



Activity Worksheets

List of Handouts:

This appendix includes the following activity handouts:

- Module 3 Activity: Forecasting Activity
- Module 5 Activity: Winter Storm Activity

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Module 3 Activity: Forecasting Activity

Time

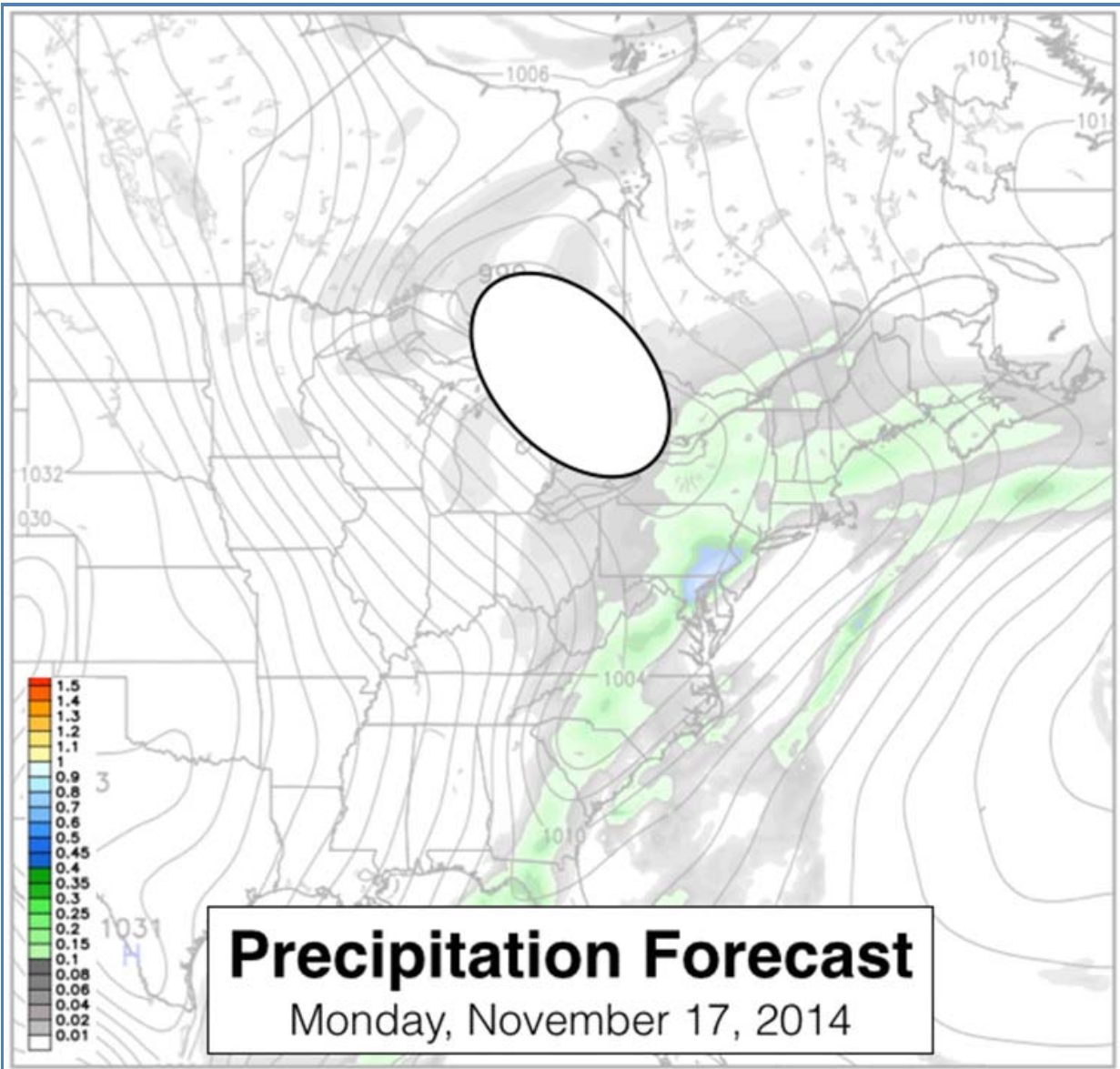
15 minutes

Practical Exercise Statement

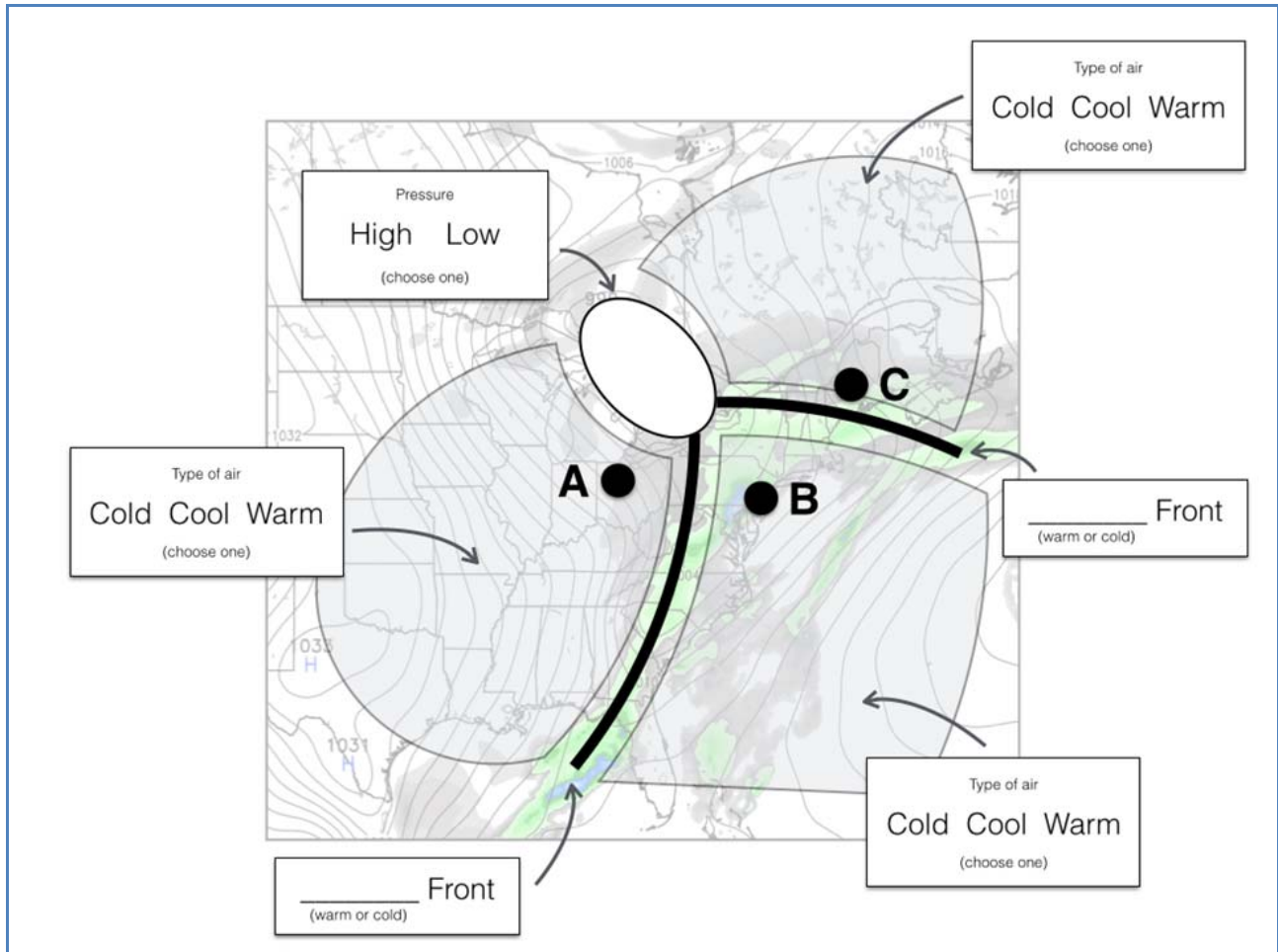
This activity provides an opportunity for participants to develop a stronger understanding of weather forecasting through an individual activity. Participants will consider horizontal and vertical temperature