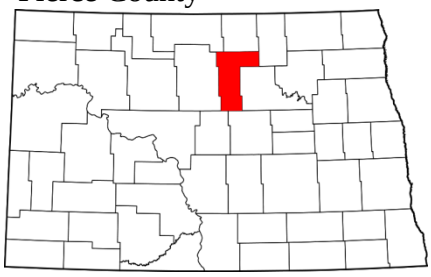
Draft

2013 Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan

Pierce County



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County of Pierce, ND

Pierce County Commission

Rugby, ND 58368

RESOLUTION

Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan Adoption

Whereas, the County of Pierce recognizes the threat that natural, man-made or technological hazards pose to people and property within our County; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple Federal Emergency Management Agency (FEMA) pre- and post-disaster mitigation grant programs; and

Whereas, the County of Pierce participated in the FEMA-prescribed mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and

Whereas, the N.D. Department of Emergency Services and the Federal Emergency Management Agency Region VIII officials have reviewed the Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

Now, therefore, be it resolved, that the Pierce County Commission adopts the Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan.

Signed this____day of_____, 2013.

_____

_____, Chairman

City of Balta, ND

Balta City Council

Balta, ND 58313

RESOLUTION

Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan Adoption

Whereas, the City of Balta recognizes the threat that natural, man-made or technological hazards pose to people and property within our County; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple Federal Emergency Management Agency (FEMA) pre- and post-disaster mitigation grant programs; and

Whereas, the City of Balta participated in the FEMA-prescribed mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and

Whereas, the N.D. Department of Emergency Services and the Federal Emergency Management Agency Region VIII officials have reviewed the Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

Now, therefore, be it resolved, that the Balta City Council adopts the Pierce County Multi-Jurisdictional Multi-Hazard Mitigation .

Signed this____day of_____, 2013.

_____

Michael Jundt, Mayor

City of Rugby, ND

Rugby City Council

Rugby, ND 58368

RESOLUTION

Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan Adoption

Whereas, the City of Rugby recognizes the threat that natural, man-made or technological hazards pose to people and property within our County; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple Federal Emergency Management Agency (FEMA) pre- and post-disaster mitigation grant programs; and

Whereas, the City of Rugby participated in the FEMA-prescribed mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and

Whereas, the N.D. Department of Emergency Services and the Federal Emergency Management Agency Region VIII officials have reviewed the Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

Now, therefore, be it resolved, that the Rugby City Council adopts the Pierce County Multi-Jurisdictional Multi-Hazard Mitigation .

Signed this____day of_____, 2013.

_____

Dave Cichos, Mayor

City of Wolford, ND

Wolford City Council

Wolford, ND 58385

RESOLUTION

Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan Adoption

Whereas, the City of Wolford recognizes the threat that natural, man-made or technological hazards pose to people and property within our County; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, an adopted Multi-Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple Federal Emergency Management Agency (FEMA) pre- and post-disaster mitigation grant programs; and

Whereas, the City of Wolford participated in the FEMA-prescribed mitigation planning process to prepare this Multi-Hazard Mitigation Plan; and

Whereas, the N.D. Department of Emergency Services and the Federal Emergency Management Agency Region VIII officials have reviewed the Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

Now, therefore, be it resolved, that the Wolford City Council adopts the Pierce County Multi-Jurisdictional Multi-Hazard Mitigation .

Signed this____day of_____, 2013.

_____

Jim Wolf, Mayor

LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction:	**Title of Plan:**	**Date of Plan:**
Local Point of Contact:	**Address:**	
Title:		
Agency:		
Phone Number:	**E-Mail:**	

State Reviewer:	**Title:**	**Date:**

FEMA Reviewer:	**Title:**	**Date:**
Date Received in FEMA Region VIII		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

****Completed Document from FEMA will be on File here.**

Introduction

The Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan (MHMP) was developed and approved by Federal Management Agency (FEMA) in 2003. The plan was updated and submitted for FEMA approval in 2013 to address the needs of people living and working in Pierce County and its three incorporated cities: Rugby, Balta, and Wolford.

This document includes a profile of Pierce County and its incorporated cities. The planning process is explained along with those involved in the updating of the county's multi-jurisdictional plan. A comprehensive assessment is included in the plan, of the risks that affect the county, maps, hazards and risk assessment, mitigation strategies including goals, objectives, projects, and plan maintenance.

This document articulates the discussions and considerations stated during the planning process in 2012 to update the 2003 Plan. The MHMP Planning Committee understands that the plan must be dynamic. Improvements, updates, and revisions will be made constantly to assure this plan continues to mitigate the potential losses and damages that can impact Pierce County and its citizens.

Purpose

To fulfill federal, state, and local hazard mitigation planning responsibilities; to promote pre- and post-disaster mitigation measures, short and/or long range strategies that minimize suffering, loss of life, and damage to property resulting from hazardous or potentially hazardous conditions to which citizens and institutions within the County are exposed; to improve quality of life; and to eliminate or minimize conditions which would have an undesirable impact on our citizens, the economy, environment, and well-being of the County.

Objective

To establish a methodical process to assist in hazard recognition, impact evaluation, and action plan development to decrease the impacts from hazards where possible and to protect lives and property.

Scope

The scope of the Pierce County Multi-Hazard Mitigation Plan is countywide. The Plan is not necessarily limited to Federal, State, or locally declared disasters or emergencies. Any time situations or incidents occur that produce a requirement for mitigation actions, activities, and strategies, etc.; they will be developed and incorporated into the Pierce County Multi-Hazard Mitigation Plan.

Authority

Federal: Public Law 93-288 as amended, established the basis for federal mitigation activity in 1974. A section of this Act requires the identification, evaluation, and mitigation of hazards as a prerequisite for

state receipt of future disaster assistance outlays. Since 1974, many additional programs, regulations, and laws have expanded on the original Stafford Act, several additional provisions were also added that provided for the availability of significant mitigation measures in the aftermath or presidentially declared disasters. Civil preparedness Guide 1-3, Chapter 6-Hazard Mitigation Assistance Programs places emphasis on hazard mitigation planning directed towards hazards with a high impact and threat potential.

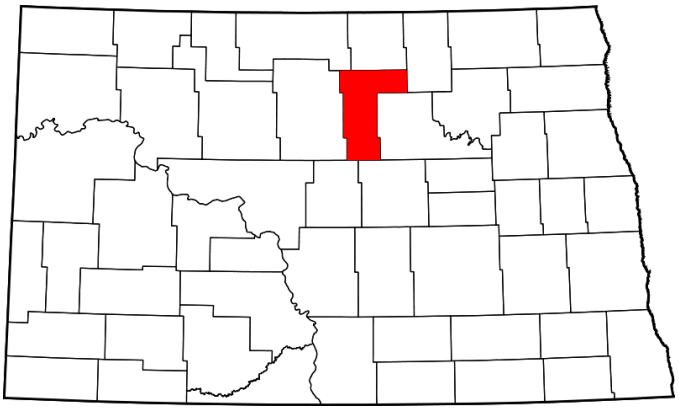
Legislative: The North Dakota Century Code, Chapter 37-17.1 requires North Dakota Division of Emergency Management to coordinate the development of a Hazard Mitigation Plan. Other state laws require various state agencies to mitigate the effects or impacts of hazards in regard to public safety, environment, etc. The North Dakota State Water Commission is responsible for assisting in the flood insurance program and is the lead agency in flood hazard mitigation actions.

Executive: The Governor has the leadership role in the issuance of guidance to all state agencies to minimize the effects of hazards on the citizens of North Dakota. In state and federal recovery agreements following a presidentially declared disaster, the Governor initiates updating of the state and local mitigation plans based on federal requirements or state and presidentially declared disaster (see State Administrative Recovery Handbook for Mitigation Assistance).

Local: Local governments play an essential role in implementing effective mitigation, both before and after disaster events. Each local government will review all damages, losses, and related impacts to determine the need or requirement for mitigation action and planning whenever seriously affected by a disaster, or when applying for state or federal recovery assistance. In Pierce County the local executive responsibility for carrying out plans and policies is the Board of Commissioners. Local government must be prepared to participate in post disaster Hazard Mitigation Team process and the pre-mitigation planning as outlined in this document.

Profile of Pierce County

General: Pierce County is located in the north central portion of North Dakota. It has the 36th largest area of the 53 counties in the state, encompassing 1,082 square miles. Of those 1,082 square miles, 1,018 square miles of it is land and 64 square miles (5.95 percent) include water. It is 48 miles from north to south and 36 miles from east to west. The county is bordered on the north by Bottineau and Rolette counties, on the west by McHenry County, on the south by Wells County and Sheridan County, and on the east by Benson County and Tower County. Agriculture is the main economic enterprise in the county. Other sectors on the economy are comprised mostly of agriculturally related industries. The geographical center of North America is in Pierce County, about 6 miles (10 km) west of Balta. Rugby has a monument for the center at the intersection of US Highway 2 and ND Highway 3.



Pierce County is the highlighted county located in north central North Dakota.

There are thirty townships in the county and fifteen are organized. The fifteen organized townships are: Alexanter, Antelope Lake, Balta, Elling, Elverum, Hagel, Jefferson, Meyer, Ness, Reno Valley, Rush Lake, Tongerson, Truman, Tuscarora, and White.

Demographics: According to the U.S. Census Bureau, the 2010 population for Pierce County, N.D., is 4,357, while the population in 2000 was 4,675, resulting in a -6.8 percent decrease in population from 2000 to 2010. While the State of North Dakota experienced a 4.7 percent increase in population. The city of Rugby has experienced long-term decline in population level. Between 1980 and 2009, the city has lost 918 people, or nearly 28 percent of its population.

Pierce County has three incorporated cities including the county seat Rugby, Balta, and Wolford. There are also four rural communities that are unincorporated: Silva, Orrin, Selz, and Barton. The following graphic shows 2010 Census data of the incorporated communities.

Table 1. 2010 Demographic Data for Pierce County Jurisdictions

Jurisdiction	Population	Median Age	Number owner-owned occupied homes	Median value single-family owner occupied homes	Average Household Size
Pierce County	4,357	47	1,304	$77,100	2.27
Rugby	2,876	47	1,239	Na	2.11
Balta	65	44.8	26	Na	2.17
Wolford	36	51.5	17	Na	2.12

Source: 2010 Census

Housing: According to the 2011 Rugby Comprehensive Housing Study, both Rugby and Pierce County have been losing households over the last decade. The study states that the 2009 American Community Survey household estimate for all of Pierce County shows a loss of 217 households since the year 2000. Based on this estimate, the rate of loss has also accelerated countywide. In the 1990s, the county's household level stayed relatively stable. However, the actual 2010 Census showed a less dramatic decline in population than the study projected. Based on the demand for housing from people displaced from Minot from the 2011 flood and the housing demand in the western North Dakota oil fields, community leaders believe that the American Community Survey as it is updated will show more people are living in the community. However, based at the time of this mitigation plan, information from the most recent housing data is being included.

Table 2. 2010 Household Data for Pierce County Jurisdictions

	1980 Households	1990 Households	% Change 1980-1990	2000 Households	% Change 1990-2000	2009 Estimate
Rugby	1,271	1,243	-2.2%	1,291	3.9%	1,136
Pierce County	2,113	1,974	-6.6%	1,964	-0.5%	1,747

Source: Rugby Comprehensive Housing Study 2011

Community Partners Research, as part of the Comprehensive Housing Study, calculated future household projections. For the city of Rugby, the high-end projections assume that the city will lose approximately 31 households over the six-year projection period or five households in an average year. The high-end and low-end projections for Pierce County are almost identical. Over the past 30 years, the rate of loss has been very consistent, and forecasts created from historical trends yield very similar levels for the number of households in the future. These projections assume the loss of approximately 10 households in an average year.

Table 3. Household Projections 2009 Through 2015

	2009 Household Estimate	2015 Projection Low-end	2015 Projection High-end
Rugby	1,136	1,045	1,105
Pierce County	1,747	1,684	1,686

Source: Rugby Comprehensive Housing Study 2011

Climate: The county's geographic location results in a sub-humid continental climate characterized by marked fluctuations in daily and seasonal maximum and minimum temperatures, and light to moderate precipitation. The precipitation tends to be irregular in occurrence, amounts, and area coverage. The inconsistency of the county's weather arises from the interaction of three major air masses which originate in distinct global regions; cold, dry air from the polar region; warm moist air from the Gulf of Mexico; and cool, moist air from the northern Pacific. Both the temperature and the moisture characteristics of a northern Pacific air mass change as the air moves across the Rocky Mountains. The resulting air, which is usually mild and dry, reinforces the continental nature of the county's climate. The polar air mass tends to dominate the other two, but its influence is considerably lessened during the summer.

Normally the temperature is moderate until the beginning of July, after which short hot periods are experienced until the end of August. The freeze-free period is the number of days between the average

last occurrence of 32 degrees Fahrenheit (F) or lower in the fall. The length of the freeze-free period approximates the length of the growing season which ranges from 110 days to 129 days between May 23rd and September 11th. Topography and local weather conditions can produce subfreezing temperatures at the ground surface while the air temperature a few feet above the ground remains above 32 degrees F.

Winter snowfall is generally not too heavy, and it is blown into drifts, so that much of the ground is free of snow. Yearly snow average is 37.3 inches of snow. In 1996-1997, snowfall ranged from fifty to eighty inches. Tables 5 and 6 show the average monthly snowfall and season average from 2008 through 2012 in Rugby in the northern portion of the county and Drake located just to the west of the southern portion of the county.

Table 4. 2008-2013 Rugby Monthly Totals/Averages Snowfall (inches)

Season	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Season
2008-2009	0.0	0.0	0.0	0.0	16.8	18.8	7.6	3.3	8.0	1.0	0.0	0.0	55.5
2009-2010	0.0	0.0	0.0	2.0	1.0	14.3	10.0	13.8	0.6	1.0	0.5	0.0	43.2
2010-2011	0.0	0.0	0.0	0.0	12.5	17.8	11.2	3.7	8.5	5.4	3.5	0.0	62.6
2011-2012	0.0	0.0	0.0	0.0	0.0	1.3	8.3	6.3	8.5	0.0	0.0	0.0	24.4
2012-2013	0.0	0.0	0.0	-	-	-	-	-	-	-	-	-	-
Average	0.0	0.0	0.0	1.0	10.1	13.0	9.3	6.8	6.4	1.9	1.3	0.0	49.3

Source: John Paul Martin, Warning Coordination Meteorologist, NOAA/NWS Bismarck, ND

Table 5. 2008-2013 Drake 9 NE Southern Portion of Pierce County Monthly Totals/Averages Snowfall (inches)

Season	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	March	April	May	Jun	Season
2008-2009	0.0	0.0	0.0	0.0	17.0	39.0	19.0	5.0	18.0	2.0	0.0	0.0	100.00
2009-2010	0.0	0.0	0.0	2.0	1.0	22.0	14.0	14.0	2.0	2.0	1.0	0.0	58.0
2010-2011	0.0	0.0	0.0	0.0	11.0	29.0	11.0	7.0	15.0	5.0	3.0	0.0	81.0
2011-2012	0.0	0.0	0.0	0.0	2.0	4.5	4.0	9.0	4.0	0.0	0.0	0.0	23.5
2012-2013	0.0	0.0	0.0	-	-	-	-	-	-	-	-	-	-
Average	0.0	0.0	0.0	.7	7.8	23.6	12.0	8.8	9.8	3.0	1.3	0.0	79.0

Source: John Paul Martin, Warning Coordination Meteorologist, NOAA/NWS Bismarck, ND

Table 7. Climatological Data from Records at National Weather Service

Highest Temperature Recorded	Lowest Temperature Recorded	Average Annual Temperature	Mean Temperature In January	Mean Temperature in July	Annual Average Precipitation	Average Seasonal Snowfall
107 degrees Fahrenheit in 1988	Negative 47 degrees Fahrenheit in 1996	39 degrees Fahrenheit	6 degrees Fahrenheit	68 degrees Fahrenheit	19.67 inches	40 inches

Source: National Weather Service

Economy: According to the 2010 Census, the largest percentage of the population, 20.4 percent, is employed in the category of educational service, and healthcare and social assistance, followed by 13 percent agriculture, and 9.7 percent in retail trade. A total of 68.4 percent of the workers are private wage and salary workers, 12.4 percent are government workers, and 18.1 percent are self-employed in their own not-incorporated businesses. The median household income listed in the 2010 Census is $37,091. The poverty status as of the 2010 Census was 6.4 percent of the families below the poverty level, 12.9 percent of the individuals below the poverty level, with the percent of 65 and older individuals below the poverty level at 19.2 percent.

According to Job Service of North Dakota, There are 54 job openings advertised online in Pierce County, North Dakota on September 30, 2012. The employers with the highest number of job openings advertised online in Pierce County, North Dakota on September 30, 2012, are Heart of America Medical Center (23), Bremer Financial Corporation (3), Midwest TeleServices International (3), American Greetings Corporation (2), Army National Guard (2), CHS Inc. (2), FGP - Red River Valley (2), Rugby Manufacturing (2), Thrivent Financial for Lutherans (2) and Aspect Foundation (1).

The average weekly wage for Pierce County, North Dakota in 1st quarter, 2012 was $657. This would be equivalent to $16.43 per hour or $34,164 per year, assuming a 40-hour week worked the year around.

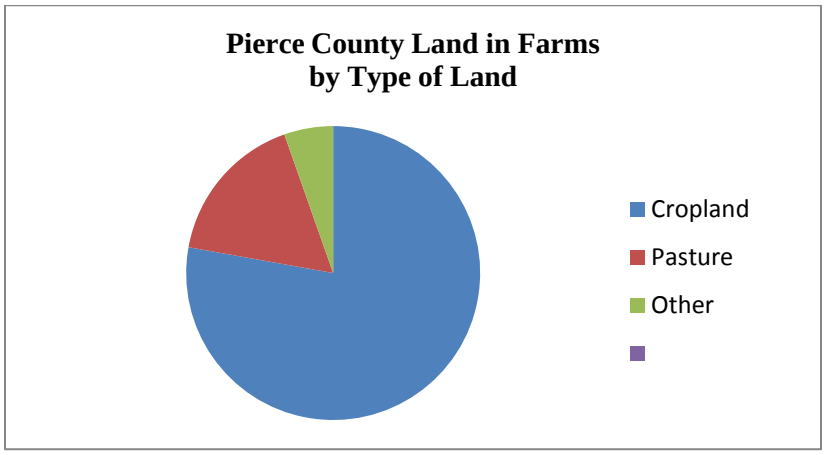
Agriculture is the main economic enterprise in the county. Other sectors of the economy are comprised mostly of agriculturally related industries. The principal crops in the county are wheat. Other crop produced include, sunflowers, soybeans, oats, hay, alfalfa, flax seed, dry edibles peas, dry edible beans, corn, canola, and barley. (See table below)

Table 7. Pierce County Total Crop Production in 2010 and 2011 and Rank among State's 53 Counties in 2007

Crop	Year	Acres Planted	Acres Harvested	Yield (bushels)	Production (bushels)	Crop Acres by Rank 2011
Spring Wheat	2011	120,000	118,500	37.4 bu.	4,430,000	31
Spring Wheat	2010	1258,000	124,000	47.1 bu.	5,840,000	
Winter Wheat	2011	4,500	4,300	45.6 bu.	196,000	
Winter Wheat	2010	8,300	7,900	54.1 bu.	427,000	
Sunflowers, Oil	2011	6,900	6,800	1,130 lbs.	7,7000,000	
Sunflowers, Oil	2010	14,000	13,800	1.360 lbs.	18,800,000	
Sunflowers, Non-Oil	2011	Data Withheld	Data Withheld	Data Withheld	Data Withheld	
Sunflowers, Non-Oil	2010	2,500	2,300	1,240 lbs.	2,850,000	
Soybeans	2011	64,500	64,300	32.3 bu.	2,080,000	21
Soybeans	2010	64,100	63,700	34 bu.	2,165,000	
Oats	2010	5,600	2,700	63bu.	170,000	
Oats	2011	Data Withheld	Data Withheld	Data Withheld	Data Withheld	
Hay, Other	2011	n/a	31,000	1.55 tons	48,400	23
Hay, Other	2010	n/a	30,000	1.35 tons	40,000	
Hay, Alfalfa	2011	n/a	19,700	2.75 tons	54,300	23
Hay, Alfalfa	2010	n/a	17,000	2.05 tons	35,000	
Flaxseed	2011	2,000	2,000	16.3 bu.	32,500	
Flaxseed	2010	4,700	4,700	19.1 bu.	90,000	
Dry Edible Pea	2011	Data Withheld	Data Withheld	Data Withheld	Data Withheld	
Dry Edible Pea	2010	2,100	2,050	2,680 lbs.	55,000	
Dry Edible Beans	2011	Data Withheld	Data Withheld	Data Withheld	Data Withheld	
Dry Edible Beans	2010	65,000	5,500	1,620 lbs.	89,000	
Corn	2011	19,500	16,500	91.1 bu.	1,503.000	
Corn	2010	16,000	12,500	107.6 bu.	1,345,000	
Canola	2011	27,300	27,200	1,600 lbs.	43,500,000	11
Canola	2010	32,900	32,900	1,770 lbs.	58,300,000	
Barley	2011	Data Withheld	Data Withheld	Data Withheld	Data Withheld	14
Barley	2010	20,000	19,500	65.6 bu.	1,280,000	

Source: N.D. Agricultural Statistics Service, USDA

Of the county's square miles of land, approximately 1,080 square miles are devoted to agricultural use or 64 percent. The following chart breaks down land use further.



Source: N.D. Agricultural Statistics Services, USDA

According to the 2007 Census of Agriculture, 530 farms were recorded in the county, compared to 487 in 2002, which shows a +9 increase in farm numbers. The average size farm in Pierce County in 2007 was reported at 1,097 acres, showing an increase in farm size of +10 acres from 2002.

Livestock plays a role in the county's economy with 181 of the county's 530 farms raising livestock. The following table shows the impact of livestock in the county.

Table 8. Pierce County Livestock Farms, Animal Numbers and Rank in State

Livestock Industry	Number of Farm	Number of Animals	Rank in State
Cattle and Calves	181	29,533	27
Beef Cows	157	16,028	Not Available
Milk Cows	11	548	14
Hogs & Pigs	4	18	Not Available

Source: N.D. Agricultural Statistics Services, USDA

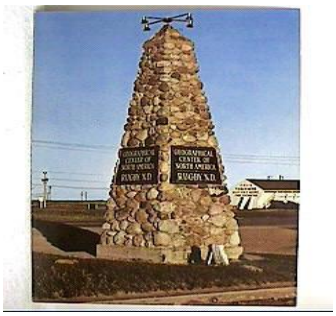
Nature: Most of the county is nearly level to undulating, but some areas are rolling to steep. Native vegetation consists of a wide variety of grasses, forbs, shrubs, and trees. The most common herbaceous plants include bluestem, goldenrod, beggar weed, wheatgrass, grama, indiangrass, and fescue. Shrubs include snowberry, chokecherry, and juneberry. Common wetland plants are smartweed, saltgrass, cordgrass, rushes, sedges, reeds, and cattail. There are approximate 1,600 acres of native woodland. Most of this woodland is bur oak, American elm and green ash. The most common tree species include American elm, green ash, bur oak, quaking aspen cottonwood, boxelder, and various species of willow.

Rivers, lakes, and dams are located in Pierce County. The North Fork Sheyenne River runs through the county. The following lakes are also found: Hurricane, Island, Grass, Eileen, Round, Horseshoe, Davis, and Sand. Dams include: Balta and Buffalo Lake.

The Buffalo Lake National Wildlife Refuge is a National Wildlife Refuge found in Pierce County. It is managed under J. Clark Salyer National Wildlife Refuge.

Geology: Pierce County is a land of gently rolling prairie broken by low hills and ridges with a few sharp peaks. Drainage is fairly well developed in some parts of the county, but poorly developed in others. Drainage to the east consists of Sheyenne River tributaries (Red River of the North basin), and to the west consists of intermittent streams of the Souris River basin. The Devils Lake basin lies between the basins of the Red and Souris Rivers and is generally regarded as a closed basin. The land surface contains numerous not-drained depressions, commonly referred to as sloughs or prairie potholes.

Soil is the most important natural resource in the county. The crops produced and livestock that graze the grasslands are marketable products derived from the soil. It provides a growing medium for crops and for the grasses grazed by livestock. Economic mineral deposits include the sand and gravel materials, which are favorable for commercial excavation.



The Geographic Center of North America monument located in Rugby.

In January, 1931, an U.S. Geological Survey determined the center of North America in Pierce County. The Survey Bulletin Number 817 states: "The geographic center on an area may be defined as that point on which the surface of the area would balance if it were a plane of uniform thickness, or in other words the center of gravity of the surface. The triangular station is the reference point for all property lines and city, county, State and international boundaries on the North American Continent that are tied to the national triangulation network of the United States, Canada, Mexico, and Central America. This triangulation station is the base point of origin of geodetic positions and directions in the triangulation net of the United States because it is at the junction of the main east-west transcontinental triangulation arc stretching from the Atlantic to the pacific Coast and the main north-south arc, which follows approximately the 98th meridian from the Canadian border to the Rio Grande. The following position should be considered as approximations only. North America Continent: Latitude 48° 21' 19" longitude 99 59 57 West.

The center is marked with a monument or cairn that is pyramid form in shape. It is 21 feet high, 6 feet wide at its base, and setting on a heart-shaped foundation. It was built across the highway, northwest of its present location, by W.B. Paterson and E.B. Paterson with the assistance from local Boy Scouts and other young men in the community. The Rugby Lions Club donated cement and other materials used in the construction. It was completed in August 1932. It remained at that location until July 1971 when Highway 2 became four lanes, and its location was becoming a frontage road. At that time it was moved to its present location on the southeast corner of the intersection of highway 2 and 3. In 1955, work was done to beautify the area around the monument with a rock garden, an information board, and three new flagpoles representing each of the countries making up North America. (Canada, United States, and Mexico)

Development: Energy development is impacting Pierce County. The county has a wind farm that is located in the northern portion of the county. Wind towers produce electrical power. Oil and gas development in the counties to the west and north are having a large impact in the county from increased traffic and increased people. The city of Rugby and the Rugby Jobs Development Authority is working on housing for single family homes in east Rugby.

Health and Public Safety Resources: Countywide law enforcement agencies include the Pierce County Sheriff's Department and the North Dakota Highway Patrol. City police departments include Rugby. The North Dakota Game and Fish Department patrol state parks and game management areas. Federal game refuges are the responsibility of the U.S. Fish and Wildlife Service. The U.S. Border Patrol also has individuals located in Rugby. Correctional officers also work at the Heart of America Correctional Center, located in Rugby

The Heart of America Medical Center, located in Rugby, provides hospital services, clinic services, ambulance services, and nursing home care for the county. The county relies upon a major trauma center located in Minot, N.D., about 70 miles west of Rugby.

Fire departments serving Pierce County include: Rugby, Rugby Rural, Willow City, Wolford, Leeds, Anamoose, Esmond, and Harvey. The county is predominantly rural and has limited health and public resources available. Therefore, it relies heavily upon first responders, volunteer fire services, and mutual aid agreements with other counties.

Transportation Resources: Because of its rural nature, the county is highly dependent upon its network of federal and state highways and county roads. U.S. Highways 2 and 52 and N.D. Highways 17 and 19 are the major east-west routes across the county. N.D. Highways 3, 60 and 30 are major north-south routes. (See Chapter 7 Maps) These state and federal highways along with the hard surfaced and graveled county and township roads provide the county's transportation network. The county has 1,140 miles of roads. Only 13 miles of these roads are paved.

Passenger rail service is provided by Amtrak. Daily passenger service is available going east and west from the Rugby Amtrak Depot. Of the seven North Dakota stations served by Amtrak, Rugby was the fifth busiest in 2010, boarding or detraining an average of 18 passengers daily. The platform, tracks, and station are all owned by BNSF Railway.

Rugby airport is the community airport. The nearest major airline facility to the west is located in Minot, N.D., in Ward County; to the east in Grand Forks, N.D., in Grand Forks County; and to the south in Bismarck, N.D., in Burleigh County.

Recreation Resources: Outdoor activities are at the center of the county's recreation resources. Hunting opportunities are abundant in the county whether its waterfowl, upland game, or big game. Rugby is located at the center of two major flyways, therefore surrounding them with a large concentration of Snow Geese, Canadian Geese, and many varieties of ducks offering a unique advantage for wildlife enthusiasts. Major recreational areas in the county include: Sand Lake, Balta Dam, Davis Lake, and Buffalo Lake. Fishing is a popular sport year-round as local lakes offer excellent fishing, swimming, and camping. Major fishing areas available: are Sand Lake, Balta Dam, and Davis Lake. Developed facilities are available for such activities as fishing, boating, swimming, softball, basketball, camping, picnicking, horseshoes, golfing, rodeos, and car racing at the Geographical Center Speedway. The county also offers historical sites that bring history to life: Victorian Dress Museum, Geographical Center of North America, Northern Light Tower, and Niewoehner Bell Tower, Dale and Martha Hawk Museum, and Prairie Village Museum.

Historic and Archeological Sites: Pierce County has seven listing on the National Register of Historic Places: 1) Great Northern Passenger Depot (Amtrak Depot), 2) Old Mt. Carmel Cemetery, Wrought-Iron Cross Site, 3) St. Anselm's Cemetery, Wrought-Iron Cross Site, 4) St. Mathias Cemetery, Wrought-Iron Cross Site, 5) U.S. Post Office Rugby, 6) Episcopal Church, and 7) Pierce County Courthouse.

Amtrak Depot in Rugby, N.D.

The Rugby Amtrak Depot was built in 1907 as the Great Northern Passenger Depot and is still in use as a depot. In 1987 the Lions Club chapter was among the groups involved in a restoration project for the station. The former Great Northern Depot was placed on the National Register of Historic Places on September 26, 1991.

St. Paul's Episcopal Church is an historic Episcopal building in Rugby. The Late Gothic Revival style of architecture by noted Grand Forks architect Joseph Bell DeRemer was built in 1903 to 1905 of local fieldstone with concrete mortar and wooden gables and roof. Its stained glass windows which came from Holy Trinity Parish in New York City and arrived in poor condition were refitted by members of the congregation. Around 1968 the church closed and remained vacant until 1991 when a local undertaker bought it. On December 3, 1992, it was added to the National Register of Historical Places. Today it is the Victorian Dress Museum and Boutique.

Pierce County has over 1,400 historic and archeological sites. Of these sites, approximately 298 are prehistoric archeological, 61 are historic archeological, and 623 are architectural standing structures. There are also approximately 432 prehistoric/historic site leads that have not been confirmed.

Wildlife: Public land provides excellent wildlife habitat. The U.S. Fish and Wildlife manages approximately 3,135 acres as waterfowl production areas and 1,875 acres as refuges. North Dakota Game and Fish manages approximately 3,500 acres of state-owned wildlife management areas. Private landowners manage some areas of upland and wetland habitat primarily for wildlife. Some landowners, acting in the public interest, have conveyed their drainage rights on 90,207 acres of wetland to the federal government under the Small Acquisition Program.

A variety of seasonal and year round birds including songbirds, hawks, eagles, falcons, marsh birds, and shorebirds heavily populate the county. Important game bird species include pheasant, partridge, duck, geese, and sharp-tailed grouse. Small mammals located within the area include mink, muskrat, beaver, jackrabbit, skunk, and fox. Larger mammals include white-tailed deer. Several species of fish live in the waters of the county. Among the most prevalent are northern pike, bullhead, and perch.

The Whooping Crane is listed on the endangered species list for Pierce County.

The only endangered species listed in Pierce County according to a report by the U.S. Fish and Wildlife, North Dakota Field Office, is the Whooping Crane. The Whooping Crane is the tallest bird in North America standing five feet tall with a wingspan of seven feet. The bird is white with black wingtips and red markings on the head. However, the younger birds have a brown-mottled appearance. Whooping cranes inhabit shallow wetland and can also be found in upland areas. The decline in number is due to the loss of habitat and shootings.

The piping plover is listed as threatened in Pierce County meaning that they are species which are likely to become endangered within the foreseeable future. The piping plover is a small shore line bird measuring six and one-half to seven inches long and is whitish on the underside and light brown on the wings, back, and top of head. Distinctive markings include single black bands across the chest and forehead. These birds are located along barren sand and gravel shorelines of lakes and rivers. Loss of habitat through reservoir construction, pesticides, cattle trampling, and wetland have caused the population of these birds to decline.

The U.S. Fish and Wildlife Service maintain a list of candidate species which may warrant listing as endangered or threatened; however, the data are inconclusive. Candidate species are not protected under the Endangered Species Act. In Pierce County, the Sprague's Pipit is listed as a candidate species.

The Sprague's Pipit is listed as a candidate species for endangered or threatened with the U.S. Fish and Wildlife Service.

Sprague's pipits are about 14 cm in length. The wings and tail are dark brown with two pale indistinct wing-bars and mostly white outer retrices, the crown, nape and upper parts are buffy with blackish streaking and the face is buffy with a pale eye-ring creating a large eyed appearance. Habitat loss, inappropriate management, nest predation, parasitism, energy development, climate change, and droughts are threats that currently or potentially effect Sprague's Pipits populations.

Balta – The community of Balta is small rural farming community in central Pierce County. It has a 2010 U.S. Census population of 65 residents, a loss of 12 residents from the 2000 Census. The community is located approximately a mile and half west of North Dakota Highway 3, and the Canadian Pacific/Soo Line Railroad passes through the community. There are limited shopping and service businesses in the Balta community. The city of Rugby, 15 miles to the north, serves the community with education, health care and shopping opportunities. Utilities in the community are provided by Northern Plains Electric Cooperative. The city of Balta has two businesses, a vehicle repair shop and a bar. The city has one church. The city council meets in the former post office building.

