Reporting Severe Weather

Spotter ID Number ___________

CRITERIA:
• Tornado
• Funnel Cloud
• Storm Damage (deaths, injuries, broken tree limbs, shingles off roofs, etc.)
• Flooding (streets, running washes, etc.)
• Low Visibility
  - less than 1 mile due to dust, sand, fog, etc. (not rain though)
• Rotating Wall Cloud
• Heavy Rainfall
  - measured ½ inch or more accumulation in 30 minutes or less
• Hail (diameter of largest stone - any size)
• Snow (accumulating or not)
Estimating Sustained Wind Speeds with Visual Clues (Gusts will be higher)

<table>
<thead>
<tr>
<th>Speed</th>
<th>Visual Clues and Damage Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Calm wind. Smoke rises vertically with little if any drift.</td>
</tr>
<tr>
<td>1-3 mph</td>
<td>Direction of wind shown by smoke drift, not by wind vanes. Little if any movement with flags. Wind barely moves tree leaves.</td>
</tr>
<tr>
<td>4-7 mph</td>
<td>Wind felt on face. Leaves rustle and small twigs move. Ordinary wind vanes move.</td>
</tr>
<tr>
<td>8-12 mph</td>
<td>Leaves and small twigs in constant motion. Wind blows up dry leaves from the ground. Flags are extended out.</td>
</tr>
<tr>
<td>13-18 mph</td>
<td>Wind moves small branches. Wind raises dust and loose paper from the ground and drives them along.</td>
</tr>
<tr>
<td>19-24 mph</td>
<td>Large branches and small trees in leaf begin to sway. Crested wavelets form on inland lakes and large rivers.</td>
</tr>
<tr>
<td>25-31 mph</td>
<td>Large branches in constant motion. Whistling sounds heard in overhead or nearby power and phone lines. Umbrellas difficult to use.</td>
</tr>
<tr>
<td>32-38 mph</td>
<td>Whole trees in motion. Inconvenience felt when walking against the wind.</td>
</tr>
<tr>
<td>39-46 mph</td>
<td>Wind breaks twigs and small branches. Wind generally impedes walking.</td>
</tr>
<tr>
<td>47-54 mph</td>
<td>Structural damage occurs, such as chimney covers, roofing tiles blown off, and television antennas damaged. Ground is littered with many small twigs and broken branches.</td>
</tr>
<tr>
<td>55-63 mph</td>
<td>Considerable structural damage occurs, especially on roofs. Small trees may be blown over and uprooted.</td>
</tr>
<tr>
<td>64-75 mph</td>
<td>Widespread damage occurs. Larger trees blown over and uprooted.</td>
</tr>
<tr>
<td>Over 75 mph</td>
<td>Severe and extensive damage. Roofs can be peeled off. Windows broken. Trees uprooted. RVs and small mobile homes overturned. Moving automobiles can be pushed off the roadways.</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Hail Diameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot;</td>
<td>Pea Size</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>Marble Size</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>Dime/Penny Size</td>
</tr>
<tr>
<td>7/8&quot;</td>
<td>Nickel Size</td>
</tr>
<tr>
<td>1&quot; (Severe Threshold)</td>
<td>Quarter Size</td>
</tr>
<tr>
<td>1 1/4&quot;</td>
<td>Half Dollar Size</td>
</tr>
<tr>
<td>1 1/2&quot;</td>
<td>Walnut/Ping Pong Ball Size</td>
</tr>
<tr>
<td>1 3/4&quot;</td>
<td>Golf Ball Size</td>
</tr>
<tr>
<td>2&quot;</td>
<td>Hen Egg Size</td>
</tr>
<tr>
<td>2 1/2&quot;</td>
<td>Tennis Ball Size</td>
</tr>
<tr>
<td>2 3/4&quot;</td>
<td>Baseball Size</td>
</tr>
<tr>
<td>3&quot;</td>
<td>Teacup Size</td>
</tr>
<tr>
<td>4&quot;</td>
<td>Grapefruit Size</td>
</tr>
<tr>
<td>4 1/2&quot;</td>
<td>Softball Size</td>
</tr>
</tbody>
</table>

**NWS Phoenix contact info**

weather.gov/phoenix

602-275-7418
- Public phone line for obtaining routine information

austin.jamison@noaa.gov
- Storm Spotter focal point

marvin.percha@noaa.gov
- HAM radio coordinator (KI7BLU)

**Routine Skywarn NETs**
Sector 2 (Phoenix area) 442.550 MHz (PL 100.0)
The first Wednesday of the month at 8 pm

Sector 6 (Globe area) 147.200 MHz (PL 162.2)
Tuesdays 8 pm

Sector 7 (Yuma area) 146.780 MHz (PL 103.5)
Tuesdays 7 pm
Skywarn Spotter Class Study Guide

