# FAA Snow Measurement Training



# Training Objectives

In accordance with NWS Snow Measurement Guidelines, FAA Observing Staffs at designated sites should be able to:

Perform preseason checks on snow plot and equipment

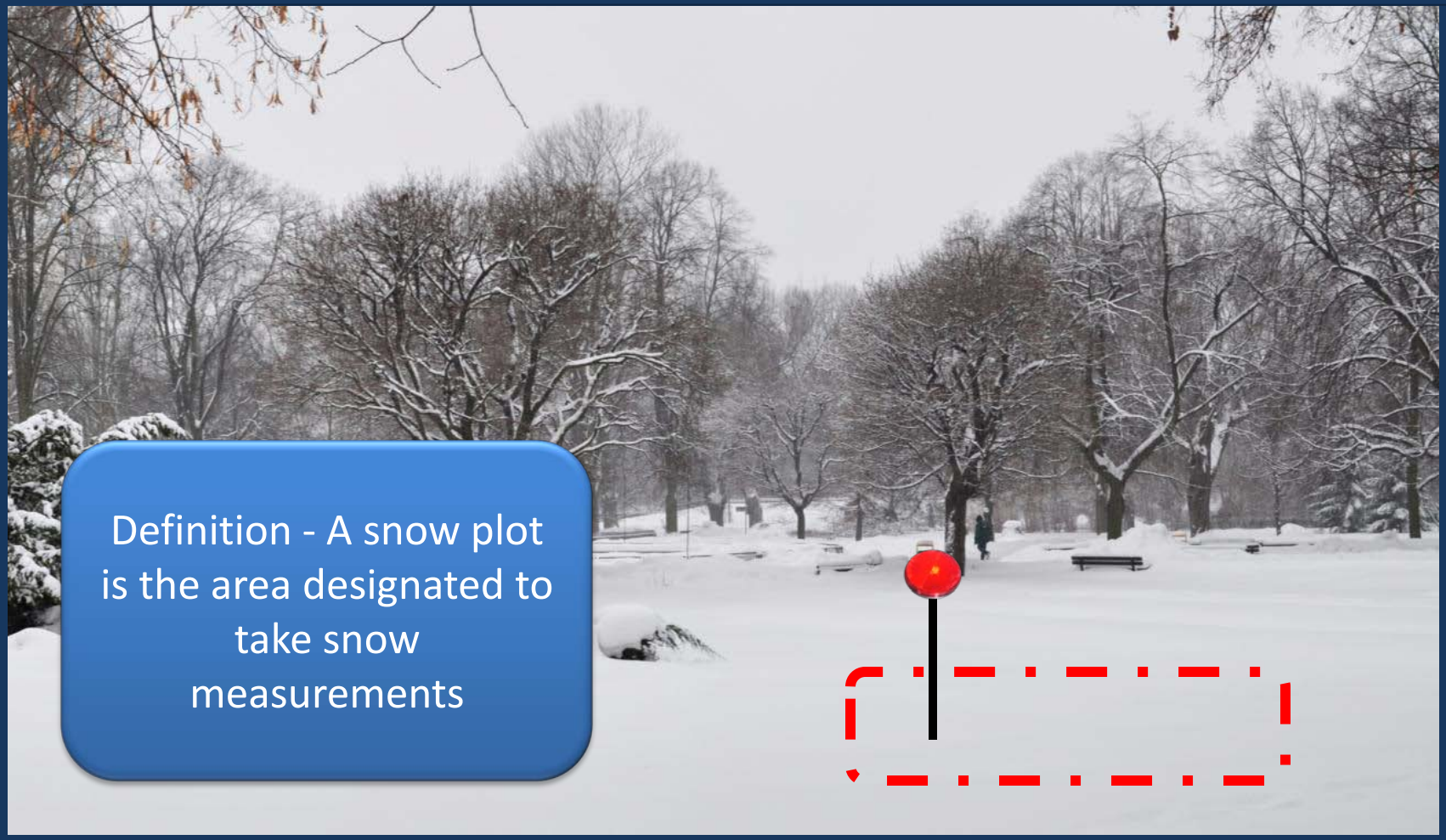
Take snow measurements

# Preseason Snow Plot and Equipment Check



# Snow Plot



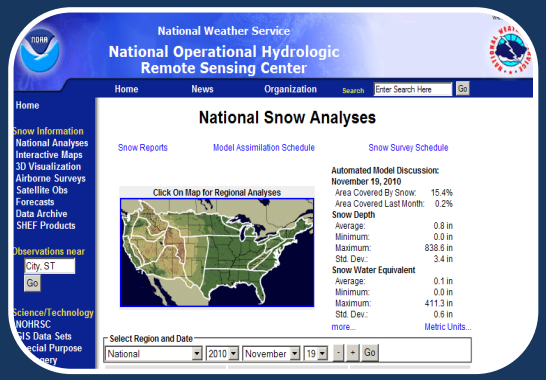

Definition - A snow plot is the area designated to take snow measurements

# Preseason Check Overview

- Station Managers should…

Evaluate the existing snow plot.

Inspect the Snow Measuring Equipment.




Coordinate with NWS on pre-season readiness.

# The Existing Snow Plot



- Changes in exposure (since last winter)
  - Structural changes (buildings, snow berms, or vehicle parking) that could affect the wind patterns in the area surrounding the snow plot
  - Ground cover changes
- Changes in observer access (since last winter)
  - Identify normal path from office to snow plot
  - Identify "heavy snow" path from office to snow plot (if applicable)
- Notify local NWS office of any significant changes to exposure or access

# Snow Plot Siting Standards



- An ideal exposure would eliminate all turbulence and eddy currents near the snow plot created by obstructions that tend to create wide variances in snowfall coverage within the plot
  - An object is considered an obstruction if the included lateral angle from the snow board to the ends of the object is 10 degrees or more.
  - Height of an obstruction should not exceed twice its distance to the snow board. Easy "rule of thumb" … "obstructions should not extend more than 30 degrees above the snow board"