2010 Census – City of Balta

Population	Number
Total Population	65

Housing Status (in housing units unless noted)

Total	47
Occupied	30
Owner-occupied	26
Population in owner-occupied (number of individuals)	51
Renter-occupied	4
Population in renter-occupied (number of individuals)	14
Households with individuals under 18	7
Vacant	17
Vacant: for rent	0
Vacant: for sale	0

Population by Sex/Age

Male	38
Female	27
Under 18	14
18 & over	51
20 - 24	4
25 - 34	6
35 - 49	10
50 - 64	18
65 & over	11

Population by Ethnicity

Hispanic or Latino	0
Non-Hispanic or Latino	65

Population by Race

White	65
African American	0
Asian	0
American Indian and Alaska Native	0
Native Hawaiian and Pacific Islander	0
Other	0
Identified by two or more	0

(Source: 2010 Census)

Rugby – The community of Rugby is the County Seat of Pierce County and is a full service retail and service community with a large trade area. The community is in a rich agricultural region with the main crops being cereal grains, sunflowers, and oil crops and the support facilities that service the agricultural sector of the economy. Rugby is a city of 2,876 people, according to the 2010 Census. City officials estimate there may be a modest increase in population since 2010. People have moved into the community from the impact of oil development in western North Dakota and also relocating from the flooding in Minot. According to the "Rugby Housing Study-2011," that was published prior to the release

of the 2010 Census, the American Community Survey had estimated the city of Rugby had a population of 2,417. While the population of Rugby was still a loss of 63 people from the 2000 Census, it was slighter loss than the housing study predicted, indicating a change in the accelerated population decline.

Rugby is located along two of the state's classified "Interregional Highways" – U.S. Highway 2 and N.D. Highway 3. Rugby is also located south of Dunseith, one of the North Dakota's three Land Ports of Entry that operate 24/7/365 and offer veterinary and Animal Plant Health Inspection Services between the United States and Canada. Participants said that N.D. Highway 3 south of Rugby has increasing traffic flow as the Canadian-U.S. traffic avoids other north south routes across western North Dakota because of the excess traffic from oil development. Rugby is also on the mainline of the BNSF Railroad and is a stop for Amtrak passenger service.

The city of Rugby is the regional center providing governmental, agricultural-related business, educational, medical, transportation hub, tourism, retail and professional services to the region. The city also has an industrial park.

Government entities in the community include two elementary schools and a high school; county courthouse, county shop; city hall and fire hall; park district facilities; N.D. Department of Transportation shop; N.D. driver's license registration office; U.S.D.A Farm Service offices; a regional law enforcement center with 9-1-1 dispatch, chemical dependency treatment center and jail housing 100 to 130 people, and representatives from the following entities are stationed in Rugby: U.S. Border patrol, N.D. Game and Fish; N.D. Bureau of Criminal Investigation.

The next largest use of agricultural land is for livestock. The north portion, about 12 miles from east to west, is the location of a wind farm. Oil and gas development in western North Dakota are having some impacts on Pierce County. There is no drilling for oil or natural gas in Pierce County as of 2012.

Utilities in the community are provided by Otter Tail Power, North Dakota Telephone, MidContinent Communications, and the rural area is served by Northern Plains Rural Electric.

The city is planning a 40 to 45 lot residential area for multi- and single-family residences.

2010 Census – City of Rugby

Population	**Number**
Total Population	2,876

Housing Status (in housing units unless noted)

Total	1,407
Occupied	1,239
Owner-occupied	847
Population in owner-occupied (number of individuals)	1,984
Renter-occupied	392
Population in renter-occupied (number of individuals)	631
Households with individuals under 18	287
Vacant	168
Vacant: for rent	60
Vacant: for sale	26

Population by Sex/Age

Male	1,401
Female	1,475
Under 18	575
18 & over	2,301
20 - 24	121
25 - 34	278
35 - 49	532
50 - 64	549
65 & over	765

Population by Ethnicity

Hispanic or Latino	36
Non-Hispanic or Latino	2,840

Population by Race

White	2,643
African American	8
Asian	1
American Indian and Alaska Native	166
Native Hawaiian and Pacific Islander	320
Other	-
Identified by two or more	-

(Source: 2010 Census)

Wolford – The community of Wolford small rural farming community in northeast Pierce County. According to the 2010 U.S. Census, it has a population of 36 residents – a loss of 14 residents from the 2000 Census.

The community is located along N.D. Highway 17 and an abandoned spur line of BNSF Railroad that is used for storage of train cars. There is a U.S. Post Office in the community. There is a volunteer city/rural fire department that serves 15-square mile around the community. For ambulance service, the city of Wolford cooperates with Rugby, Cando, and Rolette. The city has a first responder unit in Wolford. The city park is under the management of the Wolford City Council. A county shop is also located in the community

Education is provided for the region with a kindergarten through grade 12 school facility. The city of Rugby, 24 miles to the southwest, serves the community with health care and shopping opportunities. Hospital and medical services are also available from Cando – 25 miles and Rolla – 30 miles. Utilities are provided by Otter Tail Power Company, North Dakota Telephone, and water is provided for residents from either private wells or rural water from All Seasons Water from Rugby. The city has water well available for fire protection. Sanitary sewer is provided by individual septic tanks. The city has no storm sewer. The city is located in an area of potholes and sloughs and flooding of roads and basements in town occurs during the region's wet cycles.

The city of Wolford's businesses include:

- Farmers Union Agronomy Center that has anhydrous ammonia, dry fertilizer, chemicals and oils,
- Bar and grill with gas tanks for car fuel, and
- High Plains Hot Tubs.

According to the 2010 Census, Wolford has 27 houses. Of those 17 are occupied, and 15 are owner occupied. The Census listed 10 houses as vacant that were neither for sale or rent. City Council members challenges that the city has 10 vacant houses. They identified four houses that are hunter homes. They identified about three homes that are truly vacant. City has torn down most vacant, unlivable homes.

The city of Wolford has not experienced any growth or proposed expansion from the oil development in the western portion of North Dakota. The city has no houses for sale and few houses ever are put on the market. The last sales in the town have been private sales. They estimated that the last two house sales in Wolford were in 2007 and 2009. The last new house was built in 1997.

The city of Wolford does have power outages. Winter ice storms take out power. About a year ago the city had no power for 24 hours. Generally if there is no power for any extended time, people work together to obtain generators to provide power. Rural farmers have generators and often will bring them in to provide assistance in town. The city has no identified shelter(s) for winter storms, summer storms, tornadoes, or shortage of critical materials. Some houses have basements. Those without basements need to locate a neighbor who has a basement. Public buildings have no basements or ability to be a good shelter. The Lutheran church has a basement. The city has no generator for backup power for any public buildings or for any sheltering.

2010 Census – City of Wolford

Population	**Number**
Total Population	36

Housing Status (in housing units unless noted)

Total	27
Occupied	17
Owner-occupied	15
Population in owner-occupied (number of individuals)	32
Renter-occupied	2
Population in renter-occupied (number of individuals)	4
Households with individuals under 18	4
Vacant	10
Vacant: for rent	0
Vacant: for sale	0

Population by Sex/Age

Male	17
Female	19
Under 18	9
18 & over	27
20 - 24	0
25 - 34	3

35 - 49	5
50 - 64	12
65 & over	7

(Source: 2010 Census)

Planning Process

The Pierce County Commission began the process to update its multi-hazard mitigation by applying for and receiving a grant to assist in the cost of the planning process. The Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan was approved by the North Dakota Department of Emergency Services and the Federal Emergency Management Agency in 2003 and has expired. The four county jurisdictions in the 2003-approved plan participated in the planning process for the 2013 plan.

Table 1. Jurisdictional Continued Participation in Mitigation Planning

Jurisdictions Represented in Plan	Participation
Pierce County	Continued Participation (2003-2013)
City of Balta	Continued Participation (2003-2013)
City of Rugby	Continued Participation (2003-2013)
City of Wolford	Continued Participation (2003-2013)

Whereas, the jurisdictions have limited capability to undertake extensive participation in the preparation of a hazard mitigation plan, the Pierce County Commission contracted with the Souris Basin Planning Council of Minot, N.D., to act on behalf of the county's jurisdictions to facilitate the planning process for the analysis and development of a hazard mitigation plan. When the Souris River flooded the city of Minot and other communities in Ward County and greatly impacted the staff of the Souris Basin Planning Council, the South Central Dakota Regional Council contracted with the county to facilitate the planning process and writing of the update to Pierce County's plan.

Building the Team: Deb Kantrud, executive director of South Central Dakota Regional Council, worked with Pierce County Auditor Karin Fursather and County Emergency Manager Kelsey Siegler to identify a list of representatives from each jurisdiction and stakeholders who assist in reducing the risks and hazards in the county to be part of the planning process. Invitations were sent to 58 representatives.

Meetings to begin the planning process to update the 2003 Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan began May 1, 2012. Kantrud of South Central Dakota Regional Council met with the Pierce County Commission to discuss the process to update the plan. In April, the county had hired a new emergency manager, Kelsey Siegler. She was named the point of contact for the planning process. During the planning process, Siegler reorganized the local emergency management committee. For the planning process, representatives from each jurisdiction served as the planning committee.

Plan committee members included Pierce County Emergency Manger Kelsey Siegler; Pierce Commissioners Mike Christenson, Duane Johntson, David Migler, Rick Larson, and Joe Bohl; County Auditor Karin Fursather; Rugby Mayor David Cichos; Balta City Council member Jim Rennock; Wolford Mayor and fire chief Jim Wolf; Rugby city and rural fire chief Jerry Kurtyka; Brenda Foster, representing economic development and the city of Wolford; Ken Reed of Rugby EMS, Jennifer Reed of Rugby EMS and Heart of America Medical Center; Souris Basin Planning Council Executive Director Greg Hagen; and Karla Heisler of Lake Region District Health Unit. The committee had the authority in

Pierce County to review, update, and create mitigation projects for the plan. In addition to the committee meetings, meetings were held with the city councils of Balta, Rugby and Wolford to identify specific vulnerabilities and strategies for each community. Meeting participation and individual discussion were also held with emergency services, school leaders, law enforcement, chamber and businesses.

May

At the May meeting, the Planning Committee identified stakeholders who needed to be invited to be part of the plan updating process and decided to hold meetings at 7 p.m. the first Tuesday of each month. The committee met monthly in May, June, July, August, September, October and December. Other stakeholders attended the meeting. In addition many were contacted to add information for the planning process.

The first meeting of the Pierce County Planning Committee was held from 7 to 9 p.m., Tuesday, May 1, 2012, in the basement of the Memorial Hall. Invitations had been sent to local jurisdictions, stakeholders, agencies, and neighboring emergency managers and news releases had been sent to the local media.

The meeting was opened with Pierce County Commission Chairman Mike Christenson introducing plan consultant Deb Kantrud, South Central Dakota Regional Council, and the county's emergency manager Kelsey Siegler. Each participant introduced himself or herself and indicated who he or she was representing.

The agenda included discussion of the purpose of mitigation and the update of the Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan, how the current mitigation plan is used, who needed to be involved in the planning process, how to get public involvement, when to hold meetings, and review of the 2003 Pierce County Mitigation Plan, an initial review of the county's and state's hazards and vulnerabilities, and identification of the processes and steps to be taken in the planning process.

The Pierce County Planning Committee identified that the plan is for the four jurisdictions in the county: the Pierce County Commission and the cities of Balta, Rugby, and Wolford. A representative of each jurisdiction would be part of the planning committee. Jurisdictional meetings would also be held to have each jurisdiction conduct a specific risk assessment, identify vulnerable areas, assess level of readiness and preparedness, estimate potential losses from specific hazard events, decide on capacity and on how to allocate resources, and prioritize mitigation measures/actions/projects.

The committee discussed that entities, such as school districts, park districts, water boards, rural electric cooperatives, that can apply directly for FEMA grant funds can also participate in the planning and sign a resolution to adopt the plan. These entities were invited and encouraged to attend and participate in the planning process.

The Pierce County Planning Committee voted to make decisions in the planning process by a majority vote of committee members present. Committee members discussed how to gather the information needed to update the plan and how to garner public involvement. Letters, phone calls, and surveys were discussed. Other community and jurisdictional plans were discussed.

After consideration of several days for meetings, the committee voted to meet monthly from 7 to 9 p.m. the first Tuesday of each month for planning meetings and public meetings. City jurisdictional meetings will be scheduled with city councils.

The 2003 Pierce County Mitigation Plan was reviewed in a PowerPoint presentation, copies were distributed, and the consultant agreed to post the document on the web site: www.scdrc.org. The resource from FEMA and N.D. Department of Emergency Services: Mitigation Ideas was also distributed and put on the web site as a planning resource.

Upon review of the 2003 Pierce County Mitigation Plan, it was decided to:

- Reorganize the plan document.
- Goals will be moved from the appendices into a chapter including Mitigation Strategies.
- Update the Profile Section.
- Update Hazard Background and Risk Assessment.
- Move the projects from the hazard section to a Mitigation Strategies chapter.
- Add Hazards as identified in the planning process and add corresponding data.
- Eliminate some of the sections that are not required in a mitigation plan, especially if they are covered in other plans and include specific location information.
- In depth review of goals and strategies will be done at a future meeting and will be changed accordingly.
- The hazards will be reprioritized when hazard history and vulnerabilities are reviewed at future meetings.

The committee reviewed what was prioritized in the 2003 Pierce County Mitigation Plan. The committee voted to eliminate and add some vulnerability items as more history is reviewed. They also voted to change five hazards to match the North Dakota Hazard Mitigation Plan.

- The hazard Urban Fire will be Urban Fire and Structure Collapse in the update.
- The hazard Rural Fire will be updated to Wildland and Rural Fire and Wildland Fire. The committee said Wildland Fire alone does not accurately describe rural fires in the county. Most of the fires in the county are started by equipment operating in cropland and hayland. Few of the fires are wildland fires
- The hazards National Security and Civil Disorder and Terrorism will be changed to Homeland Security Incident.
- The hazard Mass Causality Accident will be updated to Transportation Accidents.

The committee considered the other hazards as mandated by 44 CFP Part 201. The risk of communicable disease was added. The Planning Committee determined that the increase large risk of economic losses from diseases in crops and livestock and the risk to loss of human life made communicable disease a

hazard to be added in the county. The risk of Extreme Heat was added. The hazard history has identified excessive heat in 2005, 2006, 2007, 2008 and 2011. It poses a large risk of economic loss to crops and livestock and with the limited number of shelters, heat disorders impacting a larger number of people could pose a risk to the county.

The Planning Committee determined that the risk for avalanche, coastal erosion, coastal storm, earthquake, expansive soils, levee failure, hurricane, land subsidence, landslide tsunami, and volcano to be significantly low enough to eliminate a risk assessment in the county. This determination was made on factors including: no past presidential disaster declaration, governor declaration, or secretary of agriculture declarations on these hazards, no incident/situation report on these hazards, no historical records of these hazards occurring, no existing reports or plans include them, and there is no anecdotal evidence by residents or experts in the region.

The Planning Committee reviewed some of the hazard history. The Planning Committee compared the ranking of hazards in the 2010 State Multi Hazard Mitigation Plan: **High Hazards -** Winter Storm, Summer Storm, Drought, Flood. **Moderate Hazards -** Communicable Disease, Hazardous Material Release, Wildland Fire, Shortage or Outage of Critical Materials or Infrastructure. **Low Hazards -** Urban Fire or Structure Collapse, Homeland Security Incident, Transportation Accident, Dam Failure
The Planning Committee discussed additional data to be considered to assist the committee in ranking and prioritizing hazards in the county.

The Planning Committee agreed to use the following risk analysis criteria. This will be done at a future meeting.

Local Risk Analysis Criteria

Frequency - Probability	
Highly Likely	Nearly 100% probability in the next year
Likely	10 to 100% probability in the next year, or at least 1 chance in next 10 years
Possible	1-10% probability in next year, or at least 1 chance in the next 100 years
Unlikely	Less than 1% probability in the next 100 years
Severity - Impact	
Catastrophic	More than 50% of jurisdiction affected
Critical	25-50% of jurisdiction affected
Limited	10-25% of jurisdiction affected
Negligible	Less than 10% of jurisdiction affected

Local Risk Analysis Classifications

		Severity			
		Negligible	Limited	Critical	Catastrophic
Frequency	Highly Likely	C	B	A	A
	Likely	C	C	B	A
	Possible	D	C	B	B
	Unlikely	D	D	C	C

June

On June 5, 2012, the second meeting of the Planning Committee was held from 7 to 9 p.m. at the Otter Tail Power community room.

The committee members reviewed the 2003 mitigation strategies using the following tool for each of the hazards identified in the 2003 plan. This information was used by committee members in evaluating and determining what strategies to include in the 2013 plan and what should be considered in other emergency management plans, i.e. the operations plan.

Committee meeting 2 Review of 2003 MHMP Hazard

Number	Question	Possible Responses
Q1	Was this mitigation project completed?	Yes/No/Not Applicable/Unsure
Q2	Should this mitigation project be deleted?	Yes/No/Not Applicable/Unsure
Q3	Was this mitigation project deferred?	Yes/No/Not Applicable/Unsure
Q4	Should this project be included in the Mitigation Plan Update?	Yes/No/Not Applicable/Unsure

July

The third meeting of the Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan committee was held from 7 to 9 p.m., Tuesday, July 3, 2012, at the Otter Tail Power community room in Rugby. The meeting was facilitated by Deb Kantrud, South Central Dakota Regional Council.

In attendance were: Karla Heisler, Duane Johnston, Karin Fursether, Kelsey Siegler, Travis Ramsey, Jim Rennock, Breanda Foster, Jim Zacher, Jerry Kurtyka, and Joel Bald.

Review of 2003 plan's objectives and actions. The agenda included review of what was learned in the evaluation of the 2003 plan's objectives and actions; identification of critical facilities, mapping needs, and prioritization of the thirteen hazards that the committee has identified.

In general discussion of the 2003 plan's objectives and actions, committee members stated that some objectives and actions were dated, such as in the Homeland Security area. Many of the objectives and actions focused on educational and training issues.

The committee discussed the 2003 plan's Crosswalk review from FEMA, including discussion of the Rush Lake and FEMA Flood Insurance Study.

In reviewing critical facilities, Deb Kantrud reported that Katie Haarsager of Enbridge Pipeline LLC, Minot, N.D., called and discussed the mitigation plan and actions and training that Enbridge takes to

mitigate risks from the sweet crude oil pipeline carrying up to 210,000 barrels per day of Bakken light across the county. The pipeline, which runs from Plentywood, Montana, to Clearbook, Minnesota, runs along Highway 2 across Pierce County. Enbridge has plans to add a second pipeline in the easement in the next four to five years. Haarsager said Enbridge works to ensure the integrity of the system, that the lines are protected from rust, corrosion, cracks, aging of pipeline. The company also provides materials and training on an annual basis to county commissions, emergency manager, city officials, sheriff departments, fire departments, ambulance departments and property owners along the pipeline easement.

Committee members discussed the trainings and correspondence the county and its jurisdictions have with the Kinder Morgan Pipeline Company.

The committee reviewed listings of critical facilities in Pierce County and the cities of Balta, Rugby, and Wolford. The emergency manager, county auditor and city auditors will work with elected officials and jurisdiction employees and critical facility owners to update the locations and contact information of critical facilities in the jurisdictions. The committee considered the overlap of hazards and vulnerable critical facilities and the need to consider mitigation strategies to reduce risks. Some of the discussion included storm shelters, but no shelters identified for extreme heat, assuring constant access to water and sanitary sewer, consideration of generators to assure power to critical facilities, the hospital, power companies, vulnerable population, educational needs and opportunities for limiting risks of specific hazards.

The committee discussed the Border Patrol and what it does in the community and Homeland Security Incident threats.

Mapping Needs. The committee discussed what needs it has for additional mapping. The committee will review the FEMA Flood Insurance Study. The committee discussed: possible value of mapping of culverts, of identified main roads that need to be kept open during emergencies, of the main waterways that run through the townships and could impact the townships from flash flooding roads, and of expanding the GPS mapping of emergency services. The county has detailed maps of all the wind towers. The committee discussed using zones that would be designated for shelters for specific areas of the community of Rugby.

Prioritizing Hazards. The committee reviewed the history of hazards that has been compiled to date. Additional information will be gathered as follows:

- Fire departments. Eight fire departments provide fire and rescue services in the county. While the National Fire Incident Reporting Program gives general numbers, the committee would like more specifics to develop mitigation strategies. The facilitator will work with Jerry Kurtyka, Rugby City and Rural Fire Department, to develop a letter to send to the fire departments asking for more details of the incidents to which they have responded in Pierce County from 2003 to present. The letter will ask for incident type, i.e. fire, rescue, traffic accident, hazardous materials; cause of incident: i.e. lightning, farm equipment; impact: loss of life, loss of vehicle or equipment, estimated dollar losses, acres burned if applicable; type of fire, i.e. grass, structure, farm equipment, railroad.
- Karla Heisler, Lake Region District Health Unit, will obtain communicable disease statistics for Pierce County from 2003 to present from the State Health Department.
- Kelsey Siegler, Pierce County Emergency Manager, will compile history details for Pierce County from 2003 to present for hazardous materials and transportation incidents.

The committee discussed that there have been no homeland security incidents, however, this hazard is a risk and mitigation strategies are necessary.

The committee prioritized the following hazards: Winter Storm, Summer Storm, Flood, Drought, Hazardous Materials, Urban Fire and Structure Collapse, Rural Fire and Wildland Fire, Shortage of Critical Materials, Homeland Security Incident, Transportation Accidents, Dam Failure, Communicable Diseases, and Extreme Heat.

When compiling the risk assessment, the committee members determined that some hazards are of different risk to the city of Rugby and to the other areas of Pierce County. The graphic in the risk assessment chapter notes the different evaluations for each jurisdiction. The committee discussed that the Shortage of Critical Materials impacts residents in Rugby differently than in the rest of Pierce County, especially with loss of electrical power. The rural areas and the cities of Wolford and Balta do not have the redundancies that the city of Rugby has. Urban Fire and Structure Collapse is a higher risk in the city of Rugby since the city has the most structures and the highest density of structures, including residential, public, commercial, agricultural and industrial. Flooding is a hazard that impacts the county with flash flooding with in the county. However, flooding outside the county also has an immense negative impact on the residents of Pierce County. The flooding of the Souris River in 2012 cut off access to medical facilities in Minot. The committee also discussed that the city of Rugby with the county's major population would be the most negatively impacted by a Homeland Security Incident.

August

Following the public meeting on August 7, 2012, the Pierce County Planning Committee called its meeting to order. The committee discussed how to get more public input. Two surveys - a multi-page survey and a two page survey – were considered. Emergency manager Kelsey Siegler and Deb Kantrud, plan facilitator, will work together to develop a tool to get basic information that the county jurisdictions can use for decisions.

The committee was updated on the information from the Rugby jurisdictional meeting. Committee members discussed the public input. Committee members continued the review of 2003 strategies and hazard history. Results of their work are reflected in the strategies chapter.

September

The fifth Pierce County Planning Committee meeting was held from 7 to 9 p.m. at the Otter Tail Power Company meeting room on September 4, 2012.

Kathleen Donahue, ND Department of Emergency Services, had provided technical assistance by reviewing the 2003 strategies and identifying which were prevention, protection, mitigation, response and recovery. She also assisted by identifying some that could be considered for mitigation projects. Using this information, the committee broke into small groups and identified strategies and projects for the 2013 plan. The committee identified hazard addressed, jurisdiction(s) affected, responsible party, partners, estimated timeframe for completion and cost, and possible funding sources. The results of their work are in the mitigation strategies chapter.

October

The Pierce County Planning Committee met from 7 to 9 p.m., Tuesday, October 2. Committee members reviewed the projects identified at the last committee meeting. A scoring and ranking criterion was reviewed. The committee agreed to use the STAPLEE tool. Then each project was scored using the FEMA-recommended STAPLEE feasibility criteria. STAPLEE criteria refer to seven items: Social, Technical, Administrative, Political, Legal, Economic and Environmental – identifying the negative and/or positive impacts and cost-benefit ratio of each proposed mitigation project. The committee used a 1 to 5 scoring for each of the seven criteria. One (1) was low, indicating a negative impact and too costly, and five (5) being high, indicating a positive impact and higher benefit compared to cost.

The highest total score is 35 points. The committee identified: projects scoring 1 to 14 points as low priority, projects scoring 15 to 24 points as medium priority, and projects scoring 25 to 35 points as high priority.

The committee decided to have the next meeting on December 4. At 7 p.m. will be the public meeting for review of the draft. The draft will be available for review on websites. After the public meeting, the committee will meet to incorporate public comments. The comments and minutes of the public meeting and committee meeting will be incorporated into the plan and the final plan will be presented to the Pierce County Commission at its January meeting and upon county's approval, submitted to the ND Department of Emergency Services for review and submittal to FEMA for approval.

December. To be added

Jurisdictional Meetings

Balta. A jurisdictional meeting was held in the city of Balta at 7 p.m., September 17 with Jim Rennock, Balta City Council, and Deb Kantrud, South Central Dakota Regional Council. The two other members of the Balta City Council were harvesting. Jim Rennock and Deb Kantrud decided to review the 2003 plan, past hazard history since 2003 and identify some potential projects. Jim will take this information to the full city council for review and then submit the information to the plan committee for addition into the Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan.

Most individuals who live in Balta farm near the community. The city of Balta has two businesses, a vehicle repair shop and a bar. The city has one church. The city council meets in the former post office building. Utilities in the community are provided by Northern Plains Electric Cooperative.

Past mitigation actions were reviewed. The comments from the North Dakota Department of Emergency Services were reviewed. Mitigation actions that Jim will discuss with the Balta City Council include: a warning siren for the town and Balta Dam recreation area, a shelter for residents, a backup power source for the city's lift station, consider review of city ordinances to assure are mitigating hazards when possible, and development of a bypass that would route hazardous materials around the city.

Jim and Deb reviewed the STAPLEE scoring system. Jim will take this information and the draft mitigation actions to the next city council meeting for review. If they would like to add any to the county

plan, they will score them and mail them to the plan consultant. (For 2010 Census data and further information about the city of Balta, see Profile Chapter 4)

Rugby. The Rugby City Council; city auditor; city economic developer; public works, police and fire department representatives participated in the first of two meetings to update the Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan on May 31, 2012. The meeting was facilitated by Deb Kantrud of South Central Dakota Regional Council.

The agenda of the meeting included discussion of the purpose of a mitigation plan, the county's 2003 plan, a review of the city of Rugby, review of the hazards impacting the city, review of past mitigation actions, and consideration of mitigation needs.

The city council and auditor reviewed the city, identified vulnerable areas and discussed readiness and preparedness and what the city had the resources to do. A map of the city and Census information from 2000 and 2012 and local knowledge was discussed.

While the city does not have a river running through it, it has a storm drainage ditch which connects with a 42-inch storm sewer pipe. The city maintains both to keep water flowing through the city without causing damage. The city has eight warning sirens and designated storm shelters. The city has been working to obtain funding to make one shelter handicap accessible. It also needs a backup generator.

The city does not have extensive ordinances that address natural or manmade hazards. The city has no building inspector. The state's closest building inspectors are located in Minot or Devils Lake. Without a building inspector, there is no one to enforce building codes.

The committee reviewed the hazards, mitigation strategies and goals in the 2003 plan and some of the updated hazard history.

A second jurisdictional meeting was held for the city of Rugby on September 26, 2012. The meeting agenda was identifying mitigation strategies and scoring them. Ten strategies specific to the city of Rugby were identified and scored per the Plan Committee-approved STAPLEE scoring. The strategies are included in the Mitigation Strategies chapter.

Wolford. The meeting of the Wolford City Council to review and update the 2003 Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan was held from 7 to 9:30 p.m., Tuesday, July 10, 2112. In attendance were Wolford Mayor Jim Wolf, and council members Jeff Walsh, Fred Kanagy, Kim Yoder, City Auditor Robin Armstrong, and plan consultant Deb Kantrud, South Central Dakota Regional Council.

The agenda included, welcome and introductions, purpose of mitigation plan, review of Wolford, review of hazards that put Wolford at risk, review of 2003 mitigation actions, consideration of possible mitigation actions, and discussion of next steps. The city council and auditor reviewed the city, identified vulnerable areas and discussed readiness and preparedness and what the city had the resources to do. A map of the city and Census information from 2000 and 2012 and local knowledge was discussed.

Wolford has a decline in population from 2000 and 2010 from 50 people to 36 people. According to the 2010 Census, Wolford has 27 houses. Of those 17 are occupied, and 15 are owner occupied. The Census

listed 10 houses as vacant that were neither for sale or rent. City Council challenges that the city has 10 vacant houses. They identified four houses that are hunter homes. They identified about three homes that are truly vacant. City has torn down most vacant, unlivable homes.

The city of Wolford has not experienced any growth or proposed expansion from the oil development in the western portion of North Dakota. The city has no houses for sale and few houses ever are put on the market. The last sales in the town have been private sales. They estimated that the last two house sales in Wolford were in 2007 and 2009. The last new house was built in 1997. People who live in Wolford grew up here, work here, or houses were available when moved into area.

The city of Wolford's businesses include: Farmers Union Agronomy Center that has anhydrous ammonia, dry fertilizer, chemicals and oils; a bar and grill with gas tanks for car fuel; and High Plains Hot Tubs.

Wolford's services are as follows: The Wolford School is for grades kindergarten through grade 12; a post office, the city park is under the city council, utilities are provided by Otter Tail Power Company and ND Telephone; fire protection is provided by the Wolford Fire Department; for ambulance service, Wolford cooperates with Rugby, Cando, and Rolette; the city has a first responder unit in Wolford; for hospital Hospital/Medical, residents travel to Rugby – 25 miles, Cando – 25 miles, Rolla- 30 miles. A railroad line in town is abandoned, but used to store railway cars.

The town is surrounded by water in closed basins. Many of the houses have basements and when there is water from snow melt and excess rain there is water in basements. 2012 is first year in a number of years that residents weren't using sump pumps to pump water out of basements. The city has no storm sewer system or sanitary sewer system. Each building has its own septic tank. Water is provided by Rugby Rural Water or individual water wells.

City does have power outages. Winter, ice storm could take out power. About a year ago had no power for 24 hours. Generally if no power for any extended time, people work together to obtain generators to provide power. Rural farmers have generators and often will bring them in to provide assistance in town. The city has no official shelter for winter storms, summer storms, tornadoes, shortage of critical materials. People who have basements go into basements. Those who don't have basements find a neighbor who has a basement. Public buildings have no basements or ability to be a good shelter. The Lutheran church has a basement. It could be a public shelter. It is open. It is not handicap accessible. City has no generator for backup power for any public buildings or for any sheltering.

The city has a fire siren, but it has no storm siren for tornado or warning system.

The table below indicates who participated and how they participated in the mitigation planning process from each Pierce County jurisdiction in 2003 and 2013.

Table 2. Jurisdictional Participation in Planning Process

Jurisdictions in Pierce County	Jurisdictions Represented in Plan	Name and Title	How Participated	Status of Plan Participation
Pierce County	Pierce County	Kelsey Siegler Pierce County Emergency	Projects Review Survey	2012

		Manager	Comments Information	
Pierce County	Pierce County	David Migler Pierce County Commission	Comments Information Review	2012
Pierce County	Pierce County	Rick Larson Pierce County Commissioner	Comments Information Review	2012
Pierce County	Pierce County	Mike Christenson Pierce County Commissioner Chairman	Comments Information Review	2012
Pierce County	Pierce County	Duane Johnston Pierce County Commissioner	Comments Information Review Projects	2012
Pierce County	Pierce County	Joe Bohl Pierce County Commissioner	Comments Information Review	2012
Pierce County	Pierce County	Karin Fursather Pierce County Auditor	Comments Information Projects Review	2003, 2012
City of Rugby	City of Rugby	Dave Cichos Mayor, City of Rugby	Comments Information Review	2012
City of Rugby	City of Rugby	Dawn Hauck Rugby City Auditor	Comments Information Review	2012
City of Rugby	City of Rugby	Jerry Harmel Rugby City Council	Comments Information	2012
City of Rugby	City of Rugby	Bruce Rheault Rugby City Council	Comments Information	2003, 2012
City of Rugby	City of Rugby	Neil Lotvedt Rugby City Council	Comments Information	2012
City of Rugby	City of Rugby	David Bednarz Rugby City Council	Comments Information	2012
City of Rugby	City of Rugby	Jim Hoffert Rugby City Council	Comments Information	2012
City of Wolford	City of Wolford	Jim Wolf Mayor, City of Wolford, Wolford Fire	Comments Information Projects Review	2012

		Department		
City of Wolford	City of Wolford	Robin Armstrong Auditor, City of Wolford	Comments Information Projects Review	2012
City of Wolford	City of Wolford	Jeff Walsh Wolford City Council	Comments Information Projects Review	2012
City of Wolford	City of Wolford	Fred Kanagy Wolford City Council	Comments Information Projects Review	2012
City of Wolford	City of Wolford	Kim Yoder Wolford City Council	Comments Information Projects Review	2012
City of Balta	City of Balta	Jim Rennock Balta City Council	Comments Information Projects Review	2012

As part of the planning process and the gathering of information for the updating of the risk assessment, emergency managers from the neighboring counties were invited to all committee meetings and were sent a link to review the draft Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan. Fire chiefs from each of the eight fire districts and/or departments providing protection to property in Pierce County were sent letters to ask for additional information regarding the types of calls each fire districts and/or departments provided in the region. Fire chiefs from the Rugby rural and city fire department and the Wolford fire department participated in the planning meetings.

Table 3. Participation of Neighboring Emergency Services

Other Participation	Name and Title	How Participated	Status of Plan Participation
McHenry County	Marvin Sola, Emergency Manager	Review	2012
Wells County	Tammy Rochrich, Emergency Manager	Review	2012
Benson County	Scott Todah, Emergency Manager	Review	2012
Sheridan County	Wayne Houston, Emergency Manager	Review	2012
Bottineau County	Rick Hummel, Emergency Manager	Review	2012
Towner County	Larry Halverson, Emergency Manager	Review	2012
Anamoose Rural Fire Protection District	Brent Weninger, Fire Chief	Information	2012
Esmond Rural Fire Protection District	Ronald Lauinger, Fire Chief	Information	2012
Harvey Rural Fire	Ralph Muscha, Fire Chief	Information	2012

Protection District			
Leeds Rural Fire Protection District	Paul Peterson, Fire Chief	Information	2012
Willow City Rural Fire Protection District	Bill Prellwitz, Fire Chief	Information	2012

Regional and Business Participation: Additional participants in the plan development are listed in the table below, each was allowed the opportunity to comment on the plan.