profiles of the atmosphere and forecast hazards and precipitation types accordingly. The objective of the activity is to use the knowledge and understanding gained from previous modules to better understand weather forecasts and the complexity of forecasting precipitation types.

Actions to be Completed

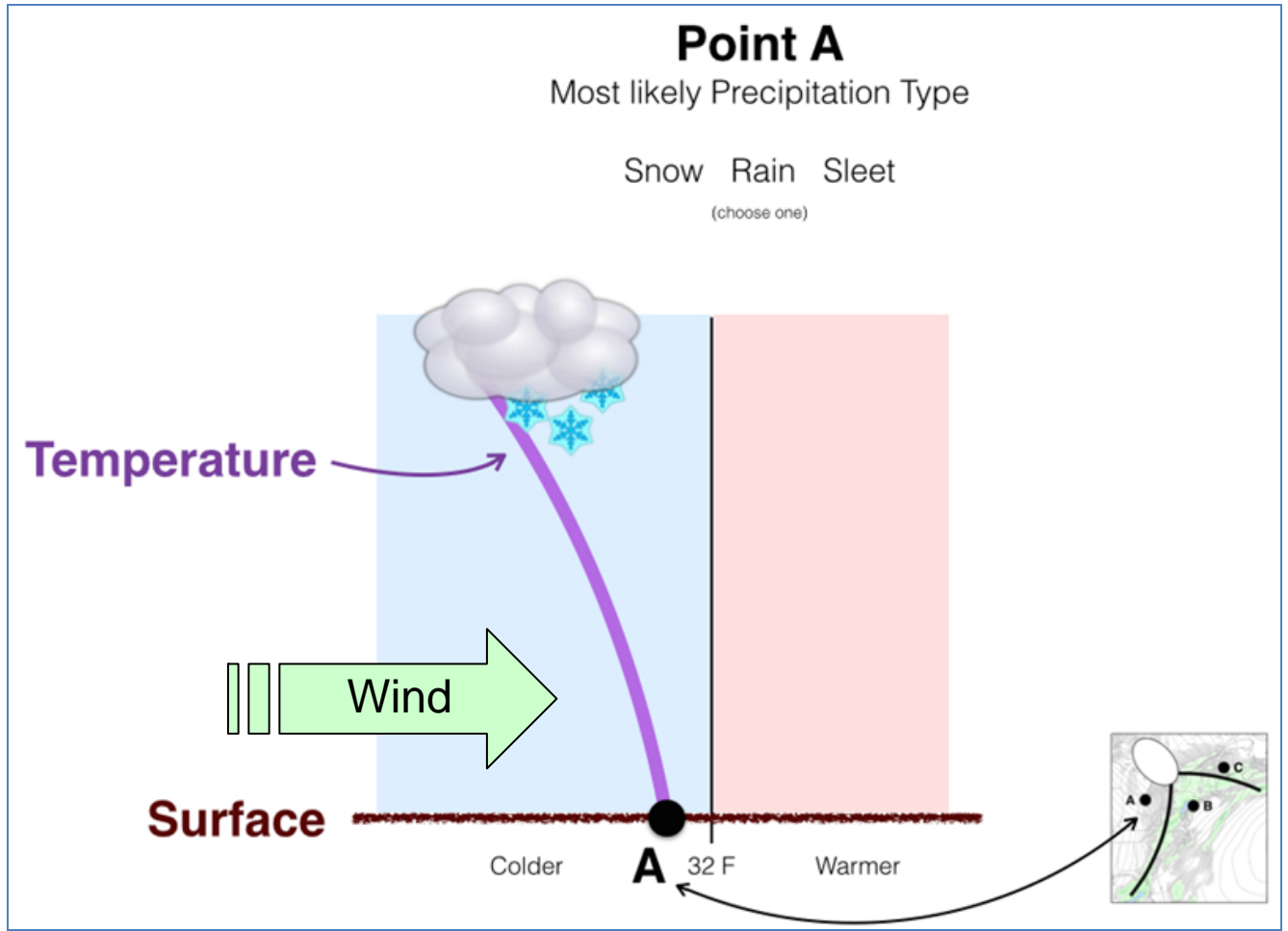
1. Break into small groups.
2. Label the pressure, fronts, and air masses.
3. Determine the most likely type of precipitation falling at the time of this map for each point.
4. Discuss how the precipitation will likely change at each point as the storm moves northeast.