# Snow Plot Siting Standards (cont.)



- An ideal location would be where the snow plot is uniformly protected in all directions, such as an opening in the middle of a grove of trees or hedgerow.
- The snow plot should be situated over relatively flat terrain with natural ground cover (i.e. grass or dirt) away from foot or road traffic, or in proximity to snow removal or snow piling activities.
- ***Snow Plots may not be located on roofs.***
- Any relocation of a snow plot needs to be closely coordinated with the local NWS office

# Snow Measuring Equipment



- Inventory and assess functionality (i.e. marks can still be read, no cracking, warping, or leaks).
  - Snow board(s)
  - Snow Measuring Stick
  - 8” and/or 4” inch rain gauges (snow water equiv.)
  - 8” rain gauge measuring stick(s)
  - Snow Stake(s)

Notify local NWS office of any problems or missing equipment.

# Preseason Review…

- What are the 3 primary factors in a preseason evaluation?
  - State of the existing snow plot
  - Status of snow measuring equipment
  - Coordination with local NWS Office
- Anything else?
  - Preseason staff review of training material

# Snow Measurement Techniques



# Snow Depth: Measuring Snow…



- is typically more difficult than measuring rainfall
- takes more time to accomplish
- Accurate and timely snow measurements can be extremely important to your local NWS Office, Air Traffic Control, Airport Facilities, Municipal Public Works , Climatologists, and other Scientists

# Snow Depth Measurement Tips



- **NOTE:** Snow is rarely uniform in coverage,
  - so take several measurements
  - and average them to obtain your total snow depth

