APPENDIX 4: SEVERE THUNDERSTORM EMERGENCY

DESCRIPTION

The main hazards from severe thunderstorms are tornadoes, large hail, strong downburst winds, heavy rains, and lightning. Of these, tornadoes are the most feared and cause the most devastating localized damage. Most tornado damage is caused by downburst winds. Large hail from thunderstorms can cause extreme damage to structures and vehicles. Torrential rainfall can cause flash floods and lightning. Thunderstorms are one of the most deadly hazards, second only to flooding.

Thunderstorms can develop quickly leaving little time for warning. The National Weather Service provides severe weather watches and warnings, and keeps track of severe weather events all over the country. These storm reports can be accessed through their Storm Prediction Center web site. To qualify as a severe local storm, the weather service defines it as one that is sufficiently intense to threaten life and/or property, including storms with large hail (3/4 inch or greater), damaging winds (58 mph or greater), or those producing tornadoes.

The topography of Hampton Roads is a contributing factor in the initiation of convective storms, that often form in the spring and summer season. During hot weather, air east of the Blue Ridge Mountains is compressed and forms a leeside trough of low pressure helping initiate and enhance convective development. Sea breeze boundaries that form when there is significant temperature difference between the air and water, can further initiate and maintain convection. These boundaries often occur over the Hampton Roads area.

A. Tornadoes

1. Virginia has a long tornado season, running from mid-March to mid-November. Fortunately, tornadoes are rare in Virginia and infrequent on the Peninsula. According to the National Weather Service, tornados are most likely to occur during the spring and summer months with the peak frequency in May and a second peak frequency in August. Fall tornados are often associated with land-falling tropical systems. Tornado activity peaks in the late afternoon between 4 and 6 pm. On the average, about seven tornadoes are reported in Virginia per year.

2. Tornado outbreaks are rare in Virginia. In August of 1993, such an outbreak occurred during the mid-summer season. Eighteen tornados occurred in Virginia that season with 2 reported in Surry County, 1 in James City/York County, Isle of Wight County, Cities of Newport News/Hampton, Suffolk County, Cities of Chesapeake, and Virginia Beach. In September of 1996, funnel clouds were spotted over the Chesapeake Bay and on the Elizabeth River near downtown Norfolk.

3. Thunderstorms associated with strong, late spring and fall cold fronts or low-pressure systems approaching the state can potentially produce strong tornadoes.

4. Tornado intensity is rated using the Fujita Scale that assigns numerical values based on wind speed. Damage from tornadoes is correlated to wind speeds. Most tornados that occur in this area are weak (F0 or F1) and short tracked. Two hundred thirty (230) tornadoes have been reported in the County Warning Area (CWA - lower Maryland Eastern Shore, central and eastern Virginia, and northeast North Carolina) of the National Weather Service's Wakefield Office between 1950 and 1995. Of these tornadoes, nearly three quarters were classified as weak F0 or F1 tornados. Less than one percent was classified as violent F4 tornadoes. There have been no documented F5 tornadoes.

5. Tornadoes can occur before a warning is issued. The NWS is continuously monitoring their Doppler radar, but because most tornadoes are less than one mile wide, they are sometimes smaller than the radar resolution and do not appear on radar. Therefore, it is crucial that close attention is paid to tornado watches.

B. Hail

1. Hail forms when ice particles that are swirling around within a thunderstorm become too heavy and fall to the ground. Large stones can fall at speeds faster than 100 mph.

2. Most hail events in the Hampton Roads area occur in the spring. Incidences peak in May and the months of April through June account for 65% of all occurrences. They rarely occur in the fall and early winter. Severe hail usually occurs in the early to mid-afternoon time frame and is rare in the morning.

3. Large hail can cause major damage to structures and vehicles. Fortunately, hail over 2 inches in diameter is uncommon in the CWA and major damage reports are infrequent.

C. Wind Gusts

1. Damaging wind events from severe thunderstorms can blow down trees or cause damage to permanent structures.

2. Damaging winds usually occur in the spring and peak in June. These winds peak in the late afternoon between 4 pm and 6 pm. Most are in the 50 to 60 knot range.

3. Most severe wind events are not measured, but determined by the amount of structural and/or tree damage that coincide with the event. When they are recorded, most are in the 50 to 60 knot range. The highest recorded convective wind gust in the Wakefield Warning Area was 87 mph on April 23, 1999 at Cape Henry, VA.

D. Lightning

1. Newport News has approximately 4 to 5 ground strikes of lightning per square kilometer (approximately 250 acres). This compares to Northern Virginia that has 2 ground flashes of lightning per square kilometer. This is because summertime temperatures are the highest in southeastern Virginia and moisture is abundant from precipitation and the Atlantic Ocean. This provides the necessary ingredients for the formation of lightning producing storms.

2. Lightning strikes can kill people, cause wildfires, and damage structures. During the past 30 years, lightning has killed an average of 73 people per year. Most deaths were males between the ages of 20 and 40 who are caught outside. The highest percentage of deaths occurs under trees. Unfortunately, lightning can strike even when the storm is miles away. This can create a hazardous situation for anyone who is engaging in any type of outdoor activity, such as picnics, sports games, and work.