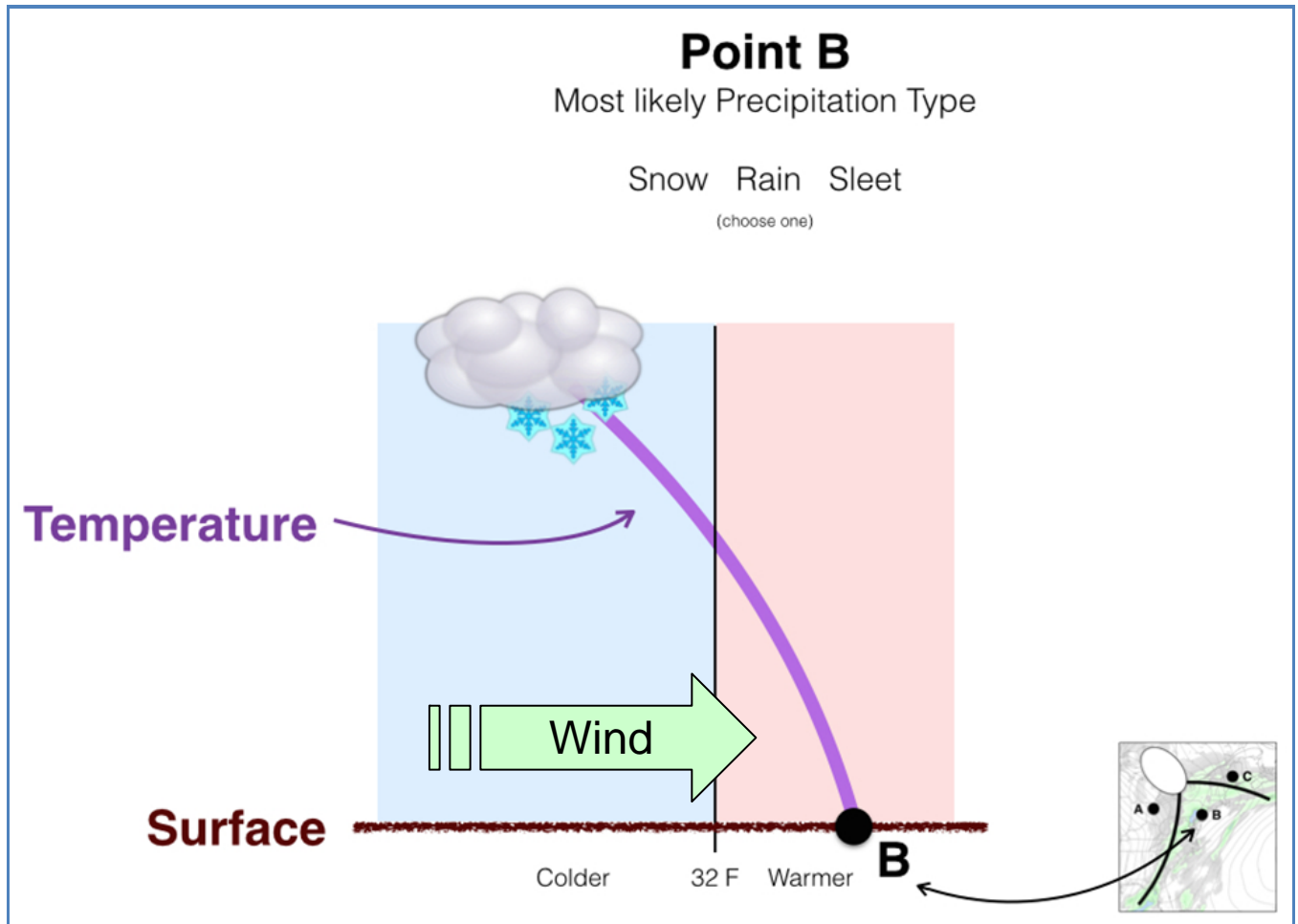


(Source: Weatherbell, 2014)