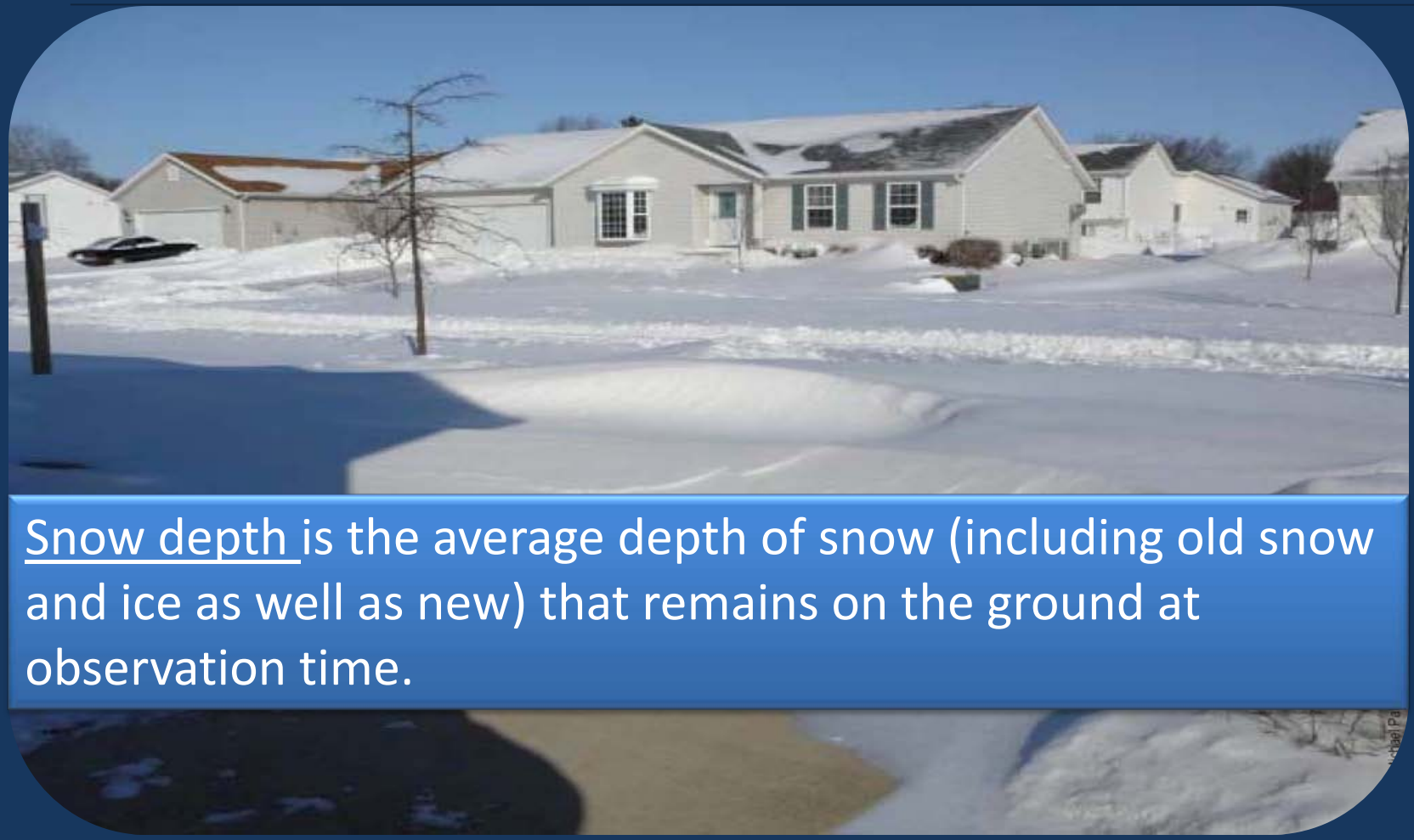
STEPS

1. Slide your snow stick through all layers of snow (new and old)
2. Read the value on the snow stick and record (values are rounded to the nearest inch)

- Don't measure "artificial accumulations", such as plowed piles (berms), large drifts, or shoveled snow

# Snow Depth Measurement (definition)





Snow depth is the average depth of snow (including old snow and ice as well as new) that remains on the ground at observation time.

# Snow Water Equivalent Measurement



# Snow Water Equivalent



## First find a representative location

- The location should have not drifted, melted, or blown clear
- For example, if you determined the total depth of the snow is 3 inches, then take your core sample from an area where the depth of snow is three inches