Table 4. Regional and Business Participation in Planning Process

Other Participation	Representing	Name and Title	How Participated	Status of Plan Participation
Wolford Fire Department	City of Wolford	Lonnie Anderson Wolford Fire Department	Comments Information Review	2012
Business Media	Pierce County Tribune	Terri Barta Pierce County Tribune Editor	Comments Information	2012
Pierce County City of Balta	Road Department	Scott Beaver Road Department Pierce County/ Balta Area	Comments Information	2012
Regional	Souris Basin Planning Council Pierce County	Greg Hagen Executive Director	Comments Information	2012
Pierce County City of Rugby	Rugby (city and rural) Fire Department	Jerry Kurtyka Rugby Fire Department	Comments Information Projects Review	2012
Rugby Schools	Rugby Schools	Jeff Lind Rugby School	Comments Information	2012
Pierce County City of Rugby	Rugby EMS	Ken Reed Director Rugby EMS	Comments Information Projects Review	2012
Pierce County City of Rugby	Rugby EMS and Heart of America Medical Center	Jennifer Reed Rugby EMS and Heart of America Medical Center	Comments Information Projects Review	2012
City of Rugby	Rugby Job Development Authority	Brenda Foster Executive Director	Comments Information Projects Review	2012
City of Rugby	Rugby City Council and City Park District	Arland Geiszler Rugby City Council and Rugby Park	Comments Information Review	2012

		District		
City of Rugby	Rugby Police Department	John Rose Chief, Rugby Police Department	Comments Information	2012
Pierce County City of Rugby	Rugby Fire Department	Kevin Schepp Rugby Fire Department	Comments Information	2012
Regional	Lake Region District Health Unit	Candace Carlson	Comments Information	2012
Regional	Lake Region Health District	Karla Heisler, RN EPR Coordinator	Comments Information	2012
Wind Energy	Iberdrola Wind Park	Joshua Woodford Iberdrola Wind Park	Comments Information	2012
Pierce County	Pierce County Sheriff's Department	Matthew Lunde Sheriff Pierce County	Comments Information Review	2012
Pierce County	Pierce County Park Department	Jim Zacher Pierce County Park Department	Comments Information	2012
Customs and Border Protection	Border Patrol	Travis Ramsey Border Patrol	Comments Information	2012
Rugby Schools	Rugby School District	Mike McNeff Superintendent	Comments Information	2012
Wind Energy	Iberdrola Wind Park	Tim Sanderson Wind Park	Comments Information	2012
Pierce County	USDA Farm Service Agency	Gary Kraft USDA Farm Service Agent	Comments Information Review	2012
Regional	Lake Region Health District	Brooke Kirkeide Lake Region Health District	Comments Information	2012
City of Rugby	Rugby JDA	SyAnn Graber	Comments Information	2012
State of North Dakota	North Dakota Department of Emergency Services	Kathleen Donahue	Comments Review	2012
State of North Dakota	North Dakota Department of Emergency Services	Jessica Earle	Information	2012
State of North Dakota	National Weather Service/NOAA Bismarck, ND	John Paul Martin Warning Coordination Meterologist	Information	2012
State of North Dakota	North Dakota Water	Jeff Klein State NFIP	Information	2012

	Commission	Coordinator		
State of North Dakota	North Dakota Department of Transportation	John Thompson	Information	2012
Pipeline	Enbridge Pipeline	Katie Haarsager Enbridge Pipeline	Information	2012
Business Media	KZZJ Radio	Bruce Rheault KZZJ Radio	Information	2012
Business	Rugby Farmers Union Elevator	Tim McKay Manager	Information on Plan elevator has in place	2012

Public Involvement: First Public Meeting. All planning meetings were open to the public. In addition two public meetings were held. The first public meeting to review the drafting of the plan update was held at 7 p.m., Tuesday, August 7. Plan facilitator Deb Kantrud, South Central Dakota Regional Council, opened the meeting. Kelsey Siegler, Pierce County Emergency Manager, was introduced. The others in attendance introduced themselves.

The agenda included: Discussion of the Purpose of Mitigation and Plan Update; How is Current Plan Used; Review of Who Needs to be Involved; Schedule of Meetings; Review of 2003 Pierce County Mitigation Plan; Review of Hazards and Vulnerabilities in County, Asking for Public Comments, and Next Steps.

Public comments at the meeting included discussion that the crop damage from the weather has a large impact on the county. The numbers in the SHELDUS is lower than the numbers documented by USDA Farm Service Agencies. When discussing strategies, it was said that all farmers have crop insurance to participate in the Farm Programs. Prevent plant, a Farm Program that provided economic compensation for flooded cropland, was an important tool in the past high moisture years. During the discussion of the hazards, public members said it has been 25 years since it was too dry in the county; drought has not been an issue since 1988. However, drought is always a disaster. It is more an issue if drought during growing season. Public comments also included: Winter storms, transportation issues, and road closures need to be included in the plan.

Since the public input was limited, other tools to obtain information were discussed, including surveys.

Survey. At first public meeting to review the past plan and gather input for the update, committee members reviewed a multi-page survey. They decided to use that survey and the emergency manager, working with the plan consultant, developed a two-page survey to distribute to citizens to encourage more public input. Surveys and drop boxes were placed in community gathering places in Rugby, Wolford, Balta and Selz. The response was limited, but it is an initial attempt to get the public more involved in hazard awareness, preparedness and mitigation. The results have been included to encourage public to respond to future surveys.

Results from Survey for Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan

Only 12 percent of the respondents have been impacted by a natural disaster in the past five years. They identified winter storm and summer storm as the natural disasters.

Have you ever received information about how to make your household and home safer from natural disaster? Response in percent: Yes 38%; No 63%

Does your household have insurance coverage for flood events?
Response in percent: Yes 6%; No 94%

More than 50 percent of the respondents indicated that they were most concerned about drought, winter storms, summer storms, rural and wildland fire, extreme heat, transportation accidents and hazardous materials. Respondents, less than 10 percent, were least concerned about dam failure and earthquake.

Responses to how concerned respondent was by each of the following hazards.

	Extremely concerned	Very concerned	Concerned	Somewhat concerned	Not concerned	Total Concerned
	Percent	Percent	Percent	Percent	Percent	Percent
Drought	6	19	44	13	19	82
Winter storms	0	0	63	13	25	76
Summer storms	0	6	38	31	31	75
Rural and wildland fire	6	0	38	19	38	63
Extreme heat	0	0	19	44	38	63
Transportation accidents	0	0	31	25	44	56
Communicable diseases	0	0	13	38	50	51
Hazardous materials	6	0	13	31	44	50
Shortage of critical materials	0	6	0	44	50	50
Urban fire and structure collapse	0	0	19	25	50	44
Homeland security incident	0	0	0	44	50	44
Floods	0	0	0	31	56	31
Earthquake	0	0	6	0	94	6
Dam failure	0	0	0	6	94	6

What is the most effective way for you to receive information about how to make your household and home safer from natural disasters?

	Percent		Percent
Newspaper stories	75	Outdoor ads (billboards)	0
Newspaper ads	19	Books	0

Television news	56	Mail	56
Television ads	25	Fire Dept./ Rescue	6
Radio news	44	Fact sheet/brochure	19
Radio ads	19	Chamber of Commerce	19
Social Media	38	Public workshops/meetings	13
Website	25	Magazines	6
Schools	19	University/research institution	6

Did you consider the possible occurrence of a natural hazard when you bought or moved into your current home? Response in percent: Yes 19%; No 81%

Would you be willing to spend more money on a house that had features that made it more disaster resistant? Response in percent: Yes 56%; No 44%

Would you be willing to make your home more resistant to natural disasters?

Response in percent: Yes 63%; No 38%

If yes, how much are you willing to spend to better protect your home from natural disaster?

One said he or she already has invested $2,000. 13% would invest $100 to 400; 13% said would invest $1,000 to $2,499; 6% would invest $2,500 to $4,900; 38% responded Don't Know and 25% did not answer.

Natural hazards can have a significant impact on a community, but planning for these events can help lessen the impacts. The following statements will help determine citizen priorities for planning for natural hazards. Please tell us how important each is to you.

	Results in Percentages				
Statements	Very Important	Somewhat Important	Neutral	Not Very Important	Not Important
Protecting private property	63	19	13	0	0
Protecting critical facilities (e.g. transportation networks, hospitals, fire stations)	81	0	13	0	6
Preventing development in hazard areas	25	50	19	0	6
Enhancing the function of natural features (e.g. streams, wetlands)	13	44	31	6	6
Protecting historical and cultural landmarks	38	25	25	0	13
Promoting cooperation among public agencies, citizens, nonprofit organizations, and businesses	63	25	6	0	6
Protecting and reducing damage to utilities	56	25	6	0	6

Strengthening emergency services (e.g. police, fire, ambulance)	69	13	13	0	6

Respondents also wrote in the issue of "protecting students at school" as important in the planning.

Below respondents ranked how they felt about activities that could reduce the community's risk from natural disaster:

Statements - Results in Percentages	Strongly Agree	Agree	Total Agree	Neutral	Disagree	Strongly Disagree	Total Disagree
I support a regulatory approach to reducing risk	13	31	44	38	0	6	6
I support a non-regulatory approach to reducing risk	19	31	50	38	0	0	0
I support a mix of both regulatory and non-regulatory approaches to reducing risk	25	31	56	19	6	0	6
I support policies to prohibit development in areas subject to natural hazards	25	38	63	19	0	0	0
I support the use of tax dollars (federal and/or local) to compensate land owners for not developing in areas subject to natural disasters	0	13	13	44	19	13	32
I support the use of local tax dollars to reduce risks and losses from natural disasters	6	25	31	56	0	0	0
I support protecting historical and cultural structures	19	44	63	13	6	0	6
I would be willing to make my home more disaster-resistant	13	56	69	19	0	0	0
I support steps to safeguard the local economy following a disaster	19	63	82	6	0	0	0
I support improving the disaster preparedness of local schools	44	38	82	6	0	0	0
I support a local inventory of at-risk buildings and infrastructure	19	50	69	13	0	0	0

The draft plan was available for public review for the month of November. Draft plans were available with each city's mayor at city hall and in the courthouse. Plans were also available online on the county's website and the South Central Dakota Regional Council website. News releases regarding accessing the draft plans for reviews and submitting comments and attending the December 4 public meeting for commenting on the plan were sent to the newspaper and radio station

Second Public Meeting. The second public meeting to review the draft plan was held at 7 p.m., Tuesday, December 4. Data will be added after the public meeting.

Review and incorporation of existing plans and information. As part of the planning process, numerous plans were reviewed and information incorporated into this document. The plan reviewed data from the following plans, documents, and agencies:

- Flood Insurance Study, City of Rugby, North Dakota, Pierce County, March 16, 1992
- Job Service of North Dakota
- National Climatic Data Center (NCDC)
- National Oceanic and Atmospheric Administration (NOAA) Satellite and Information Service
- National Register of Historic Places
- National Weather Service
- North Dakota Agricultural Statistic Service, USDA
- North Dakota Department of Emergency Services
- North Dakota Department of Health Plan
- North Dakota Department of Transportation, Draft TransAction III, North Dakota's Statewide Strategic Transportation Plan 2012
- North Dakota Game and Fish
- North Dakota Multi-Hazard Mitigation Plan, March 2011
- North Dakota State University Extension Service
- Pierce County Tribune
- Pierce County Hazardous Materials Response Plan, Annex 2004
- Pierce County Multi-Hazard Mitigation Plan, July 2003
- Rugby Comprehensive Housing Study, February 2011
- Rugby Job Development Authority, 2010-2015 Pierce County and Rugby Strategic Planning
- Rugby Ordinances, Revised June 2010
- Spatial Hazard Events and Losses Database for the United States (SHELDUS)
- Tornado Project
- U.S. Census 2010
- U.S. Centers for Disease Control and Prevention (CDC)
- U.S. Department of Commerce
- U.S. Drought Monitor
- U.S. Fish and Wildlife Service, North Dakota Field Office
- U.S. Geological Survey

Risk Assessment Summary

After reviewing the 2003 Pierce County Multi-Hazard Mitigation Plan and the updated history, and conducting a risk assessment for each of jurisdictions in Pierce County, the following thirteen hazards have been identified to pose risks to the jurisdictions in Pierce County:

1. Winter Storms - A risk classification
2. Summer Storms - A risk classification
3. Shortage of Critical Materials - A risk classification
4. Drought - A risk classification
5. Extreme Heat - B risk classification
6. Hazardous Materials Incidents - B risk classification
7. Flood - B risk classification
8. Communicable Diseases - B risk classification
9. Homeland Security Incident - B risk classification
10. Urban Fire and Structure Collapse - C risk classification
11. Rural Fire and Wildland Fire - C risk classification
12. Transportation Accident - C risk classification
13. Dam Failure - D risk classification

As part of the planning process, the Pierce County Multi-Jurisdictional Mitigation Planning Committee revised the risk analysis for the impact and probability of hazards from 2003 to 2012; they combined and renamed some hazards; and they added two new hazards as posing risks of loss of life and property.

In the prioritization, Winter Storms and Summer Storms continued to be classified as "A" risk hazards. Shortage of Materials was moved from a "C" risk hazard to an "A" risk hazard because of the rural nature of the county, the isolation experienced when the Minot flooding eliminated access for supplies and medical care to the city of Minot, and the small cities lack of redundancy for utilities. Drought was moved from a "B" risk to an "A" risk classification because of the enormous economic impact a drought will have on the agricultural-based economy of the county. Plus little rain fell in the growing season of 2012 and if the trend continues, leaders fear the negative impact of the 1980s droughts.

Hazardous Materials Incidents was moved from a "C" risk to a "B" risk because of the increased amount of hazardous materials being transported through the county and cities in the county on both the roads and

railway systems. Mass Casualty was changed to Transportation Accidents to concur with the N.D. Mitigation Plan and the risk classification was changed from a "D" risk to a "C" risk. Again upon review incidents and the potential for transportation accidents, the committee felt the increased traffic on both the roads and rail system made more people and property vulnerable.

The committee voted to combine Civil Disorder, Terrorism, and National Security Incident to one hazard: Homeland Security Incident to concur with the state plan. The committee also felt that if a Homeland Security Incident occurred, it was likely to be in the city of Rugby and would affect more than 50 percent of the population of the county. The risk classification was moved from a "C" or "D" classification in 2003 to a "B" classification in this plan update.

After reviewing the state plan and considering a history of incidents and potential risks, the committee voted to add two new hazards to be part of this mitigation plan update: Extreme Heat and Communicable Diseases.

Extreme Heat incidents seem to be on the increase. Exposure to extreme heat can cause physical problems and may cause heat disorders or illnesses. Older adults, young children and those who are sick or overweight are most vulnerable to extreme heat. Conditions that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality. Studies indicate that, other things being equal, the severity of heat disorders tends to increase with age. Conditions that cause heat cramps in a 17-year-old may result in heat exhaustion in someone 40-years old, and in heat stroke in a person over 60. The age of much the population in Pierce County is 60 and over and increases the vulnerability for more negative impact. In addition extreme heat can cause significant stress for animals. The livestock industry is a vital portion of the agricultural economy of the county.

Extreme heat produces numerous impacts on Pierce County. Overcrowding of medical facilities becomes a concern. Medical facilities have not released patients because they did not have air conditioned homes to go to. Personal injury and death risk increase during periods of extreme heat. Heat exhaustion is a great concern for those with outdoor occupations as well as students participating in sport programs. The number of kids being left in unattended vehicles during high temperatures is increasing. Extreme heat dries foliage making it a fire-ready tender and during periods of harvesting crops, equipment can overheat and bearings can emit sparks which can result in fires. Animal/livestock/wildlife need to be monitored due to their increased risk of stress during periods of extreme heat. Heat stress can have a significant effect on production and reproduction of livestock, which results in economic losses.

Some of the identified risks include: animal causalities, personal injury and death risk, increased fire potential, loss of crop production, increased public safety runs, overcrowding of medical facilities.

Communicable Diseases pose a great risk to the county, especially in the agricultural impact. A communicable disease could affect only a few to a large number of individuals in Pierce County. The entire county could be impacted affecting schools, businesses, and medical facilities. Elderly, young-children, and individuals with suppressed immune systems are at greatest risk. It could overwhelm the health care system, force quarantines, and result in mass casualties, requiring the need for mass care facilities. Through the use of vaccines, members of the community can be protected against such diseases if the vaccines are available. Points of distribution may be required to administer mass vaccinations.

Animal and plant diseases, particularly those that infect livestock or crops, can distress an agricultural community like Pierce County. Such diseases can lead to food shortages and negative economic impacts.

Some of the identified risks include: business interruptions, increased public safety runs, personal injury and death risk, loss or overcrowding of medical facilities, critical shortages of medical supplies and personnel, animal casualties, quarantine of cattle and/or people, property damage, crop disease, loss of crop production, mass casualties, and school closures.

The committee determined that the risk for avalanche, coastal erosion, coastal storm, earthquake, hurricane, tsunami, and volcano to be significantly low enough to eliminate a risk assessment in the county. The committee did reconsider earthquake in its October meeting, but again deemed it to be too low of a risk to add to the risk assessment. These determinations were made on factors including: no past presidential disaster declarations, governor declarations, or secretary of agriculture declarations on these hazards, no incident/situation report on these hazards, no historical records of these hazards occurring, no existing reports or plans that include them, and there is no anecdotal evidence by residents or experts in the region.

As illustrated by the following risk analyses, unique and varied risks exist among and between the jurisdictions in the plan. Although all jurisdictions are impacted by Summer Storms, the city of Balta, which recently was impacted by a tornado and high winds, had loss of property to almost all of its residents, and classified the risk ad Catastrophic to the small community. Both Balta and Wolford identified that Urban Fire would be more damaging to these small communities. It would have a greater economic impact with the loss of structures because the likelihood of rebuilding would be less. All three communities identified little risk from dam failure. However, there are two low-hazards dams in the county, Balta Dam and Buffalo Lake Diversion Dam, that could have some potential risks in the county. The detailed information on dams in Pierce County is in the appendix: For Official Use Only.

Pages 6-8 through 6-106 include the updated hazard history. Additional hazard history for Pierce County is in the 2003 Pierce County Multi-Hazard Mitigation Plan.

The Committee reviewed the hazard history, and evaluated the probability, vulnerability, and impact and created the following prioritization or risks as indicated in the following two charts:

Pierce County MHMP Risk Analysis

Black Countywide and City of Rugby as noted
City of Wolford – Risks in Red if Different
City of Balta – Risks in Blue if Different

Impact ➔ % Jurisdiction Affected Probability ⬇ How likely to happen	**Negligible Less than 10%**	**Limited 10-25%**	**Critical 25-50%**	**Catastrophic More than 50%**
Highly Likely Nearly 100%	**C** Urban Fire and Structure Collapse - Rugby Rural fire and Wildland Fire Transportation Accidents	**B** Extreme Heat	**A** Summer Storms Shortage of Critical Materials - rural Pierce County	**A** Winter Storms **Summer Storms- Balta** Shortage of Critical Materials - **Balta**, Wolford
Likely 10-100%	**C** Hazardous Materials Rugby, County and **Balta** Urban Fire and Structure Collapse – rural Pierce County	**C** Urban Fire and Structure Collapse – **Balta**, Wolford	**B** Hazardous Materials **-Wolford** Flood Communicable Diseases	**A** Drought Shortage of Critical Materials - Rugby
Possible 1-10%	**D**	**C**	**B**	**B** Homeland Security Incident
Unlikely Less than 1%	**D** Dam Failure ~~Dam Failure~~ ~~Dam Failure~~	D	C	C

	Pierce County	Rugby	Balta	Wolford
Winter Storm				
RISK CLASS	A	A	A	A
Blizzard	X	X	X	X
Ice Storm	X	X	X	X
Downed Power Lines	X	X	X	X
Downed Trees	X	X	X	X
Blocked Roads	X	X	X	X
Building Collapse	X	X	X	X
Business Interruptions	X	X	X	X
Delayed Emergency Response	X	X	X	X
Vehicle Accident and Damage	X	X	X	X
Hypothermia People and Livestock	X	X	X	X
Summer Storm				
RISK CLASS	A	A	A	A
Wind Downbursts and Straight-Line Winds	X	X	X	X
Hail	X	X	X	X
Lightning	X	X	X	X
Tornados	X	X	X	X
Flash Floods	X	X	X	X
Severe Thunderstorms	X	X	X	X
Flood				
RISK CLASS	B	B	B	B
River Flooding				
Overland Flooding	X	X	X	X
Flooding Basements	X	X	X	X
Flooding Main Floor				
Ice Jams of Creeks			X	
Ice Jams Culverts	X	X	X	X
Lift Stations		X	X	
Lagoon Over Runs				
Washed Out Roads	X	X	X	X
Street Flooding		X	X	X
Road Closures	X	X	X	X
Evacuations	X	X	X	X
Loss of Sewer		X	X	
Loss of Water		X	X	X
Loss of Livestock	X			
Prevent Plant	X			
Cropland Flooded	X			
Drought				
RISK CLASS	A	A	A	A
Increased Fire Potential	X	X	X	X
Crop and Livestock Losses	X	X	X	X

	Pierce County	Rugby	Balta	Wolford
Hazardous Materials				
RISK CLASS	C	C	C	B
Anhydrous Ammonia	X	X	X	X
Bulk Fuel	X	X	X	
Bulk Fertilizers	X	X	X	X
Propane	X	X	X	X
Fuel and Gas	X	X	X	X
Natural Gas				
Explosion	X	X	X	X
Hazmat Release	X	X	X	X
Urban Fire and Structure Collapse				
RISK CLASS	C	C	C	C
Structure	X	X	X	X
Explosion	X	X	X	X
Evacuation, Road Closure	X	X	X	X
Wind Turbine Failure/Rescue	X	X		X
Rural Fire/Wildland Fire				
RISK CLASS	C	C	C	C
Acres Burned	X	X	X	X
Cities/Building Risk	X	X	X	X
Farm Equipment/Farm Building	X	X	X	X
Shortage of Critical Materials				
RISK CLASS	A	A	A	A
Loss of Power	X	X	X	X
Loss and Overcrowding of Medical Facilities	X	X	X	X
Need for shelters	X	X	X	X
Diesel Fuel for Generators	X	X	X	X
Homeland Security Incident				
RISK CLASS	B	B	B	B
Chemical Terrorism	X	X	X	X
Biological Terrorism	X		X	X
Terrorism Using Explosive/Incendiary Devices	X	X	X	X
Radiological/Nuclear Terrorism	X	X	X	X
Cyber Terrorism	X	X	X	X
Civil Unrest	X	X	X	X
Public Shooting	X	X	X	X
Bomb Threat	X	X	X	X
Transportation Accidents				
RISK CLASS	C	C	C	C
Highway/Railroad/Airport/Roads	X	X	X	X
Dam Failure				
RISK CLASS	D	D	D	D
Loss of Livestock	X			
Cropland Flooded	X			

	Pierce County	Rugby	Balta	Wolford
Extreme Heat				
RISK CLASS	B	B	B	B
Loss of Livestock	X	X	X	X
Personal Injury/Death	X	X	X	X
Loss of Crop Production	X	X	X	X
Increased Fire Potential	X	X	X	X
Need for Shelter	X	X	X	X
Communicable Diseases				
RISK CLASS	B	B	B	B
Personal Injury/Death	X	X	X	X
Loss of Livestock	X	X	X	X

National Flood Insurance Program

Communities Participating in National Flood Insurance Program

Community	INIT FHBM Identified	INIT FIRM Identified	Curr Eff Map Date	Reg-Emer Date
Pierce County	-	-	(NSFHA)	05/04/1998
City of Rugby	3/22/1974	07/16/1979	03/16/1992	07/16/1979

Source: FEMA Community Status Book Report, North Dakota

Policy Statistics North Dakota as of 8/31/2012

Community Name	Policies In-Force	Insurance In-Force Whole $	Written Premium In-Force
Rugby	1	140,000	274
Pierce County	0		
Balta	0		
Wolford	0		

Source: North Dakota Policy Statistics, http://bsa.nfipstat.com/reports/1011.htm#NDT

Loss Statistics as of 8/31/2012

Community Name	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
Pierce County	6	4	0	2	45,785.67

Source: http://bsa.nfipstat.com/reports/1040.htm#38

Pierce County Repetitive Loss Structures

According to Jeff Klein, North Dakota National Flood Insurance Program Coordinator, neither Pierce County nor Rugby had experienced any repetitive flood loss structures. And neither the city of Balta nor the city of Wolford is enrolled in the National Flood Insurance Program so no repetitive losses can exist in either jurisdiction.

Presidential Declarations for Pierce County, N.D.

For All Disasters Types Between 1953 through 2009

Decision Number	Date	Type	Disaster Description	Statewide Costs Constant 2009 $	President
256	04/18/1969	F	Flooding	20,349,850	Nixon
434	05/14/1974	F	Heavy rains, snowmelt, flooding	6,947,558	Nixon
581	04/26/1979	F	Severe storms, snowmelt, flooding	57,100,615	Carter
1032	07/01/1994	W	Severe storms, flooding	6,426,384	Clinton
1050	05/16/1995	W	Severe storms, flooding, ground saturation	24,294,145	Clinton
1118	06/05/1996	W	Severe storms, flooding, ice jams	18,135,392	Clinton
1157	01/12/1997	S	Severe winter storms, blizzard	21,264,168	Clinton
1174	04/07/1997	W	Severe flooding, severe winter storm	531,404,655	Clinton
1220	06/15/1998	F	Flooding, ground saturation, severe storms	24,468,099	Clinton
1279	06/08/1999	S	Severe storms, flooding, snow, ice	145,619,808	Clinton
1334	06/27/2000	F	Severe storms, flooding, ground saturation	113,151,807	Clinton
1376	05/28/2001	F	Severe storms, flooding, ground saturation	45,117,082	GWBush
1515	05/05/2004	F	Severe storms, flooding, ground saturation	17,712,004	GWBush
1597	07/22/2005	W	Severe storms, flooding, ground saturation	19,237,140	GWBush
1616	11/21/2005	S	Severe winter storm, record and/or near record snow	2,808,990	GWBush
1829	03/24/2009	W	Severe storms, flooding	107,590,628	Obama

Source: http://maggie6.cadsr.udel.edu/presdec/searchlistingmulti.cfm?data

Turned Down State Requested Disaster Declarations for North Dakota

For All Disaster Types between 1953 through 2009

Requested Number	Turn Down Date	Type	Disaster Description	President
61005	08/31/1961	Major	Drought	Kennedy
69006	03/21/1969	Major	Snow removal, flood preparations	Nixon
71045	06/24/1971	Major	Flooding	Nixon
72022	04/25/1972	Major	Flooding	Nixon
75079	04/08/1975	Major	Snow, floods	Ford
76010	09/03/1975	Major	Storms, high winds	Ford
78018	01/25/1978	Major	Severe winter storms	Carter
78042	02/16/1978	Emergency	Snowstorm	Carter
80045	06/16/1980	Emergency	Drought	Carter
88022	11/18/1988	Major	Drought	Reagan
96176	11/19/1996	Major	Severe storms	Clinton
2106	09/05/2002	Emergency	ND Wildfire threat	GWBush

Source: http://maggie6.cadsr.udel.edu/presdec/searchlistingmulti.cfm?data

Communicable Diseases

	Pierce County	Rugby	Wolford	Balta
Frequency	Likely 10 to 100% probability in the next year, or at least 1 chance in the next 10 years	Likely 10 to 100% probability in the next year, or at least 1 chance in the next 10 years	Likely 10 to 100% probability in the next year, or at least 1 chance in the next 10 years	Likely 10 to 100% probability in the next year, or at least 1 chance in the next 10 years
Severity	Critical 25 to 50% of jurisdiction affected	Critical 25 to 50% of jurisdiction affected	Critical 25 to 50% of jurisdiction affected	Critical 25 to 50% of jurisdiction affected
Risk Class	B	B	B	B
Seasonal Pattern	None, Flu has been fall and winter, now can be year round			
Duration	Could be multiple waves, 9 months, could be ongoing			
Speed of Onset	6 weeks or less			

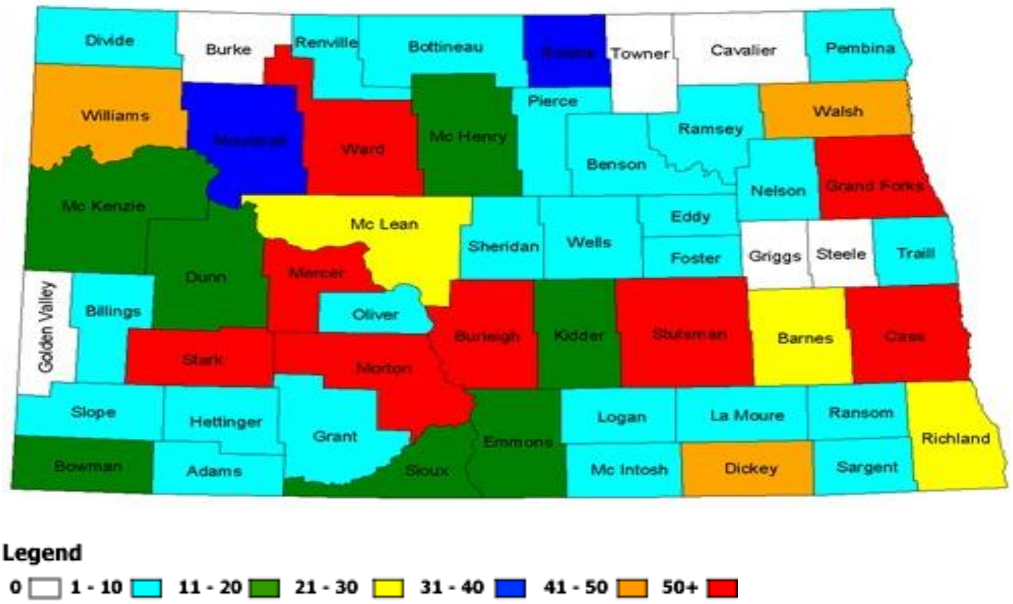
Definition: Communicable disease is an illness that is caused by microorganisms and transmitted from an infected person or animal to another person or animal. Some diseases are passed on by direct or indirect contact with infected person or with excretions. Most diseases are spread through contact or close proximity because the causative bacteria or viruses are airborne. Diseases can be spread by plants, animals and insects. The causes and significance of diseases vary. Such diseases can devastate human populations and the economy.

Threats: A communicable disease could affect only a few to a large number of individuals in Pierce County. The entire county could be impacted affecting schools, businesses, and medical facilities. Elderly, young-children, and individuals with suppressed immune systems are at greatest risk. It could overwhelm the health care system, force quarantines, and result in mass casualties, requiring the need for mass care facilities. Through the use of vaccines, members of the community can be protected against such diseases if the vaccines are available. Points of distribution may be required to administer mass vaccinations.

Disease transmission may occur naturally or intentionally, as in the case of bioterrorism, and infect populations rapidly with little notice. New diseases regularly emerge or mutate. Known diseases, such as influenza, can be particularly severe in any given season, like the H1N1 flu of 2009. Terrorism experts also theorize the possibility of attack using biological agents.

Natural illnesses of concern include: Influenza, Meningitis, Pertussis (Whooping Cough), Measles, Norwalk Virus, Severe Acute Respiratory Syndrome (SARS), and food-borne illnesses, such as E. Coli and Salmonella outbreaks, among others. Source: Epidemiology Report, North Dakota Department of Health. These diseases can infect populations rapidly, particularly through groups of people in close proximity such as schools, assisted living facilities, and workplaces.

Seasonal influenza outbreaks occur annually. According to the North Dakota Department of Health, Pierce County has not experienced a pandemic outbreak in recent years, seasonal influenza outbreaks do occur annually. In the year 2011 to 2012, ten (10) or less incidents of flu were reported. Table 9 below shows that for the past seven years, Pierce County has had less than five (5) reported cases every year except 2011-12. Below is a map showing the number of reported influenza cases reported in 2011 to 2012.



Source: North Dakota Department of Health

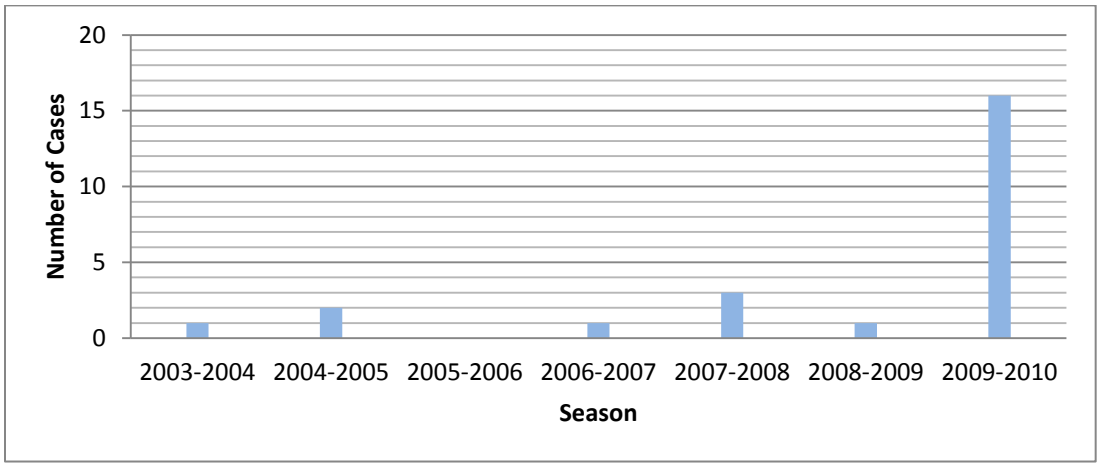
Table 8. 2011-2012 Reported Influenza Activity in North Dakota

2011-2012 Flu Summary			
Total Cases		**Age Information**	
		Range	Cases
Gender		<10	461
Female	726	10-19	203
Male	718	20-29	166
		30-39	165
Hospitalized$^{\Delta}$	69	40-49	103
		50-59	115
Deaths	0	60 and over	231

Quick Statistics on all Influenza	
Type	**Cases**
Type A, 2009 H1N1	45
Type A, H1	0
Type A, H3	62
Type A, Unspecified	1279
Type B	52
Unknown	6
Total	1,444

Source: North Dakota Department of Health

Table 9. History of Influenza in Pierce County



Source: North Dakota Department of Health

Animal and plant diseases, particularly those that infect livestock or crops, can distress an agricultural community like Pierce County. Such diseases can lead to food shortages and negative economic impacts. Known livestock and animal diseases of specific concern to the North Dakota Board of Animal Health include: African Horse sickness, African swine fever, Bluetongue, Classical Swine fever (Hog Cholera), Contagious Bovine Pleuropneumonia, Foot and Mouth Disease, Goat Pox, Hendra Virus, Highly Pathogenic Avian Influenza, Lumpy Skin Disease, Nipah Virus, Newcastle Disease, Peste des Petitis Ruminants, Rift Valley fever, Rinderpest, Sheep Pox, Swine Vesicular Disease, and Vesicular Stomatitis. Source: North Dakota Department of Agriculture.