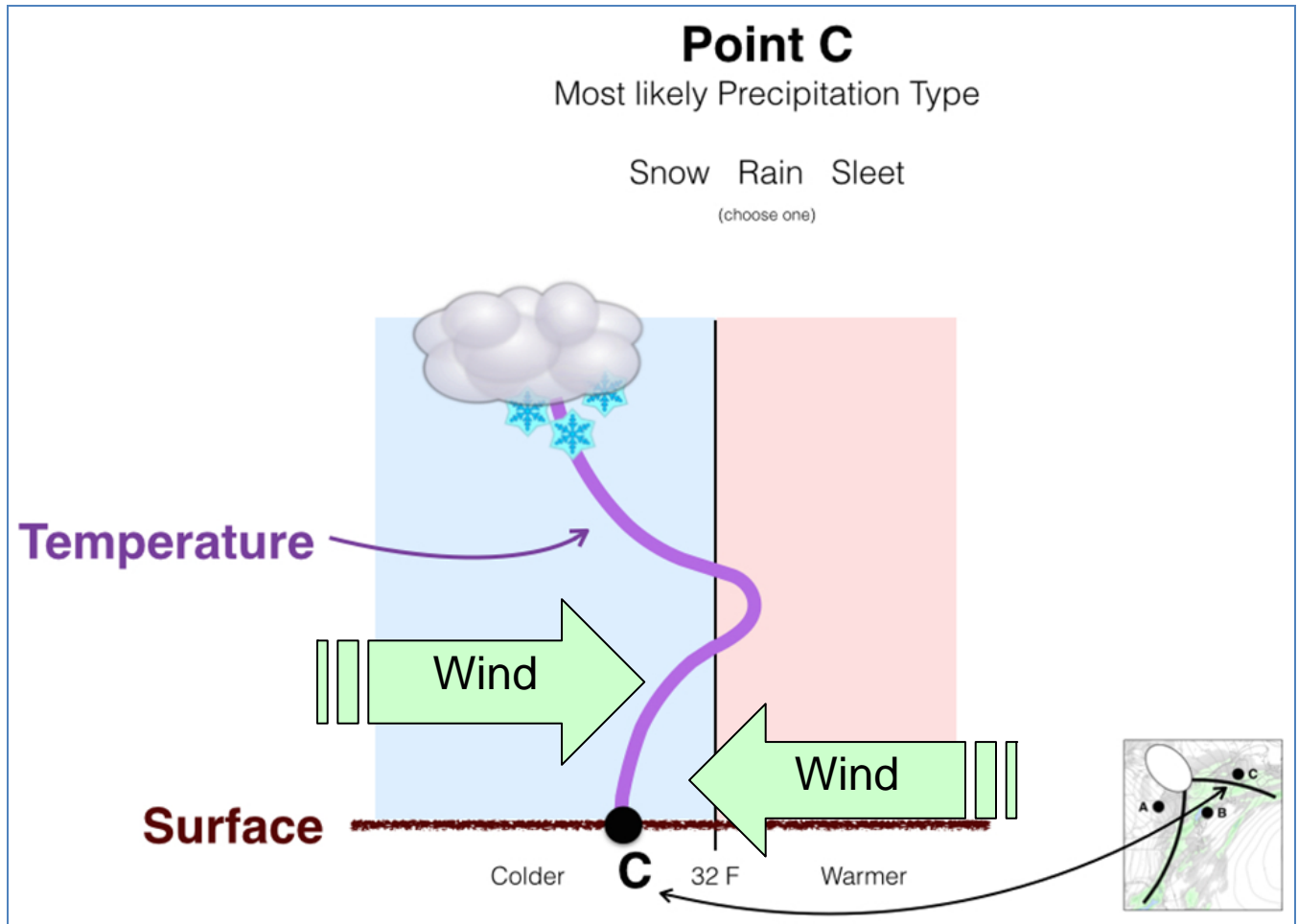


(Source: Weatherbell, 2014)





(Source: Gratz, 2014)



(Source: Gratz, 2014)



Module 5 Activity: Winter Storm Activity

Time

60 minutes

Practical Exercise Statement

This exercise provides an opportunity for participants to work together in groups to role-play in a winter storm situation. Participants will consider the different decisions and courses of action that should be made prior to and during a winter storm. The objective of the activity is to use the knowledge and understanding gained from this course to understand when to make key preparedness decisions and to feel the surprise when encountering a situation that was not forecast correctly.

Actions to be Completed

1. Return to Activity 3 groups and analyze information presented in the following slides.
2. Respond to instructor and discussion prompts from the perspective of the profession assigned to your group.

Please do not proceed to the next page until instructed to do so.



Tuesday, Hazardous Weather Outlook

At 05:09 AM on Tuesday (Day 1), the National Weather Service issued the following Hazardous Weather Outlook:

“DAYS TWO THROUGH SEVEN...WEDNESDAY THROUGH MONDAY.

WEDNESDAY...NO HAZARDS.

THURSDAY...NO HAZARDS.

FRIDAY...NO HAZARDS.

SATURDAY...WINTER WEATHER POTENTIAL.

SUNDAY...WINTER WEATHER POTENTIAL.

MONDAY...WINTER WEATHER POTENTIAL.

EXTENDED DISCUSSION...

A COLD FRONT WILL MOVE ACROSS THE AREA WEDNESDAY... HOWEVER LIMITED MOISTURE AHEAD OF THE FRONT WILL PRECLUDE ANY RAIN. SHORTWAVE ENERGY PASSING TO THE NORTH ON THURSDAY WILL OFFER LOW CHANCES FOR RAIN MAINLY ACROSS NORTHEAST OKLAHOMA. THE UPPER PATTERN BECOMES MORE ACTIVE AS IT TRANSITIONS TO THE SOUTHWEST BY THE WEEKEND. A SHALLOW...BUT STRONG COLD FRONT WILL MOVE THROUGH ON SUNDAY. BEHIND THE BOUNDARY...A WINTRY PRECIPITATION EVENT IN THE FORM OF FREEZING RAIN WILL BE POSSIBLE ACROSS NORTHEAST OKLAHOMA SUNDAY AND INTO MONDAY.

EMERGENCY MANAGEMENT PLANNING STATEMENT...

INTERESTED PARTIES SHOULD MONITOR THE LATEST FORECASTS AND DISCUSSIONS CONCERNING THE POTENTIAL FOR FREEZING RAIN ACROSS NORTHEAST OKLAHOMA LATE IN THE WEEKEND AND EARLY NEXT WEEK.”

Please do not proceed to the next page until instructed to do so.



Wednesday, Hazardous Weather Outlook

At 11:46 PM on Wednesday (Day 2), the National Weather Service issued the following Hazardous Weather Outlook:

“DAYS TWO THROUGH SEVEN...THURSDAY THROUGH TUESDAY.
THURSDAY...NO HAZARDS.
FRIDAY...NO HAZARDS.
SATURDAY...THUNDERSTORM POTENTIAL.
SUNDAY...THUNDERSTORM POTENTIAL...WINTER WEATHER POTENTIAL.
MONDAY...WINTER WEATHER POTENTIAL.
TUESDAY...WINTER WEATHER POTENTIAL.

EXTENDED DISCUSSION...

A COLD AIRMASS WILL SPREAD ACROSS THE AREA LATE IN THE WEEKEND...RESULTING IN SHARPLY COLDER TEMPERATURES LATE SUNDAY AND EARLY NEXT WEEK. SHOWERS AND THUNDERSTORMS WILL BE POSSIBLE ALONG THE FRONT ACROSS NORTHWEST ARKANSAS AND SOUTHEAST OKLAHOMA SATURDAY NIGHT INTO SUNDAY MORNING.

MOIST SOUTHWESTERLY FLOW ALOFT WILL BRING SEVERAL WAVES OF PRECIPITATION TO THE REGION...WHICH MAY FALL PRIMARILY AS FREEZING RAIN OR SLEET ACROSS MUCH OF NORTHEAST OKLAHOMA AND NORTHWEST ARKANSAS LATE SUNDAY INTO MONDAY. THE RAIN AND FREEZING RAIN THREAT WILL CONTINUE TUESDAY AS YET ANOTHER WAVE EJECTS OUT OF THE SOUTHWESTERN STATES.

