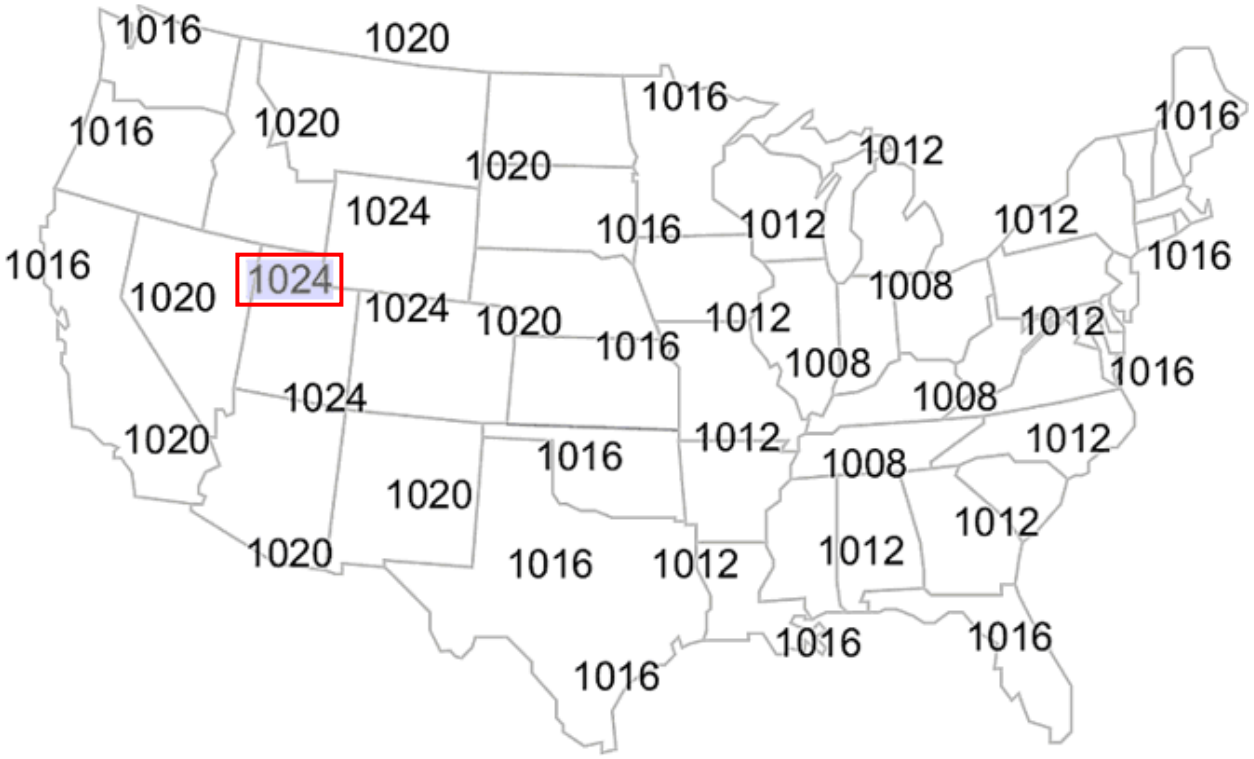
G0271 Student Activity Workbook

October 2013

Unit 2. Activity 1

WALKTHROUGH ACTIVITY: READING A SURFACE PRESSURE MAP

Follow the steps given by the instructor to complete the activity. Start at the outlined point on the map.



Source: This activity is courtesy of the National Weather Service's JetStream online school for weather. http://www.srh.noaa.gov/jetstream//synoptic/ll_analyze_slp.htm.

There are many weather lessons available from the NWS JetStream website you are interested in learning more: http://www.srh.noaa.gov/jetstream//index.htm.

Unit 3. Activity 2

Individual Activity: Identifying Potentially Hazardous Situations

Choose two of the hydrometeorological events discussed earlier in this unit and record them in the first row.

For each event, list five community or environmental factors or conditions that may worsen the impact of the event. For example, extensive development and paved surface prohibit water absorption, which worsens the impact of flooding.

Circle the factors or conditions that are present in your community.

	Event #1:	**Event #2:**
1		
2		
3		
4		
5		

Unit 4. Activity 3

Small Group Activity: The Dallas Hailstorm

- Working with your table group, read the information on the following page about the May 5, 1995, Dallas-Ft. Worth hailstorm event.
- For the two questions that appear after the case study, record your responses on your group's flipchart.
- Be prepared to share your responses with the class.