In plants, the spread of disease could cause major crop loss and also negatively impact the area economy. Crops could be ordered destroyed, crop disease can lower production, and major economic losses could impact the county. Specific plant epidemics of concern to Pierce County are those that affect wheat, corn, hay/alfalfa, soybeans, sunflowers, oats, peas, beans, canola, and barley. A complete list of plant diseases/symptoms along with information on controlling the crop disease can be found on the NDSU extension office website: www.ag.ndsu.edu.

History: North Dakota has not experienced any major outbreaks within its population. Following World War I, the Spanish influenza pandemic of 1918 killed 20-40 million people worldwide, including 675,000 Americans. In North Dakota, about 2,700 people died and around 6,000 people were infected. Schools, churches, and businesses were closed for a time, and public gatherings were banned. Source: State of North Dakota Enhanced Hazard Mitigation Plan. Perhaps the most recent significant disease outbreak for both humans and animals in North Dakota has been West Nile Virus. In 2007, North Dakota had over 350 confirmed human cases. In 2003, 617 human cases were recorded in North Dakota; five people died. Since 2007, the number of confirmed human cases of West Nile Virus has continued to decline (see chart below.) Source: North Dakota Department of Health. Fortunately, West Nile Virus is not especially deadly for humans and a vaccine has been developed for horses.

Table 10. Confirmed West Nile Virus Cases Comparing North Dakota to Pierce County

Year	Type of Cases	ND Confirmed Cases	Pierce County Confirmed Cases
2007	Human	369	5
	Animal	26	0
2008	Human	37	0
	Animal	0	0
2009	Human	1	0
	Animal	3	0
2010	Human	9	0
	Animal	4	0
2011	Human	4	0
	Animal	7	0
2012 *	Human		0
	Animal		0

Source: North Dakota Department of Health, Disease Control * No reported cases in Pierce Co. through August 16, 2012.

The number of cases of anthrax found in cattle continues to rise in North Dakota. However, Pierce County has no reported cases from 1988 to present.

Identified Risks:

- Business Interruptions
- Delayed Emergency Response
- Personal Injury/Death Risk
- Increased Public Safety Runs
- Loss/Overcrowding of Medical Facilities
- Critical Shortages of Medical Supplies and Personnel
- Animal Casualties
- Quarantine of Cattle/People
- Mandatory Slaughter of Cattle
- Property Damage
- Crop Disease
- Loss of Crop Production
- Evacuation (Localized)
- Mass Casualties
- School Closures

Dam Failure

	Pierce County	Rugby	Wolford	Balta
Frequency	Unlikely Less than 1% probability I the next 100 years	Unlikely Less than 1% probability I the next 100 years	Unlikely Less than 1% probability I the next 100 years	Unlikely Less than 1% probability I the next 100 years
Severity	Negligible Less than 10% of jurisdiction affected	Negligible Less than 10% of jurisdiction affected	Negligible Less than 10% of jurisdiction affected	Negligible Less than 10% of jurisdiction affected
Risk Class	D	D	D	D
Seasonal Pattern	None			
Duration	24 hours			
Speed of Onset	12 to 16 hours warning			

Description: A dam is any artificial barrier, including appurtenant works, which impounds or diverts water. Its purposes include the storage of water for irrigation, hydro-electric power generation, flood control, water supply, recreation, wildlife.

A dam failure is defined as a sudden, rapid, and uncontrolled release of impounded water that will create a potential significant downstream hazard.

The dam failure hazard is determined by the potential loss of life and downstream property damage it may cause, and not by any particulars of the dam itself.

There are many reasons and/or potential causes for dam failure such as terrorism, earthquakes, etc. However the most common reasons are hydraulic inadequacy, seepage problems, and structural defects.

Hydraulic Failures: Hydraulic failures result from the uncontrolled flow of water, over, around, and adjacent to the dam, the erosion action of the water on the dam and its foundation. Earthen dam are particularly susceptible to hydraulic failures since earthen material erodes at relatively low velocities. Hydraulic failures account for approximately 30 percent of all dam failures. A hydraulic failure may occur due to wave action, toe erosion, and excessive spillway erosion, and overtopping as a result of insufficient reservoir storage and insufficient spillway capacity.

Seepage Failure: All dams do have some seepage. This seepage occurs through the structure and its foundation. Seepage, it uncontrolled, can erode material from the downstream slope or foundation and work backwards toward the upstream slope to form a "scour hole" which often leads to a complete failure of the structure. Seepage accounts for approximately 40 percent of all dam failures. Piping is a special seepage problem where soil particles are transported by a flow of water from one area to another. Soil particles are transported, the flow becomes larger and the soil particles move faster until a tunnel of flowing water is created.

Structural Failure: Structural failures involve the rupture or movement of monolithic components of the dam and/or its foundation. This is a particularly important hazard on large earthen dams and on dams

built of low strength material such as silts. Structural failure accounts for approximately 30 percent of all dam failures.

Generally speaking, these type of failures are interrelated and complex. For example, uncontrolled seepage may weaken the soil of an earthen dam and lead to an embankment failure. A structural failure may shorten the seepage path and lead to a "piping" failure. Surface erosion may lead to embankment failures.

Time itself can also have an impact on dam integrity. Such things as weathering, mechanical changes, and the influence of chemical agents can affect a dam in the following ways:

- Engineering properties of the foundation and materials composing the dam may change
- Chemical properties of the contents may change
- Concrete can gradually deteriorate and weaken from leaching and frost, and the amount of sulfate present in the surrounding soil
- Monolithic behavior is affected causing high stress concentrations and water pressure that has free access to the interior of the structure
- Freeze/thaw damage is accelerated by these cracks
- Metal components can corrode unless maintained
- Timber structures such as cribbing will eventually decay from the change of water content as well as infestation by insects or attack by other organisms

Threat: Few man-made facilities pose a greater potential for the loss of life and property than the failure of a dam. Pent-up waters suddenly unleashed can have catastrophic effects on life and property downstream. Homes, bridges, and roads can be demolished in minutes.

Dams are categorized according to the potential hazard for loss of life and property damage, should the dam suddenly fail. Existing development must be considered when categorizing a dam. The hazard category is based on potential hazard from failure and not on the selected design criteria or storage capacity.

Although it is recognized that loss of life is possible with any dam failure, the following categories of dams have been established for North Dakota:

Low Hazard: Dams located in rural or agricultural areas where there is little possibility of future development. Failure of low hazard dams may result in damage to agricultural land, township and county roads, and farm buildings other than residences. No loss of life is expected if the dam fails.

Medium Hazard: Dams located in predominantly rural or agricultural areas where failure may damage isolated homes, main highways, railroads or cause interruption of minor public utilities. The potential for the loss of lives may be expected if the dam fails.

High Hazard: Dams located upstream of developed and urban areas where failure may cause serious damage to homes, industrial and commercial building, and major public utilities. There is a potential for the loss of more than a few lives if the dam fails.

History: There are no high hazards dams in Pierce County. The two dams within the county, Balta Dam and Buffalo Lake Diversion Dam, are both low hazard dams.

1. Balta Dam 99 acres
2. Buffalo Lake Diversion Dam elevation 454 feet

The detailed information on dams in Pierce County is in the appendix: For Official Use Only.

Identified Risks:

- Agriculture and Related Business
- Blocked Roads
- Building Collapse
- Business Interruptions
- Delayed Emergency Response
- Downed Power Lines
- Downed Trees
- Evacuation (Localized)
- Flooding (Street)
- Flooding (Structure)
- Hazardous Material Release
- Increased Public Safety Runs
- Loss of Portable Water
- Loss of Power
- Mass Casualties
- Property Damage
- School Closure
- Sewer Backup
- Personal Injury/Death Risk
- Animal Casualties

Drought

	Pierce County	Rugby	Wolford	Balta
Frequency	Likely 10 to 100% probability in the next year, or at least 1 chance in the next 10 years	Likely 10 to 100% probability in the next year, or at least 1 chance in the next 10 years	Likely 10 to 100% probability in the next year, or at least 1 chance in the next 10 years	Likely 10 to 100% probability in the next year, or at least 1 chance in the next 10 years
Severity	Catastrophic More than 50% of jurisdiction affected	Catastrophic More than 50% of jurisdiction affected	Catastrophic More than 50% of jurisdiction affected	Catastrophic More than 50% of jurisdiction affected
Risk Class	A	A	A	A
Seasonal Pattern	Starts with limited snowfall/Summer			
Duration	1 to 5 years			
Speed of Onset	Slow			

Definition: Drought is a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. Drought is a temporary diversion from normal climatic conditions. Drought is different than aridity, which is a permanent feature of climate in regions where low precipitation is the norm, as in a desert. Drought characteristics usually include precipitation levels well below normal and temperatures higher than normal.

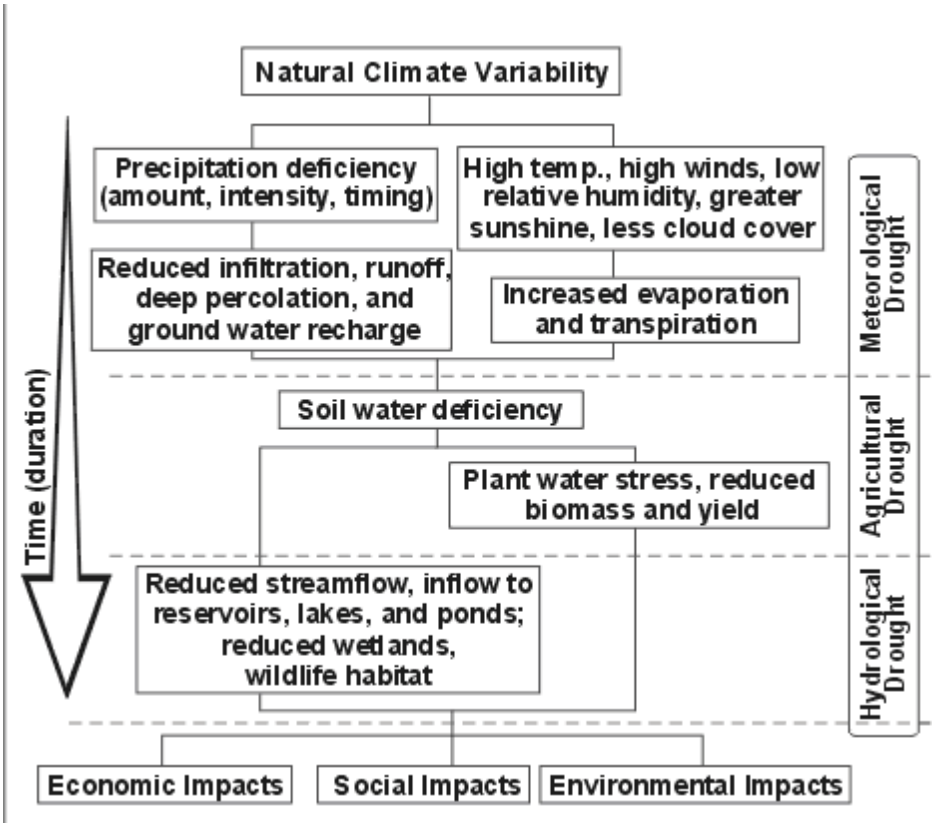
In addition to severe damage to vegetation, soil in a drought area becomes dry and crumbles. Often topsoil is blown away by hot, dry winds. Streams, ponds, and wells often dry up during a drought, thus wildlife and livestock suffer and even die.

Human factors, such as water demand and water management, can affect the impact that drought has on a region. Below are three commonly used definitions:

Meteorological Drought: is defined based on the degree of dryness (in comparison to some "normal" or average) and the duration of the dry period. Drought onset generally occurs with a meteorological drought.

Agricultural Drought: links various characteristics of meteorological drought to agricultural impacts, focusing on precipitation shortages, soil water deficits, reduced ground water or reservoir levels needed for irrigation and so forth.

Hydrological Drought: usually occurs following periods of extended precipitation shortfalls that impact water supply (examples: stream flow, reservoir and lake levels, ground water), potentially resulting in significant social impacts.



Flow chart illustrating the progression of drought, and the relationship between Meteorological, Agricultural, and Hydrological Drought. Economic, social and environmental impacts are shown at the bottom of the chart, independent of the time scale, indicating that such impacts can occur at any stage during a drought. Source: National Drought Mitigation Center

Threat: Weather forecaster cannot predict just when a drought will occur. But they do know that these drier than normal periods tent to alternate with wetter than normal periods. Droughts of the past can be read in the growth rings of tress. In we periods, the ring is thicker than in dry periods. It is a fact that precipitation deficits as little as four to six inches can cause severe drought conditions. Drought severity regarding our agricultural procedures depends on the time of year, timing of precipitation, amount of stored soil water, type of crop, stage of growth, and meteorological variables such as temperature, humidity, and wind.

The U.S. is vulnerable to the social, economic, and environmental impacts of drought. The over 100-year weather record of the U.S. indicates that there were three to four major drought events. Two of these, the 1930s Dust Bowl drought and the 1950's drought, each lasted five to seven years and covered large areas of the continental United States.

A number of secondary hazards are generally associated with drought. Rural grassland fires increase because of dry vegetation. Reduction in vegetation cover will expose the soil to wind, and dust storms and soil erosion will occur. Because of reduction in flow, the chemical quality of river and lake water will change, and sediment transport regimes of streams will be altered.

Deterioration in water quality, in turn, results in injury and death to plants and animals. Stagnant pools along river courses will provide favorable habitats for insects, particularly mosquitoes and grasshoppers. Finally, with the return of rain, the dry and unstable top soil is vulnerable to gullying and flooding.

Drought produces a complex web of impacts that spans many sectors of the economy and reaches well beyond the area experiencing physical drought. The complexity exists because water is integral to our ability to produce goods and provide services.

Impacts are commonly referred to as direct or indirect. Reduced crop, rangeland, and forest productivity; increased fire hazard; reduced water levels; increased livestock and wildlife mortality rates; and damage to wildlife and fish habitat are a few examples of direct impacts. The consequences of these impacts illustrate indirect impacts. For example, a reduction in crop, rangeland, and forest productivity may result in reduced income for farmers and agribusiness, increased prices for food and timber, unemployment, reduced tax revenues, increase crime, foreclosures on bank loans to farmers and businesses, mitigation, and disaster relief programs. In fact, the web of impacts becomes so diffuse that it's very difficult to come up with financial estimates of damages.

The U.S. Department of Agriculture frequently declares agricultural disasters because of drought as is noted in the history section. In Pierce County the impacts would be felt from agricultural losses as the counties economy relies on agricultural.

History:

Source: National Oceanic and Atmospheric Administration (NOAA) Satellite and Information Service/ National Climatic Data Center (NCDC). Pierce County, ND, Data between 1929 and 2008:

The Dust Bowl of 1929-1940
1976 DR 3016 North Dakota Presidential Emergency Declaration; Driest year in North Dakota since 1936
1980 State EO North Dakota State Declared Drought Disaster
1981 State EO North Dakota State Declared Drought Disaster
June, 1988 the hottest June on record at every major station across North Dakota. There were 13 to 22 days with temperatures of 90 degrees or more. In southwest and south central sections, 7 to 10 of these days were 100 degrees or more. This hot dry weather hurt growth of crops, leaving them weak and vulnerable. Damage estimated to be in the tens of millions of dollars
1990 State Request North Dakota Governor's Request for USDA assistance for Adverse Weather/Drought
1993 State EO North Dakota State Declared Agricultural Emergency
2000 State Request Governor's Request for USDA assistance for Dry and Flood Conditions
2002 State EO North Dakota State Declared Drought Disaster
2003 State EO North Dakota State Declared Drought Emergency
2004 State EO North Dakota State Declared Agricultural Emergency/Drought Disaster
2005 State EO North Dakota State Declared Drought Disaster/Fire Danger Emergency
January 1, 2007 through December 31, 2007, USDA Secretarial Declaration for the counties of: Bottineau, McHenry, McLean, Pierce, Renville, Sheridan, and Ward. Drought
January 1, 2008 through December 31, 2008, USDA Secretarial Declaration for the entire State of North Dakota, Drought

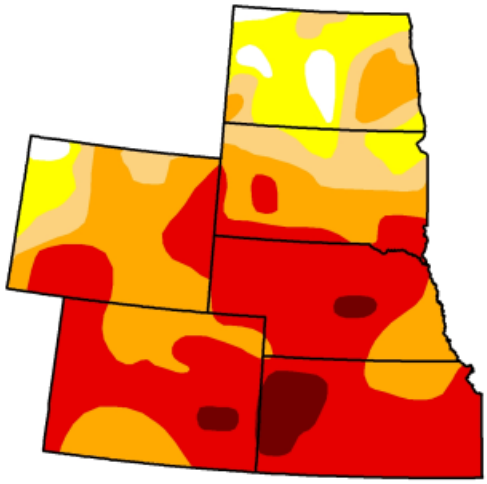
U.S. Drought Monitor

July 31, 2012
Valid 7 a.m. EST

High Plains

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	2.36	97.64	87.16	77.25	48.26	4.01
Last Week (07/24/2012 map)	2.32	97.68	86.74	76.98	44.51	2.51
3 Months Ago (05/01/2012 map)	57.05	42.95	13.27	6.41	0.00	0.00
Start of Calendar Year (12/27/2011 map)	61.66	38.34	18.12	7.22	2.07	0.04
Start of Water Year (09/27/2011 map)	70.09	29.91	17.44	11.97	6.22	2.96
One Year Ago (07/26/2011 map)	79.57	20.43	15.17	11.97	6.64	2.31



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu

Released Thursday, August 2, 2012
Mark Svoboda, National Drought Mitigation Center

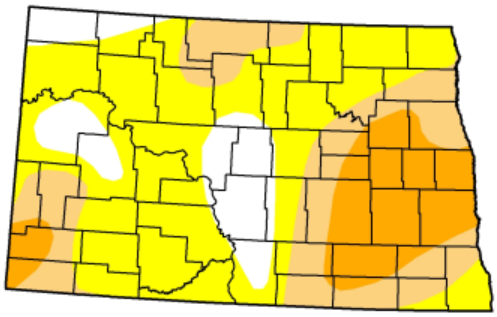
U.S. Drought Monitor

July 31, 2012
Valid 7 a.m. EST

North Dakota

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	13.23	86.77	38.20	16.28	0.00	0.00
Last Week (07/24/2012 map)	12.95	87.05	30.46	16.22	0.00	0.00
3 Months Ago (05/01/2012 map)	49.34	50.66	14.15	0.00	0.00	0.00
Start of Calendar Year (12/27/2011 map)	25.96	74.04	8.67	0.00	0.00	0.00
Start of Water Year (09/27/2011 map)	100.00	0.00	0.00	0.00	0.00	0.00
One Year Ago (07/26/2011 map)	100.00	0.00	0.00	0.00	0.00	0.00



Intensity:

- D0 Abnormally Dry
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- D2 Drought - Severe
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Released Thursday, August 2, 2012
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Identified Risks:

- Business Interruptions
- Increased Fire Potential
- Increased Public Safety Runs
- Loss of Portable Water
- Livestock/Wildlife Injury/Death
- Property Damage (crops, etc.)
- Loss of Economy

Extreme Heat

	Pierce County	Rugby	Wolford	Balta
Frequency	Highly Likely Nearly 100% probability in the next year	Highly Likely Nearly 100% probability in the next year	Highly Likely Nearly 100% probability in the next year	Highly Likely Nearly 100% probability in the next year
Severity	Limited 10 to 25% of jurisdiction affected	Limited 10 to 25% of jurisdiction affected	Limited 10 to 25% of jurisdiction affected	Limited 10 to 25% of jurisdiction affected
Risk Class	B	B	B	B
Seasonal Pattern	June, July, August			
Duration	2 to 7 days			
Speed of Onset	24 to 72 hours			

Definition: Heat kills by pushing the human body beyond its limits. In extreme heat and high humidity, evaporation is slowed and the body must work extra hard to maintain a normal temperature. When the body heats too quickly to cool itself safely, or when you lose too much fluid or salt through dehydration or sweating, your body temperature rises and heat-related illness may develop.

Threats: As the days get warmer, State and Federal emergency management officials warn that extreme heat can be very dangerous and in some instances even fatal. Exposure to extreme heat can cause physical problems and may cause heat disorders or illnesses. Older adults, young children and those who are sick or overweight are most vulnerable to extreme heat. Conditions that can induce heat-related illnesses include stagnant atmospheric conditions and poor air quality. Consequently, people living in urban areas may be at greater risk from the effects of a prolonged heat wave than those living in rural areas.

Studies indicate that, other things being equal, the severity of heat disorders tends to increase with age. Conditions that cause heat cramps in a 17-year-old may result in heat exhaustion in someone 40-years old, and in heat stroke in a person over 60. Sunburn, with its ultraviolet radiation burns, can significantly hamper the skin's ability to shed excess heat. Acclimatization has to do with adjusting sweat-salt concentrations, among other things. The idea is to lose enough water to regulate body temperature, with the least possible chemical disturbance—salt depletion.

Each year, dozens of children left in parked vehicles die from hyperthermia. Hyperthermia is an acute condition that occurs when the body absorbs more heat than it can handle. Hyperthermia can occur even on a mild day. Studies have shown that the temperature inside a parked vehicle can rapidly rise to a dangerous level for children, pets and even adults. Leaving the windows slightly open does not significantly decrease the heating rate. The effects can be more severe in children because their bodies warm at a faster rate than adults.

The most common heat disorders are:

- Sunburn: Redness and pain. In severe cases swelling of skin, blisters, fever, headaches.

- Heat Cramps: Painful spasms usually in the muscles of legs and abdomen with heavy sweating
- Heat Exhaustion: Heavy sweating, weakness, cold, pale, clammy skin, unsteady pulse, fainting, and vomiting, but may have normal temperature.
- Heat Stroke (or sunstroke): High body temperature (106 degrees F or higher), hot dry skin, rapid and strong pulse, possible unconsciousness. Heat stroke is a severe medical emergency that can be life-threatening.

During extremely hot weather, you should take the following precautions:

- Stay indoors as much as you can, on lower floors if possible
- Limit exposure to the sun and use sun block with a high sun protector factor rating (at least 15 spf) if you must be outdoors
- If your home does not have air conditioning, spend the hottest part of the day in public buildings such as libraries, schools, movie theaters, shopping malls, and other community facilities
- Use fans. Circulating air can cool the body by increasing the perspiration rate of evaporation.
- If you have window air conditioning, eliminate any holes or gaps around the installation.
- Check air-conditioning ducts for proper insulation
- Eat well-balanced, light, and regular meals. Avoid using salt tablets unless directed to do so by a physician.
- Drink plenty of water.
- Dress in loose-fitting, lightweight, and light-colored clothes that cover as much skin as possible.
- Protect your face and head by wearing a wide-brimmed hat.
- Check on family, friends, and neighbors who do not have air conditioning and who spend much of their time alone.
- Never leave children or pets alone in closed vehicle
- Avoid strenuous work during the warmest part of the day, 11 a.m. to 4 p.m. Have a buddy system when working in extreme heat, and take frequent breaks.
- Exercise should be done in the early morning hours between 4-7 a.m.
- Make sure there is enough food and water for pets.

Livestock/animals and extreme heat: Extreme heat causes significant stress for all animals. Managing animals in high temperatures requires good forward planning. Water, shelter, and proper handling are important considerations during periods of extreme heat. Location of water should be familiar to animals before days of extreme heat. Shelter should be provided if possible or an alternative such as shelterbelts. It is recommended not to handle animals in extreme heat unless absolutely necessary. Transportation of animals should be planned for early mornings.

Impacts: Extreme heat produces numerous impacts on Pierce County. Overcrowding of Medical facilities becomes a concern. Medical facilities have not released patients because they did not have air conditioned homes to go to. Personal injury and death risk increase during periods of extreme heat. Heat exhaustion is a great concern for those with outdoor occupations as well as students participating in sport programs. The number of kids being left in unattended vehicles during high temperatures is increasing. Extreme heat dries foliage making it a fire-ready tender and during periods of harvesting crops, equipment can overheat and bearings can emit sparks which can result in fires. Animal/livestock/wildlife

need to be monitored due to their increased risk of stress during periods of extreme heat. Heat stress can have a significant effect on production and reproduction of livestock, which results in economic losses.

Identified Risks:

- Agriculture and Related Industry
- Business Interruptions
- Increased Fire Potential
- Property Damage
- Animal Casualties
- Personal Injury/Death Risk
- Loss of Crop Production
- Increased Public Safety Runs
- Loss/Overcrowding of Medical Facilities

History:

Source: National Oceanic and Atmospheric Administration (NOAA) Satellite and Information Service/ National Climatic Data Center (NCDC). Pierce County, ND, Data between January 2005 and July 2011:

January 1, 2005 through December 31, 2005 USDA S2198 Surrounding Counties Includes impacts from hail, wildfires, high winds, excessive heat
January 1, 2006 through December 31, 2006 USDA S2388 Entire State of North Dakota Includes impacts from hail, insects, wildfires, high winds, excessive heat
January 1, 2007 through December 31, 2007 USDA Secretarial Bottineau, McHenry, McLean, Pierce, Renville, Sheridan, and Ward Counties Includes impacts from freeze and frost damage, high temperatures, hail and high winds
January 1, 2008 through December 31, 2008 USDA Secretarial Entire State of North Dakota Includes impacts from excessive heat, hail, severe storms, high winds, wildfires, and insects
Event Excessive Heat State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date 07/16/2011 11:00:00 CST-6** End Date 07/19/2011 21:00:00 CST-6 Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K Episode Title July 16 - 19 Excessive Heat over all of West and Central North Dakota Episode Narrative Upper level high pressure centered over the Central Plains, coupled with persistent low pressure over the Rockies, brought a prolonged period of above seasonal temperatures and high humidity to west and central North Dakota. Daytime temperatures in the 90s combined with the high humidity to produce heat index values well over 100 degrees for many locations for several days. Heat index values topped out between 110 and 120 degrees, not a common thing in North Dakota.‖Although no human life was lost and no injuries were reported, there were livestock losses associated with the heat. It is estimated that up to 700 head of cattle died from the heat wave. Estimated at near 1,000 dollars per head, monetary damages are estimated at near 700,000 dollars. A detailed breakdown by county was not available so the losses were all assigned to one county in southwest North Dakota, Slope

Flooding

	Pierce County	Rugby	Wolford	Balta
Frequency	Likely 10 to 100% probability in the next year, or at least 1 chance in the next 10 years	Likely 10 to 100% probability in the next year, or at least 1 chance in the next 10 years	Likely 10 to 100% probability in the next year, or at least 1 chance in the next 10 years	Likely 10 to 100% probability in the next year, or at least 1 chance in the next 10 years
Severity	Critical 25 to 50% of jurisdiction affected	Critical 25 to 50% of jurisdiction affected	Critical 25 to 50% of jurisdiction affected	Critical 25 to 50% of jurisdiction affected
Risk Class	B	B	B	B
Seasonal Pattern	Spring snow melt off, Summer flash flooding, seasonal rain			
Duration	2 weeks			
Speed of Onset	More than 24 hours warning			

Definition: Flooding, as a natural hazard, has been a part of the county's conflict with nature throughout history and is defined as an overflow of water on land not normally covered by water. Floods are a natural phenomenon; however, flood hazards are often intensified by man because he interferes with or alters natural conditions.

Flood hazards arise from the complex effects of water on land surfaces and by water pressure. Flooding and its impact occur from the overflow of rivers, creeks, drainage channels, streams, lakes, and other bodies of standing water. Also, the inundation of low lands, the temporary backup of sewer and storm water systems, the rise of ground water, and finally the failure of flood control facilities such as dams, dikes, and levees.

Floods can occur when the ground in frozen and/ or saturated with moisture and cannot absorb any further moisture. This moisture can come from several different sources and circumstances. One source is heavy snowpack which is affected by rapid warming trend as well as spring rain falling directly on the snowpack. Another source of flooding occurs when heavy rain falls in such a short time that the soil cannot absorb it. Flooding is also caused when heavy rain falls over a prolonged period of time and the ground becomes saturated and cannot absorb the additional moisture.

Flooding can also result from ice jamming or blocking streams. Ice breaking up into pieces, called floes, move along with the flowing rivers or streams. The ice floes can jam at curves, narrow places in the channel, and at structures creating an effective dam that produces water backup and overflow. Finally, flooding can occur as a result of dam, dike, or levee failure, overtopping or breaching.

Floods are classified as gradual or flash floods. A gradual flood is a slow developing event with a natural, predictable source of water or moisture, such as snow melt, slow rain, or a controlled dam release. This type can often be forecast from the amount of moisture or water available. Its time of occurrence can be calculated to a reasonable degree. Protective measures can usually be implemented in a timely manner to

mitigate the potential damage and loss. The other type of flood is a quick-occurring, flash flood. A flash flood can happen in any jurisdiction in the county and is caused by: thunderstorms, heavy rains on snowpack, dam, dike or levee failures. This type of flood happens with little warning and response organizations have little time to react.

Description of problem: High runoff produced by excessive rainfall and/or sudden spring thaws after periods of heavy snowfall will cause a river or other bodies of water to overflow and inundate areas, causing or threatening damage. The loss of life and severe damages may result when floodwaters strike cities, industries, and farms located in or near river valleys. Usually the damaged area is in a floodplain, which is a strip of relatively level land bordering a stream.

Floods can be classified in three categories:

Category A- All major floods, exclusive of relatively localized floods, which extensive property damages occurs or serious danger to life or flood protective work prevails.

Category B- Floods, including so-called "flash floods", as well as other relatively localized short duration floods, that produce high property damage or hazard to life in local areas without creating or contributing substantially to dangerous flooding along larger rivers downstream.

Category C- Flows approaching flood stage in relatively large drainage area without having directly caused loss of life or significant property damage, but creating a condition especially favorable to a major flood in the event of further heavy rainfall or snow melt or both.

History: Before settlers came to North Dakota, there were few flood damages. River and streams carved the valleys and the nomadic peoples who inhabited the territory moved to higher lands. Today, however, these valleys are populated with people and development needed to sustain those people has taken place.

Flooding of land adjoining the normal course of a stream or river has been a natural occurrence since the beginning of time. If these floodplain and floodway areas were left in their natural state, the floods would not cause any major damage. However, the economic attractiveness of the vacant land has resulted in the development of some floodplain areas despite the risk. The urban, industrial, and agricultural encroachment on natural floodplains areas has increased the potential for dangerous flooding and causes the flood waters to adversely affect land that formally was considered safe. The flood potential is increased because rainfall that used to soak into the ground or take several days to reach a stream/river via a natural drainage basin now quickly runs off streets, parking lots, rooftops, and through man-made channels and pipes.

The impact of flooding may be felt by the individual and family; city, county, state government; and within regions, such as an entire drainage basin.

A tremendous amount of soil erosion takes place throughout all river basins, drainage areas, streams, etc., by water movement and its pressure on land surfaces. Runoff from the eroded areas is swift, thus contributing to flood magnitude. Additionally, the eroded materials settle within runoff channels taking up space that previously was occupied by water during runoff periods. This sedimentation increases flood potential.

The spring flood danger occurs during March and April. A wet fall, early freeze up with saturated ground at the time of freezing, heavy winter precipitation, and warm rains during and after spring thaw add to the seriousness of the spring flooding situation.

Flood control development had its beginning with the Flood Control Act of 1936. This act provided a basic plan and authorized program for the control of water resources. In the early 1940's the North Dakota Water Commission cooperated with the Federal agencies to plan and engineer the overall program for North Dakota.

The U.S. Army Corps of Engineers occupies one of the major roles in flood control planning and construction. Two reservoirs built by the U.S. Soil Conservation Service have contributed materially to flood control by the construction of watershed projects in North Dakota. These watershed projects include channel work and flood retention structures. In such projects, the Soil Conservation District has the responsibility for assuring that 50 percent of the farms above a structure are under a basic conservation plan.

Flooding is a hazard that impacts the county with flash flooding with in the county. However, flooding outside the county also has an immense negative impact on the residents of Pierce County. The flooding of the Mouse River in 2012 cut off access to medical facilities in Minot.

Floodplain Management in North Dakota: North Dakota has recognized that good floodplain management involves the utilization of a variety of tools to reduce the impact of flood disasters. It is also recognized that a balance must be reached between the three aspects of floodplain management which are: structural works designed to modify the flood itself, regulatory functions which may reduce susceptibility to flooding and emergency preparedness actions which may reduce susceptibility to flooding, and emergency preparedness actions which minimize a flood's effect during a disaster.

The Federal Disaster Protection Act of 1973 requires state and local government to participate in the National Flood Insurance Program (NFIP) as a condition to the receipt of any federal loan or grant for construction projects in flood prone areas. Participation in the NFIP requires communities to adopt floodplain regulations that meet NFIP objectives, which are: Buildings must be protected from flooding damages that occur as a result of the 100-year flood and new development must not cause an increase in flood damages to other property.

Communities have been provides assistance through passage, in 1981, of the state's first Floodplain Management Act that directs the State Engineer to aid local government to reduce flood damages through floodplain management. As a start, the state legislature provided the State Engineer with an appropriation to be used in assisting communities to obtain base flood (100-year) elevation data. With appropriate planning, we will see continued reduction in flood damage susceptibility across the state but it will likely take many years to achieve the established goals.