# Snow Water Equivalent



## Steps to cutting a core sample

Place gauge upside down and push down into the snow

Clear snow from around the gauge

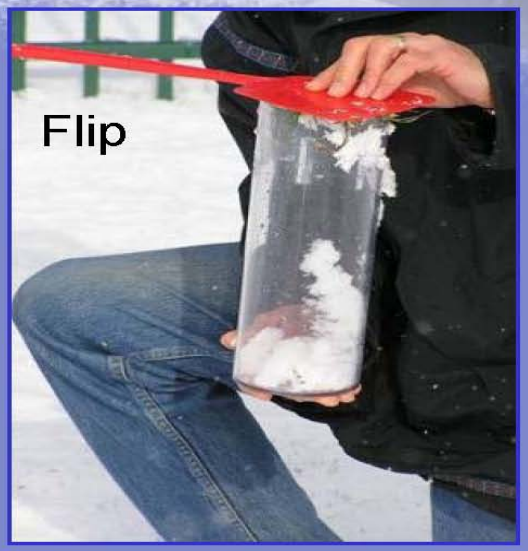
# Snow Water Equivalent



## Capturing the core


Slide snow-swatter (spatula works, too) under gauge

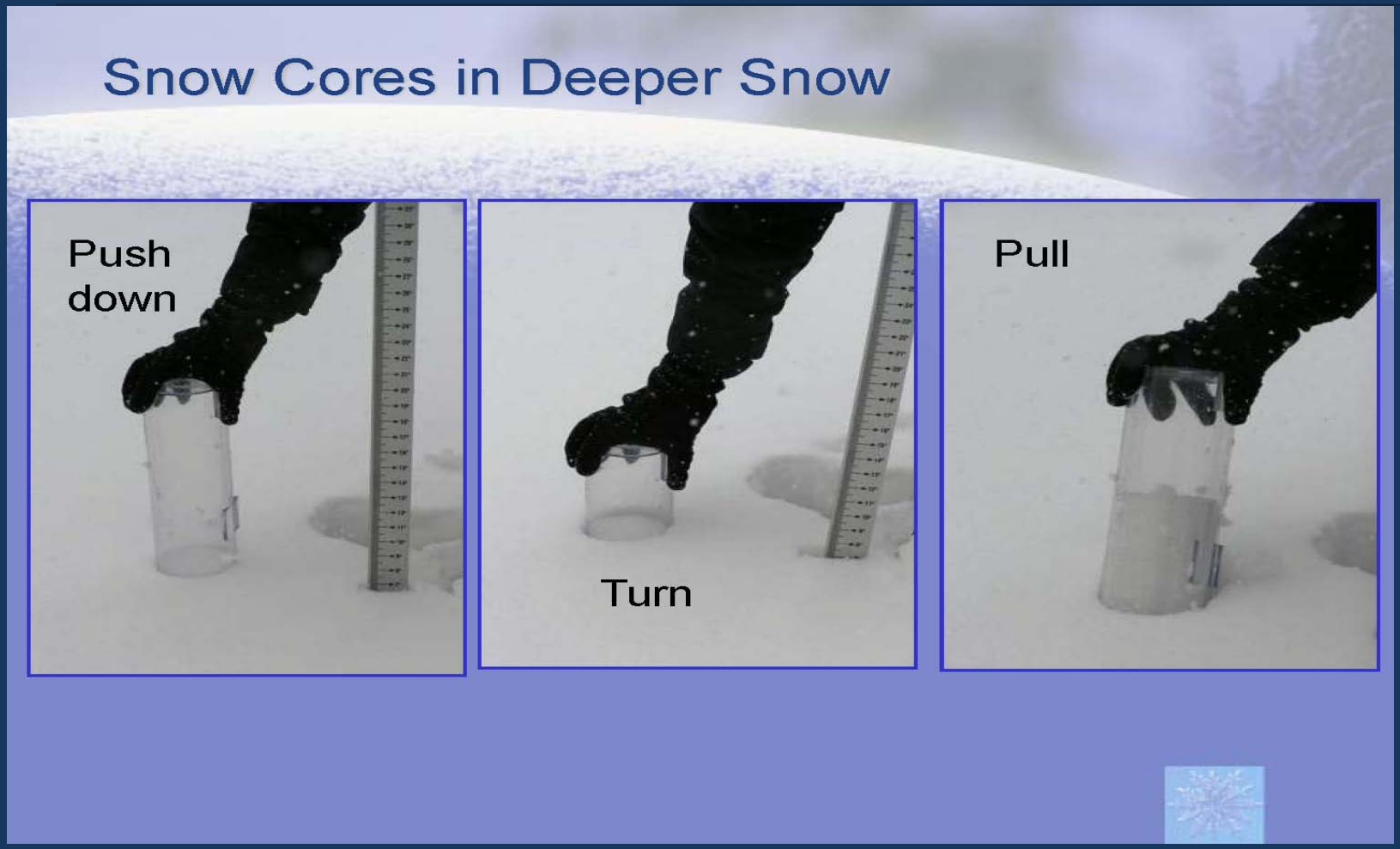

Carefully lift and get ready to flip the gauge




Bring the sample inside to melt

# Snow Water Equivalent





# Snow Water Equivalent

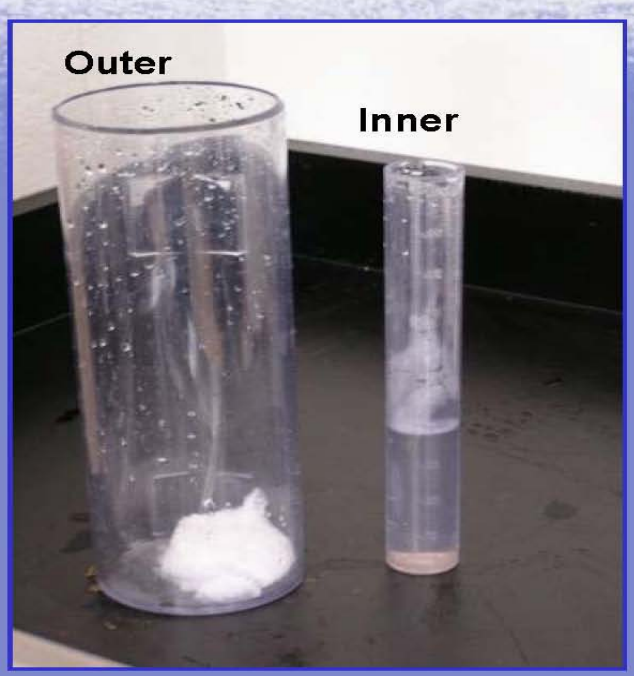


In wetter snow, the core will come out in one piece