Scenario: May 5, 1995

On Friday, May 5th 1995, a powerful Springtime North Texas thunderstorm complex struck in the worst possible place (a major metropolitan area) during the worst possible time (a Friday evening during a major outdoor event). The Dallas-Fort Worth Metroplex endured its worst hailstorm ever and its most deadly flash flooding ever. The staggering results included a total of 21 fatalities and 510 injuries—all from a storm that was well forecast. The damages were estimated at $2 billion, making this one of the costliest hail storms in U.S. history. While most of the damage was unavoidable (large hail falling on automobiles and structures), the fatalities and injuries were mostly the result of people failing to respond appropriately to warnings.

In the late afternoon, an isolated thunderstorm formed in a warm, moist, highly unstable air mass ahead of a squall line approaching Tarrant County. (See the radar images on the following page.) Favorable winds in the lower and middle levels of the atmosphere (from the surface to around 12,000 feet) helped the thunderstorm develop storm-scale rotation and a powerful, sustained updraft. A supercell capable of generating one or more tornadoes was born. Additionally, the squall line, a solid line of strong thunderstorms, was overtaking the supercell and exhibited a “bow echo” signature, indicative of damaging straight-line winds. The supercell generated baseball- to softball-sized hail across downtown Fort Worth. More than 500 people were injured by hail at the annual Mayfest celebration, an outdoor event in downtown Fort Worth, when they were caught without shelter.

The NWS Office in Ft. Worth issued a severe thunderstorm warning for Tarrant County 15 minutes before the first reported hail fell. They issued frequent statements updating the storm’s movement.

That evening the squall line overtook the supercell in eastern Tarrant County and the storm complex slowed. As night fell the slower movement of the merged supercell/squall line caused torrential downpours from eastern Tarrant County across most of Dallas County. Rainfall rates of more than three inches per ½-hour resulted in flash flooding. Many who drowned were attempting to drive through flooded low-water crossings or were abandoning their stalled vehicles.

1. As an Emergency Manager, what responsibilities would you have for detecting, warning, and responding to this event?

2. What personnel or agencies would you have coordinated with prior to and during this event? Why?

Unit 5. Activity 4

Group Activity: NWS Offices Knowledge Bowl

NWS Offices

Center Weather Service Units (CWSUs)

There are 21 Center Weather Service Units (CWSUs) that operate in cooperation with the Federal Aviation Administration (FAA). There are four CWSUs in the Eastern Region, five in the Central Region, seven in the Southern Region, four in the Western Region, and one in the Alaska Region.

The main responsibility of a CWSU is to provide weather support and consultation to FAA air traffic managers and controllers. Rerouting of aircraft around hazardous weather is based largely on forecasts provided by the CWSU meteorologist. Special emphasis is given to those weather conditions that would be hazardous to aviation or would impede the flow of air traffic in the National Airspace System. CWSU meteorologists also issue Center Weather Advisories (CWA). CWAs are aviation weather warnings for thunderstorms, icing, turbulence, and low ceilings and visibilities.

National Center for Environmental Prediction (NCEP)

The National Center for Environmental Prediction (NCEP) is made up of the following offices:

- Aviation Weather Center
  - The Aviation Weather Center provides aviation warnings and forecasts of hazardous flight conditions at all levels within domestic and international air space.
- Climate Prediction Center
  - The Climate Prediction Center monitors and forecasts short-term climate fluctuations and provides guidance information on the long-term global effects climate patterns can have on the nation.
- Environmental Modeling Center
  - The Environmental Modeling Center develops and improves numerical weather, climate, hydrological and oceanic predictions through programs of applied research in data analysis, modeling, and product development in partnership with the broader research community.
- Hydrometeorological Prediction Center
  - The Hydrometeorological Prediction Center provides analysis and forecast products, specializing in quantitative precipitation forecasts to five days in advance, weather forecast guidance to seven days in advance, real-time weather model diagnostics discussions, and surface pressure and frontal analyses.