Identified Risk Areas:

- Overland flooding
- Flooding basements
- Ice jams of creeks

- Ice jams of culverts
- Lift stations
- Lagoon over runs
- Washed out roads
- Street flooding
- Road closures
- Evacuations
- Loss of sewer
- Loss of water
- Loss of livestock
- Cropland flooded

History:

Source: National Oceanic and Atmospheric Administration (NOAA) Satellite and Information Service/ National Climatic Data Center (NCDC)

Pierce County, ND, Data between 4/18/1969 and 4/01/2009

Event Flood -- Flood Cause Heavy Rain / Snow Melt State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 04/01/2009 00:00:00 CST-6
Begin Range 2 Begin Azimuth NNW Begin Location BARTON Begin Lat/Lon 48.52/-100.19
End Date 04/21/2009 23:59:00 CST-6
End Range 8 End Azimuth E End Location WOLFORD End Lat/Lon 48.52/-99.52
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 271.00K Crop Damage 0.00K
Episode Title Devastating late Winter and Spring Flooding continues in April over West and Central North Dakota Episode Narrative Western and central North Dakota experienced a snowy winter of 2008-2009. Bismarck, for example, had the snowiest December on record, which was also the snowiest month ever on record, with 33.3 inches of snow in December 2008. March 2009 was the fifth snowiest month on record with 29.7 inches. For the entire season Bismarck ended up the second snowiest on record with 100.3 inches. A similar scenario played out all across the west and central parts of North Dakota with locations receiving two to three times the normal snowfall. This set the stage for devastating flooding. ||Continued moderating temperatures, along with additional heavy snowfall in late March across southern North Dakota, and April snowfall in northern South Dakota, resulted in a second round of flooding over much of west and central North Dakota during the month of April.||For most areas the flooding, some of it river and stream related and some overland flooding away from rivers and streams, was the worst in a dozen years, rivaling and in some cases surpassing that following the winter of 1996-1997. For a few places it was the worst flooding ever. Ice jams, which occur most springs in North Dakota, were more numerous and severe than what would be considered normal. ||Losses were tremendous with hundreds of homes flooded, some completely destroyed, and many roads and some bridges washed out. County and township roads, already damaged by the winter plowing of snow, suffered more damage by the flooding. Sections of major state highways were closed due to flooding, including interstate 94. ||Agriculture was hard hit. It has been estimated by the Farm Services Agency that because of the flooding over west and central North Dakota, around 1.7 million acres would not be planted in 2009. Using an average value of $300 an acre, that amounts to a potential loss through non planting of around $490 million. ||The ranching industry was also hard hit. It has been estimated by the Farm Services Administration that the harsh winter, including blizzards, and the flooding, resulted in 78,000 calves being killed, along with 19,100 cows, 180 horses, and 3,000 other farm and ranch animals. It was estimated that this number of beef

cows, had they lived to slaughter, could have fed 800,000 people for one year. The cost loss would be around $50 million. Economic impact to society, impact on communities, uses a multiplier of four to seven times the loss, so $200 million to $350 million. ||See entries for the month of March as well.
Event Narrative Heavy runoff generated from snowmelt caused overland flooding which washed out several county roads.

Event Flood -- Flood Cause Heavy Rain / Snow Melt State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 03/06/2009 00:00:00 CST-6
Begin Range 2 Begin Azimuth NNW Begin Location BARTON Begin Lat/Lon 48.52/-100.19
End Date 03/31/2009 23:59:00 CST-6
End Range 8 End Azimuth E End Location WOLFORD End Lat/Lon 48.52/-99.52
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 25.00K Crop Damage 0.00K
Episode Title Devastating late Winter and Spring Flooding begins in March over West and Central North Dakota Episode Narrative This devastating flooding continued into April, and in some cases worsened.||Western and central North Dakota experienced a snowy winter of 2008-2009. Bismarck, for example, had the snowiest December on record, which was also the snowiest month ever on record, with 33.3 inches of snow in December 2008. March 2009 was the fifth snowiest month on record with 29.7 inches. For the entire season Bismarck ended up the second snowiest on record with 100.3 inches. A similar scenario played out all across the west and central parts of North Dakota with locations receiving two to three times the normal snowfall. This set the stage for devastating flooding.||A warm up over the southwest early in March resulted in flooding there. Much more significant and widespread warming came toward the middle of March. It occurred ahead of a storm that brought thunderstorms and heavy rain that resulted in rapid snow melt and ice jams, followed by heavy snow and a blizzard.||For most areas the flooding, some of it river and stream related and some overland flooding away from rivers and streams, was the worst in a dozen years, rivaling and in some cases surpassing that following the winter of 1996-1997. For a few places it was the worst flooding ever. Ice jams, which occur most springs in North Dakota, were more numerous and severe than what would be considered normal.||Losses were tremendous with hundreds of homes flooded, some completely destroyed, and many roads and some bridges washed out. County and township roads, already damaged by the winter plowing of snow, suffered more damage by the flooding. Sections of major state highways were closed due to flooding, including interstate 94.||Agriculture was hard hit. It has been estimated by the Farm Services Agency that because of the flooding over west and central North Dakota, around 1.7 million acres would not be planted in 2009. Using an average value of $300 an acre, that amounts to a potential loss through non planting of around $490 million.||The ranching industry was also hard hit. It has been estimated by the Farm Services Administration that the harsh winter, including blizzards, and the flooding, resulted in 78,000 calves being killed, along with 19,100 cows, 180 horses, and 3,000 other farm and ranch animals. It was estimated that this number of beef cows, had they lived to slaughter, could have fed 800,000 people for one year. The cost loss would be around $50 million. Economic impact to society, impact on communities, uses a multiplier of four to seven times the loss, so $200 million to $350 million.||See entries for the month of April as well.
Event Narrative Overland flooding damaged county and township roads. No homes were flooded in March. Flooding continued into April.

Event Flash Flood
Begin Date: 29 Jun 2005, 12:45:00 PM CST
Begin Location: 5 Miles South East of Orrin, Begin LAT/LON: 48°02'N / 100°05'W, End Date: 29 Jun 2005, 02:45:00 PM CST, End Location: 15 Miles South East of Orrin, End LAT/LON: 47°56'N / 99°56'W, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, County: Pierce
Description: Water several feet deep in some fields. Water from culverts flowing over county roads.

Presidential Declaration 1515**, 5/5/04**

Presidential Declaration 1376, **5/28/01**
Presidential Declaration 1334, **6/27/00**
Presidential Declaration 1220, **6/15/98**
Presidential Declaration 581, **4/26/79**
Presidential Declaration 434, **5/14/74**
Presidential Declaration 256, **4/18/69**

Hazardous Materials

	Pierce County	Rugby	Wolford	Balta
Frequency	Likely 10 to 100% probability in the next year, or at least 1 chance in next 10 years	Likely 10 to 100% probability in the next year, or at least 1 chance in next 10 years	Likely 10 to 100% probability in the next year, or at least 1 chance in the next 10 years	Likely 10 to 100% probability in the next year, or at least 1 chance in next 10 years
Severity	Negligible Less than 10% of jurisdiction affected	Negligible Less than 10% of jurisdiction affected	Critical 25 to 50% of jurisdiction affected	Negligible Less than 10% of jurisdiction affected
Risk Class	C	C	B	C
Seasonal Pattern	Summer			
Duration	Application of chemicals			
Speed of Onset	Immediate			

Definition: Hazardous materials are any substance in any quantity or form that may pose an unreasonable risk to the safety, health, environment, and property of citizens. The term "hazardous materials" covers a wide array of products, from relatively innocuous ones such as hair spray in aerosol dispensers and wash preservatives such as creosote to highly toxic or poisonous materials such as polychlorinated biphenyl (PCB's) and phosgene gas. The potential severity of hazards of these materials is varied but the primary reason for their designation is their risk to public safety.

The following are included in this definition:

- Explosive (A/B/C/Blasting Agents)
- Flammables and combustibles
- Oxidizers
- Organic Peroxides
- Poisonous/infectious
- Radioactive Substances/Materials
- Corrosives
- Other regulated materials/hazardous wastes

Hazardous materials are defined and/or managed under a number of federal, state, and local laws, regulations, plans, and ordinances.

Further definitions can be found in laws, i.e. Federal Water Pollution Act, Clean Water Act, Comprehensive Environmental Response, Compensation and Liability Act, and Amendments, Low Level Radioactive Waste Policy Act, Nuclear Waste Policy Act, and the Hazardous Materials Transportation Act.

Hazardous materials incidents can be basically categorized as falling into two distinct groups. These are hazardous materials incidents of a transportation nature, and those that occur at a stationary or fixed facility.

The former is an occurrence resulting in the uncontrolled release of materials during transport that are capable of posing a risk to health, safety, and property as determined in the Department of Transportation (DOT) regulations. Generally, such materials are classed identically to those listed below for a stationary incident. Over 18,000 materials are covered under the DOT regulations. The population likely to be seriously affected would be within the most densely populated five mile circle around a major transportation route (highway, rail lines, or pipeline) along which hazardous materials move.

A stationary hazardous materials incident is any occurrence resulting in the uncontrolled release of materials from a fixed site capable of posing a risk to health, safety, and property, as determined in Environmental Protection Agency regulations. Areas at risk include the locations of hazardous materials manufacturing, processing, or storage facilities, as well as all hazardous waste treatment, storage, and disposal (legal and illegal) sites.

Threat: Pierce County is exposed to and is at risk from accidents and/or incidents involving hazardous materials. The economy is based on agriculture, manufacturing, and industry. All of these rely on the production, use, storage, transportation of hazardous materials. Explosives, flammable liquids, flammable solids, gases, poisons, pesticides, oxidizing substances, miscellaneous dangerous substances, and radioactive materials are either used in or transported through Pierce County.

Anhydrous Ammonia is a threat when transported to fields and stationary at farms and facilities. Locations of facilities are identified in the Pierce County Emergency Operations Plan.

Other significant hazardous materials concerns are the hazardous by-products from the production of the drug methamphetamine. This drug is easily "cooked" up using readily available hazardous materials in clandestine labs. These labs may then be contaminated with a variety of toxic chemicals such as methanol, ether, benezene, methylene chloride, trichloroethane, toluene, muriatic acid, sodium hydroxide, anhydrous ammonia, and red phosphorus. Source: North Dakota Enhanced Hazard Mitigation Plan 2011.

Hazardous materials are also often used during terrorist attacks and can cause damages to the water supply and food supply.

Background: In the past, states and local governments have concentrated emergency preparedness (operational planning, training, etc.) activities to just the transportation of hazardous materials.

Since the amendments of CERCLA (Title III) Emergency Planning and Community Right-To-Know law, we have improved our hazardous materials planning base for fixed facility disaster or emergency situations.

It is common to view hazardous materials accidents and incidents in terms of worst case. The vast majority of these accidents and incidents, however, involve small spills and releases requiring little response or recovery actions. The problem, for decision makers at all levels of government, is to create a

safe system for the use, storage, transportation, etc. of hazardous materials while retaining the state's economic viability.

Although many of the accidents and incidents (spills and releases) are small, a single hazardous materials accident can result in the loss of many lives and cause millions of dollars of property damage. Water supplies, sewer lagoons, fish and wildlife habitats can be threatened if hazardous materials leak into rivers, streams, underground water resources.

Hazardous materials have major components that affect the response to and recovery from an incident. These components include planning through, organizations of responders, training, equipment, and exercises. These elements combined can provide for an effective overall response; however, the chances that major harm maybe incurred by first responders or the public. Due to the potential exposure of a hazardous materials release at a fixed facility all of the populated cities would be in the impact zone.

History: Explosives, flammable liquids, flammable solids, gases, poisons, pesticides, oxidizing substances, miscellaneous dangerous substances, and radioactive materials are either used in or transported through Pierce County on railroad, highways and county roads.

Maps identifying locations of anhydrous tanks in the county are in the Pierce County Emergency Response Plan.

Identified Risks:

- People, Personal Injury/Death Risk
- Livestock. Animal Casualties
- Evacuation (Localized)
- Explosion
- Hazardous Materials Release
- Increased Fire Potential
- Increased Public Safety Runs
- Mass Casualties
- Property Damage
- School Closure
- Loss of Portable Water
- Agricultural and Related Business

Homeland Security Incident

	Pierce County	Rugby	Wolford	Balta
Frequency	Possible 1 to 10% probability in the next year, or at least 1 chance in the next 100 years	Possible 1 to 10% probability in the next year, or at least 1 chance in the next 100 years	Possible 1 to 10% probability in the next year, or at least 1 chance in the next 100 years	Possible 1 to 10% probability in the next year, or at least 1 chance in the next 100 years
Severity	Catastrophic More than 50% of jurisdiction affected	Catastrophic More than 50% of jurisdiction affected	Catastrophic More than 50% of jurisdiction affected	Catastrophic More than 50% of jurisdiction affected
Risk Class	B	B	B	B
Seasonal Pattern	None			
Duration	Low			
Speed of Onset	Little time or warning			

Definition: A homeland security incident is any intentional human-caused incident, domestic or intentional, that causes mass casualties, large economic losses, or widespread panic in the country. Terrorism and civil unrest are examples of human-caused hazards that are intentional and often planned. Forms of civil unrest can range from groups blocking sidewalks, roadways, and buildings to mobs rioting and looting. Civil unrest may be spontaneous, as when a mob erupts into violence, or it may be planned, as when a demonstration or protest intentionally interferes with another individual's or group's lawful business.

Universities, industry, government officials and buildings, power grids, telecommunication systems, dams, water supplies, and pipelines are potential terrorism targets. Another potential terrorist activity that must be considered is violence in the workplace.

History: Whereas other hazards have a track record within the county, civil unrest and homeland security incidents, have no significant record of occurrences; but that by no means indicates that such a tragedy could not happen. There have been no incidents specific to Pierce County. However, such events can cause possible death, injuries, and significant property damage. There have been cases in the past year of individuals bringing weapons into places of business and schools. Miles of our international border with Canada are unprotected, with smuggling occurring often.

Threat: Although political violence has existed in the United States since the American Revolution, new forms of politically motivated terrorism are emerging. Domestic terrorist acts in the 1990s have been characterized by violence directed against state and society in general, increasing sophistication in the choice of targets, use of mass media to further terrorist goals.

The 1990s clearly marked a high point in a new age of international terrorism. The main ingredient that singles out this decade is the sponsorship by sovereign states of ideological, religious, and political violence aimed at people. The crucial battles of today, waged covertly by authoritarian and totalitarian

dictatorships, exploit the local grievances and discontents in social and economic systems of free nations. They endanger domestic security, political stability, and military defenses almost as much, or sometimes as much, as if declared state war existed. The events of 2001-2004, with global terrorism on the rise as an effort to impact elections, are also a concern.

Three major characteristics of contemporary terrorism are apparent. First, terrorism poses many threats to contemporary society, and it is likely to have serious impact on the quality of life and on orderly, civilized existence. Perhaps the most significant dangers are those relating to safety, welfare, and rights of ordinary people, the stability of the state system, and health and pace of economic development, and the expansion or even the survival of democracy.

Secondly, terrorism is escalating into the struggle-for-power process as a form of surrogate warfare, whereby small groups with direct and indirect state support are able to conduct political warfare at the national level, and ultimately may even succeed in altering the balance of power on the international level.

Thirdly, the governments and the peoples of the free world have failed to appreciate the nature, scope and intensity of the terrorist threat. Democracies tend to see terrorism as a mere nuisance or irritant. The result is that pluralist governments have not developed the commitment needed to deal with the problem effectively.

The United States, as the leader of the free world, must now learn to understand the harsh challenge of contemporary terrorism and decide to conduct countermeasures to save lives and prevent damage to its security interest.

Potential weapons (countermeasures) against terrorism that have been used with some success in the past and may be successful in the future include:

- International Cooperation and Formal Agreements
- Intelligence
- Law Enforcement and Security
- Economic Sanctions
- Diplomatic Sanctions

Summary: In addition to the threats posed by specific hazards, various trends also affect the consequences of national security emergencies and their impact on emergency management organizations. Our global environment is changing rapidly, and many of these changes increase our exposure and render us more vulnerable to risks and hazards. These trends also place greater demands on federal, state, and local authorities to be prepared and capable of managing emergencies resulting from hazards of all kinds:

- We depend more everyday on complex and interdependent systems. A major system failure has more widespread consequences.
- In a world where things happen quickly, crises can erupt suddenly. Long warning times in which to increase preparedness capabilities and enhance operational readiness cannot be assumed.

- There is growing public reliance on government for crisis support. Individuals and groups will help themselves in any crisis situation, but only government and large organizations can marshal the resources to deal with large crises.
- There is a growing need to effectively and efficiently use public resources. Resource use choices must be made to ensure that preparedness needs are met.

These factors help make up the complex environment of any emergency that a jurisdiction may experience. They put a high premium on all-hazard preparedness and the ability to deal with the consequences of emergencies regardless of their cause. They also raise the prospect of severe consequences for failure to be ready when the next emergency occurs. They also place new emphasis on the ability of government response capabilities to survive and perform in any emergency.

The North Dakota Department of Health (NDDoH) has received federal funding to help the state prepare for terrorism events. The funds are being used to:

- Educate the public
- Train health-care professionals
- Expand the ability of local public health units to respond quickly to emergencies.
- Design and remodel laboratory facilities, enhancing ability to detect terrorism agents.
- Increase communication abilities.
- Prepare to receive medicines and other medical supplies from the Strategic National Stockpile.
- Develop partnerships with hospitals and local public health units to implement an enhanced disease surveillance system that would rapidly identify unusual disease events that may occur.

Source: North Dakota Department of Health, Emergency and Terrorism Preparedness Guide for North Dakotans

The U.S. Centers for Disease Control and Prevention (CDC), in consultation with other partners in bioterrorism preparedness, has developed a Strategic National Stockpile (SNS) program to respond to biological or chemical terrorism emergencies. The stockpile is made up of life-saving antibiotics, chemical antidotes and other medical supplies and equipment that are meant to be available when medical supplies at the local level are exhausted. The North Dakota Department of Health currently is working with in conjunction with the Division of Emergency Management and other city, county and state agencies to develop a plan to receive and distribute items from the national stockpile. North Dakota has adopted an "all hazards preparation" approach to emergency planning.

Identified Risks:

- Blocked Roads
- Building Collapse
- Business Interruptions
- Delayed Emergency Response
- Downed Power Lines
- Evacuation (Localized)
- Evacuation (Full)

- Explosion
- Hazardous Materials Release
- Increased Fire Potential
- Increased Public Safety Runs
- Loss of Portable Water
- Loss of Medical Facilities
- Loss of Power
- Mass Casualties
- Livestock Injury/Death
- Property Damage (Crops)
- Loss of Economy
- School Closure
- Sewer Backup
- Agricultural and Related Business

Shortage of Critical Materials

	Pierce County	Rugby	Wolford	Balta
Frequency	Rural area—Highly Likely Nearly 100% probability in the next year	Likely 10 to 100% probability in the next year, or at least 1 chance in next 10 years	Highly Likely Nearly 100% probability in the next year	Highly Likely Nearly 100% probability in the next year
Severity	Critical 25 to 50% of jurisdiction affected	Catastrophic	Critical 25 to 50% of jurisdiction affected	Critical 25 to 50% of jurisdiction affected
Risk Class	A	A	A	A
Seasonal Pattern	Spring, Fall, Winter			
Duration	6 months			
Speed of Onset	Slow			

Descriptions: A shortage of critical materials occurs when demand for a produce exceeds supply. A shortage of critical materials may include a wide variety of resources, however, this section will only address those relating to energy.

The potential for a shortage of energy products requires preparing provisions for providing electricl power and fuels to support emergency and disaster response operations and for the normal functioning of business and industry throughout the county. Supplying energy related resources during a shortage involves the production/generation, refinement, and transportation/transmitting of such resource. It also includes the conservation of these resources and the construction and maintenance of the energy system and its components.

Threat: The sudden and devastating occurrence of a severe natural disaster to include an extended period of severe cold weather; the disruption of a supply system; an embargo, which could result from international global conflict; or other significant events, can disrupt the availability of fuels and other critical energy products. Such occurrences could impact future energy supplies and place extreme pressure on existing supplies, threatening the health, safety, and well-being of the citizens.

Shortages of critical energy supplies can cause:

- Widespread and prolonged electrical power failure, which impacts both da-to-day and emergency communications capability.
- A lack of transportation fuels, causing surface movement gridlock and disruption of commerce; and,
- Diminished supplies of heating fuels during winter. This could cause severe economic impact on the general public, because they would be forced to seek alternate, possibly more costly, energy sources. Such energy shortages will impact on other emergency public health and safety services as well.
- A lack of medical supplies especially vaccines, antibiotics, and anti-viral medications posing a public health and safety threat.

- Private hoarding, compounding a shortage problem.
- A lack of adequate food, water, and shelter.

History: Pierce County has limited recorded history of critical material shortages with the exception of power outages caused mainly by storms. Power outages impact the rural areas and the cities of Balta and Wolford most often. Many of these have kept residents in some rural areas of the county without power for days. Pierce County residents were impacted by the Souris River flooding in 2011. The flooded river cut residents access to the city of Minot where many access major medical care and other supplies.

Identified Risks:

- Vulnerable Populations, Personal Injury/Death Risk
- Agricultural and Related Business
- Business Interruptions
- Delayed Emergency Response
- Downed Power Lines
- Evacuation (Localized)
- Increased Fire Potential
- Increased Public Safety Runs
- Loss of Portable Water
- Loss of Power
- Property Damage
- School Closure

Summer Storm

	Pierce County	Rugby	Wolford	Balta
Frequency	Highly Likely Nearly 100% probability in the next year	Highly Likely Nearly 100% probability in the next year	Highly Likely Nearly 100% probability in the next year	Highly Likely Nearly 100% probability in the next year
Severity	Critical 25 to 50% of jurisdiction affected	Critical 25 to 50 % of jurisdiction affected	Critical 25 to 50 % of jurisdiction affected	Critical 25 to 50 % of jurisdiction affected
Risk Class	A	A	A	A
Seasonal Pattern	May through August			
Duration	1 to 2 hours			
Speed of Onset	Minimal to no warning			

Definition: Summer storms are generated by temperature imbalances in the atmosphere and as warm, moist air rises the thunderstorm develops. These conditions will produce updraft and downdrafts. Both the updrafts and downdrafts can reach velocities of 170 mph. Updrafts and downdrafts are the reason for gust fronts, heavy rain (flash flooding), lightning, hail, and high winds. Downburst or straight line winds can be as deadly as tornados. If the thunderstorm continues to intensify, a tornado may develop. A thunderstorm affects a relatively small area when compared to a winter storm. The typical thunderstorm is 15 miles in diameter and lasts an average of 30 minutes. Despite their small size, all thunderstorms are dangerous.

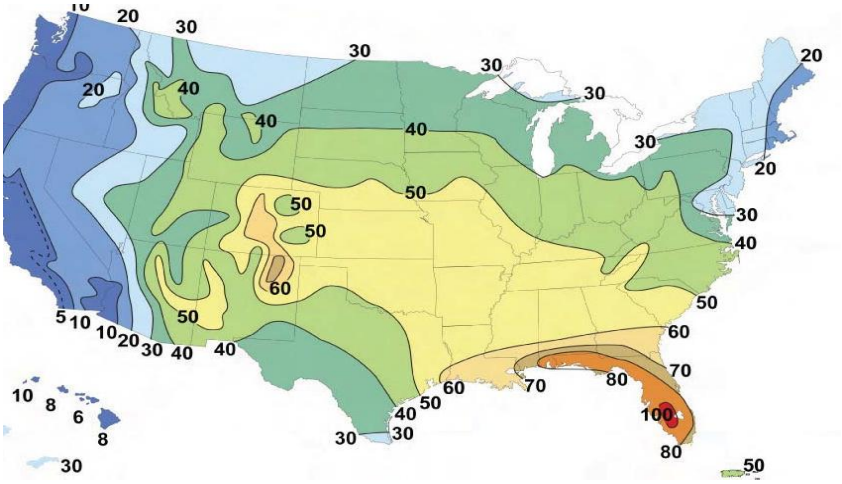
There are many elements to a thunderstorm, they are listed and explained below.

Stright-line winds: The numbe rone cause of wind damage in North Dakota is from downburst winds, not tornados. Straight-line winds are any winds not associated with the rotation of a tornado. Straight-line winds are responsible for most thunder storm wind damage with speeds that can exceed 125 mph. A downburst is a small area of rapidly descending air beneath a thunderstorm. It can cause damage equivalent to a strong tornado and can be extremely aviation. A “dry microburst” is a downburst that occurs with little or no rain.

Severe Thunderstorms: Severe Thunderstorm can occur any time of day or night, but are most frequent during the late afternoon and evening hours. This is mostly due to the daytime heating which creates the extra heat energy to form these large thunderstorms. The criteria used by the Nationional Weather Service for calling a thunderstorm sever is winds of 58 mph or and/or hail three-quarters of an inch in diameter. The general makeip of a severe thunderstorm is similar to that of a regular thunderstorm, except that each element is enhanced or more intense. This can be seen in cloud formations and the weather that the storm produces.

Hail: Strong rising currents of air within a storm, called updraft, carry water droplets to a height where they freeze. Ice particles grow in size, becoming too heay to be supported by the updraft, and fall to the ground as hail. Hail is larger than sleet and forms only in thunderstorms. Hail can be larger than a softbal

which is a 5 inch diameter. Hail tends to fall in swaths that range from 20 to 150 miles in length and 5 to 30 miles wide. Large hailstones can fall in speeds faster than 100 mph. The major hazard is to crops, aircraft, automobiles, roofs, and windows. Hail causes more than $1 billion in crop and property damage each year. The destructiveness of hailstorms is not due to the hailstones alone. Hail damage is difficult to determine as hail, wind, and rain frequently occur at he same time.



This map depicts the average number of days with thunderstorms each year.

Source: U.S. Department of Commerce

Lightning: The rising air in a thunderstorm cloud causes various types of frozen precipitation to form within the cloud. Included ih these precipitation types are very small ice crystals and much larger pellets of ice. The smaller ice crystals are carried upward towards the top of the clouds by the rising air while the heavier and denser pellets are eithier suspended by the rising air or start falling toward the ground. Collisions occur between the ice crystals and the pellets, and these collisions serve as the charging mechanism of the thunderstorm. The small ice crystals become positively charged while the pellets become negatively charged. At the same time, the groung underneath the cloud becomes charged oppositely of the charges directly overhead.

When the charge difference between the ground and the cloud becomes too large, a conductive channel of air developes between the cloud and the ground, and a small amount of charge (step leader) starts moving towards the ground. When it nears the ground, an upward leader of opposite charge connects with the step leader. At the instant this connection is made, a powerful discharge occurs between the cloud and the ground. We see this discharge as a bright visible flash of lightning.

The vast majority of lightning victims were going to a safe place but waited to long before seeking shelter. More than 80% of lightning fatality victims are male, typically between the ages of 15 and 40. Lightning fatalities are most common during summer afternoons and evenings. The energy from one lightning flash could light a 100-watt light bulb for more than three months. Many wildfires are ignitied by lightning.

The channel of air through which lightning passes can be heated to 50,000 F, hotter than the surface of the sun. The rapid heating and cooling of the air near the lightning channel causes a shockwave that results in the sound we know as thunder.

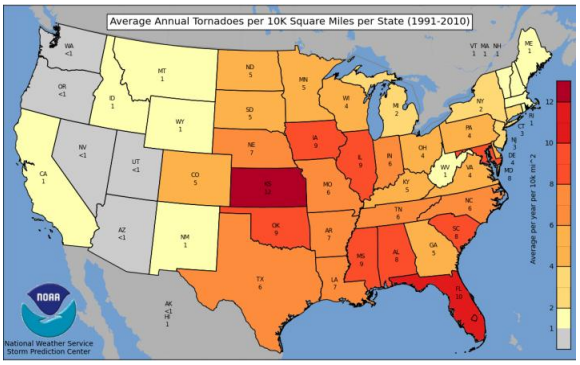
Almost all lightning deaths have occurred outdoors. In recent years, fatal activities have included:

- Boating
- Riding horse
- Riding on a lawn mower
- Golfing
- Walking
- Mountain climbing
- Camping
- Standing under a tree
- Swimming
- Playing sports
- Watching the storm
- Loading a truck
- Fishing
- Running to shelter

Flash Floods: A flash flood occurs within a few hours (usually less than 6 hours) of heavy or excessive rainfall, a dam or levee failure, or the sudden release of water impounded by an ice jam. Flash floods and floods are the number one cause of death associated with thunderstorms. Many flash flood fatalities occur at night. Six inches of fast-moving water can knock you off your feet and two feet of rushing water can carry away most vehicles, including SUVs and pickups. Flash floods are discussed further in floods section.

Tornados: Although tornados occur in many parts of the world, they are found most frequently in the United States. In an average year, 1,200 tornados cause 60-65 fatalities and 1,500 injuries nationwide. The peak time of the year that tornados occur is from the end of May through the beginning of August. As with thunderstorms that create them, tornados can form anytime day or night. The peak time, however, is during the evening hours from 6:00 to 8:00 p.m.

Average Annual Tornados Per State



Source: National Weather Service

A tornado is a violently rotating column of air extending from a cumuliform cloud, such as a thunderstorm, to the ground. Tornados may appear nearly transparent until dust and debris are picked up

or a cloud form within the funnel. The average tornado moves from southwest to northeast, but tornados can move in any direction and can suddenly change their direction of motion. The average speed of a tornado is 30 mph but may vary from nearly stationary to 70 mph. The strongest tornados have rotating winds of more than 200 mph. The typical tornado is on the ground for less than ten minutes. However, tornados may only touchdown for one second and then go back up, or be on the ground for an hour or longer. Their funnel-shapes clouds can affect areas ranging from ¼ mile to a full mile wide and upward to 16 miles long. Extreme events have been known to travel over areas up to a mile wide and 300 miles long.

The National Weather Service uses the Enhanced Fujita Scale or EF-Scale to assign a tornado a rating based on estimated wind speeds and related damage.

EF-Scale

EF Rating	3 Second Wind Gust (mph)
0	65-85
1	86-110
2	111-135
3	136-165
4	166-200
5	Over 200

Before thunderstorms develop, winds change direction and increase in speed and altitude. This creates an invisible, horizontal spinning effect in the lower atmosphere. Rising air within the thunderstorm updraft tilts the rotating air from horizontal to vertical. An area of rotation, 2-6 miles wide, now extends through much of the storm. Most tornados form within this area of strong rotation.

Weak Tornadoes

- 88% of all tornados
- Cause less than 5% of tornado deaths
- Lifetime 1-10+ minutes
- Winds less than 110 mph
- Produces EF0 or EF11 damages

Strong Tornadoes

- 11% of all tornadoes
- Cause nearly 30% of all tornado deaths
- May last 20 minutes or longer
- Winds 111-165 mph
- Produces EF2 or EF3 damage

Violent Tornadoes

- Less than 1% of all tornados
- Cause 70% of all tornado deaths
- Can exceed 1 hour
- Winds greater than 166 mph
- Produces EF4 or EF5 damage

Weather radar watches the sky. The National Weather Service has a Doppler radar network strategically located across the country that can detect air movement toward or away from the radar. Early detection of increasing rotation aloft with in a thunderstorm can allow lifesaving warnings to be issued before the tornado forms.

Flying debris kills over 90 percent of all people killed by tornadoes. The winds of a tornado can reach extreme speeds, and at these speeds, neither man nor nature makes many things that can hold together. The one thing to remember about a tornado is that nothing can be done about them and they will go where they want. Get to a shelter immediately. With this in mind, the best place to go is underground, or as underground as possible to avoid wind and flying debris.

Identified Risks:

- Blocked Roads
- Building Collapse
- Business Interruptions
- Delayed Emergency Response
- Downed Trees and power lines

- Evacuation (Localized)
- Evacuation (Full)
- Explosion
- Street Flooding
- Structure Flooding
- Release of Hazardous Materials
- Increased Fire Potential
- Increased number of public safety runs
- Loss of Drinking Water
- Loss of Medical Facilities
- Loss of Power
- Mass Casualties
- Property Damage
- School Closure
- Sewer Backup
- Livestock/Wildlife Injury/Death
- Loss of Economy

History:

Source: National Oceanic and Atmospheric Administration (NOAA) Satellite and Information Service/ National Climatic Data Center (NCDC)

Pierce County, ND, Data between 8/11//2000 and 7/20/2011

Event Thunderstorm Wind Magnitude 59 kts. State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date 07/20/2011 05:50:00 CST-6** Begin Range 1 Begin Azimuth W Begin Location RUGBY Begin Lat/Lon 48.37/-100 End Date 07/20/2011 06:03:00 CST-6 Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 35.00K Crop Damage 0.00K Episode Title July 20 Early Morning Severe Weather over North Central and Northeast North Dakota Episode Narrative Early morning thunderstorms developed and intensified across north central into northeastern North Dakota in response to a strengthening low level jet and in advance of a strong surface cold front. Storms initially were elevated with several reports of strong thunderstorm wind gusts. A bowing structure developed with one confirmed tornado on the leading edge of the storm near Rugby. Additional reports of strong winds followed the tornado, with the storms eventually moving east out of the Bismarck County Warning Area. Event Narrative Tree branches were blown down throughout the city of Rugby.
Event Thunderstorm Wind Magnitude 61 kts. State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date 07/20/2011 05:45:00 CST-6** Begin Range 5 Begin Azimuth NW Begin Location BALTA Begin Lat/Lon 48.22/-100.11 End Date 07/20/2011 05:53:00 CST-6 Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 30.00K Crop Damage 0.00K Episode Title July 20 Early Morning Severe Weather over North Central and Northeast North Dakota Episode Narrative Early morning thunderstorms developed and intensified across north central into northeastern North Dakota in response to a strengthening low level jet and in advance of a strong surface

cold front. Storms initially were elevated with several reports of strong thunderstorm wind gusts. A bowing structure developed with one confirmed tornado on the leading edge of the storm near Rugby. Additional reports of strong winds followed the tornado, with the storms eventually moving east out of the Bismarck County Warning Area.
Event Narrative The strong thunderstorm winds blew down box elder trees and bent a flagpole.

Event Thunderstorm Wind Magnitude 52 kts. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 06/25/2011 18:20:00 CST-6
End Date 06/25/2011 18:22:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title June 25 Severe Weather Outbreak over Central North Dakota
Episode Narrative A surface cold front advecting from west to east, coupled with a mid-level jet streak, combined with abundant moisture and instability to result in widespread thunderstorm activity during the afternoon and evening hours of June 25th. Numerous reports of large hail and several reports of severe thunderstorm wind gusts were received. ||The overall tornado threat was low due to insufficient deep layer shear, although there was supportive surface vorticity and low level cape which led to one report of a funnel cloud and several reports of general rotation at the base of the storms.||Also during this episode, training thunderstorms across northwest and north central North Dakota resulted in locally very heavy rainfall which resulted in the issuance of several flash flood warnings.
Event Narrative Winds were estimated at 60 miles per hour.

