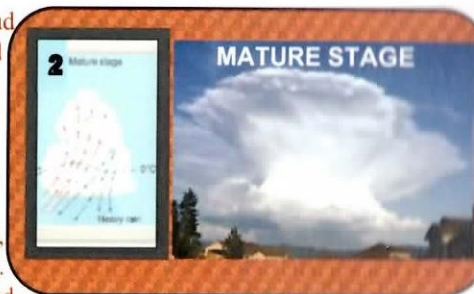


During the *cumulus stage*, strong updrafts act to build the storm. The *mature stage* is marked by heavy precipitation, strong updrafts, and some cool downdrafts in part of the storm. When the warm updrafts disappear completely, precipitation becomes light and the cloud begins to evaporate marking the *dissipating stage*.

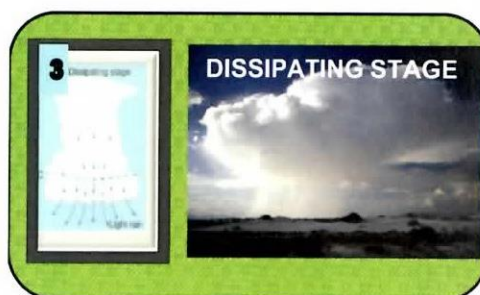


- Towering cumulus cloud indicates rising air.
- Usually little (if any) rain occurs during this stage.
- Lasts roughly 10-15 minutes.
- Occasional lightning can be observed.

- Cumulonimbus cloud
- The top of the cloud takes on the familiar anvil shape.
- At its base, it is several miles in diameter.
- Contains heavy rain, thunder, and lightning.
- Produces strong wind gusts at the surface.



- Storm is dominated by the downdraft.
- Occurs approx. 20-30 minutes into the life of the thunderstorm.
- The cool air carried to the ground by the downdraft cuts off the inflow.
- Updraft disappears, storm dissipates.



- **Single Cell Storms**- Typically last 20-30 minutes and can produce severe weather elements (not shown).
- **Multicell Cluster Storms (1)**- A group of cells moving as a single unit, with each cell in a different stage of the thunderstorm life cycle.
- **Multicell Line Storms (2)**- Consist of a line of storms with a continuous, well developed gust front at the leading edge of the line. Also known as squall lines.
- **Supercells (3)**- Defined as a thunderstorm with a rotating updraft. The strongest of all thunderstorm types.



Flash Flood Safety Tips

- Flash flood season in the desert SW is typically July through September.
- Most flash flood deaths occur in cars. Never drive through floodwater.
- **TURN AROUND DON'T DROWN!!!**
- Only a few inches of floodwater can wash your car off the road. Bigger vehicles have bigger tires which makes it a better boat.
- Be especially cautious at night when it is harder to recognize the dangers of flash floods.

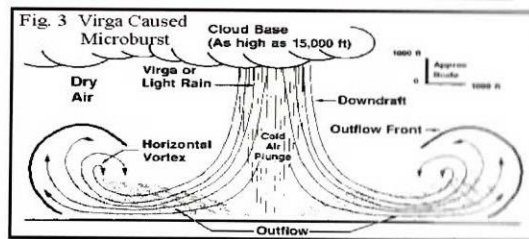
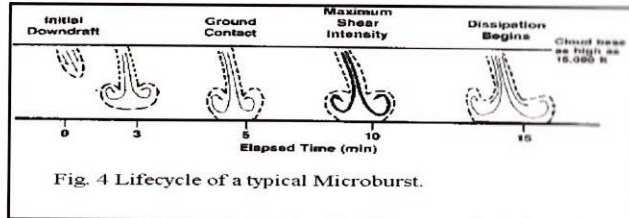


Death Valley August 15, 2004



DOWNBURSTS

- Also called Microbursts or Macrobursts depending on size of the area affected.
- Winds may exceed 130 mph.
- Visibilities may be reduced to near zero with little or no warning.
- Can be “wet” or “dry” depending on the surrounding environment.



LIGHTNING



- Lightning kills more people each year than tornadoes.
- Lightning often strikes as far as 10 miles away from any rainfall.
- You are in danger from lightning if you can hear thunder.

There are 4 different types of lightning:

1. Cloud to Ground (CG) - Most dangerous and biggest problem in the western U.S. with regards to fire
2. In Cloud (IC)
3. Cloud to Cloud (CC)
4. Cloud to Air (CA)



Lightning Safety

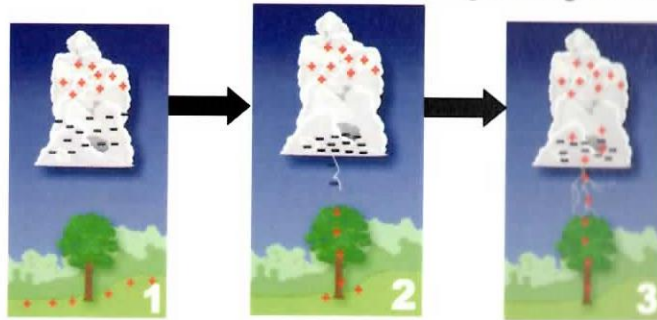
•When Thunder Roars Go Indoors!