- National Hurricane Center
  - The National Hurricane Center provides official NWS forecasts of the movement and strength of tropical weather systems and issues the appropriate watches and warnings for the US and surrounding areas. The National Hurricane Center is located in Miami, Florida.
  - **NOTE:** The NWS also operates a **Central Pacific Hurricane Center**, co-located with the WFO in Honolulu, HI, that provides information concerning tropical cyclones in the Central Pacific basin, between 140 degrees West to the International Dateline, including Hawaii. The U.S. Navy operated **Joint Typhoon Warning Center** monitors the Pacific Region west of the International Dateline as well as the Indian Ocean.
- NCEP Central Operations (NCO)
  - The NCEP Central Operations sustains and executes the operational suite of the numerical analysis and forecast models and prepares NCEP products for dissemination. It also links all nine of the national Centers together via computer and communications-related services.
- Ocean Prediction Center
  - The Ocean Prediction Center issues weather warnings and forecasts out to five days in advance, in graphic, text, and voice formats for the Atlantic and Pacific Oceans.
- Space Weather Prediction Center
  - The Space Weather Prediction Center provides space weather alerts and warnings for disturbances that can affect people and equipment working in space and on earth. The Space Weather Prediction Center is located in Boulder, Colorado.
- Storm Prediction Center
  - The Storm Prediction Center (SPC) provides tornado and severe weather watches for the contiguous United States along with a suite of hazardous weather forecasts, mesoscale guidance products, and a continuous watch on mesoscale atmospheric processes. The SPC works closely with NOAA's National Severe Storms Laboratory (NSSL). NSSL applies research to advance the understanding of weather processes, improve forecasting and warning techniques and to develop operational applications. Both SPC and NSSL are located in Norman, Oklahoma.

National Climatic Data Center (NCDC)

NOAA's NCDC is the world's largest active archive of weather data. Its mission is to provide access and stewardship to the nation's resource of global climate and weather-related data, and also to assess and monitor climate variation and change. This effort requires the acquisition, quality control, processing, summarization, dissemination and preservation of a vast array of climatological data generated by the national and international meteorological services. The NCDC maintains our nation's snow climatology which is applied in FEMA's snow policy in the disaster declarations process.

National Operational Hydrologic Remote Sensing Center (NOHRSC)

Located in Chanhassen, Minnesota, the NOHRSC provides remotely-sensed and modeled hydrology products for the conterminous U.S. and Alaska. NOHRSC airborne, satellite, and modeled snow data and products are used by NWS RFCs, WFOs, as well as other government agencies to support operational and research hydrology programs. Their observed snow data maps are useful for the disaster declaration process.

National Weather Service (National) Headquarters (NWSH)

NOAA NWS maintains a national headquarters in Silver Spring, MD. This is where the Director and Deputy Director of the NWS oversee the organization. There are several offices within NWSH that work policy, service and operational issues. These offices include: the Office of Operational Systems, NWS Communications, NWS Public Affairs, the Office of Strategic Planning and Policy, the Office of Science and Technology, the Office of Hydrological Development, and the Office of Climate, Weather, and Water Services (OCWWS). It is OCWWS that works national issues with FEMA, the National Emergency Management Association (NEMA), the International Association of Emergency Managers (IAEM) and other national partners.

National Weather Service Regional Headquarters

There are six Regional Headquarters in the NWS: Eastern (Bohemia, NY), Southern (Fort Worth, TX), Central (Kansas City, MO), Western (Salt Lake City, UT), Alaska (Anchorage, AK) and Pacific (Honolulu, HI). Each Regional Headquarters has its own Director. The NWS Regional Headquarters oversee policy, service and operational issues for the NWS offices in their Regional areas of responsibility. They represent and coordinate regional issues to NWS national headquarters.

River Forecast Centers (RFCs)

There are 13 River Forecast Centers (RFCs). Responsibilities of the RFCs include:

- Issuing river stage and flood guidance based on computer models
- Providing hydrologic forecast guidance and technical support to Weather Forecast Offices (WFOs)
- Running dam break models, providing expert assistance, and performing dam failure analyses for dams that pose an imminent threat to the safety of the residents downstream from the dam
- Providing water supply outlooks to water resource managers

The following RFCs are currently in operation:

- Alaska/Pacific RFC
- Arkansas-Red Basin RFC
- California-Nevada RFC
- Colorado Basin RFC
- Lower Mississippi RFC
- Middle Atlantic RFC
- Missouri River Basin RFC
- North Central RFC
- Northeast RFC
- Northwest RFC
- Ohio RFC
- Southeast RFC
- West Gulf RFC

Tsunami Warning Centers (TWCs)

There are two NOAA NWS Tsunami Warning Centers: The West Coast/Alaska Tsunami Warning Center (WC/ATWC) in Palmer, Alaska, and the Pacific Tsunami Warning Center (PTWC) in Ewa Beach, Hawaii. It is their responsibility to provide reliable tsunami detection, forecasts, and warnings and to promote community resilience.