Event Funnel Cloud State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 07/20/2010 15:01:00 CST-6
Begin Range 4 Begin Azimuth E Begin Location WOLFORD Begin Lat/Lon 48.5/-99.62
End Date 07/20/2010 15:03:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title July 20 Severe Weather Event over Northwest and Central North Dakota
Episode Narrative Thunderstorms developing ahead of an upper level short wave trough across eastern Montana, were expected to spread eastward into northwest and portions of central North Dakota during the afternoon and evening hours of Tuesday, July 20th. Severe Thunderstorm Watch number 503 was issued as a result. ||Numerous severe thunderstorm warnings were issued. Several reports of large hail and three reports of funnel clouds were received during this episode. Event Narrative a brief funnel cloud formed.

Event Thunderstorm Wind Magnitude 56 kts. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 05/24/2010 20:58:00 CST-6
Begin Range 4 Begin Azimuth NNE Begin Location BALTA Begin Lat/Lon 48.22/-100
End Date 05/24/2010 21:08:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title May 24 Severe Weather Outbreak across Southwest and Central North Dakota
Episode Narrative A surface warm front continued to lift slowly north across southern North Dakota during the day on Monday, May 24th, in advance of a potent upper level trough racing northeast across the Rocky Mountains and towards the Northern Plains. Tornado Watch number 215 was issued by mid-afternoon in anticipation of rapid thunderstorm development and intensification once mass divergence associated with the upper wave spread across the region. An elevated threat for tornadoes existed along the warm front due to favorable low level vertical shear parameters. ||Numerous severe thunderstorm and tornado warnings were issued from late in the afternoon till later in the evening. Several reports of large hail, multiple reports of severe thunderstorm winds, and several reports of funnel clouds and tornadoes were received during this event. The number of confirmed tornadoes was two. Event Narrative Very heavy rain accompanied the severe thunderstorm winds.

Event Thunderstorm Wind Magnitude 61 kts. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 08/14/2009 05:30:00 CST-6
Begin Range 1 Begin Azimuth NW Begin Location SELZ Begin Lat/Lon 47.86/-99.89

End Date 08/14/2009 05:40:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 15.00K Crop Damage 0.00K
Episode Title August 14 Morning Severe Weather over portions of Central North Dakota
Episode Narrative A strong short wave impulse ejecting northeast across North Dakota, coupled with strong ascent ahead of a surface boundary, maintained thunderstorm activity across portions of central North Dakota throughout the early morning hours of August 14th. These storms eventually moved east into an area of moderate to strong elevated instability just to the west of the Devils Lake Basin, resulting in rapid intensification around sunrise. Several severe thunderstorm warnings were issued. Several reports of large hail and several reports of damage from severe thunderstorm winds were received in less than one hour. Event Narrative Severe thunderstorm winds blew down trees near Selz.

Event Thunderstorm Wind Magnitude 56 kts. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 06/14/2008 17:00:00 CST-6
Begin Range 0 Begin Azimuth N Begin Location RUGBY Begin Lat/Lon 48.37/-99.98
End Date 06/14/2008 17:04:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title June 14 Severe Thunderstorm Event over West and Central North Dakota
Episode Narrative In the early afternoon of Saturday, June 14th, Severe Thunderstorm Watch 529 was issued in anticipation of severe thunderstorms developing in the vicinity of low level convergence boundaries and an approaching vorticity maximum. In addition, strong diabatic heating and cold air aloft produced steep mid-level lapse rates which resulted in destabilization of the atmosphere. Multiple severe thunderstorm warnings were issued. Several reports of large hail and severe thunderstorm wind gusts were received during the afternoon and early evening hours.
Event Narrative Strong thunderstorm winds were reported from KZZJ radio in Rugby.

Event Thunderstorm Wind Magnitude 65 kts. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 08/13/2007 08:43:00 CST-6
Begin Range 9 Begin Azimuth NW Begin Location BALTA Begin Lat/Lon 48.26/-100.17
End Date 08/13/2007 08:58:00 CST-6
End Range 5 End Azimuth SE End Location BALTA End Lat/Lon 48.12/-99.95
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 45.00K Crop Damage 500.00K
Episode Title August 13 Severe Thunderstorm Event over North Central and parts of Eastern North Dakota Episode Narrative Around daybreak on Monday, August 13th, scattered thunderstorms developed across north central North Dakota in response to low level warm air advection and large scale ascent from an incoming upper level short wave trough. Severe Thunderstorm Watch 591 was issued by mid-morning in anticipation of continued severe thunderstorm development through the morning hours over the eastern parts of the Bismarck CWA (County Warning Area).
Event Narrative High wind blew down four 40 foot trees. Nickel to walnut sized hail was also reported with the winds. Buildings were damaged on a farmstead northwest of Balta, along with major crop damage across central Pierce county due to the combined effects of the wind and hail.

Event Thunderstorm Wind Magnitude 59 kts. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 07/13/2007 17:21:00 CST-6
Begin Range 0 Begin Azimuth N Begin Location RUGBY Begin Lat/Lon 48.37/-99.98
End Date 07/13/2007 17:33:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title July 13 Severe Thunderstorm over North Central North Dakota
Episode Narrative In the late afternoon and early evening hours of July 13th, a severe thunderstorm developed and moved across parts of north central North Dakota. One severe thunderstorm warning was issued during the early evening. Reports of severe thunderstorm wind gusts were received across Rolette and Pierce counties. Event Narrative A report from the public in Rugby also included peak winds of around 70 mph during this time.

Event Thunderstorm Wind Magnitude 57 kts. State NORTH DAKOTA County/Area PIERCE WFO BIS

Begin Date 05/21/2007 19:22:00 CST-6 Begin Range 0 Begin Azimuth N Begin Location RUGBY Begin Lat/Lon 48.37/-99.98 End Date 05/21/2007 19:27:00 CST-6 Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K Episode Title May 21 Severe Thunderstorm Event over much of West and all of Central North Dakota Episode Narrative In the early afternoon of Monday May 21st, Severe Thunderstorm Watch 282 was issued in anticipation of severe thunderstorms developing along and ahead of a cold frontal boundary approaching western North Dakota, and along a warm front over north central North Dakota. Numerous severe thunderstorm warnings and several tornado warnings were issued. Over a dozen reports of large hail, several reports of severe thunderstorm wind gusts, and 2 confirmed tornado reports were received during the late afternoon and evening hours. Event Narrative Storm total rain was 1.57 inches.
Severe Storm/Thunderstorm-Wind Pierce County **7/12/2006** Fatalities 0 Property Damage 75000.00 Crop Damage 0 (Source: Sheldus)
Event Tstm Wind State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 12 Jul 2006, 08:30:00 PM CST** Begin Location: Rugby, Begin LAT/LON: 48°22'N / 99°59'W, End Date: 12 Jul 2006, 08:38:00 PM CST, End Location: Rugby, End LAT/LON: 48°22'N / 99°59'W, Magnitude: 70, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, County: Pierce Description: Trees up to 3 feet in diameter snapped in half.
Event: Tstm Wind State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 12 Jul 2006, 05:15:00 PM CST** Begin Location: Balta, Begin LAT/LON: 48°10'N / 100°02'W, End Date: 12 Jul 2006, 05:30:00 PM CST, End Location: Balta, End LAT/LON: 48°10'N / 100°02'W, Magnitude: 78, Fatalities: 0, Injuries: 0, Property Damage: $ 75.0K, Crop Damage: $ 0.0, State: North Dakota, Description: Much damage to a recreational area with picnic shelters and tables ripped apart. Roof torn off of a barn, many trees blown over, and grain bins blown over. Roof damage to other buildings in town and damage to two single stall garages.
Event Tstm Wind State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 02 Jul 2006, 06:13:00 PM CST** Begin Location: Rugby, Begin LAT/LON: 48°22'N / 99°59'W, End Date: 02 Jul 2006, 06:16:00 PM CST, End Location: Rugby, End LAT/LON: 48°22'N / 99°59'W, Magnitude: 52, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Description: None Reported
Severe Storm/Thunderstorm-Wind Pierce County **8/2/2005** Property Damage 15000.00 Crop Damage 0 (Source: Sheldus)
Event Tstm Wind State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 02 Aug 2005, 06:35:00 PM CST** Begin Location: Rugby, Begin LAT/LON: 48°22'N / 99°59'W, End Date: 02 Aug 2005, 06:43:00 PM CST, End Location: Rugby, End LAT/LON: 48°22'N / 99°59'W, Magnitude: 83, Fatalities: 0, Injuries: 0, Property Damage: $ 15.0K, Crop Damage: $ 0.0, State: North Dakota, County: Description: 60 mph wind at 735 PM CDT increased to 71 mph at 739 PM CDT and maxed out at 95 mph at 742 PM CDT. Rugby also had one inch of rain from the storm and pea sized hail that covered the ground. Numerous tree branches down in the city.
Event **Tstm Wind** State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 07 Jul 2005, 10:55:00 PM CST** Begin Location: Rugby, Begin LAT/LON: 48°22'N / 99°59'W, End Date: 07 Jul 2005, 11:05:00 PM CST,

End Location: Rugby, End LAT/LON: 48°22'N / 99°59'W, Magnitude: 66, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Description: Street signs and trees knocked over in Rugby. Roofs were damaged and some torn from buildings. Also had 1.75 inches of rain from the storm.
Severe Storm/Thunderstorm-Wind Pierce County **6/19/2005** Fatalities 0 Property Damage 1800000.00 Crop Damage 0 (Source: Sheldus)
Event Tstm Wind State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 19 Jun 2005, 03:47:00 AM CST** Begin Location: 6 Miles South West of Silva, Begin LAT/LON: 48°06'N / 100°01'W, End Date: 19 Jun 2005, 03:57:00 AM CST, End Location: 4 Miles South East of Silva, End LAT/LON: 48°08'N / 99°51'W, Magnitude: 96, Fatalities: 0, Injuries: 0, Property Damage: $ 1.8M, Crop Damage: $ 0.0, State: North Dakota, County: Pierce Description: Six (6) miles of 230 KV high voltage transmission lines down. Event Tstm Wind State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 01 Aug 2004, 09:22:00 PM CST** Begin Location: Rugby, Begin LAT/LON: 48°22'N / 99°59'W, End Date: 01 Aug 2004, 09:22:00 PM CST, End Location: Rugby, End LAT/LON: 48°22'N / 99°59'W, Magnitude: 52, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Description: A few trees blown down from the strong winds.
Event Tstm Wind State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 02 Jul 2003, 09:01:00 AM CST,** Begin Location: Rugby, Begin LAT/LON: 48°22'N / 99°59'W, End Date: 02 Jul 2003, 09:06:00 AM CST, End Location: Rugby, End LAT/LON: 48°22'N / 99°59'W, Magnitude: 57, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Description: None Reported
Event Tstm Wind State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 21 Jul 2001, 12:00:00 AM CST** Begin Location: Selz, Begin LAT/LON: 47°51'N / 99°53'W, End Date: 21 Jul 2001, 12:00:00 AM CST, End Location: Selz, End LAT/LON: 47°51'N / 99°53'W, Magnitude: 52, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, County: Pierce Description: None Reported
Event Tstm Wind State NORTH DAKOTA County/Area PIERCE WFO BIS Begin Date: **11 Jun 2001, 01:50:00 AM CST** Begin Location: Rugby, Begin LAT/LON: 48°22'N / 99°59'W, End Date: 11 Jun 2001, 01:50:00 AM CST, End Location: Rugby, End LAT/LON: 48°22'N / 99°59'W, Magnitude: 52, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, County: Pierce Description: Numerous small tree's reported down and fence knocked over at a golf course.
Event Tstm Wind State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 11 Aug 2000, 11:15:00 PM CST** Begin Location: 12 Miles West North West of Selz, Begin LAT/LON: 47°55'N / 100°07'W, End Date: 11 Aug 2000, 11:35:00 PM CST, End Location: Selz, End LAT/LON: 47°51'N / 99°53'W, Magnitude: 70, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Description: Trained storm spotter reported branches down and crop damage 12 miles west northwest of Selz. In the city of Selz, numerous large tree's down, including a 60 foot pine tree. A 5000 bushel grain bin lifted and blown 200 yards and destroyed. Several other grain bins were twisted off their foundations. Roof damage to several homes reported.

Hail

Source: National Oceanic and Atmospheric Administration (NOAA) Satellite and Information Service/ National Climatic Data Center (NCDC)

Pierce County, ND, Data between 6/22/2000 and 7/26/2010

Event Hail Magnitude 1.00 in. State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date 07/26/2010 20:12:00 CST-6** Begin Range 5 Begin Azimuth SW Begin Location ORRIN Begin Lat/Lon 48.02/-100.24 End Date 07/26/2010 20:20:00 CST-6 Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K Episode Title July 26 Severe Weather Outbreak over Portions of West and Central North Dakota Episode Narrative Severe Thunderstorm Watch number 537 was issued for west and north central North Dakota in the late afternoon hours of Monday, July 26th. This was in anticipation of thunderstorms developing and increasing in intensity during the evening along a west to east oriented surface front, stretching from northeastern Montana into north central North Dakota. Organized storm development was expected as a mid-level short wave impulse lifted into northeastern Montana, combined with a moderately unstable atmosphere and ample deep layer wind shear.||Early in the evening, Tornado Watch number 538 was issued for northern North Dakota, where low boundary layer dew point depressions and stronger low level wind shear coincided. This was also where isolated severe thunderstorms were ongoing, along with one confirmed tornado touchdown having already occurred.||Numerous severe thunderstorm and several tornado warnings were issued. Numerous reports of large hail, several reports of severe thunderstorm wind gusts, one report of flash flooding, and two confirmed tornadoes occurred during this episode.
Event Hail Magnitude 0.75 in. State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date 06/08/2010 13:21:00 CST-6** Begin Range 1 Begin Azimuth NW Begin Location SELZ Begin Lat/Lon 47.86/-99.89 End Date 06/08/2010 13:28:00 CST-6 Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K Episode Title June 8 Non-severe Hail Event over North Central and East Central North Dakota Episode Narrative A weak upper level short wave trough combined with a weak surface boundary and marginal wind shear, resulted in scattered thunderstorms developing over portions of central North Dakota during the afternoon hours of Tuesday, June 8th.
Event Hail Magnitude 1.50 in. State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date 07/19/2009 23:05:00 CST-6** Begin Range 3 Begin Azimuth SE Begin Location SILVA Begin Lat/Lon 48.14/-99.87 End Date 07/19/2009 23:11:00 CST-6 Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K Episode Title July 19 Severe Thunderstorm Event over parts of west and central North Dakota Episode Narrative In the early evening hours of July 19th, Severe Thunderstorm Watch 605 was issued in anticipation of severe thunderstorms developing in the vicinity of a low level moisture convergence axis and an approaching mid-level short wave trough. In addition, strong diabatic heating and cold air advection aloft produced steep mid-level lapse rates which resulted in destabilization of the atmosphere. Several severe thunderstorm warnings were issued. Several reports of large hail and one report of a severe thunderstorm wind gust were received during the evening hours. Event Narrative No damage was reported.
Event Hail Magnitude 1.00 in. State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date 07/19/2009 22:55:00 CST-6** Begin Range 2 Begin Azimuth SSW Begin Location BALTA Begin Lat/Lon 48.15/-100.0 End Date 7/19/2009 23:02:00 CST-6

Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title July 19 Severe Thunderstorm Event over parts of west and central North Dakota
Episode Narrative In the early evening hours of July 19th, Severe Thunderstorm Watch 605 was issued in anticipation of severe thunderstorms developing in the vicinity of a low level moisture convergence axis and an approaching mid-level short wave trough. In addition, strong diabatic heating and cold air advection aloft produced steep mid-level lapse rates which resulted in destabilization of the atmosphere. Several severe thunderstorm warnings were issued. Several reports of large hail and one report of a severe thunderstorm wind gust were received during the evening hours.

Event Hail Magnitude 1.25 in. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 06/26/2009 16:15:00 CST-6
Begin Range 11 Begin Azimuth W Begin Location SELZ Begin Lat/Lon 47.87/-100.11
End Date 06/26/2009 16:20:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title June 26 Severe Weather Outbreak over parts of Southwest and Central North Dakota
Episode Narrative In the early afternoon of June 26th, Severe Thunderstorm Watch 518 was issued in anticipation of severe thunderstorms developing and intensifying along and ahead of a surface boundary across western South Dakota and central North Dakota, and ahead of a series of upper level vorticity maxima advancing northeast into North Dakota. Tornado watch 522 was then issued in the early evening and replaced eastern portions of Severe Thunderstorm Watch 518. This upgrade was due to discrete supercells developing along a warm front where enhanced ascent and strong low level wind shear coincided.||Multiple tornado and several severe thunderstorm warnings were issued. Multiple reports of large hail, several reports of severe thunderstorm wind gusts, and two confirmed tornado reports were received from the mid-afternoon hours through the mid-evening hours. In addition, very heavy rainfall over north central and south central North Dakota prompted the issuance of several flash flood warnings.

Event Hail Magnitude 0.75 in. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 08/02/2008 12:04:00 CST-6
Begin Range 5 Begin Azimuth W Begin Location WOLFORD Begin Lat/Lon 48.5/-99.81
End Date 08/02/2008 12:16:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title August 2 Severe Weather Outbreak over North Central North Dakota
Episode Narrative A surface cold front pushing west to east across the northern half of the state was the primary trigger for widespread thunderstorm development from the early morning to the early afternoon of Saturday, August 2nd. Numerous severe thunderstorm warnings were issued. Numerous reports of large hail were received during the morning and early afternoon hours.

Event Hail Magnitude 0.88 in. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 06/23/2008 18:30:00 CST-6
Begin Range 4 Begin Azimuth NNE Begin Location BALTA Begin Lat/Lon 48.22/-99.99
End Date 06/23/2008 18:38:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title June 23 Severe Thunderstorm Event over parts of Central North Dakota
Episode Narrative Destabilization of the atmosphere and favorable shear profiles initiated development of an isolated thunderstorm over north central North Dakota during the late afternoon of Monday, June 23rd. This storm eventually became super-cellular. Several severe thunderstorm warnings were issued. Several reports of large hail were received during the evening.

Event Hail Magnitude 1.00 in. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 06/23/2008 17:25:00 CST-6
Begin Range 10 Begin Azimuth NW Begin Location RUGBY Begin Lat/Lon 48.47/-100.13
End Date 06/23/2008 17:45:00 CST-6
End Range 7 End Azimuth NW End Location RUGBY End Lat/Lon 48.44/-100.09
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K

Episode Title June 23 Severe Thunderstorm Event over parts of Central North Dakota
Episode Narrative Destabilization of the atmosphere and favorable shear profiles initiated development of an isolated thunderstorm over north central North Dakota during the late afternoon of Monday, June 23rd. This storm eventually became super-cellular. Several severe thunderstorm warnings were issued. Several reports of large hail were received during the evening.
Event Narrative Trained spotters reported 20 minutes of quarter size hail from ten miles northwest to seven miles northwest of Rugby.

Event Hail Magnitude 0.88 in. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 08/10/2007 11:30:00 CST-6
Begin Range 21 Begin Azimuth S Begin Location RUGBY Begin Lat/Lon 48.07/-99.98
End Date 08/10/2007 11:50:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title August 10 and 11 Prolonged Severe Weather Event over West and Central North Dakota
Episode Narrative A complex and lengthy severe weather event occurred over west and central North Dakota starting in the morning of Friday, August 10th, and lasting into the early morning hours of Saturday, August 11th. ||Scattered severe thunderstorms continuously redeveloped over the area along a surface trough that was oriented from southwest to northeast, from around Dickinson, to near Grand Forks. Convection was also supported by a favorable overrunning situation when the southerly low level jet intensified and persisted. Numerous warnings were issued, and numerous severe weather reports were received.||Severe Thunderstorm Watch 582 was issued due to ongoing convection and in anticipation of future development/intensification across south central North Dakota.||Late in the afternoon on Friday, Severe Thunderstorm Watch 584 was issued for all of western and much of central North Dakota. Storms were expected to re-intensify during the evening and spread east as large scale upper level support and a cold front approached.
Event Narrative Hail up to nickel size lasted 20 minutes.

Event Hail Magnitude 0.88 in. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 08/03/2007 12:39:00 CST-6
Begin Range 10 Begin Azimuth SSE Begin Location RUGBY Begin Lat/Lon 48.24/-99.9
End Date 08/03/2007 12:46:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title August 3 Severe Thunderstorm Event over parts of Central North Dakota
Episode Narrative In the early afternoon of Friday August 3rd, isolated severe thunderstorms developed across parts of north central and east central North Dakota. They produced large hail and flash flooding.

Event Hail Magnitude 1.00 in. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 06/22/2007 20:45:00 CST-6
Begin Range 1 Begin Azimuth NW Begin Location BARTON Begin Lat/Lon 48.51/-100.19
End Date 06/22/2007 21:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title June 22 Severe Thunderstorm Event over Western and North Central North Dakota
Episode Narrative In the mid afternoon of Friday June 22nd, Severe Thunderstorm Watch 445 was issued in anticipation of severe thunderstorms developing along a surface boundary over western North Dakota. Numerous severe thunderstorm warnings along with a few tornado warnings were issued. Numerous reports of large hail and one confirmed tornado report were received during the late afternoon and evening hours.

Event Hail Magnitude 1.00 in. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 05/06/2007 15:40:00 CST-6
Begin Range 0 Begin Azimuth W Begin Location RUGBY Begin Lat/Lon 48.37/-99.98
End Date 05/06/2007 15:44:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title May 6 Large Hail Report in Pierce County

Episode Narrative An isolated severe thunderstorm produced large hail in Pierce County.
Event Hail State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 12 Aug 2006, 12:45:00 PM CST** Begin Location: 8 Miles South of Wolford, Begin LAT/LON: 48°23'N / 99°42'W, End Date: 12 Aug 2006, 12:50:00 PM CST, End Location: 8 Miles South West of Wolford, End LAT/LON: 48°23'N / 99°42'W, Magnitude: 0.75 inches, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0
Event Hail State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 27 May 2006, 09:10:00 AM CST** Begin Location: 6 Miles South East of Rugby, Begin LAT/LON: 48°18'N / 99°53'W, End Date: 27 May 2006, 09:13:00 AM CST, End Location: 6 Miles South East of Rugby, End LAT/LON: 48°18'N / 99°53'W, Magnitude: 0.75 inches, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, County: Pierce
Event Hail State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 27 May 2006, 07:20:00 PM CST** Begin Location: Wolford, Begin LAT/LON: 48°30'N / 99°42'W, End Date: 27 May 2006, 07:22:00 PM CST, End Location: Wolford, End LAT/LON: 48°30'N / 99°42'W, Magnitude: 1.75 inches, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, County: Pierce
Event Hail State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 27 May 2006, 06:02:00 PM CST** Begin Location: 9 Miles East of Wolford, Begin LAT/LON: 48°30'N / 99°30'W, End Date: 27 May 2006, 06:04:00 PM CST, End Location: 9 Miles East South East of Wolford, End LAT/LON: 48°30'N / 99°30'W, Magnitude: 0.75 inches, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, County: Pierce
Event Hail State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 06 Jun 2004, 08:49:00 PM CST** Begin Location: Silva, Begin LAT/LON: 48°10'N / 99°55'W, End Date: 06 Jun 2004, 08:51:00 PM CST, End Location: Silva, End LAT/LON: 48°10'N / 99°55'W, Magnitude: 1.75 inches, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0
Event Hail State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 21 Jun 2003, 05:15:00 PM CST** Begin Location: 6 Miles South East of Rugby, Begin LAT/LON: 48°18'N / 99°53'W, End Date: 21 Jun 2003, 05:18:00 PM CST, End Location: 6 Miles South East of Rugby, End LAT/LON: 48°18'N / 99°53'W, Magnitude: 1.00 inches, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0
Event Hail State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 15 Jun 2003, 08:47:00 PM CST** Begin Location: Rugby, Begin LAT/LON: 48°22'N / 99°59'W, End Date: 15 Jun 2003, 08:51:00 PM CST, End Location: Rugby, End LAT/LON: 48°22'N / 99°59'W, Magnitude: 0.75 inches, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0 Event Hail State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 03 May 2003, 05:05:00 PM CST** Begin Location: 12 Miles North of Balta, Begin LAT/LON: 48°20'N / 100°02'W, End Date: 03 May 2003, 05:05:00 PM CST, End Location: 12 Miles North of Balta, End LAT/LON: 48°20'N / 100°02'W, Magnitude: 0.75 inches, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0
Event **Hail** State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 31 Jul 2002, 04:36:00 PM CST** Begin Location: 4 Miles North East of Rugby, Begin LAT/LON: 48°24'N / 99°55'W, End Date: 31 Jul 2002, 04:36:00 PM CST, End Location: 4 Miles North East of Rugby, End LAT/LON: 48°24'N / 99°55'W, Magnitude: 1.75 inches, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0
Event Hail State NORTH DAKOTA County/Area PIERCE WFO BIS

Begin Date: 31 Jul 2002, 04:35:00 PM CST Begin Location: Rugby, Begin LAT/LON: 48°22'N / 99°59'W, End Date: 31 Jul 2002, 04:35:00 PM CST, End Location: Rugby, End LAT/LON: 48°22'N / 99°59'W, Magnitude: 1.00 inches, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0
Event Hail State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 08 Aug 2001, 04:55:00 PM CST** Begin Location: 8 Miles South East of Orrin, Begin LAT/LON: 48°00'N / 100°03'W, End Date: 08 Aug 2001, 04:55:00 PM CST, End Location: 8 Miles South East of Orrin, End LAT/LON: 48°00'N / 100°03'W, Magnitude: 1.50 inches, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0
Even Hail State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 24 Aug 2000, 01:45:00 AM CST** Begin Location: 2 Miles North East of Silva, Begin LAT/LON: 48°11'N / 99°53'W, End Date: 24 Aug 2000, 01:45:00 AM CST, End Location: 2 Miles North East of Silva, End LAT/LON: 48°11'N / 99°53'W, Magnitude: 1.00 inches, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0
Event Hail State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 22 Jun 2000, 04:45:00 PM CST** Begin Location: 8 Miles East of Orrin, Begin LAT/LON: 48°05'N / 100°00'W, End Date: 22 Jun 2000, 04:45:00 PM CST, End Location: 8 Miles East South East of Orrin, End LAT/LON: 48°05'N / 100°00'W, Magnitude: 1.00 inches, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0

Tornadoes

Source: National Oceanic and Atmospheric Administration (NOAA) Satellite and Information Service/ National Climatic Data Center (NCDC)

Pierce County, ND, Data between 87/1/1973 and 7/20/2011

Event Tornado Scale EF1 -- Length 1.25 -- Width 50 State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date 07/20/2011 05:50:00 CST-6** Begin Range 5 Begin Azimuth S Begin Location RUGBY Begin Lat/Lon 48.3/-100 End Date 07/20/2011 05:55:00 CST-6 End Range 4 End Azimuth S End Location RUGBY End Lat/Lon 48.31/-99.98 Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 325.00K Crop Damage 150.00K Episode Title July 20 Early Morning Severe Weather over North Central and Northeast North Dakota Episode Narrative Early morning thunderstorms developed and intensified across north central into northeastern North Dakota in response to a strengthening low level jet and in advance of a strong surface cold front. Storms initially were elevated with several reports of strong thunderstorm wind gusts. A bowing structure developed with one confirmed tornado on the leading edge of the storm near Rugby. Additional reports of strong winds followed the tornado, with the storms eventually moving east out of the Bismarck County Warning Area. Event Narrative a brief tornado touched down five miles south of Rugby on the leading edge of a linear severe thunderstorm. This tornado was within a larger area of straight line thunderstorm winds which also caused damage. Several buildings sustained damage or were destroyed by this tornado, along with trees, and three power poles were snapped along North Dakota Highway 3 where the tornado crossed. A semi-truck was picked up along Highway 3 and thrown into the ditch. There were no injuries or deaths reported with this tornado. The tornado damage corresponded to EF1 on the Enhanced Fujita Scale. From that it was determined that wind speeds with this tornado were on the order of 100 miles per hour.
Event Tornado NORTH DAKOTA County/Area PIERCE WFO BIS

Begin Date: 10 Jul 2005, 07:57:00 PM CST Begin Location: 4 Miles North West of Selz, Begin LAT/LON: 47°53'N / 99°57'W, End Date: 10 Jul 2005, 07:59:00 PM CST, End Location: 4 Miles North West of Selz, End LAT/LON: 47°53'N / 99°57'W, Magnitude: F0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, County: Pierce Description: Tornado briefly touched down in open country. No damage reported.
Tornado **6/19/2005** Fatalities 0 Property Damage 250000.00Crop Damage 0 (Source: Sheldus)
Event Tornado NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 19 Jun 2005, 03:45:00 AM CST** Begin Location: 8 Miles South of Silva, Begin LAT/LON: 48°03'N / 99°55'W, End Date: 19 Jun 2005, 03:56:00 AM CST, End Location: 8 Miles South South East of Silva, End LAT/LON: 48°04'N / 99°51'W, Length: 3.00 Miles, Width: 75 Yards, Magnitude: F1, Fatalities: 0, Injuries: 0, Property Damage: $ 250.0K, Crop Damage: $ 0.0, State: North Dakota, County: Pierce Description: Tornado touched down 8 miles south of Silva near Long Lake. It moved east-northeast and crossed into Benson County, Grand Forks NWS County Warning Area. Damage to high voltage transmission lines partly due to the tornado and partly due to 110 mph estimated wind gusts listed as a separate entry
Event Tornado NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 19 May 2004, 03:49:00 PM CST** Begin Location: 5 Miles East of Barton, Begin LAT/LON: 48°30'N / 100°03'W, End Date: 19 May 2004, 03:54:00 PM CST, End Location: 6 Miles East South East of Barton, End LAT/LON: 48°30'N / 100°02'W, Length: 1.00 Mile, Width: 600 Yards, Magnitude: F1, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, County: Pierce Description: The tornado destroyed a barn.
Event Funnel Cloud NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 27 Jul 2001** 01, 01:40:00 AM CST, Begin Location: Rugby, End Date: 27 Jul 2001, 01:40:00 AM CST, End Location: Rugby, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, County: Pierce
Event Tornado NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 20 Jun 2001, 12:30:00 PM CST** Begin Location: 2 Miles West of Orrin, Begin LAT/LON: 48°05'N / 100°13'W, End Date: 20 Jun 2001, 12:31:00 PM CST, End Location: 2 Miles West North West of Orrin, End LAT/LON: 48°05'N / 100°13'W, Magnitude: F0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, County: Pierce Description: Tornado briefly touched down in open country.
Event Funnel Cloud NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 20 Jun 2001, 12:00:00 PM CST** Begin Location: Rugby, End Date: 20 Jun 2001, 12:00:00 PM CST, End Location: Rugby, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, County: Pierce Description: None Reported
Event Tornado NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date: 04 Jul 2000, 04:10:00 PM CST** Begin Location: 21 Miles South East of Rugby, Begin LAT/LON: 48°09'N / 99°40'W, End Date: 04 Jul 2000, 04:10:00 PM CST, End Location: 21 Miles South East of Rugby, End LAT/LON: 48°09'N / 99°40'W, Length: 3.00 Miles, Width: 50 Yards, Magnitude: F1, Fatalities: 0, Injuries: 0, Property

Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, County: Pierce Description: Barns and half of the farm house destroyed. Uprooted trees and up to 20 hay bales moved a half mile away.
JLY 01, 1993 012 1220 0 0 F1 069
JUN 06, 1989 004 1800 0 0 F1 069
JLY 04, 1978 022 2215 0 0 F1 069
MAY 25, 1978 005 1830 0 0 F1 069
JUN 25, 1977 014 0700 0 0 F0 069
JUN 11, 1976 011 1805 0 0 F1 069
AUG 21, 1973 010 0430 0 0 F2 069
JLY 01, 1973 007 1700 0 0 F1 069
Source: tornadoproject.com

High Winds

Source: National Oceanic and Atmospheric Administration (NOAA) Satellite and Information Service/ National Climatic Data Center (NCDC)

Pierce County, ND, Data between 4/5/2000 and 9/20/2011

Event High Wind Magnitude 35 kts. State NORTH DAKOTA County/Area Pierce WFO BIS
Begin Date 09/20/2011 03:00:00 CST-6
End Date 09/20/2011 15:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title September 19 - 20 High Wind Event over Much of West and Central North Dakota
Episode Narrative A strong low pressure system moving across the Northern Plains brought a prolonged period of strong winds to west and central North Dakota from the evening of the 19th through the afternoon of the 20th. The first round of the stronger winds impacted southwest North Dakota during the evening of the 19th along the initial pressure rises behind a cold front. The second round of the stronger winds lasted through the morning hours and into the early afternoon of the 20th.
Event Narrative Estimated sustained winds up to 40 mph occurred across Pierce County.

July 20, 2011 Rugby residents woke up to sirens warning them to take cover immediately on Wednesday, July 20 at approximately 6:45 a.m. No lives were lost and no injuries reported in the storm that took down a shop, stripped off roofs of outbuildings, uprooted large trees, and damaged some crops in parts of Pierce County. Source: Pierce County Tribune

This shop at a farm at 58th Street NE, Rugby, was demolished by high winds which went through the Rugby area on Wednesday, July 20, 2011.

Source: Pierce County Tribune

This tree, among many that were uprooted by the storm that hit Wednesday morning, July 20, 2011, in the Rugby area and the unincorporated community of Knox.

Source: Pierce County Tribune

June 25, 2011 High winds, clocked at 100 mph by a local resident with a wind meter, left a path of destruction in the Barton area on Saturday, June 25. Barton is located in the NW corner of Pierce County. The small rural city of Barton had already been wrestling with water issues as residents' basements filled with water earlier this spring. Source: Pierce County Tribune

Many large trees were uprooted by a storm that went through Barton on June 25, 2011, in the early evening. Residents went to their basement to try and escape the brunt of the storm.

Source: Pierce County Tribune

A storm with 100 mph winds (unofficially) took down a pole barn near Barton, June 25, 2011.

Source: Pierce County Tribune

Event High Wind Magnitude 35 kts. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 05/31/2011 09:00:00 CST-6
End Date 05/31/2011 17:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title May 31 High Wind Event over West and Central North Dakota
Episode Narrative Deep low pressure lifting north into southern Canada resulted in strong winds across all of west and central North Dakota May 31st. Sustained winds of 40 mph and peak gusts up to 60 mph were reported during the morning and afternoon.