# Snow Water Equivalent



## Melting snowfall




Notice that you have two cylinders

Add some warm water to the inner cylinder

# Snow Water Equivalent



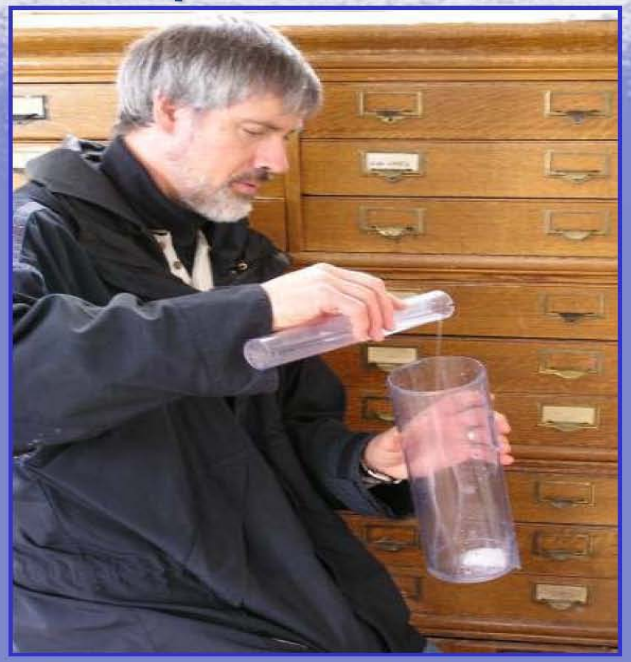
Carefully measure your tap water before adding to outer cylinder

Be sure to measure to nearest hundredth of an inch

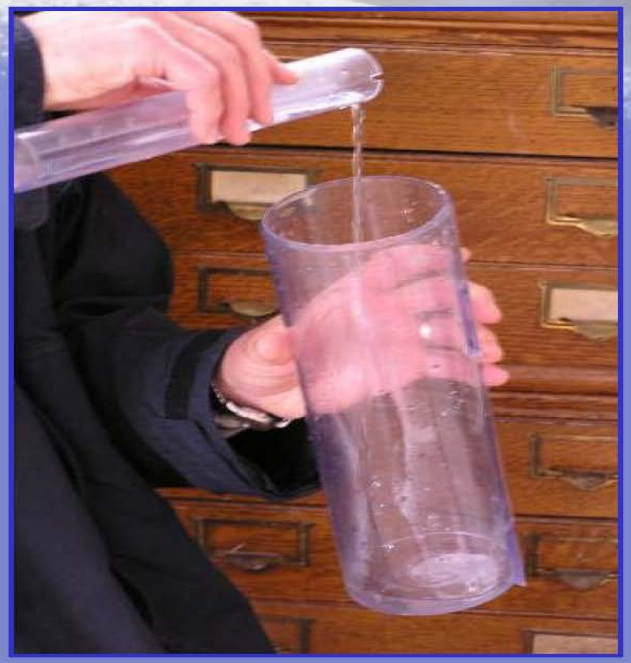
# Snow Water Equivalent



## Add the warm water to the snow sample



Pour water directly into sample



Allow sample to completely melt

# Snow Water Equivalent



## Measure the liquefied snowfall sample

Pour snow sample into smaller tube

Remember "Every drop counts!"