Weather Forecast Offices (WFOs)

There are 122 Weather Forecast Offices (WFOs) across the country. Responsibilities of the WFOs include:

- Issuing all local forecasts and warnings
- Providing operational decision support to emergency managers
- Building and maintaining working relationships with local and state governments and the news media.
- Soliciting customer feedback on products and services
- Conducting community outreach and education programs
- Training volunteer observers and storm spotters

Weather Service Offices (WSOs)

There are 21 Weather Service Offices (WSOs). There is one WSO located in the Eastern Region, two in the Central Region, 12 in the Alaska Region, and six in the Pacific Region.

A WSO is an office that serves as a seamless extension of the Weather Forecast Office (WFO), providing their customers and partners with a high level of service and supporting the short term forecast and warning operations of the WFO through collaboration, coordination, observations, and outreach.

Unit 5. Activity 5

Group Activity: NWS Non-routine Products

In this activity, your table group will be assigned one of the NWS products to examine and outline its features and uses for emergency managers. When you are finished you will report-out what you have learned.

Review the information in Appendix E that corresponds to the non-routine product your group was assigned.

You will have 20 minutes to familiarize yourselves with the product your group was assigned, and then you will give a 5-minute presentation to the class outlining its features and uses for emergency managers.

Your presentation should answer the following questions:

- ***Who issues the product?***

- ***What is the purpose of the product?***

- ***Under what circumstances is the product issued?***

- ***How far into the future does the product project the forecast?***

- ***How can the product be used by Emergency Managers?***

Unit 5. Activity 6

Individual Activity: Selecting Forecast Products and Resources

In this activity, you will work individually to choose products that are appropriate for use in your community. Use the information provided by each group during their *Group Activity: NWS Non-routine Products* presentations as a reference. You will have 10 minutes to complete this activity. Be prepared to share your responses in a group discussion when you are finished.

- ***List three hazardous weather events to which your community is particularly vulnerable.***

- ***List the forecast products that will help you be prepared for those events.***

- ***List the local resources that will help you be prepared for those events.***

Unit 5. Activity 7

Questions for Consideration

- ***What office is your primary access point for obtaining NWS weather information?***

- ***What NWS office is best equipped to provide guidance on flooding and flash floods?***

- ***From what office do you obtain watches, warnings, and advisories for the local area?***

- ***Name four dissemination networks for NWS information?***

- ***What is the main factor that limits forecast accuracy?***

- ***As an Emergency Manager, what steps would you take after you receive a Tornado Watch?***

- ***As an Emergency Manager, what steps would you take after you receive a flood warning?***

Unit 6. Activity 8

Individual Activity: Analyzing Threats

During this activity, you will work independently to complete an analysis of a specific hydrometerological event using threat analysis worksheets. Then, you will evaluate how effective your community's EOP is for addressing the event.

You may refer to your local EOP, the Student Manual Appendices, and any other references you wish to complete this activity, following the instructions below:

- Complete the Analyzing Threats worksheets for the hydrometeorological event selected for this activity.
- For each factor listed, complete the analysis and comment in the columns provided on the worksheets.
    - Note: To fully and accurately complete the analysis, you will need access to historical data for your jurisdiction. For the purposes of this class, complete the tables to the best of your ability with all known information.
    - These tables can serve as a good starting point for a full analysis when you return home to your jurisdiction.
- When you have completed the worksheets, answer the questions on the Summary Worksheet about your community's local planning and response capability.
- Be prepared to discuss your responses with the class.
- You will have 45 minutes to complete this activity.

ANALYZING THREATS

THREAT ANALYSIS WORKSHEETS

Threat: _____

Climatological Factors	Analysis	Area Potentially Impacted	Comments
Maximum probable event or most likely significant threat		□ State □ Region □ County □ Community	
Worst ever event (Record precipitation, temperature, winds, flood crest, flood volume, destruction, etc.)	Record levels: Duration: Deaths: Injuries: Damage:	□ State □ Region □ County □ Community	
Average frequency of occurrence		□ State □ Region □ County □ Community	
Average loss per year from this type of event	Deaths: Injuries: Property: Other:	□ State □ Region □ County □ Community	
Percentile chance of occurrence		□ State □ Region □ County □ Community	
Months of peak occurrence	J F M A M J J A S O N D	□ State □ Region □ County □ Community	