Event High Wind Magnitude 35 kts. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 05/31/2011 09:00:00 CST-6
End Date 05/31/2011 17:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title May 31 High Wind Event over West and Central North Dakota
Episode Narrative Deep low pressure lifting north into southern Canada resulted in strong winds across all of west and central North Dakota May 31st. Sustained winds of 40 mph and peak gusts up to 60 mph were reported during the morning and afternoon.

Event High Wind Magnitude 35 kts. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 02/13/2011 09:00:00 CST-6
End Date 02/13/2011 21:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 20.00K Crop Damage 0.00K
Episode Title February 13 High Wind Event over West and Central North Dakota
Episode Narrative An area of deep low pressure moving across south central Canada, combined with high pressure building across Montana, resulted in high winds across western and central North Dakota on February 13. Many areas experienced sustained winds of 40 mph or greater, with several peak wind gusts in excess of 60 mph. A semi-trailer was blown over in Billings County resulting in injury (direct) to the driver.

Event High Wind Magnitude 50 kts. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 05/25/2010 09:00:00 CST-6
End Date 05/25/2010 16:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 30.00K Crop Damage 0.00K
Episode Title May 24-25 High Wind Event over West and Central North Dakota
Episode Narrative A deep low pressure system lifting north into south central Canada brought strong winds to much of the Northern Plains from Monday night of the 24th through Tuesday afternoon of the 25th. Sustained winds measuring over 45 mph with gusts in excess of 60 mph resulted in numerous reports of tree damage, a few reports of power lines blown down, and scattered reports of damage to property. Event Narrative Sustained winds of 40 to 45 mph with peak gusts to around 60 mph were common across Pierce County during the late morning and afternoon.
Event High Wind Magnitude 35 kts. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 01/31/2009 11:00:00 CST-6
End Date 01/31/2009 17:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title A High Wind Event on January 31 ends the month
Episode Narrative Low pressure moved through Saskatchewan and Manitoba, Canada, on January 30 and 31. The cold front associated with the low moved into northwest North Dakota Saturday morning, January 31, with high winds. It moved through the central part of the state that afternoon. Winds were sustained over 40 mph across the north and central. The highest wind gust was measured at 60 mph in Ward County. Event Narrative This report was from the North Dakota Department of Transportation observation site near Rugby.

Event High Wind Magnitude 35 kts. State NORTH DAKOTA County/Area Pierce WFO BIS
Begin Date 07/12/2008 13:00:00 CST-6
End Date 07/12/2008 16:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title July 12 High Wind Event over most of West and Central North Dakota
Episode Narrative A strong low pressure system over Lake Winnipeg brought high winds to most of west and central North Dakota during the afternoon hours of Saturday, July 12th. Sustained winds of around 40 mph were common across the warned area.

Event High Wind Magnitude 35 kts. State NORTH DAKOTA County/Area Pierce WFO BIS
Begin Date 03/24/2008 17:15:00 CST-6
End Date 03/24/2008 18:15:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title March 24 High Wind Event over all of West and Central North Dakota
Episode Narrative A strong low pressure system and its associated cold front moved across west and central North Dakota during the afternoon and evening hours of Monday, March 24th. Mesonet data showed the highest wind gusts in excess of 65 mph across Mountrail, Mclean, and Morton Counties. Sustained winds greater than 40 mph were common over the entire warned area throughout the afternoon and early evening.

Event High Wind Magnitude 36 kts. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 11/13/2007 15:00:00 CST-6
End Date 11/13/2007 16:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title November 13 High Wind Event West and North Central North Dakota
Episode Narrative A strong low pressure system and jet stream moving across the region created a tight pressure gradient over western and central North Dakota. This resulted in high winds during the morning and afternoon hours of Tuesday, November 13th. Mesonet data showed the highest wind gusts in excess of 65 mph across parts of Mclean County. Sustained winds greater than 40 mph were common over the entire warned area throughout the day. Event Narrative North Dakota DOT site at Rugby observation

Event High Wind Magnitude 63 kts. State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 06/26/2007 02:00:00 CST-6
End Date 06/26/2007 02:30:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 5.00K Crop Damage 0.00K
Episode Title June 26 High Wind along a Thunderstorm Outflow Boundary in Northcentral North Dakota
Episode Narrative In the early morning hours of June 26, severe thunderstorms rolled along the Canadian Border. An outflow boundary extended well south of the convection, into McLean and then Pierce counties. The high wind occurred away from convection, with no thunderstorm in progress at the time.
Event Narrative KZZJ radio in Rugby had high wind peaking at 72 mph at 310 AM CDT and again at 312 AM CDT. The high wind occurred along an outflow boundary that extended into Pierce County from convection along the Canadian border. No thunderstorm was reported with the high wind.

Event High Wind State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date: 31 Aug 2005, 12:15:00 PM CST
Begin Location: Not Known, End Date: 31 Aug 2005, 02:45:00 PM CST, End Location: Not Known, Magnitude: 59, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Bottineau, Burke, Mchenry, Mclean, Mountrail, Pierce, Renville, Rolette, Sheridan, Ward, Wells
Description: Trees and tree branches were broken. Some trees fell onto electric power lines in Bottineau and McHenry counties and power was out for a time. Minor roof damage to homes in Rolette County. Highest sustained wind speed was at the Minot Air Force Base with 40 mph. Highest gust was 68 mph at Rugby. Both speeds were measured.

Event High Wind State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date: 09 Mar 2005, 10:00:00 PM CST
Begin Location: Not Known, End Date: 10 Mar 2005, 11:00:00 AM CST, End Location: Not Known, Magnitude: 64, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Billings, Bottineau, Burke, Burleigh, Dickey, Dunn, Emmons, Foster, Grant, Hettinger, Kidder, La Moure, Logan, Mchenry, Mcintosh, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Stutsman, Ward, Wells
Description: A strong cold front moved rapidly through the northern plains resulting in strong winds over western and central North Dakota. Sustained speeds were generally 30 to 40 mph. The highest gusts were 68 mph at Selfridge and 73 mph just south of New Salem. Snow showers accompanied the winds causing reduced visibilities in some locales in the eastern part of central North Dakota.

Wind Pierce County
12/11/2004
Pierce County
Fatalities 0 Injuries .02 Property Damage 833.33 Crop Damage 0
(Source: Sheldus)

Event **High Wind** State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date: 11 Dec 2004, 02:57:00 PM CST
Begin Location: Not Known, End Date: 12 Dec 2004, 12:00:00 PM CST, End Location: Not Known,

Magnitude: 66, Fatalities: 0, Injuries: 1, Property Damage: $ 30.0K, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Dickey, Divide, Dunn, Emmons, Foster, Golden Valley, Grant, Hettinger, Kidder, La Moure, Logan, Mchenry, Mcintosh, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Stutsman, Ward, Wells, Williams
Description: A strong cold front brought high winds to western and central North Dakota causing one minor injury and minor damage across the region. The frontal system also brought scattered snow showers with areas of blowing snow reducing visibilities in several locations. No travel was advised in the southwest due to the high winds. Sustain winds of 40 to 50 mph existed over the region with gust of 50 to 65 mph. The highest gust reported was 76 mph 5 miles east of Richardton in Stark County. Damage was confined to a new construction being built at the Fort Berthold Community College in Mountrail County. A male carrying his luggage from the Bismarck Airport to his vehicle was blown over by the high winds causing minor injuries to his leg.

Event High Wind State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date: 10 Mar 2004, 11:00:00 AM CST
Begin Location: Not Known, End Date: 10 Mar 2004, 09:00:00 PM CST, End Location: Not Known, Magnitude: 54, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Dickey, Divide, Dunn, Emmons, Foster, Golden Valley, Grant, Hettinger, Kidder, La Moure, Logan, Mchenry, Mcintosh, Mckenzie, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Stutsman, Ward, Wells, Williams
Description: A fast moving cold front brought strong to high winds to western and central North Dakota in the late morning hours and continued through the early evening hours. Sustained winds of 40 mph with gust to 60 mph were common over western and central North Dakota. The winds subsided late in the evening of the 10th.

Event High Wind State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date: 29 Nov 2002, 08:00:00 AM CST
Begin Location: Not Known, End Date: 29 Nov 2002, 07:15:00 PM CST, End Location: Not Known, Magnitude: 61, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Dickey, Divide, Dunn, Emmons, Foster, Golden Valley, Grant, Hettinger, Kidder, La Moure, Logan, Mchenry, Mcintosh, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Stutsman, Ward, Wells, Williams Description: After record high temperatures on Thanksgiving day a strong Canadian cold front moved rapidly south through the state producing strong northwest winds of 40 to 70 mph over western and central North Dakota. The winds diminished during the evening hours. The cold front brought much colder air and a few snow showers to the region Friday night and Saturday.

Event: High Wind, State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date: 01 Nov 2001, 04:00:00 AM CST
Begin Location: Not Known, End Date: 01 Nov 2001, 06:00:00 PM CST, End Location: Not Known, Magnitude: 50, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Billings, Burke, Burleigh, Dickey, Divide, Dunn, Emmons, Foster, Grant, Hettinger, Kidder, La Moure, Logan, Mchenry, Mcintosh, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Sheridan, Sioux, Stark, Stutsman, Ward, Wells, Williams
Description: A strong low pressure system skirting across southern Saskatchewan and Manitoba Canada swept a fast moving cold front through western and central North Dakota producing strong westerly winds of 30 to 45 mph. Occasional gust over 55 mph were observed. The winds tapered off late in the afternoon and early evening.

Event High Wind State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date: 05 Apr 2000, 07:00:00 AM CST
Begin Location: Not Known, End Date: 05 Apr 2000, 08:00:00 PM CST, End Location: Not Known,

Magnitude: 62, Fatalities: 0, Injuries: 10, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Dickey, Divide, Dunn, Emmons, Foster, Golden Valley, Grant, Hettinger, Kidder, La Moure, Logan, Mchenry, Mcintosh, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Stutsman, Ward, Wells, Williams Description:
A low pressure system over Alberta Canada moved southeast and intensified along the Canadian/North Dakota border. A very tight pressure gradient resulted in very high winds causing injuries and property damages throughout western and central North Dakota. Wind gust of 55 to 70 mph were common. The injuries were mainly in Burleigh County in the city of Bismarck where 9 persons were taken to area hospitals injured from flying debris. One (1) person suffered broken wrist from falling. Damage was widespread. Homes...automobiles...trees...power lines...business and widespread power outages suffered during the wind storm. Several grass fires erupted across the region.

Throughout this Risk Assessment Chapter in the hazard history portion are summary information from SHELDUS of incidents from 01/01/1960 through 12/31/2010 that were used by the committee in its analysis.

Summary Tally Sheets:

Sheldus Totals 01/01/1960 through 12/31/2010 No Inflation **Severe Storm Only**

Begin Date	End Date	Hazard/Type/Combo	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
7/1/1994	7/31/1994	Severe Storm/Thunder Storm	0	0	2083333.33	208333.33	HEAVY RAINS
7/1/1993	7/31/1993	Severe Storm/Thunder Storm	0	0	943396.23	943396.23	Heavy Rain
8/21/1973	8/21/1973	Severe Storm/Thunder Storm	0	0	5000	50000	THUNDERSTORMS
8/14/2009	8/14/2009	Severe Storm/Thunder Storm - Wind	0	0	15000	0	Thunderstorm Wind (61EG)
8/13/2007	8/13/2007	Severe Storm/Thunder Storm - Wind	0	0	45000	500000	Thunderstorm Wind (65EG)
7/12/2006	7/12/2006	Severe Storm/Thunder Storm - Wind	0	0	75000	0	Thunderstorm Wind (G78)
8/2/2005	8/2/2005	Severe Storm/Thunder Storm - Wind	0	0	15000	0	Thunderstorm Wind
6/19/2005	6/19/2005	Severe Storm/Thunder Storm - Wind	0	0	1800000	0	Thunderstorm Wind
5/9/1992	5/9/1992	Severe Storm/Thunder Storm - Wind	0	0	50000	0	Thunderstorm Winds
7/8/1989	7/8/1989	Severe Storm/Thunder Storm - Wind	0	0	500000	500000	TSTM WIND
8/14/1988	8/14/1988	Severe Storm/Thunder Storm - Wind	0	0	50000	0	Severe Storm-Wind

6/26/1986	6/26/1986	Severe Storm/Thunder Storm - Wind	0	0	500000	500000	Thunderstorm Wind
8/23/1983	8/23/1983	Severe Storm/Thunder Storm - Wind	0	0	500	0	Thunderstorm Winds
9/18/1975	9/19/1975	Severe Storm/Thunder Storm - Wind	0	0	1136.36	0	WIND, RAIN
7/22/1965	7/22/1965	Severe Storm/Thunder Storm - Wind	0	0	50000	500	High wind, heavy rain 2 in. 30 min.
5/11/1983	5/11/1983	Severe Storm/Thunder Storm - Winter Weather	0	0	2380.95	0	Severe Storm-Snow
3/4/1983	3/4/1983	Severe Storm/Thunder Storm - Winter Weather	0	0	94339.62	0	Severe Storm-Snow
4/25/1966	4/28/1966	Severe Storm/Thunder Storm - Winter Weather	0	0	943.4	0	RAIN, FREEZING RAIN AND HEAVY SNOW
			0	0	$6,231,029.89	$2,702,229.56	

Sheldus Totals 01/01/1960 through 12/31/2010 **Hail Only** No Inflation

Begin Date	End Date	Hazard/Type/Combo	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
5/17/1998	5/17/1998	Hail	0	0	5000	0	HAIL
7/14/1992	7/14/1992	Hail	0	0	50000	50000	Hail
7/6/1977	7/6/1977	Hail	0	0	50000	0	Hail
7/24/1971	7/24/1971	Hail	0	0	0	185.19	Hail
7/19/1968	7/20/1968	Hail	0	0	0	2777.78	Hail
6/13/1964	6/13/1964	Hail	0	0	0	250	Hailstorm
9/8/1961	9/8/1961	Hail	0	0	5000	0	Hailstorm
8/14/1988	8/14/1988	Hail - Severe Storm/Thunder Storm	0	0	500000	500000	Severe Storm-Hail
7/6/1971	7/6/1971	Hail - Severe Storm/Thunder Storm - Tornado - Wind	0.17	0	21739.13	21739.13	Hail, wind, rain, and tornadoes
7/8/1989	7/8/1989	Hail - Severe Storm/Thunder Storm - Wind	0	0	500000	500000	TSTM WIND,HAIL
7/17/1978	7/17/1978	Hail - Severe Storm/Thunder Storm - Wind	0	0	50000	0	Hail, Wind, Heavy Rain
6/26/1972	6/26/1972	Hail - Severe Storm/Thunder Storm - Wind	0	0	31.25	312.5	Wind, hail, rain
8/3/1979	8/3/1979	Hail - Tornado	0	0	5000	50000	Tornado, Hailstorm
8/5/1969	8/6/1969	Hail - Tornado - Wind	0	0	94.34	943.4	Tornadoes, hailstorms, funnel clouds, windstorms
7/7/1968	7/7/1968	Hail - Tornado - Wind	0	0	4166.67	4166.67	Tornado, hail, wind
6/11/1976	6/11/1976	Hail - Wind	0	0	5000	0	Windstorm, hail
6/15/1973	6/15/1973	Hail - Wind	0	0	12500	125	HAIL, WINDS
			0.17	0	$1,208,531.39	$1,130,499.67	

Sheldus Totals 01/01/1960 through 12/31/2010 **Lightning Only**

Begin Date	End Date	Hazard/Type/ Combo	Injuries	Fatalities	Property Damage	Crop Damage
7/24/1997	7/24/1997	Lightning	0	0	12000	0
5/26/1983	5/26/1983	Lightning	0	0	5000	0
7/5/1982	7/5/1982	Lightning	0	0	5000	0
					$22,000.00	$0.00

Sheldus Totals 01/01/1960 through 12/31/2010 **Tornado** No Inflation

Begin Date	End Date	Hazard/Type/Combo	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
8/3/1979	8/3/1979	Hail - Tornado	0	0	5000	50000	Tornado, Hailstorm
8/5/1969	8/6/1969	Hail - Tornado - Wind	0	0	94.34	943.4	Tornadoes, hailstorms, funnel clouds, windstorms
7/7/1968	7/7/1968	Hail - Tornado - Wind	0	0	4166.67	4166.67	Tornado, hail, wind
6/19/2005	6/19/2005	Tornado	0	0	250000	0	Tornado (F1)
5/25/1978	5/25/1978	Tornado	0	0	500	0	Tornado
6/25/1977	6/25/1977	Tornado	0	0	500	0	Tornado
8/21/1973	8/21/1973	Tornado	0	0	50000	0	Rugby
7/1/1973	7/1/1973	Tornado	0	0	50000	0	Rugby
					$360,261.01	$55,110.07	

Sheldus Totals 01/01/1960 thruogh 12/31/2010 No Inflation

Begin Date	End Date	Hazard/Type/Combo	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
7/6/1971	7/6/1971	Hail - Severe Storm/Thunder Storm - Tornado - Wind	0.17	0	21739.13	21739.13	Hail, wind, rain, and tornadoes
7/8/1989	7/8/1989	Hail - Severe Storm/Thunder Storm - Wind	0	0	500000	500000	TSTM WIND,HAIL
7/17/1978	7/17/1978	Hail - Severe Storm/Thunder Storm - Wind	0	0	50000	0	Hail, Wind, Heav Rain
6/26/1972	6/26/1972	Hail - Severe Storm/Thunder Storm - Wind	0	0	31.25	312.5	Wind, hail, rain
8/3/1979	8/3/1979	Hail - Tornado	0	0	5000	50000	Tornado, Hailstorm
8/5/1969	8/6/1969	Hail - Tornado - Wind	0	0	94.34	943.4	Tornadoes, hailstorms, funnel clouds, windstorms
7/7/1968	7/7/1968	Hail - Tornado - Wind	0	0	4166.67	4166.67	Tornado, hail, wind
6/11/1976	6/11/1976	Hail - Wind	0	0	5000	0	Windstorm, hail
6/15/1973	6/15/1973	Hail - Wind	0	0	12500	125	HAIL, WINDS
8/14/2009	8/14/2009	Severe Storm/Thunder Storm - Wind	0	0	15000	0	Thunderstorm Wind (61EG)
8/13/2007	8/13/2007	Severe Storm/Thunder Storm - Wind	0	0	45000	500000	Thunderstorm Wind (65EG)
7/12/2006	7/12/2006	Severe Storm/Thunder Storm - Wind	0	0	75000	0	Thunderstorm Wind (G78)
8/2/2005	8/2/2005	Severe Storm/Thunder Storm - Wind	0	0	15000	0	Thunderstorm Wind
6/19/2005	6/19/2005	Severe Storm/Thunder Storm - Wind	0	0	1800000	0	Thunderstorm Wind
5/9/1992	5/9/1992	Severe Storm/Thunder Storm - Wind	0	0	50000	0	Thunderstorm Winds
7/8/1989	7/8/1989	Severe Storm/Thunder Storm - Wind	0	0	500000	500000	TSTM WIND
8/14/1988	8/14/1988	Severe Storm/Thunder Storm - Wind	0	0	50000	0	Severe Storm-Wind
6/26/1986	6/26/1986	Severe Storm/Thunder Storm - Wind	0	0	500000	500000	Thunderstorm Wind
8/23/1983	8/23/1983	Severe Storm/Thunder Storm - Wind	0	0	500	0	Thunderstorm Winds

9/18/1975	9/19/1975	Severe Storm/Thunder Storm - Wind	0	0	1136.36	0	WIND, RAIN
7/22/1965	7/22/1965	Severe Storm/Thunder Storm - Wind	0	0	50000	500	High wind, heavy rain 2 in. 30 min.
6/19/2005	6/19/2005	Tornado	0	0	250000	0	Tornado (F1)
5/25/1978	5/25/1978	Tornado	0	0	500	0	Tornado
6/25/1977	6/25/1977	Tornado	0	0	500	0	Tornado
8/21/1973	8/21/1973	Tornado	0	0	50000	0	Rugby
7/1/1973	7/1/1973	Tornado	0	0	50000	0	Rugby
5/25/2010	5/25/2010	Wind	0	0	30000	0	
1/31/2009	1/31/2009	Wind	0	0	2727.27	0	High wind
6/26/2007	6/26/2007	Wind	0	0	5000	0	High Wind
12/11/2004	12/12/2004	Wind	0.02	0	833.33	0	High Wind
10/31/1999	10/31/1999	Wind	0	0	108333.33	204166.67	HIGH WIND
11/16/1993	11/16/1993	Wind	0	0	4545.45	0	High Winds
1/10/1990	1/11/1990	Wind	0	0.02	943.4	0	High Wind
9/24/1986	9/25/1986	Wind	0	0	12195.12	12195.12	High Wind
3/12/1982	3/13/1982	Wind	0	0	94.34	0	High Winds
7/23/1980	7/23/1980	Wind	0	0	500	0	Wind
3/12/1979	3/13/1979	Wind	0	0	0.94	0	Windstorm
11/4/1978	11/4/1978	Wind	0	0	94.34	0	Windstorm
5/18/1977	5/18/1977	Wind	0	0	500	0	Windstorm
2/20/1965	2/20/1965	Wind	0	0	943.4	0	High Winds
8/22/1962	8/22/1962	Wind	0	0	5000	0	Windstorm
9/8/1960	9/8/1960	Wind	0	0	357.14	0	High Winds
11/18/1977	11/20/1977	Wind - Winter Weather	0	0.04	943.4	0	Blizzard, Wind, Snow
			0.19	0.06	$4,224,179.21	$2,294,148.49	

Transportation Accidents

	Pierce County	Rugby	Wolford	Balta
Frequency	Highly Likely Nearly 10% probability in the next year	Highly Likely Nearly 10% probability in the next year	Highly Likely Nearly 10% probability in the next year	Highly Likely Nearly 10% probability in the next year
Severity	Negligible Less than 10% of jurisdiction affected	Negligible Less than 10% of jurisdiction affected	Negligible Less than 10% of jurisdiction affected	Negligible Less than 10% of jurisdiction affected
Risk Class	C	C	C	C
Seasonal Pattern	None			
Duration	Hours to 2 weeks			
Speed of Onset	No warning			

Definition: A transportation accident, for the purpose of planning, is any large-scale vehicular, railroad, or aircraft accident involving mass casualties. Mass casualties can be defined as an incident resulting in a large number of deaths and/or injuries that reaches a magnitude that overtaxes the ability of local resources to adequately respond. In most disasters, death and injury represent one of the effects of the hazard, while in transportation accidents, mass casualties are often the primary impact and focus of the event.

Threat: Transportation accidents occur with little or no warning. Passenger and cargo trains, bus and other highway vehicles, and passenger and cargo airplanes pose the highest risk. Due to the sparse population in Pierce County, even an incident involving a small number of deaths and/or injuries could overwhelm local resources.

Railroad: The Burlington Northern Santa FE Railroad has tracks throughout the county for freight purposes. Amtrak has rails through the county for passenger travel

Bus: School bus transportation would be the most likely event. No commercial service.

Airlines: There is a general aviation airport located in Rugby. The Rugby Municipal Airport is located on 280 acres on land and is public owned. Aerial spraying companies utilize the Rugby Municipal Airport.

Schneider Aerial Spraying is one of the crop spraying services that utilizes the Rugby Municipal Airport in Pierce County. Source: Pierce County Tribune

Source: North Dakota Department of Transportation, Draft TransAction III, North Dakota's Statewide Strategic Transportation Plan 2012.

As identified in the North Dakota Department of Transportation, Draft *TransAction III, North Dakota's Statewide Strategic Transportation Plan 2012,* Pierce County has two Highways classified as Interregional Highways: all of U.S. Highway 2 that crosses the county from east to west, and N.D. Highway 3 from Rugby to the Canadian border. ND Highway 3 south of Rugby is classified as a State Corridor. (See the graphic above.) During meetings it was noted that N.D. Highway 3 south of Rugby has increasing traffic flow as the Canadian-U.S. traffic avoids other north south routes across western North Dakota because of the excess traffic from oil development. One of the North Dakota's three Land Ports of Entry that operate 24/7/365 and offer veterinary and Animal Plant Health Inspection Services is north of the city of Rugby on N.D. Highway 3 at Dunseith. As identified in the ND DOT plan, Initiative 1, the prioritization of transportation and service is important to Pierce County because of its location as a path of a great deal of highway and rail traffic across the county. The cities of Rugby and Balta's mitigation strategies related to diverting oversized loads and hazardous materials around the city fit into under the ND DOT Initiative 3, Strategy 9 regarding freight mobility.

History: Transportation Incidents occur with little or no warning. They involve a large number of people and require special types of equipment and emergency medical personnel. Such accidents not only affect people with significant numbers of deaths/injuries but also cause traffic problems, property damage, or even an explosion. The probability is increased during winter storms, periods of poor visibility from snow, smoke, or dust, during holiday festivities with more instances of drinking and driving, and during times of increased traffic volume.

Pierce County was given a moderate hazard rating in the State of North Dakota Multi-Hazard Mitigation Plan. The moderate rating was given based on the railroad infrastructure and U.S. highways running throughout the county.

Pierce County Accident Reports 2005-August 2012

	2005	2006	2007	2008	2009	2010	2011	2012-August
Fatals	2	0	2	1	3	2	0	2
Injury	14	11	11	22	7	22	14	4
Deer	52	60	52	50	56	42	47	14
Total	107	95	93	112	115	110	104	39

Source: Pierce County Emergency Manager

Identified Risks:

- Blocked Roads
- Building Collapse
- Business May Be Interrupted
- Airport Services may be interrupted
- Delayed Emergency Response
- Downed Power Lines
- Localized Evacuation
- Increased Explosion Potential
- Increased Number of Fire, Police, and Ambulance Runs
- Hazardous Materials Release
- Property Damage
- Loss of Power
- Mass Casualties
- School Closure

Urban Fire and Structure Collapse

	Pierce County	Rugby	Wolford	Balta
Frequency	(Rural area) Likely 10 to 100% probability in the next year, or at least 1 chance in next 10 years	Highly Likely Nearly 100% probability in the next year	Likely 10 to 100% probability in the next year, or at least 1 chance in next 10 years	Likely 10 to 100% probability in the next year, or at least 1 chance in next 10 years
Severity	Negligible Less than 10% of jurisdiction affected	Negligible Less than 10% of jurisdiction affected	Negligible Less than 10% of jurisdiction affected	Negligible Less than 10% of jurisdiction affected
Risk Class	C	C	C	C
Seasonal Pattern	Fall/Winter			
Duration	October to April			
Speed of Onset	No Warning			

Definition: The urban fire department is one of the oldest continuing institutions in America. Their profession and skill is to get to a fire as soon as possible, get all human life to safety, and to suppress the fire as quickly as possible.

Factors that influence the potential for urban fires include electrical devices, incendiary-arson, smoking materials, heating devices, fuel systems, sparks, spills, spontaneous combustion and the levels of human activity in urban areas.

Threat:

Among the rational motives for arson are profit, (accomplished through insurance fraud), revenge, labor trouble, racial or religious strife, and concealment of another crime such as murder, burglary, or vandalism. Burning for profit is probably the most common arson motive. When trouble comes, especially serious financial trouble, normal law-abiding citizens may see arson as a way to collect money, and an easy way out of a problem. Arsonists are very seldom convicted. With little threat of being caught hanging over the perpetrator's head, arson continues unabated.

The increasing costs of natural gas and fuel oil have caused families to rediscover alternate heating methods to heat their homes. As a result, the use of space heaters, fireplaces, and wood and pellet burning stoves has created a new fire hazard.

Many portable LP (propane) gas or kerosene heaters with self-contained fuel supplies are hazardous appliances, even when used according to the manufacturer's instructions. They are potential fire hazard because of their open flame. Leakage of fuel from their containers could cause an explosion. The fuel vapor is also a source of indoor pollution.

Most of us have very limited experience with wood burners. As a result, a number of fires are caused by faulty installation of stoves and chimneys. Wood heat has a poor safety record, and requires extra attention to work. The misuse of wood burning stoves has increased at an alarming rate.

The hazardous materials situation in this county is a steadily growing phenomenon. Chemical plant fires may pose an unreasonable risk to the safety and health, the environment, and the property of citizens. The term "hazardous materials" covers a wide array of products, from relatively innocuous ones such as hairspray in aerosol dispensers and wash preservatives to extremely hazardous materials. It is often difficult for officials to gather information on the size of the structure, the types of products sold and number of employees during working hours, whether there are explosives, and what level of inventory the business may have.

Added to this is the fact that most home fires are caused by cooking something that we do each day along with candle burning this can have catastrophic results.

The south side of Don's Drive In, Rugby, was destroyed by fire on Saturday, June 25, 2011. With fire, smoke and water damage, the business, which has served Rugby for the past 22 years, is a total loss. Source: Pierce County Tribune

Background: Urban fire mitigation is a concern to emergency management officials because it can be a killer of people, while it destroys property and critical resources needed for both the residents of both the urban and rural areas.

Because of limited resources within the county, it is necessary for several agencies representing local, state, and federal governments to share responsibility for both fire mitigation measures and fire response operations.

History:

National Fire Incident Reporting Program for the State of North Dakota

Department	Chief	Fire Incidents Reported	Other Incidents Reported
Rugby Fire Department PO Box 202 Rugby, ND 58368	Jerry Kurtyka	2003-2010 52 2011 none 2012 1	49

Identified Risks:

- Blocked Roads
- Building Collapse
- Business Interruption
- Delayed Emergency Response
- Downed Power Lines and Trees
- Localized Evacuation
- Explosion
- Release of Hazardous Materials
- Increased Fire Potential
- Increased Public Safety Runs
- Loss of Portable Water
- Loss of Medical Facilities to a Major Fire Event
- Loss of Power
- Mass Casualties
- Property Damage
- Sewer Backup
- Loss of Economy

Rural Fire and Wildland Fire

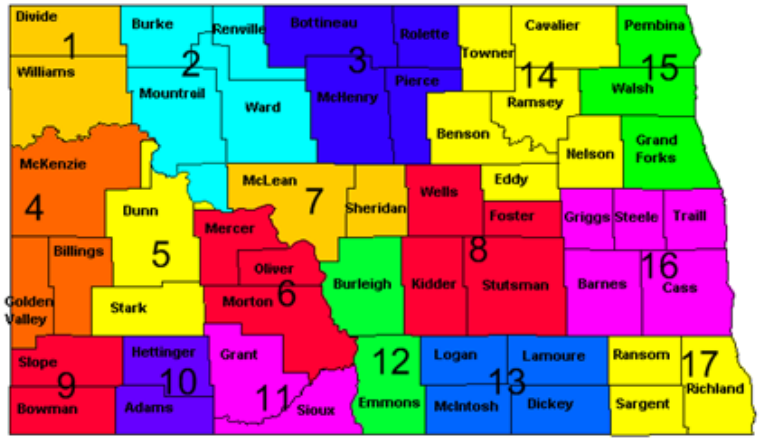
	Pierce County	Rugby	Wolford	Balta
Frequency	Highly Likely Nearly 100% probability in the next year	Highly Likely Nearly 100% probability in the next year	Highly Likely Nearly 100% probability in the next year	Highly Likely Nearly 100% probability in the next year
Severity	Negligible Less than 10% of jurisdiction affected	Negligible Less than 10% of jurisdiction affected	Negligible Less than 10% of jurisdiction affected	Negligible Less than 10% of jurisdiction affected
Risk Class	C	C	C	C
Seasonal Pattern	Spring to Fall			
Duration	April to November			
Speed of Onset	No warning			

Definition: Wildland/urban interface is defined as the zone where structures and other human development meet or intermingle with undeveloped wild land or vegetative fuel. In North Dakota, the wildland/urban interface typically is where the edge of local communities adjoins agricultural fields, many of which are enrolled in the Conservation Reserve Program.

A wildfire is an unplanned fire, a term which includes grass fires, forest fires, and scrub fires may it be human caused or natural in origin. Severe wildfire conditions have historically represented a threat of potential destruction in North Dakota. Negative impacts of wildfire include loss of life, property and resource damage or destruction, severe emotional crisis, widespread economic impact, disruption and fiscally impacted government services, and environmental degradation.

The U.S. Forest Service data indicates 25.7 percent of reported wildfires were cause by arson. Other ignition sources were debris burns (24 percent), lightning (13.3 Percent), and other (16.7 percent). Lightning can present difficult problems when dry thunderstorms move across an area suffering from seasonal drought. In North Dakota, the railroads are a common ignition source.

Multiple fires can be started simultaneously, as is often the case in North Dakota according to the U.S. Forestry Service. In dry fuel areas, these fires can cause massive damage before containment. Dry grass, associated with farmland in the Conservation Reserve Program, is primary fuel for North Dakota wildfires. The rate of speed of a fire varies directly with wind speed. The generally windy conditions typical to the region as noted in the chart below, causes wildfires to spread rapidly. Wooden structures preserved for historic purposes are particularly at risk from wildfire.



North Dakota Fire Danger Index County Groups

Source: Bismarck National Weather Service

This product is issued by the Bismarck NWS office (upon collaboration with forecasters at NWS Grand Forks). The product covers all of North Dakota, which is broken up into 17 separate fire danger groups. It is issued daily around 5:00 a.m. Central time during the fire weather season. It is a forecast of the potential for non-agricultural grasslands to carry fire. It is based on the temperature, humidity, wind, sky cover and the estimated "greenness" of the fuel. The highest threat period for grassland fire danger is usually before the spring green-up and again in the fall. This product is intended for public use as well as for state and local authorities. The product will be updated if conditions vary significantly from those forecasted. Source: National Weather Service Office in Bismarck, N.D.

Pierce County experiences many rural fires every year. Factors that influence the potential for rural fires include: type, amounts and conditions of fuel supply (vegetation), temperatures, wind conditions, precipitation patterns, humidity levels, topography and the level of human activity on the land.

Fires in areas of heavy vegetation, if not quickly detected and suppressed, can quickly flare out of control and cause major damage to habitat, crops, livestock, wildlife, people, and structural property.