# Snowfall Measurements



# Snowfall Measurements



## Where to Measure

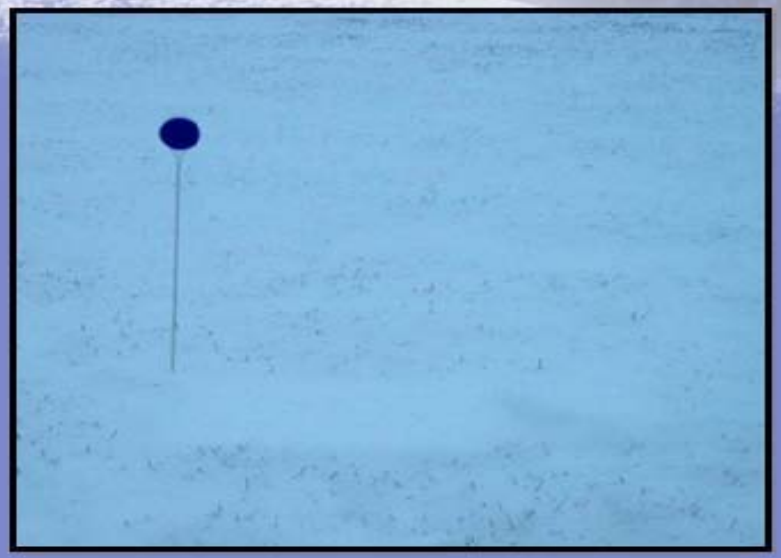
- Your snowboard should be on the ground in an area not subject to drifting

# Snowfall Measurements



## Where to Measure

- It's a good idea to mark the location of your snow board with a flag or reflector



# Snowfall Measurements



## Where to measure new snowfall

1. Find a nice, level place to measure where drifting or melting has not occurred (like a snowboard)
2. Slide snow stick or ruler into snow until it reaches the ground/board surface
3. Read value on snow stick (value is always to nearest tenth of an inch, like 3.4 inches)
4. If using snowboard, sweep it clean.