EMERGENCY MANAGEMENT PLANNING STATEMENT...

INTERESTED PARTIES SHOULD MONITOR THE LATEST FORECASTS AND DISCUSSIONS CONCERNING THIS POTENTIAL WINTER WEATHER EVENT THIS WEEKEND INTO THE EARLY PART OF THE WORK WEEK.”

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Thursday Morning, Hazardous Weather Outlook

At 05:08 AM on Thursday (Day 3), the National Weather Service issued the following Hazardous Weather Outlook:

“DAYS TWO THROUGH SEVEN...FRIDAY THROUGH WEDNESDAY.
FRIDAY...NO HAZARDS.

SATURDAY...WINTER WEATHER POTENTIAL.

SUNDAY...WINTER WEATHER POTENTIAL.

MONDAY...WINTER WEATHER POTENTIAL.

TUESDAY...WINTER WEATHER POTENTIAL.

WEDNESDAY...WINTER WEATHER POTENTIAL.

EXTENDED DISCUSSION...

LOW CHANCES FOR RAIN WILL CONTINUE FOR THE NEXT SEVERAL DAYS AS WARM ADVECTION ENSUES AND MOISTURE INCREASES. A COLD FRONT WILL APPROACH THE AREA FRIDAY...AND WILL LIKELY STALL ACROSS NORTHEAST OKLAHOMA LATE FRIDAY AND SATURDAY. A STRONGER SHOT OF COLD AIR WILL EFFECTIVELY PUSH THIS BOUNDARY THROUGH SOUTHEAST OKLAHOMA BY LATE SUNDAY. A MUCH COLDER...BUT SHALLOW AIRMASS WILL BE IN PLACE ACROSS NORTHEAST OKLAHOMA BY SUNDAY. A STRONG UPPER SYSTEM WILL APPROACH THE WEST COAST LATE IN THE WEEKEND WITH MOIST SOUTHWESTERLY FLOW ALOFT MAINTAINED AHEAD OF THE APPROACHING LOW. A LARGE AREA OF PRECIPITATION IS EXPECTED TO DEVELOP ACROSS THE REGION NORTH OF THE FRONT SATURDAY NIGHT AND SUNDAY. THE THERMAL PROFILE STILL SUGGESTS THAT MUCH OF NORTHEAST OKLAHOMA WILL SEE PERIODS OF FREEZING RAIN AS EARLY AS SATURDAY NIGHT. THE SHALLOW COLD AIR WILL BE SLOW TO MODERATE AND PIECES OF UPPER ENERGY EJECT FROM THE UPPER LOW...WHICH WILL RESULT IN CONTINUED CHANCES FOR FREEZING RAIN THROUGH WEDNESDAY ACROSS NORTHEAST OKLAHOMA.

EMERGENCY MANAGEMENT PLANNING STATEMENT...

EMERGENCY MANAGEMENT GROUPS AND OTHER INTERESTED PARTIES SHOULD MONITOR THE LATEST FORECASTS AND DISCUSSIONS CONCERNING WINTER WEATHER POTENTIAL FOR THE EARLY TO MIDDLE PART OF NEXT WEEK.”



Thursday Afternoon, Hazardous Weather Outlook

At 01:10 PM on Thursday (Day 3), the National Weather Service issued the following Hazardous Weather Outlook:

“...SIGNIFICANT ICING EVENT POSSIBLE ACROSS PARTS OF THE REGION BEGINNING BY SATURDAY NIGHT... THIS OUTLOOK IS FOR NORTHWEST AND WEST CENTRAL ARKANSAS AS WELL AS MUCH OF EASTERN OKLAHOMA.

DAY ONE...THIS AFTERNOON AND TONIGHT.

WINTER WEATHER.

ICE ACCUMULATION.

RISK...LIMITED.

AREA...FAR NORTHEAST OKLAHOMA...MAINLY NEAR THE KANSAS BORDER.

ONSET...AFTER MIDNIGHT.

DISCUSSION...

A WARM AIR ADVECTION PATTERN SHOULD RESULT IN DEVELOPING PRECIPITATION ACROSS THE REGION DURING THE OVERNIGHT HOURS. TEMPERATURES AT THE SURFACE COULD BRIEFLY DIP TO NEAR FREEZING...RESULTING IN SOME LIGHT FREEZING RAIN LATE TONIGHT NEAR THE KANSAS BORDER.

SPOTTER AND EMERGENCY MANAGEMENT ACTION STATEMENT...

SPOTTER ACTIVATION NOT EXPECTED.

DAYS TWO THROUGH SEVEN...FRIDAY THROUGH WEDNESDAY.

FRIDAY...WINTER WEATHER POTENTIAL.

SATURDAY...THUNDERSTORM POTENTIAL...WINTER WEATHER POTENTIAL.

SUNDAY...WINTER WEATHER POTENTIAL.

MONDAY...WINTER WEATHER POTENTIAL.

TUESDAY...WINTER WEATHER POTENTIAL.

WEDNESDAY...WINTER WEATHER POTENTIAL.”



Thursday Afternoon, Hazardous Weather Outlook (continued)

At 01:10 PM on Thursday (Day 3), the National Weather Service issued the following Hazardous Weather Outlook (continued):

“EXTENDED DISCUSSION...

A SIGNIFICANT WINTER WEATHER EVENT IS SHAPING UP FOR PARTS OF EASTERN OKLAHOMA AND NORTHWEST ARKANSAS OVER THE WEEKEND.

THE SHALLOW COOL AIRMASS CURRENTLY ACROSS THE AREA WILL LIFT SLOWLY NORTH ON SATURDAY...RESULTING IN A LARGE TEMPERATURE SPREAD ACROSS EASTERN OKLAHOMA AND NORTHWEST ARKANSAS. A REINFORCING SHOT OF COLDER AIR WILL EVENTUALLY PUSH THE BOUNDARY BACK SOUTH INTO SOUTHEAST OKLAHOMA OVERNIGHT SATURDAY. THERE APPEARS TO BE ENOUGH MOISTURE AND INSTABILITY TO SUPPORT A FEW THUNDERSTORMS NEAR THE FRONT IN SOUTHEAST OKLAHOMA...BUT SEVERE WEATHER IS NOT EXPECTED.