- Postpone activities promptly. Don't wait for rain.
- Take shelter, but if you cannot then try to be the lowest point. Lightning usually hits the tallest object.
- If you can't get to a shelter, stay away from trees.
- Avoid leaning against vehicles. If no other options, seek shelter inside a hard-topped car.
- Lightning can strike up to 10 miles away from the parent thunderstorm.

• 30/30 Rule:

- Move indoors the first time you hear thunder less than 30 seconds after seeing the lightning flash.
- Stay indoors until 30 minutes after you last hear thunder.

How Does Cloud to Ground Lightning Form?



Step 1 - Electrical charges separate in the cloud.

Step 2 - Channel descends from the cloud.

Step 3 - Channel rises from an object to form a complete path for the release of charge build-up. The surge of electricity creates the visible lightning flash.

Tornadoes

- Visually stunning.
- Violently rotating.
- Extends from the parent thunderstorm to the ground.
- More than one at a time is possible.
- Tornadoes are rare, and usually “weak” here in the southwest.



Severe Weather Look-a-likes



Tail cloud with characteristic funnel shape.



Low hanging "scud" attaching to a possible non-rotating wall cloud.



Low hanging cloud, no rotation.



Low hanging cloud on the front edge of storm, wrong location for funnel cloud and no rotation.

Spotter Information: Safety

- **Never** place yourself in harm's way or danger for the sake of a spotter report.
- If possible travel & spot in pairs.
- Remain aware of the local environment at all times (overhead and behind).
- Have an escape route when threatening weather is less than 2 miles from you.
- Familiarize yourself with the spotter field guides and use them while spotting.

** Pictures are always very useful and appreciated but
DO NOT place yourself in harm's way to take them!!



Spotters Should NOT:

- ✓ Exaggerate reports.
- ✓ Falsify information.
- ✓ Take risks to observe severe weather events.



Got Pictures?

We would love to see your weather pictures! So if you have pictures you would like to share please send them to faith.borden@noaa.gov

Please include in the email:

- Your name
- The date, time, and place you took the pictures
- Written permission that we may use your pictures for instructional purposes
- Attachments of the pictures you would like to share

Why are Storm Spotters so Important?

- Radar Limitations (effectiveness decreases with distance).
- *You* help the NWS save lives and property by getting the word out on dangerous storms.
- Real-time ground based verification to satellite and radar data.
- With all the technology we now possess, ***THE TRAINED EYE OF THE SPOTTER IS OUR GREATEST ASSET!***



Look for these useful NWS products during severe weather:

✓ **Hazardous Weather Outlook** – summary of potential hazardous weather threats for the next seven days.

✓ **Short Term Forecast** – a forecast for up to two hours providing greater detail of significant weather features in your area.

✓ **Watch** – a statement detailing *potential* development of severe weather.

✓ **Warning** – product detailing specific severe weather threats at a storm-to-storm level. Severe weather is *imminent* or *occurring*.

✓ **Severe Weather Statement** – a follow-up statement to a previous warning which contains additional updated information.





What the National Weather Service does:

- Issue warnings during dangerous weather situations
- Provide support to other government agencies (fire weather and aviation to name two)
- Support local officials
- Operate NOAA Weather Radio
- Skywarn Storm Spotter Program

In short...We Protect Lives and Property!

National Weather Service:

- Federal government
- Department of Commerce
- National Oceanic and Atmospheric Administration
- 6 Regional Headquarters
- 125 Weather Forecast Offices
- 21 Central Weather Service Units
- 13 River Forecast Centers



Funnel Cloud along Interstate 15 on Thanksgiving 2008



LAS VEGAS COUNTY WARNING AREA (CWA)

- CWA is about 70,000 sq mi
- Incredibly diverse terrain
- *Highest point in the continental U.S. :*
Mt. Whitney (14,494 ft)
- *Lowest point in the US:* Death Valley, CA
(-282 ft)
- Population served: approx 2.5 million
<http://www.weather.gov/lasvegas>



American
Red Cross



Federal Emergency
Management Agency

SKYWARN

Other NWS Offices:

California:

NWS San Diego	1-858-675-8706
NWS Oxnard	1-805-988-6610
NWS Hanford	1-559-584-3752

Nevada:

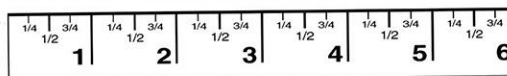
NWS Reno	1-775-673-8107
NWS Elko	1-775-738-3018

Arizona:

NWS Phoenix	1-602-275-0073
NWS Flagstaff	1-928-774-3301

Utah:

NWS Salt Lake City	1-801-524-5133
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SPOTTER HOTLINE

1-800-240-4932