- **Ground Truth**
  - Spotters provide ground truth information of hazardous weather conditions
    - Provide critical information that only people can provide (storm damage, size of hail, tornado touchdown, visual storm clues, etc.)
    - To fill in gaps in the observation networks
  - Warning Decision Process
    - Confirm or revise existing NWS forecasts
    - Prompt the issuance of new warnings and advisories
    - Alerting the general public of weather hazards

- **Hazardous Weather Services – “Ready, Go!”**
  - **WATCH**
    - Conditions are favorable for a severe weather event in the near future (2 hours up to 48 hours).
  - **ADVISORY**
    - Weather is occurring or imminent that will cause significant inconvenience and if caution is not exercised conditions could pose a threat to life or property.
  - **WARNING**
    - Life or property threatening weather is occurring or imminent (“Severe”).

- **Staying Informed**
  - Weather.gov/Phoenix
    - Clickable map
    - Radar and satellite imagery
    - Climate data
  - NOAA Weather Radio (NWR)
    - Routine and hazardous weather forecasts 24 hours a day.
    - Special radios needed to get the broadcast. Available at electronics stores, camping equipment stores, Walmart, others.
  - Social Media
    - Facebook: [www.facebook.com/NWSPhoenix](http://www.facebook.com/NWSPhoenix)
    - Twitter: @NWSPhoenix
    - Instagram: @nwsphoenix
    - YouTube: [www.youtube.com/NWSPhoenix](http://www.youtube.com/NWSPhoenix)
  - Wireless Emergency Alerts
    - Partnership between cell phone companies, FEMA, NWS
    - Targets cell phones within the warning “box”
    - Includes Tornado, Flash Flood*, Dust Storm, Snow Squall, Hurricane, Tsunami; Amber Alerts. Doesn’t include Severe T-storm (58+ mph straight line winds and/or large hail).
• **Monsoon**
  - Key Factors
    - Heating, Complex Terrain, Moisture Fluxes
    - Not the “classic” frontal systems and jet streams
  - Definition
    - A seasonal reversal in the prevailing wind flow patterns.
    - NOT a thunderstorm that occurs in Summer.
    - Change from southwest-westerly flow aloft to east-southeasterly.

• **Thunderstorm Ingredients**
  - Moisture
    - Preferably in the lower to mid levels of the atmosphere.
  - Instability
    - Ability of air to accelerate upward = buoyancy.
  - Lift
    - Method of forcing air upward such as flow over mountains; fronts; thunderstorm gust fronts; surface heating, etc.

• **Thunderstorm Lifecycle**
  - Developing Stage
    - Start as cumulus; nearly all motion upward.
  - Mature Stage
    - Updrafts and downdrafts occurring at the same time.
    - Vertical tower, rain-free base mark the updraft.
  - Dissipating Stage
    - Updrafts weaken; downdrafts/precip more prevalent.

• **Strong Storm Characteristics**
  - Strong updraft
    - Rain-free base
    - “Hard” cauliflower updraft tower
    - Thick anvil
    - Overshooting top
    - Wall cloud (possibly)
      - Pronounced lowering attached to rain free base
      - Slow rotation may be present
      - Persistent feature
  - Strong downdraft and outflow
    - Small, heavy, rapidly-forming rain area
    - Toe/Foot/Curl formation of rain or dust
    - Shelf cloud (occasionally)
      - Wedge-shaped cloud with choppy base which marks leading edge of outflow.
      - Tends to be narrow and elongated; often in a curved manner.
  - POSSIBLE storm rotation
    - Rotating wall cloud (rare!)
• **Downbursts**
  - Terminology
    - **Downburst Definition**
      - A concentrated *severe downdraft* that induces an outward burst of *damaging winds* at the surface.
      - A microburst *is* a downburst
        - Limited areal extent up to 4 km (~2.5 mi) across.
        - A macroburst is greater than 4 km in areal extent.
  - Key mechanism: Evaporative Cooling
    - evaporation of rain falling below cloud base
    - intrusion of dry air aloft
  - Straight Line Winds
    - Wind speeds may exceed 100 mph
    - Responsible for most thunderstorm wind damage on the deserts
  - Lifecycle
    - Formation, Impact, Dissipation
  - Dry Microburst
    - Occurs when most or all of the rain evaporates from the downdraft.
    - Can cause damaging wind without any rain falling.