THE COLD SHALLOW AIRMASS IS EXPECTED TO SETTLE ACROSS MUCH OF REGION BY SUNDAY...WITH TEMPERATURES STRUGGLING TO REACH THE FREEZING MARK ACROSS PORTIONS OF NORTHEAST OKLAHOMA AND FAR NORTHWEST ARKANSAS. MOIST LOW-LEVEL WARM AIR ADVECTION SHOULD OVERRIDE THIS COOL AIRMASS...SETTING THE STAGE FOR SIGNIFICANT ICING OVER NORTHEAST OKLAHOMA BEGINNING LATE SATURDAY NIGHT INTO SUNDAY. IMPULSES OF ENERGY EJECTING FROM THE SOUTHWESTERN U.S. UPPER SYSTEM COULD RESULT IN SEVERAL ROUNDS OF WINTRY PRECIPITATION THROUGH THE EARLY PART OF NEXT WEEK. AT THIS TIME...AREAS ALONG AND NORTH OF INTERSTATE 44 APPEAR TO HAVE THE BEST CHANCES FOR SIGNIFICANT ICING.

EMERGENCY MANAGEMENT PLANNING STATEMENT...

THERE STILL REMAINS MUCH UNCERTAINTY AS TO THE TIMING AND PLACEMENT OF WINTRY PRECIPITATION...SO INTERESTED PARTIES SHOULD CONTINUE TO MONITOR THE LATEST FORECASTS AND DISCUSSIONS CONCERNING THIS POTENTIAL WINTER WEATHER EVENT.”

Please do not proceed to the next page until instructed to do so.



Friday, Winter Storm Watch

At 02:19 PM on Friday (Day 4), the National Weather Service issued the following Winter Storm Watch:

“...WINTER STORM WATCH IN EFFECT FROM SUNDAY MORNING THROUGH LATE MONDAY NIGHT...

THE NATIONAL WEATHER SERVICE IN TULSA HAS ISSUED A WINTER STORM WATCH...WHICH IS IN EFFECT FROM SUNDAY MORNING THROUGH LATE MONDAY NIGHT FOR THE FOLLOWING COUNTIES...

IN OKLAHOMA... OSAGE...WASHINGTON...NOWATA...CRAIG...OTTAWA...PAWNEE... TULSA...ROGERS...CREEK.

A SECONDARY SURGE OF COLD AIR IS EXPECTED TO PUSH INTO THE AREA SATURDAY NIGHT INTO SUNDAY. PRECIPITATION SHOULD EXPAND IN COVERAGE FROM THE SOUTHWEST SATURDAY NIGHT...WITH A MIX OF LIGHT FREEZING RAIN AND RAIN EXPECTED TO DEVELOP BY SUNDAY MORNING MAINLY NORTH OF THE AREA. COLDER AIR WILL CONTINUE TO FILTER SOUTH ON SUNDAY...WITH THE FREEZING LINE POSSIBLY REACHING THE AREA BY LATE SUNDAY.

A SECONDARY WAVE OF PRECIPITATION IS EXPECTED BY MONDAY OR INTO MONDAY NIGHT. THIS COULD RESULT IN SIGNIFICANT ICING...WITH ICE ACCUMULATIONS OF A QUARTER TO ONE HALF-INCH POSSIBLE ACROSS AREAS IN THE WATCH.

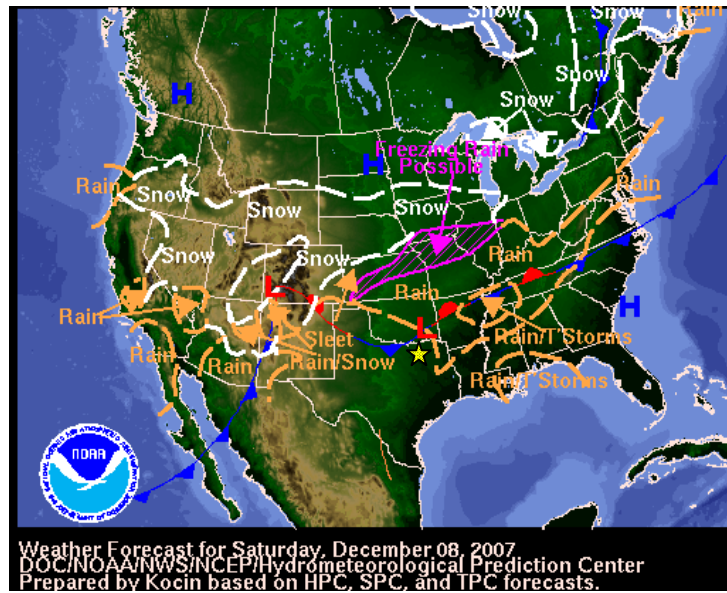
THERE REMAINS MUCH UNCERTAINTY AT THIS TIME AS TO WHERE THE TRANSITION BETWEEN RAIN AND FREEZING RAIN WILL DEVELOP ACROSS THE AREA. THE WINTER STORM WATCH MAY BE ADJUSTED AS ADDITIONAL DATA BECOMES AVAILABLE.

A WINTER STORM WATCH MEANS HEAVY SNOW OR A SIGNIFICANT ACCUMULATION OF ICE OR SLEET IS EXPECTED IN THE WATCH AREA DURING THE NEXT 24 TO 48 HOURS. RESIDENTS IN THE WATCH AREA SHOULD PREPARE NOW FOR WINTER STORM CONDITIONS. MAKE SURE YOUR CAR IS WINTERIZED AND IN GOOD WORKING ORDER. ALSO MAKE SURE YOU HAVE AN ADEQUATE SUPPLY OF FOOD...WATER AND THE NECESSARY MEDICATION TO LAST THROUGH THE DURATION OF THE WINTER STORM.”