ANALYZING THREATS

THREAT ANALYSIS WORKSHEETS (CONTINUED)

Threat: _____

Population Vulnerabilities	Analysis	Comments
Concentrations in vulnerable areas	Total population:	Concentrated areas:
Awareness level (for the type of event)	□ Low □ Medium □ High	Sources for public information:
Previous response experience (for the type of event)	□ None □ Moderate □ Extensive	Level of responsiveness to warnings: □ Little □ Moderate □ High
Special needs groups	□ Hearing impaired □ Physically impaired □ Non-English speaking □ Elderly □ Tourist □ Other:	Implications for Warning: Response:
Risk associated with population distribution	□ Floodplain □ Storm surge inundation area □ Canyon □ Mudslide area □ Avalanche □ Isolated □ Other:	
Other risk factors affecting the population	□ Seasonal shift □ Time-of-day shift □ Day-of-week shift	

Population Vulnerabilities	Analysis	Comments
Do building codes promote hazard-resistant construction?	☐ Yes ☐ No ☐ Somewhat	Potential code related issues:
Are the building codes strictly enforced?	☐ Yes ☐ No ☐ Somewhat	
Are there concentrations of properties that are vulnerable to specific events (e.g., beachfront properties)?	☐ Yes ☐ No	Describe (facility, location, and risk):
Are there facilities that pose a risk of “cascading” events (e.g., hazardous materials facilities)?	☐ Yes ☐ No	Describe (facility, location, and risk):
What critical facilities are located in the community?	☐ Fire Stations ☐ Police precincts ☐ Public works yards ☐ Water treatment facilities ☐ Utilities substations ☐ Government buildings ☐ Shelters ☐ EOC ☐ Other:	Consider: Location Construction Age Use/Population Present
What other key facilities exist in the community?	☐ Hospitals/nursing homes ☐ Schools/universities ☐ Convention centers, stadiums, arenas ☐ Military installations ☐ Other:	Consider: Location Construction Age Use/Population Present

Population Vulnerabilities	Analysis	Comments
Do any facilities present special problems for warning, response, or recovery?	□ Yes □ No	Describe (facility, location, and problem):
Are any facilities especially vulnerable to this type of hazard?	□ Yes □ No	Describe (facility, location, and vulnerability):

Resources	Analysis	Comments
Where are your community's key resources (i.e., people, tools, and equipment) located?		Describe location:
Are the key resources located where they will be needed to respond to the main hazardous weather and flooding events?	□ Yes □ No	Describe:

Infrastructure Vulnerabilities	Analysis	Comments
Are communication systems vulnerable?	□ Yes □ No	Describe vulnerability:
Are power systems vulnerable?	□ Yes □ No	Describe vulnerability:
Are water and/or sewer systems vulnerable?	□ Yes □ No	Describe vulnerability:

Infrastructure Vulnerabilities	Analysis	Comments
Are transportation systems (including bridges, tunnels, and rail lines) vulnerable?	□ Yes □ No	Describe vulnerability:
Is the community dependent on vulnerable transportation routes for evacuation, rescue, etc.?	□ Yes □ No	Identify vulnerable routes and preparedness options:
Does the community's infrastructure pose any special threats for warning, response, and/or recovery?	□ Yes □ No	Identify threats for Warning Response Recovery

Geography And Topography	Analysis	Comments
Do geographic/topographic features add to the jurisdiction's vulnerability (e.g., mountain effects, floodplains, lake effect, altitude, etc.)?	□ Yes □ No	Describe the impact caused by geography and/or topography:

ANALYZING THREATS

SUMMARY WORKSHEET

Based on your analysis of the event, as completed on the previous pages, review your community's Emergency Operations Plan (EOP) and answer the questions below.

Is the event that you analyzed part of the EOP's hazard analysis? (If yes, under what category of hazard does it fall?)

	YES	NO
Does your EOP adequately address your community's ability to:		
Warn the public of the risk?	☐	☐
Notify the public of the actions they should take?	☐	☐
Respond to the event?	☐	☐
Does your EOP include timeframes for all key decision points required to respond to this event (e.g., notification of key personnel, warnings to the public, deployment of resources, etc.)?	☐	☐
Do you have access to the main sources of information about the event? (If no, what sources of information do you need? How can you gain access to them?)	☐	☐
Is access available only at a single point? If yes, how is it disseminated?		