• **Funnel Clouds**
  - Funnel shaped cloud extending from the base of a cumuliform cloud
  - Rotation
  - Circulation not on the ground
  - Reporting funnel cloud

• **Tornadoes**
  - Violently rotating column of air in contact with the ground
  - Always associated with a cumuliform cloud
  - Reporting Tornado

• **Tornado/Funnel Cloud Identification**
  - Must have rotation!
  - If condensation does not extend all the way to the ground, look for dust/debris near the ground.
  - Watch for persistence
    - What initially looks like a funnel may turn out to be scud

• **“Imposters”**
  - Scud clouds – ragged low level clouds
  - Rain shafts, virga
  - Smoke columns
  - Steam plumes
  - Gustnadoes
    - Looks like dust devil
    - Driven by strong outflow (usually along the leading edge)
    - Moves out from under cloud base
    - No connection to cloud base (unlike a real tornado)
- **Flooding**
  - Flash flooding is life threatening – even if water is within the banks of a waterway.
  - Unbridged crossings are especially dangerous.
  - Urban and Small Stream Flood Advisories are geared for less dangerous situations.
  - Report such situations as:
    - **Flowing water covering roadway**
    - **Running washes**
      - Submerged roadway (underpasses, curb lanes, intersections)
      - Hindered traffic due to water depth
      - Water to top of sidewalk
      - Ponding in backyard (good portion of yard submerged)
      - Deep ponding in detention basins
      - Very deep puddles in parking lots (reaching car doors)
      - Rainfall heavy enough to trigger local trouble spots
  - Take note of how long it took for the situation to develop

- **Low Visibilities (Dust, Fog, etc.)**
  - Less than 1 mile
  - Estimating visibility is best done from within the dust, fog, etc.
  - Use landmarks to estimate distance.
  - Look for objects that are only partially obscured but that you can still make out some details - not furthest object that you can barely detect.
  - Tell us how widespread the low visibilities are.
  - Exception: no need to report low visibility due to heavy rain.

- **Wind Damage**
  - From any natural cause (individual thunderstorms, cold fronts, etc.)
  - Examples: tree limbs snapped, whole trees down, roof materials damaged, patio furniture blown from yard.

- **Snow/Ice**
  - Even if it is not accumulating
  - Take multiple samples of snow depth if possible
  - Let us know about road conditions (accumulating snow, ice covered roadway)

- **Spotter Report Content - Describe the Scene**
  - **Who?** (spotter ID – or name if forgotten)
  - **What?** (damage, flooding, low visibility, etc.)
    - damage: trunk/limb diameter? roof material type?
    - flooding: streets? washes? depth? ponding vs. flowing?
    - Low vis: how low (distance)? how widespread?
  - **When?** (time reportable criteria first began – or when you first observed them)
  - **Where?** (at home? elsewhere? city, major cross-streets)
  - Only report information you can confirm
  - Make sure conditions meet criteria
• **Reporting Methods**
  o Spotter only options (webpage, email, voice hotline, amateur radio).
    ▪ Specifics provided after successful quiz completion
  o Social media (Twitter, Facebook, Instagram only)

• **Amateur Radio Reports**
  o Monitor the frequency for your area
    ▪ Maricopa/Pinal Co.: 442.550 MHz (PL tone 100.0)
    ▪ Far East Valley/Southern Gila County: 147.200 MHz (PL tone 162.2)
    ▪ Southwest Arizona/Yuma: 146.780 MHz (PL tone 103.5)
    ▪ Southeast California/El Centro: 146.880 MHz (PL Tone 162.2)
  o Net Controller announces Skywarn Net activation
  o Use common radio etiquette to relay your report to the Net Controller – be prepared to provide your Spotter ID (in addition to your call sign).
  o Remember the reporting criteria
  o Be brief and to the point – no chit-chat!
  o Remember, don’t wait for the Net if you already have something to report – use one of the other methods (phone, email, web form).

• **Spotter Safety**
  o Observing and reporting during severe weather is best done from within safe shelter.
  o If you go into the field (at your own risk), always have an escape route and shelter location available. Observe from a safe distance.

• **Flooding Safety**
  o *Never drive through areas covered by running water – especially if you cannot see the road surface!*  
  o Two feet of running water can pick up and carry most vehicles (including trucks and SUVs).
  o Over half of all flash flood deaths are vehicle related.
  o **If your vehicle stalls in high water, Leave it!**

• **Lightning Safety**
  o **When thunder roars go indoors!**
  o Seek shelter immediately.
  o Stay away from trees or isolated tall objects.
  o Do not take a shower or bath due to pipes conducting electricity from lightning.
  o Avoid corded telephones and electric appliances.
  o Wait for 30 minutes after hearing the last thunder before leaving shelter.

• **Dust Storm Driving Safety**
  o **Stop and Survive!**
  o Pull off the road as far as possible and park.
  o Turn off the lights.
  o Keep foot off brake pedal.