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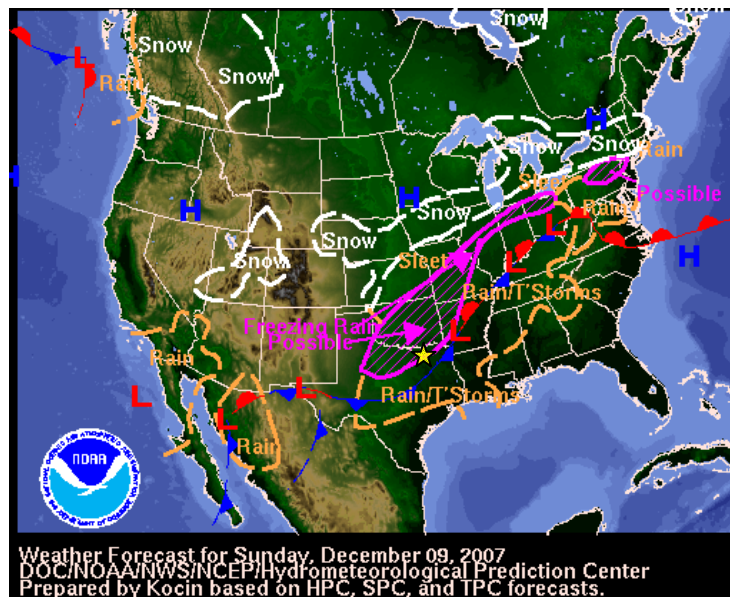


Surface Maps



(Source: WPC, 2007)

The above image displays a surface map forecast for Saturday, December 8, 2007.



(Source: WPC, 2007)

The above image displays a surface map forecast for Sunday, December 9, 2007.

Please do not proceed to the next page until instructed to do so.



Saturday, Ice Storm Warning

At 02:19 PM on Saturday (Day 5), the National Weather Service issued the following Ice Storm Warning:

“...ICE STORM WARNING IN EFFECT UNTIL 6 PM CST SUNDAY...
...WINTER STORM WATCH REMAINS IN EFFECT FROM SUNDAY EVENING THROUGH
LATE MONDAY NIGHT...

THE NATIONAL WEATHER SERVICE HAS ISSUED AN ICE STORM WARNING...WHICH IS
IN EFFECT UNTIL 6 PM CST SUNDAY FOR YOUR COUNTY

NUMEROUS SHOWERS AND ISOLATED THUNDERSTORMS HAVE DEVELOPED ALONG
AND NORTH OF THE AREA THIS EVENING... AND THIS AREA OF PRECIPITATION
EXTENDS SOUTHWESTWARD OF THE AREA. TEMPERATURES HAVE CONTINUED TO
FALL WITH THE FREEZING LINE MAKING STEADY PROGRESS SOUTHWARD... AND AS
THIS OCCURS...FREEZING RAIN HAS DEVELOPED ACROSS PORTIONS OF THE
REGION.

ICE ACCUMULATION TOTALS WILL LIKELY VARY WIDELY...HOWEVER
ACCUMULATIONS UP TO ONE HALF INCH WILL BE POSSIBLE ON ELEVATED
SURFACES. AS TEMPERATURES CONTINUE TO COOL THROUGH SUNDAY
MORNING...ROADWAYS WILL BECOME INCREASINGLY LIKELY TO MAINTAIN AN ICE
COATING. UTILITY OPERATIONS ARE EXPECTED TO BECOME INCREASINGLY
STRESSED AS ICE LOADS ON POWER LINES.

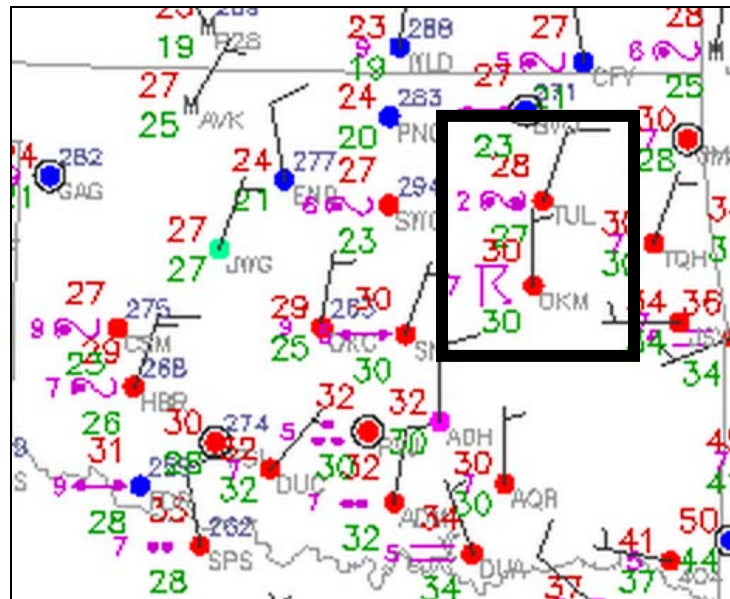
A WINTER STORM WATCH REMAINS IN EFFECT FOR ADDITIONAL ICE POTENTIAL ON
MONDAY. AN ICE STORM WARNING MEANS SEVERE WINTER WEATHER CONDITIONS
ARE EXPECTED OR OCCURRING. SIGNIFICANT AMOUNTS OF ICE ACCUMULATIONS
WILL MAKE TRAVEL DANGEROUS OR IMPOSSIBLE. TRAVEL IS STRONGLY
DISCOURAGED.

A WINTER STORM WATCH MEANS HEAVY SNOW OR A SIGNIFICANT ACCUMULATION
OF ICE OR SLEET IS EXPECTED IN THE WATCH AREA DURING THE NEXT 24 TO 36
HOURS. RESIDENTS IN THE WATCH AREA SHOULD PREPARE NOW FOR WINTER
STORM CONDITIONS. MAKE SURE YOUR CAR IS WINTERIZED AND IN GOOD
WORKING ORDER. ALSO MAKE SURE YOU HAVE AN ADEQUATE SUPPLY OF
FOOD...WATER AND THE NECESSARY MEDICATION TO LAST THROUGH THE
DURATION OF THE WINTER STORM.”