3. Towers, tall buildings, and large trees are susceptible to lightning strikes. Power contained in a flash of lightning is tremendous and it is best to take precautions that lessen the chance of property being struck by lightning. One of the best mitigation efforts for property is to install lightning rods on buildings and trees.

4. The National Weather Service does not issue warnings for ordinary thunderstorms that can produce lightning.

SEVERE THUNDERSTORM HISTORY OF NEWPORT NEWS

Some of the major events in Newport News which were reported to the National Climate Data Center are listed here by category:

A. Tornadoes

Between 01/01/1950 and 12/31/2003, the National Climate Data Center and the National Weather Service reported 11 tornadoes in Newport News. Five of the eleven reported tornadoes caused major damage. Any tornado activity prior to February 2007 was evaluated with the original Fujita Scale (F Scale). All tornado activity after the February 2007 date will be evaluated with the Enhanced Fujita Scale (EF Scale).

- **June 27, 1951:** F1 caused $3,000 in damages.
- **April 6, 1958**: F1 caused $250,000 in damages.
- **Oct 7, 1965**: F0 caused $3,000 in damages.
- **Sept. 5, 1975**: F3 caused 2 injuries and 2.5 million dollars in damages.
- **Sept. 5, 1979:** F2-F3 damaged several homes in the Hidenwood section of Newport News
- **June 1, 1982**: F0 no damage.
- **August 6 1993:**
  - National Weather Service reported a tornado in Newport News. The F1 tornado moved across Villa Road through a flea market on Jefferson Avenue.
  - Extensive damage to homes and the roof of the flea market was blown off. Eight people were injured, 163 homes were damaged, 12 homes were condemned, and damages amounted to $1.2 million.
- **July 30, 1997:** Waterspout- no damage.
- **Aug 06, 1997:** Waterspout – no damage.
- **Aug 11, 2001:** F0 $50,000 in damages.

Also recorded by the National Weather Service:

November 11 1995 – Severe weather event. Multiple tornadoes were sighted in southeastern Virginia. Wind gusts up to 60 knots were recorded at Newport News/Williamsburg International Airport.

B. Hail

Between 01/01/1950 and 12/31/2003, the National Climate Data Center reported 6 hail events in Newport News. Hail between 2.75 and 0.88 inches were reported.

May 1, 1997: The only storm reported that caused wide scale damage. The hail from this storm caused damage to homes, businesses, and vehicles. One million dollars ($1,000,000.00) in damages was reported.

C. Micro Bursts/Wind Gusts

- **August 6 1993** - Tornadoes struck the Petersburg and Colonial Heights areas of middle Virginia as part of a squall line. The same squall line gave rise to small pockets of 100 mph winds that dismembered trees in acre-size areas along Interstate 64 between Richmond and Newport News, and also in the Hilton Village area in Newport News.

- **November 11 1995** – Severe weather event. Multiple tornadoes were sighted in south-eastern Virginia. Wind gusts up to 60 knots were recorded at Newport News/Williamsburg International Airport.

D. Lightning

- **June 14, 1994 –** Lightning struck and severely burned a woman and man playing golf in Norfolk.
- **August 26, 1996 –** In Norfolk, lightning seriously injured two boys sitting on the bench of a picnic table beneath a tree.
- **July 30, 2000 -** Lightning killed a man doing yard work in Virginia Beach. In Poquoson, a man was struck and injured outside his home.
- **June 6, 2001 –** Lightning struck the nearby Giant Oil Refinery (formally BP Amoco) located in Yorktown causing a three-alarm fire. The resulting fire leveled an ultraformer refinery unit causing a 25% reduction in its refining capacity.
- **June 26 2001 –**Lightning caused a fire that totally destroyed the Newport News Church of the Nazarene.

E. Other Recent Severe Weather Events

Sept. 15, 1999 - City Line apartments were flooded.

May 19, 2004 – Nearly 13,000 Dominion Virginia Power customers were without power. Some roads flooded near Main Street and Beech Drive, and along Warwick Boulevard between 36th and 50th Streets.

May 22, 2004 – Numerous power outages, power lines down, transformers on fire, trees on houses, and flooded vehicles. Lee Hall antenna was struck by lightning and suffered severe damage.

Enhanced Fujita Scale

Category EFO	**Wind Speed**	**65-85 mph**	**105-137 km/h**
	Potential Damage	*Light Damage *Peels Surface off some roofs; some damage to gutters or siding: branches broken off trees; shallow-rooted trees pushed over *Confirmed tornados with no reported damage (those that remain in open fields)	
Category EF1	**Wind Speed**	**86-110 mph**	**138-178 km/h**
	Potential Damage	*Moderate Damage *Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.	
Category EF2	**Wind Speed**	**111-135 mph**	**179-218 km/h**
	Potential Damage	* Considerable damage. *Roofs torn off well-constructed houses; foundations of framed houses shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.	
Category EF3	**Wind Speed**	**136-165 mph**	**219-266 km/h**
	Potential Damage	*Severe Damage *Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distances	
Category EF4	**Wind Speed**	**166-200 mph**	**267-322 km/h**
	Potential Damage	*Devastating damage *Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.	
Category EF5	**Wind Speed**	**>200 mph**	**>322 km/h**
	Potential Damage	*Incredible damage *Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (109 yd); steel reinforced concrete structures badly damaged; High-rise buildings have significant structural deformation	

*Enhanced Fajita Scale introduced on February 1, 2007