# Snowfall Measurements



## Angle of Measurement

Measure at eye level, as an angle will give you an inaccurate measurement

# Snowfall Measurements

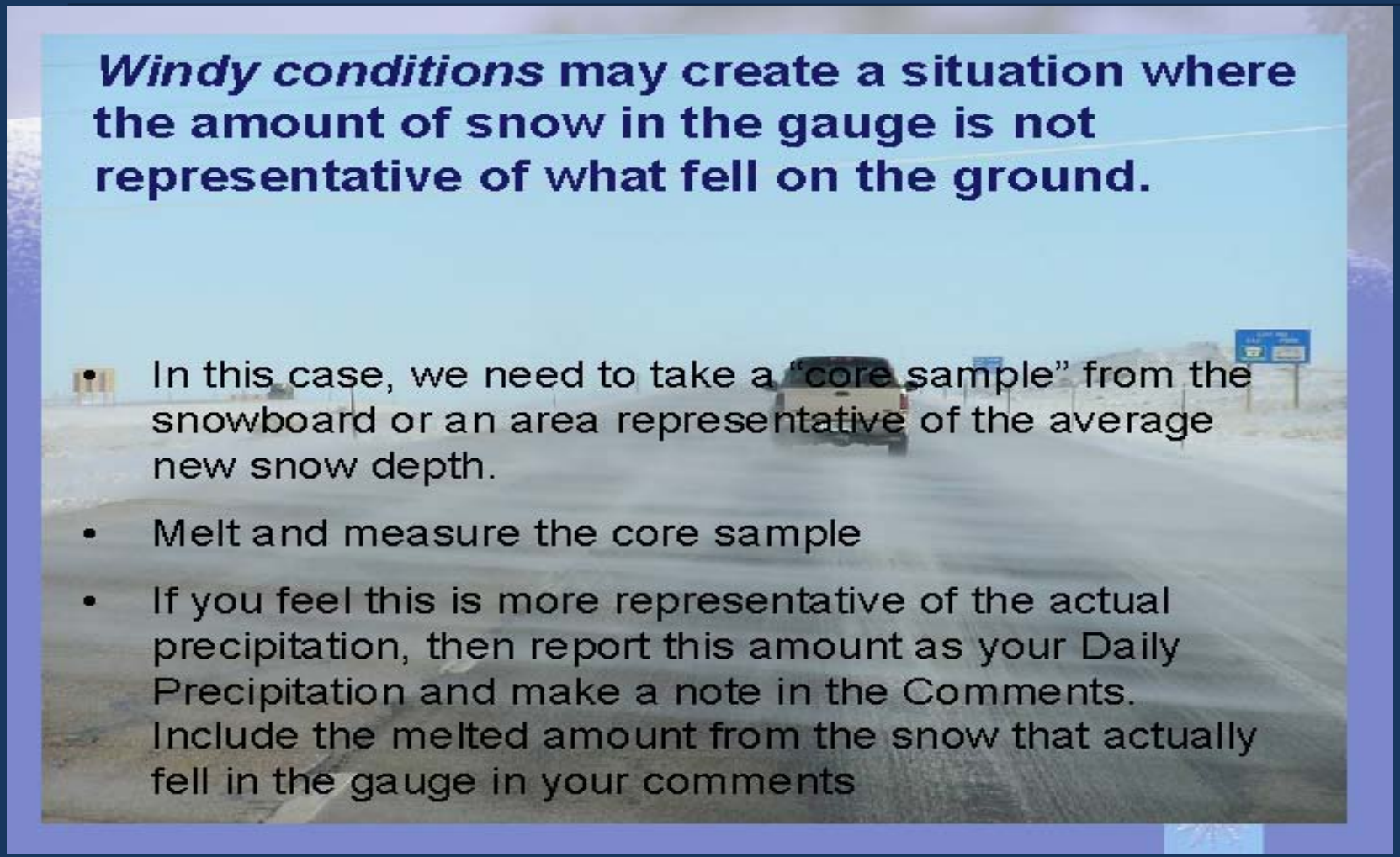


## Replace the Board

After you have measured the snow on your board, clean it off and replace it on top of the newly fallen snow. Be sure to mark its location. Now you are ready for the next snowstorm.

# Snowfall Measurement FAQs





# Snowfall Measurement FAQs



What if: Snow melts as it falls and never accumulates

- Report the precipitation in your gauge (melted) as the Daily Precipitation
- Report a Trace of new snow
- In your comments write "Snow melted as it fell"

# Snowfall Measurement FAQs



What if: Snow or sleet is mixed with rain and doesn't actually accumulate on the ground

- Report the precipitation in your gauge (melted) as the Daily Precipitation
- Report a "T" Trace of new snow
- Make a note as above in your comments such as "Snow and sleet was mixed with rain but melted as it fell."

# Snowfall Measurement FAQs



What if: Snow and rain are mixed and there is snow that accumulates

- Report the precipitation in your gauge (melted) as the Daily Precipitation
- Report the maximum accumulation of the new snow as your new snowfall
  - *If possible, it is best to measure the depth of the new snow as soon as possible after it ends before it has a chance to melt*
- Make a note that you had mixed precipitation in your comments.

# Snowfall Measurement FAQs



What if: Snow accumulates, melts, and accumulates again

- The snowfall is the sum of each accumulation before melting.

## EXAMPLE

Three separate snowfalls occur during the day. You go out and measure the snow after each has ended. The first snowfall is 2.0 inches, the second is 1.5 inches, and the third is 1.0 inch. The snow melts after each snowfall, and there is nothing on the snowboard at observation time the next morning.

The snowfall for the 24-hour period should be recorded as the sum of the individual events, or 4.5 inches.

# Snowfall Measurement FAQs



## What if: Miscellaneous

- New snowfall of less than a tenth of an inch is reported as a Trace. This could be a few flurries, or a very light dusting of snow. Snow does not have to end up in the rain gauge!

- In some situations you might have measurable snow of a couple of tenths, but the snow in the rain gauge only melts down to a Trace. This can happen when the snow is very dry and/or it is windy.

# Snowfall Measurement FAQs



## The 10:1 Myth

Do NOT estimate snowfall by converting the liquid in your rain gage to a snowfall amount!

- The adage that one inch of rain equals 10 inches of snow is a myth!
- The snow/water equivalent ratio is dependent on many factors, not just surface air temperature
- Snow to water ratios can vary from 8:1 or less to 20:1 or more!