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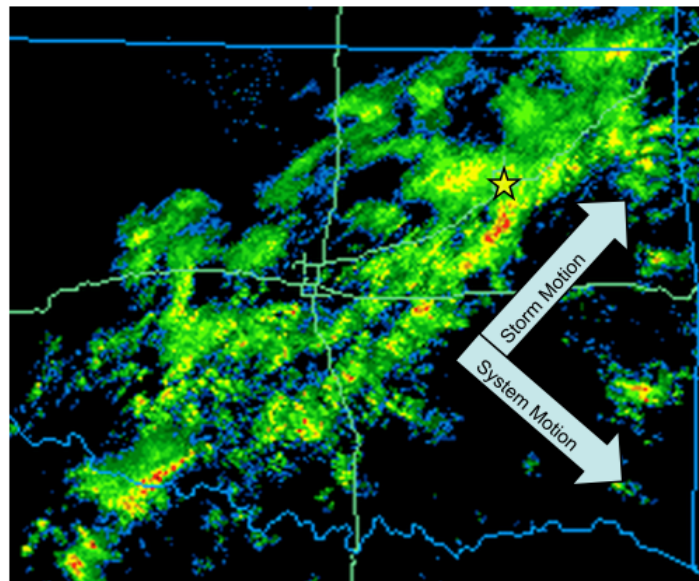


Sunday, Ice Storm Warning



(Source: College of DuPage, 2007)

The above image displays ground-based ASOS weather observations at 01:07 AM CST on Sunday, December 9, 2007.



(Source: College of DuPage, 2007)

The above image displays Doppler radar reflectivity at 01:21 AM on Sunday, December 9, 2007. Take note of the high reflectivity found south of Tulsa.

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Sunday, Ice Storm Warning Update

At 03:30 PM on Sunday (Day 6), the National Weather Service issued the following Ice Storm Warning:

“...ICE STORM WARNING NOW IN EFFECT UNTIL 12 PM CST MONDAY...

...WINTER STORM WATCH NOW IN EFFECT FROM MONDAY AFTERNOON THROUGH LATE MONDAY NIGHT...

THE ICE STORM WARNING IS NOW IN EFFECT UNTIL 12 PM CST MONDAY FOR THE FOLLOWING COUNTIES...

IN ARKANSAS...BENTON.

IN OKLAHOMA... OSAGE...WASHINGTON...NOWATA...CRAIG...OTTAWA...PAWNEE...
TULSA...ROGERS...MAYES...DELAWARE...CREEK...OKFUSKEE...
OKMULGEE...WAGONER...CHEROKEE...MUSKOGEE...MCINTOSH.

A LARGE BAND OF FREEZING RAIN WITH EMBEDDED THUNDERSTORMS EXTENDED FROM NORTHEAST OKLAHOMA INTO WESTERN NORTH TEXAS THIS AFTERNOON. THIS ACTIVITY WILL CONTINUE TO SPREAD NORTHEAST THROUGH THE OVERNIGHT HOURS. TEMPERATURES ACROSS THE WARNING

AREA WILL REMAIN BELOW FREEZING...WITH SIGNIFICANT ICE ACCUMULATIONS UPWARDS OF A HALF INCH LIKELY. MUCH OF THE ICE ACCUMULATION WILL REMAIN ON ELEVATED SURFACES SUCH AS BRIDGES..OVERPASSES...TREES AND POWER LINES...BUT TRAVEL PROBLEMS MAY DEVELOP OVERNIGHT AS TEMPERATURES CONTINUE TO SLOWLY COOL.

PRECIPITATION IS EXPECTED TO TAPER OFF BY LATE MORNING ON MONDAY.

AN ICE STORM WARNING MEANS SEVERE WINTER WEATHER CONDITIONS ARE EXPECTED OR OCCURRING. SIGNIFICANT AMOUNTS OF ICE ACCUMULATIONS WILL MAKE TRAVEL DANGEROUS OR IMPOSSIBLE. TRAVEL IS STRONGLY DISCOURAGED.”

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Monday, Ice Storm Warning Update Graphic



(Source: College of DuPage, 2007)

The above image displays Doppler radar reflectivity at 06:00 AM on Monday, December 10, 2007.



(Source: College of DuPage, 2007)

The above image displays Doppler radar reflectivity at 07:30 AM on Monday, December 10, 2007.

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Monday, Ice Storm Warning Update

At 03:30 PM on Monday (Day 7), the National Weather Service issued the following Ice Storm Warning:

“...ICE STORM WARNING NOW IN EFFECT UNTIL 12 PM CST TUESDAY...

THE ICE STORM WARNING IS NOW IN EFFECT UNTIL 12 PM CST TUESDAY FOR THE FOLLOWING COUNTIES...

IN OKLAHOMA... OSAGE...WASHINGTON...NOWATA...CRAIG...OTTAWA...PAWNEE...
TULSA...ROGERS...MAYES...CREEK.

TEMPERATURES ARE EXPECTED TO REMAIN WITHIN A FEW DEGREES OF FREEZING DURING THE OVERNIGHT HOURS...WITH LITTLE WARMING EXPECTED DURING THE MORNING HOURS TUESDAY. WIDESPREAD PRECIPITATION IS EXPECTED TO SPREAD INTO EASTERN OKLAHOMA BY THE AFTERNOON...ALONG WITH A SURGE OF COLDER AIR BACK SOUTHWARD. THIS WILL LIKELY PLACE AREAS ALONG AND NORTH OF THE INTERSTATE 44 CORRIDOR NEAR FREEZING...WITH THE POTENTIAL FOR ADDITIONAL ICE ACCUMULATIONS.

THERE REMAINS CONSIDERABLE UNCERTAINTY IN HOW WARM TEMPERATURES WILL BE PRECEDING THE NEXT ROUND OF PRECIPITATION. SHOULD WARMER TEMPERATURES DEVELOP...THEN THE WARNING MAY BE CANCELLED. HOWEVER GIVEN THE ONGOING IMPACTS FROM THE ICING...ANY ADDITIONAL ACCUMULATIONS WILL IMMEDIATELY PROVE PROBLEMATIC.

SIGNIFICANT ICE ACCUMULATION ON TREES AND POWER LINES HAVE CAUSED NUMEROUS POWER OUTAGES ACROSS THE AREA. DO NOT TOUCH DOWNED LINES AND REPORT ANY POWER OUTAGES TO YOUR ELECTRIC COMPANY. TRAVEL IS HIGHLY DISCOURAGED DUE TO THE DOWNED TREES AND POWER LINES...AND SLICK ROADWAYS.”