The Leeds Rural Fire Protection District has a volunteer roster of 30 active firemen and covers an area of over 400 square miles. The department currently has 5 trucks, highlighted by a brand new pumper truck that was purchased in 2007. Two tanker trucks that are each less than 15 years old give the firemen a water carrying capacity of about 7000 gallons. The department also has two four wheel drive grass fire trucks that have sidewinder units attached. The firemen have training drills the first Tuesday of each month and respond to an average of 50 calls per year. Source: www.leeds.northdakota.com

Threat: In contrast to grassland fires, fires in the timber areas burn hotter but spread slower, rural fires can occur at any time of the year; although they seldom occur during winter months. There are two basic fire seasons. Generally, conditions are monitored very closely from April 1 thru June 15. During this

spring period of potential fire, unseasonable hot, dry, windy conditions are experienced and occasionally increase fire danger for short periods of time. The main fire season normally begins about July 15, when summer warms significantly and precipitation is usually limited to that resulting from thunderstorm activity. This long and more dangerous season extends until about October 30 or to the first significant snow cover.

Most rural fires result from acts of human carelessness during activities such as: controlled burns of sloughs, ditches, and fields by landowners; recreational activity such as camping, hunting, and other off-vehicle travel; and use of fireworks preceding and immediately following the 4th of July.

Numerous fires are reported annually which result from the use of farm machinery in fields and pastures. For example, any time after swathing until stubble is worked or snow cover exists, machinery or other vehicles and equipment can create a dangerous fire potential.

Fire along railroad right-of-ways are common occurrences during extremely dry conditions. Other industrial fires have been reported near oil wells and mining operations.

Finally, some fires are caused annually by lightning or thunderstorms.

Background: Rural fire is of concern to emergency officials because it can be a killer of people, livestock, and wildlife while it destroys habitat and agricultural crops. It can destroy personal and real property, valuable timber and shelterbelts, forage, watersheds, and can degrade scenic and recreational areas. Soil erosion, silting of streams and reservoirs, contamination of wells, flooding and damage to utilities can also follow extensive rural fires.

Because of limited resources within rural areas, it is necessary for several agencies representing local, state, and federal governments to share responsibilities for both fire mitigation measures and fire response operations.

While continuing to use the land intensely for agricultural purposes, the population has increased recreational use of land. More land usage creates added need for strong mitigation activities to ensure minimal property loss and threat to both wildlife and human population.

History: Pierce County experiences rural fires every year. The majority of the fires are started from farm equipment from sparks from failing bearings, overheated engines and equipment. Other causes are controlled burns of sloughs and harvested cropland that get out of control. Lightning along with dry conditions and wind cause fire to start and spread quickly.

The Rugby Volunteer Fire Department has been serving the Rugby area for nearly 110 years and currently consists of 32 volunteer firemen. Source: www.cityofrugbynd.com

Fire Departments/Districts are required to report all fire incidents to the ND State Fire Marshall at the National Fire Incident Reporting website: www.ag.nd.gov. Only the reporting of fires is mandated in ND Century Code, 18-01-06, however there is no penalty for not reporting. The more incidents a fire department/district reports the more activity is documented. This documentation provides proof that

requests for grant assistance would assists a department that is providing a needed service. Some examples of other items that could be reported: responses to false alarms, assistance with traffic accidents, traffic control, responding to a fire outside a jurisdiction. The chart below show incidents reported to the National Fire Reporting Program for the departments/districts that respond to Pierce County.

National Fire Incident Reporting Program for the State of North Dakota

Department	Chief	Fire Incidents Reported	Other Incidents Reported
Leeds Fire Prot Dist PO Box 67 Leeds, ND 58346	Paul Peterson	2005 and 2007 10	0
Rugby Fire Department PO Box 202 Rugby, ND 58368	Jerry Kurtyka	2003-2010 52 2011 none 2012 1	49
Rugby Fire Prot Dist PO Box 202 Rugby, ND 58368	Jerry Kurtyka	2003-2010 149	49
Willow City Fire Prot Dist PO Box 195 Willow City, ND 58384	Bill Prellwitz	No Incidents Reported 0	0
Wolford Fire Prot Dist PO Box 55 Wolford, ND 58385	James Wolf	2006-2011 16	3
Anamoose Rural Fire Prot Dist PO Box 28 Anamoose, ND 58710	Brent Weninger	2001-2010 53 2011 1	62
Esmond Rural Fire Prot Dist PO Box 115 Esmond, ND 58332	Ronald Lauinger	2002-currrent 73	13
Harvey Rural Fire Prot Dist 1011 Allen Ave #102 Harvey, ND 58341	Ralph Muscha	2001-current 246	52

Source: June 7, 2012, phone call and e-mail with Linda Hippen, National Fire Incident Reporting Program Manager for the State of North Dakota, State Fire Marshal's Office.

Although the National Fire Reporting program gives general numbers of incidents reported, the statistics do not give much detail about the types or causes of fires or call that fire departments providing protection in the county are responding to. The committee wanted more specific information in order to develop mitigation strategies that would address the actual incidents that occurred in the county. Each fire district, Leeds, Rugby, Willow City, Wolford, Anamoose, Esmond, Harvey, were sent a form and asked to

provide incidents their department responded to from 2003 to present including cause of incident, impact, and type of fire. The data from the fire departments that responded to the committee's request are listed below.

Incidents Wolford Fire Prot District Responded to in Pierce County 2003-2012

Incident Date	Incident Type	Cause of Incident	Impact	Type of Fire
2/14/2004	Fire	Farm Equipment Electrical	Fire damage to farm equipment	Farm Equipment
4/12/2004	Fire	Burning Trash	3 Acres Burned	Grass Fire
7/6/2006	Fire	Garage Fire/Electrical	Damage Property : $3,000 Contents: $2,000	Structure
7/23/2006	Fire	Farm Equipment	10 Acres Burned	Grass Fire
10/30/2006	Fire	Electrical	Unknown	House Structure
8/7/2007	Fire	Equipment	Equipment: $20,000 5 Acres Burned	Grass
8/20/2007	Fire	Lightning	2 Acres	Hay Bale Fire
8/18/2007	Fire	Farm Equipment, Hot Bearing	Farm Equipment: Baler $10,000	Farm Equipment
9/7/2007	Fire	Sparks From Truck	Damage: Bales $5,000	Farm Equipment
10/30/2007	Fire	Sparks From Slough Being Burned	8 Acres	Grass Fire
04/14/2008	Fire	Burning Dead Trees and Fire Spread	50 Acres	Grass Fire
05/02/2008	Fire	Farm Equipment	6 Acres	Grass
09/17/2008	Fire	Bad Wiring	Loss of Vehicle	Farm Equipment
5/30/2009	Fire	Wet Bales	Unknown	Bale Pile Fire
5/04/2009	Fire	Burning Trash	2 Old Vehicles	Trash/Grass Fire
5/30/2009	Fire	Electrical Farm Equipment	Loss of Tractor: $59,000	Farm Equipment
10/04/2010	Fire	Trash Burning	5 Acres and Loss of Barn	Structure
7/21/2011	Fire	Electrical	Fire Wall Wiring	Vehicle
10/24/2011	Fire	Hot Oil From Hydraulic Line	Loss of Tractor and Baler: $35,000	Farm Equipment

11/02/2011	Fire	Electrical	Loss of tractor: $58,000	Farm Equipment
11/25/2011	Fire	Exploded Battery	Damage Engine Compartment	Vehicle
7/01/2012	Fire	Fireworks	2 Acres	Grass Fire

Source: Wolford Fire Prot District

Willow City Fire Protection District reported that they mainly responded to grass fires from farm equipment from 2003 to present.

Identified Risks:

- Business Interruptions
- Delayed Emergency Response
- Downed Power Lines and Trees
- Localized Evacuation
- Explosion
- Hazardous Materials Release
- Increased Fire Potential
- Increased Public Safety Runs
- Property Damage
- Livestock/Wildlife Injury/Death
- Loss of Economy
- Personal Injury/Death
- Blocked Roads
- Building Collapse
- Machinery
- Agricultural and Related Business

Winter Storms

	Pierce County	Rugby	Wolford	Balta
Frequency	Highly Likely Nearly 100% probability in the next year	Highly Likely Nearly 100% probability in the next year	Highly Likely Nearly 100% probability in the next year	Highly Likely Nearly 100% probability in the next year
Severity	Catastrophic More than 50% of jurisdiction affected	Catastrophic More than 50% of jurisdiction affected	Catastrophic More than 50% of jurisdiction affected	Catastrophic More than 50% of jurisdiction affected
Risk Class	A	A	A	A
Seasonal Pattern	September through May			
Duration	2 to 3 days			
Speed of Onset	6 to 12 hours			

Definition: Winter storms have the capability to completely immobilize large areas of a state or several states simultaneously. Winter storms occur in several forms, such as heavy snow storms, blizzards, and ice storms. Each in its own way is a potential killer of hundreds of people whenever the storm strikes. A brief explanation of each follows:

Heavy Snow Storms is probably the most significant winter weather phenomenon. Snow can be continuous, intermittent, flurries or if showery in nature, snow squalls. Snow squalls are brief, intense falls of snow for short durations and are comparable to summer rain showers. Blowing and drifting snow can happen together, due to strong winds and falling snow or lose snow on the ground.

Blizzards are the most dramatic and dangerous winter storms. A blizzard has winds of 35 mph or more with snow and blowing snow reducing visibility to less than ¼ mile for at least 3 hours. Blizzards are usually characterized by low temperatures and by strong winds bearing large amounts of snow. Snowfall is usually present during the early stages of the blizzard. However, most of the snow in a blizzard is in the form of fine, powdery particles of snow which are whipped up from the surface in such great density that at times the visibility is only a few yards, creating a blinding condition.

Ice Storms: Freezing rain or freezing drizzle is rain or drizzle occurring when surface temperatures are below freezing. The Moisture falls in liquid form but freezes upon impact, resulting in a coating of ice or glaze on all exposed surfaces. This is often called an ice storm. Sleet is sometimes incorrectly referred to as an ice storm. Sleet is frozen rain drop, ice pellets, which bounce when hitting the ground. Sleet does not stick to trees, but a sufficient depth can cause hazardous driving conditions. Heavy accumulations of ice can bring down tress and topple utility poles and communication towers. Ice can disrupt communications and power for days while utility companies repair extensive damage. Even small accumulations of ice can be extremely dangerous to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces.

Threat: The winter season can begin as early as September and last into May. Generally, a period from mid-November through early April provides the bulk of winter storms.

By nature, different types of winter weather occur within a winter storm, and varying intensities. Strong winds, extreme cold, accumulatins of ice and heavy snow, and dangerous wind chills are typically what most affect our region. Winter stoms may be deceptive because many deaths and injuries are directly related to the storm. Each year, dozens of Americans die due to exposure to cold. Add to that number, vehicle accidents and fatalities, fires due to dangerous use of heaters and other winter weather fatalities and you have a significant threat. People can be hurt or killed in traffic accidents on icy roads, while shoveling snow, or from hypothermia due to prolonged esposure to cold.

Blizzards can last from from than 24 hours (in faster moving storms) to more than four days (in slower moving ones). There are two major winter storm tracks that can be explained. The northern track produces the Alberta Low Pressure System, commonly called the Alberta Clipper. This is usually a fast moving storm producing blizzard conditions for a relatively short period of time. They are usually followed by extreme low temperatures. Alberta Lows have traveled as fast as 90 mph and have been known to become stationary. The southern track produces the Colorado Low Pressure System. This type of storm moves more slowly and more erratically than the Alberta Low. The Colorado Lows have traveled as fast as 60 mph, but have als been known to stop and become stationary for as long as 18 hours. Both of these storms can be deadly.

Low temperatures combined with high winds are extremely dangerous and can cause extensive damage to public and private property. Each year a number of people, stranded in a blizzard attempt to walk to safety and become lost. They often suffer from hunger, thirst, severe frostbite, and hypothermia. Frostbite can lead toloss of fingers and toes or cause permanent kidney, pancreas and liver injury and even death. Hypothermia has often been called “The killer of the unprepared”. It is also the number one killer of many outdoor sports enthusiasts.

Hypothermia is a condition where the body temperature, or core temperature, is lowered. The bllod is cooled, reducing oxygen carried to the brain and dullin senses. The victim becomes fatigued, delirious, and loses dexterity of arms and legs. If the body’s core temperature continues to grop to about 85 degrees F, the victim eventually slips int unconsciosness. If the treatment is not started immediately, the end result is arrest of the circulation and respiratory systems and death.

Wind chill is not the actual temperature but rather how wind and cold feel on exposed skin. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature. Animals are also affected by wind chill; however, cars, plants, and other objects are not.

The livestock industry can be severely impacted during winter storm situations. The snow can prevent cattlemen from getting feed and water to their livestock. Heavy snow can cause shelter roofs to cave in, crushing or suffocating livestock.

Wind Chill Chart

Wind (mph)

Temperature (°F)	Calm	5	10	15	20	25	30	35	40	45	50	55	60
	40	36	34	32	30	29	28	28	27	26	26	25	25
	35	31	27	25	24	23	22	21	20	19	19	18	17
	30	25	21	19	17	16	15	14	13	12	12	11	10
	25	19	15	13	11	9	8	7	6	5	4	4	3
	20	13	9	6	4	3	1	0	-1	-2	-3	-3	-4
	15	7	3	0	-2	-4	-5	-7	-8	-9	-10	-11	-11
	10	1	-4	-7	-9	-11	-12	-14	-15	-16	-17	-18	-19
	5	-5	-10	-13	-15	-17	-19	-21	-22	-23	-24	-25	-26
	0	-11	-16	-19	-22	-24	-26	-27	-29	-30	-31	-32	-33
	-5	-16	-22	-26	-29	-31	-33	-34	-36	-37	-38	-39	-40
	-10	-22	-28	-32	-35	-37	-39	-41	-43	-44	-45	-46	-48
	-15	-28	-35	-39	-42	-44	-46	-48	-50	-51	-52	-54	-55
	-20	-34	-41	-45	-48	-51	-53	-55	-57	-58	-60	-61	-62
	-25	-40	-47	-51	-55	-58	-60	-62	-64	-65	-67	-68	-69
	-30	-46	-53	-58	-61	-64	-67	-69	-71	-72	-74	-75	-76
	-35	-52	-59	-64	-68	-71	-73	-76	-78	-79	-81	-82	-84
	-40	-57	-66	-71	-74	-78	-80	-82	-84	-86	-88	-89	-91
	-45	-63	-72	-77	-81	-84	-87	-89	-91	-93	-95	-97	-98

Frostbite Times

30 Minutes 10 Minutes 5 Minutes

$$\text{Wind Chill } (^{\circ}\text{F}) = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T = Air Temperature (°F)
V = Wind Speed (mph)

History:

Source: National Oceanic and Atmospheric Administration (NOAA) Satellite and Information Service/ National Climatic Data Center (NCDC)

Pierce County, ND, Data between 2/25/2000 and 3/22/2011

Event Blizzard State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 03/22/2011 13:00:00 CST-6 End Date 03/22/2011 20:27:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title March 22 and 23 Winter Storm and Blizzard over West and Central North Dakota
Episode Narrative An upper level trough swinging into the Northern Plains, combined with a strong low pressure system ejecting out of the Rockies and into the Central Plains, resulted in heavy snow and blizzard conditions across much of west and central North Dakota. This episode occurred from March 22nd into the 23rd.||Warmer air surging north ahead of this storm system resulted in a wintry mix of rain, freezing rain, and sleet across much of the west and south central portions of the state at first, while all snow fell over the north central. Colder air pushing south eventually transitioned the precipitation to all snow. While there were some ice accumulations across the south, ice impacts were minor.||Heavy snow fell from west central North Dakota, through much of the south central and James River Basin region. Storm total snowfall amounts within this band ranged from eight inches to one foot, with locally higher amounts including 18.2 inches near Beulah. In addition to the snow, wind gusts up to 45 mph developed across far northwest and all of north central North Dakota resulting in several hours of blizzard conditions.||Numerous travel advisories and several road closures resulted from this storm, including the

closure of Interstate 94 from Bismarck to Fargo, Highway 83 from Bismarck to the Canadian border, and Highway 2 from Berthold to Rugby.||This was a prolonged and very complicated storm to warn for as potential was high for various types of warning criteria to be met.
Event Narrative East winds of 35 to 45 mph combined with falling snow and existing snow on the ground to create several hours of blizzard conditions.

Event Blizzard State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 03/11/2011 13:00:00 CST-6 End Date 03/12/2011 02:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title March 11 and 12 Major Blizzard and High Wind Event over West and Central North Dakota Episode Narrative A significant severe winter weather event occurred across much of west and all of central North Dakota March 11th through early March 12th.||An Alberta Clipper rapidly intensified as it moved east-southeast into the Northern Plains in response to a strong upper level jet streak amplifying the clipper's associated mid-level trough. Warm air advection ahead of the clipper resulted in the initial precipitation type to fall as rain. As the precipitation was mainly orientated along the clipper's cold front, a quick transition from rain to all snow occurred with the frontal passage. Storm total snow accumulations with this storm ranged from two to five inches northwest and central.||The main impact from this storm was the sudden onset and prolonged period of intense winds generated along and behind the cold front. Sustained winds in excess of 40 mph, with gusts to around 70 mph, developed west during the morning and spread east in the afternoon, then persisting through evening. When combined with the snow, severe blizzard conditions quickly became widespread, significantly impacting travel. In addition, temperatures initially above freezing fell into the 20s behind the front, turning wet and slushy roads into ice.||Across southwest North Dakota, very little precipitation fell and the main impact was high wind.||The violent and fast moving nature of this storm, combined with extremely icy road surfaces, resulted in dangerous if not impossible travel conditions in white out conditions. Numerous travel advisories and road closures were in effect, including the closure of Interstate 94 from Dickinson to Fargo, and Highway 83 from Bismarck to Minot. Several hundred motorists were stranded along minor and major roadways. Many accidents occurred. One in Sioux County involved injury. This blizzard caused unprecedented demand on law enforcement and emergency services, and required the North Dakota National Guard to be activated to assist in rescuing stranded motorists.
Event Narrative Widespread blizzard conditions developed as strong northwesterly winds of 40 to 55 mph combined with falling snow and fresh snow cover on the ground. Travel was significantly impacted due to near zero visibilities, strong winds, and ice covered road surfaces.

March 11, 2011 brought a blizzard to Pierce County which added 3 1/2 inches of snow to add to the 48 inches already here. Governor Jack Dalrymple issued a winter storm emergency and called out the National Guard to help stranded motorists. No loss of life or serious injury was attributed to the storm.

(Source Pierce County Tribune)

Event Blizzard State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 02/17/2011 15:00:00 CST-6 End Date 02/17/2011 21:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K

Episode Title February 17 Blizzard Conditions over Northwest and North Central North Dakota Episode Narrative Low pressure pushing across North Dakota brought strong winds and accumulating snow on February 17. While the strong winds impacted the entire local area, the accumulating snow was confined to the northwest and north central parts of the state. Although the storm total snow accumulations were only two to four inches, wind gusts up to 45 mph combined with the falling snow to result in a blizzard. Many roads were closed and numerous travel advisories were issued by county and state officials. Event Narrative Blizzard conditions developed as strong northerly winds up to 45 mph combined with falling snow and the fresh snow cover on the ground.
Event Extreme Cold/Wind Chill State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date 02/08/2011 00:00:00 CST-6** End Date 02/08/2011 12:00:00 CST-6 Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K Episode Title February 8 Warning Criteria Wind Chills over Much of West and All of Central North Dakota Episode Narrative Dangerous wind chill conditions developed across North Dakota the morning of February 8 as Arctic high pressure moved into the region. Winds up to 15 mph combined with subzero temperatures to result in wind chill temperatures of 40 below to near 50 below zero. Event Narrative The combination of winds and cold Arctic air resulted in wind chill temperatures of 40 below to near 50 below zero.
Event Extreme Cold/Wind Chill State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date 02/01/2011 18:00:00 CST-6** End Date 02/02/2011 12:00:00 CST-6 Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K Episode Title February 1 and 2 Warning Criteria Wind Chills over West and Central North Dakota Episode Narrative Dangerous wind chill conditions redeveloped across the region the night of February 1 through February 2 as Arctic high pressure remained over the area. Winds up to 15 mph combined with subzero temperatures to result in wind chill temperatures of 40 below to 50 below zero. One fatality (direct) occurred due to the extreme cold in rural Williams County. Event Narrative The combination of winds and cold Arctic air resulted in wind chill temperatures of 40 below to near 50 below zero.
Event Extreme Cold/Wind Chill State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date 02/01/2011 00:00:00 CST-6** End Date 02/01/2011 12:00:00 CST-6 Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K Episode Title January 31 to February 1 Warning Criteria Wind Chills over West and Central North Dakota Episode Narrative Dangerous wind chill conditions developed across North Dakota January 31 through February 1 as Arctic high pressure pushed into the region. North winds up to 15 mph combined with subzero temperatures to result in wind chill temperatures of 40 below to 55 below zero. (See January 2011 Storm Data). Event Narrative The combination of winds and cold Arctic air resulted in wind chill temperatures of 40 below to near 55 below zero.
Event Extreme Cold/Wind Chill State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date 01/31/2011 16:00:00 CST-6** End Date 01/31/2011 23:59:00 CST-6 Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K Episode Title January 31 - February 1 Warning Criteria Wind Chills over West and Central North Dakota Episode Narrative Dangerous wind chill conditions developed across the Northern Plains Monday night January 31st through Tuesday morning February 1st as Arctic high pressure pushed south into the region. North winds up to 15 mph combined with subzero surface temperatures to result in wind chill temperatures of 40 below to 55 below zero. (See February 2011 Storm Data). Event Narrative The combination of winds and cold Arctic air resulted in wind chill temperatures of 40 below to near 55 below zero.

Event Heavy Snow State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 12/29/2010 15:00:00 CST-6 End Date 12/30/2010 09:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title December 29 2010 - January 1 2011 Winter Storm and Blizzard over West and Central North Dakota
Episode Narrative An inverted trough extending north from an area of surface low pressure over the central plains, brought heavy snow to portions of west and central North Dakota from Wednesday, December 29th until early Thursday, December 30th. Short wave impulses originating from an upper trough enhanced the snowfall, and led to storm total amounts up to seven inches over some areas.||Forcing for snow eventually pushed further east, with an enhanced area of snow developing over the southern James River Basin from Thursday, December 30th through Friday, December 31st. Up to near fourteen inches of snow was reported. ||In addition to the heavy snow, as the surface low over the central plains lifted northeast into the Upper Mississippi Valley December 30th and 31st, a strong pressure gradient developed over central South Dakota and eastern North Dakota. A prolonged period of strong winds over 40 mph, combined with continued snowfall and fresh snow cover on the ground, resulted in blizzard conditions over portions of south central North Dakota from Thursday December 30th through the morning hours of Saturday, January 1st.||Numerous travel advisories were issued by state and county officials during this event. Several road closures also occurred, including Interstate 94 from Jamestown to Fargo for several days, and Bismarck to Jamestown New Year's Eve Night through the morning hours of New Year's Eve Day (See Storm Data for January 2011).
Event Narrative An estimated storm total snowfall of 6 inches fell over portions Pierce County.

Event Heavy Snow State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 12/20/2010 10:00:00 CST-6 End Date 12/21/2010 04:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title December 20-21 Winter Storm over Much of West and Central North Dakota
Episode Narrative A large area of surface low pressure ejecting northeast into the Northern Plains brought widespread moderate to heavy snow to much of west and central North Dakota Monday, December 20th through early morning Tuesday, December 21st. The heaviest snow fell across the northern half of North Dakota, where nine to twelve inches occurred. Lesser amount fell across the southwest and south central.||In addition to the snow, gusty northwest winds up to 25 mph across the south, created areas of blowing and drifting snow. This resulted in travel hazards and eventually led to travel advisories issued by state and county officials. Patchy freezing drizzle around the James River Basin also contributed to some travel hazards during this episode.
Event Narrative The cooperative observer at Hurricane Lake reported 7.4 inches of storm total snowfall.

Event Heavy Snow State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 12/15/2010 14:00:00 CST-6 End Date 12/16/2010 08:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title December 15-16 Winter Storm over Portions of East and Central North Dakota
Episode Narrative Low and mid-level forcing which brought freezing rain during the early morning hours of the 15th to much of central North Dakota, continued to push slowly east. An enhanced area of frontogenetical forcing, combined with upper level support, eventually set up along a stationary boundary situated north to south across portions of central and eastern North Dakota from the morning of the 15th, lasting into the morning hours of the 16th. Heavy snow resulted, with over one foot reported just west of the Devils Lake Basin, continuing south into the James River Basin.
Event Narrative The cooperative observers in Pierce County reported a storm total snowfall of near 7 inches in Rugby to around 14 inches at Hurricane Lake.

Event Heavy Snow State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 12/10/2010 13:00:00 CST-6 End Date 12/11/2010 05:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title December 10-11 Heavy Snow across portions of West and Central North Dakota

Episode Narrative An area of low pressure moving east across North Dakota brought a band of heavy snow from the northwest through central portions of the state Friday, December 10th through early Saturday, December 11th. Six inches up to over a foot of snow fell within this heavy band, with lesser amounts to the north and south. Winds up to 25 mph also creating area of blowing and drifting snow, prompting the North Dakota Department of Transportation to issue a no travel advisory for northwest and central portions of North Dakota.
Event Narrative A storm total of three to six inches of snow fell across far southern Pierce County. Lesser amounts fell over central and northern portions of the county.

Event Blizzard State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 10/26/2010 14:00:00 CST-6 End Date 10/27/2010 14:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title October 26-27 Significant Early Winter Storm over West and Central North Dakota
Episode Narrative An intense storm system which developed across northern Minnesota brought widespread high winds and periods of blizzard conditions to west and central North Dakota on Tuesday, October 26, and Wednesday, October 27, 2010.||In the early morning hours of October 26th, an area of surface low pressure ejecting out of the central plains rapidly intensified across central and northern Minnesota. This was in response to a very strong jet streak moving through the central plains, creating an area of high mid-level divergence over the upper Mississippi Valley region. The central pressure of the surface low continued to drop, with low pressure records being set across parts of Minnesota and Wisconsin. Over North Dakota on the back side of this low, a very strong pressure gradient developed as the surface low intensified, resulting in widespread high sustained winds of 40 to near 50 mph, and peak wind gusts to near 70 mph Tuesday into Wednesday.||Wrap around precipitation developed underneath a strong TROWAL (Trough Of Warm Air a Loft) from the north to the south-southeast over the Dakotas, with precipitation changing from rain to snow as cold air was pulled into the system. When combined with the very high winds, widespread blizzard conditions developed across much of the state, with the worse conditions occurring Tuesday night and Wednesday morning. Storm total snowfall amounts were highest across the Turtle Mountain area, where up to thirteen inches was reported. The southern James River Valley received the least amount of snow, with only an inch reported.||Impacts from this episode varied across the state. The high winds and blizzard conditions resulted in scattered power outages in both rural and urban areas, downed trees, some school closures, multiple traffic accidents, and numerous travel advisories and alerts issued by the North Dakota Highway Patrol and Department of Transportation.
Event Narrative Sustained winds of 35 to 45 mph, and peak gusts in excess of 55 mph, combined with falling snow and snow on the ground to create widespread and prolonged blizzard conditions. Storm total snowfall amounts ranged from four to eight inches.

Event Heavy Snow State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 02/13/2010 06:00:00 CST-6 End Date 02/13/2010 20:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title February 13 Winter Storm over portions of East Central North Dakota
Episode Narrative An upper level low moving from southern Canada into central North Dakota combined with a surface trough to produce a narrow band of heavy snow over east central North Dakota from late morning into the early evening of Saturday, February 13th. Increasing northerly winds combined with the falling snow and recent snowfall to create blowing and drifting snow, reducing visibilities and resulting in several counties issuing no travel advisories. Storm total snowfall ranged from four inches across the far southern James River Valley, to around one foot just south and west of the Devils Lake Basin over Foster, Wells, and Pierce counties. Snow totals decreased farther west.
Event Narrative The cooperative observer at Hurricane Lake reported 15.1 inches of storm total snowfall.

Event **Blizzard** State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 01/25/2010 09:00:00 CST-6 End Date 01/25/2010 16:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title January 24-25 Blizzard over all of West and Central North Dakota

Episode Narrative The third and final phase of an intense storm system (see Storm Data Entry for January 18-23) came on Sunday the 24th and Monday the 25th as the storm center started to pull out of the Northern Plains. As this occurred, areas of wrap around snow developed west and spread east, bringing several more inches of accumulation to the area. More significantly, wind speeds increased due to a strengthening pressure gradient and strong mixing, resulting in full blown blizzard conditions across much of North Dakota beginning in the west on Sunday and spreading east on Monday. Peak wind speed gusts at major reporting stations ranged from 45 to 55 mph over this two day period. These strong winds resulted in further power outages and delayed the repair of existing downed power lines. Conditions improved Monday night into Tuesday as the storm pushed through the Great Lakes region.||Impacts from this event were substantial. Numerous no travel advisories were issued by state and county officials, and several roads were closed due to icy conditions and near zero visibilities. Numerous schools and businesses were also closed either due to the blizzard conditions which followed on the 24th and the 25th, or the widespread power outages. Preliminary damage assessments indicated that there was over 20 million dollars in total damages over west and central North Dakota due to this storm, with the majority of damages related to utility systems.
Event Narrative Wind gusts up to 50 mph combined with falling snow and existing loose snow cover to create widespread blizzard conditions across Pierce County.

Event Winter Storm State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 01/22/2010 15:00:00 CST-6 End Date 01/23/2010 12:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title January 18-23 Significant Winter Storm over West and Central North Dakota
Episode Narrative A single storm system brought a wide variety of severe and unusual winter weather to west and central North Dakota from Monday, January 18th, through Monday, January 25th. (See Storm Data Entry for January 24-25). ||The first phase of this storm was a prolonged period of dense freezing fog which originated across southwest North Dakota beginning on the 18th, then developed north and east on the 19th and 20th as strong warm air advection surged north ahead of a developing storm system over the Rockies. The freezing fog deposited thick layers of rime ice and hoar frost on power lines and other objects, resulting in breaking power lines and power outages starting on the night of the 19th. As the main storm system lifted north towards the Dakotas, large scale ascent overspread the region and combined with the warm air advection resulting in continued dense fog and areas of light freezing drizzle from the 20th through the 22nd. Frost on the power lines acted as a sponge, soaking up the drizzle and thickening the existing layer of ice. The result was more downed power lines and loss of power to many across west and central North Dakota. The southwest and south central parts of the state were hit the hardest.||The second phase of the storm arrived on Friday the 22nd as the main short wave impulse ejected northeast into the Northern Plains, bringing moderate to heavy wet snow to much of the area, as well as moderate freezing rain and sleet to portions of the south central Friday morning and afternoon. Precipitation changed over to all snow later in the day Friday, and continued Friday night before diminishing in intensity and ending later Friday night into Saturday, January 23rd, as the storm's dry slot wrapped into the state. Snowfall amounts by late Saturday morning were around two inches far west to six inches central. The heavy wet snow and periods of freezing precipitation resulted in even more power outages and hazardous travel conditions.||As the storm pulled away winds increased, more snow fell, and visibility was close to zero. A full blown blizzard was raging from the 24th into the 25th.||Impacts from this event were substantial. Numerous no travel advisories were issued by state and county officials, and several roads were closed due to icy conditions and near zero visibilities. Numerous schools and businesses were also closed either due to the blizzard conditions which followed on the 24th and the 25th, or the widespread power outages. Preliminary damage assessments indicated that there was over 20 million dollars in total damages over west and central North Dakota due to this storm.
Event Narrative A brief period of freezing rain, sleet, and snow spread north across the local area. Precipitation quickly changed over to all snow, with up to six inches of accumulations reported by Saturday morning. Hazardous travel conditions resulted.

Event Extreme Cold/Wind Chill State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 01/06/2010 21:00:00 CST-6 End Date 01/08/2010 12:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title January 6-8 Warning Criteria Wind Chills over all of West and Central North Dakota
Episode Narrative After a winter storm that brought near blizzard conditions to western and central North Dakota moved out of the Northern Plains, dangerous wind chill conditions developed as Arctic high pressure pushed south across south central Canada and into the Northern Plains. The strong cold air advection combined with gusty northwest winds resulted in wind chill temperatures of 40 to 55 below zero from Wednesday night the 6th, through Friday morning the 8th.
Event Narrative The combination of winds and cold Arctic air resulted in wind chill temperatures of 40 below to near 55 below zero.

Event Winter Weather State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 01/05/2010 15:00:00 CST-6 End Date 01/06/2010 19:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title January 5-7 Winter Storm over portions of West and Central North Dakota
Episode Narrative An upper level disturbance dropping south into the Northern Plains out of the Canadian Rockies, combined with a surface trough of low pressure, brought moderate snow accumulations and gusty winds to portions of west and central North Dakota from the morning of January 5th, through the early morning of January 7th.||Snow began Tuesday morning over western portions of the state as a surface trough developed across eastern Montana, and the left exit region of an upper level jet streak approached the local area. Areas of light to moderate snow developed further east through Tuesday night as these features pushed south and east, and continued into Wednesday as the parent upper level trough moved into the region.||Storm total snow accumulations ranged from five to eight inches from western North Dakota into portions of central North Dakota, with heavier amounts just under one foot reported over the James River Valley.||Furthermore, strong northwest winds of 20 to 35 mph developed behind the surface trough as strong Arctic high pressure surged south into the region Tuesday night into Wednesday. These strong winds accompanied the snow and produced near blizzard conditions over southwest and south central North Dakota at times, and resulted in numerous no travel advisories issued by county officials.
Event Narrative Two to three inches of snow fell across Pierce County. Northwest winds of 15 to 30 mph created areas of blowing and drifting snow.

Event Blizzard State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 12/25/2009 06:00:00 CST-6 End Date 12/26/2009 09:30:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title December 24-26 Significant Winter Storm and Blizzard over West and Central North Dakota
Episode Narrative A significant and prolonged winter storm impacted all of west and central North Dakota beginning Wednesday, December 23rd, lasting into Saturday, December 26th. Lead time was significant, as statements, watches, and warnings were posted well in advance of the storm.||During the afternoon hours of Wednesday the 23rd, the first wave of snow moved into the region as a northern stream upper low dropped south into the Northern Plains from central Alberta, combined with a surface trough of low pressure pushing from west to east across the state Wednesday and Wednesday night. After a brief lull in snowfall intensity Thursday, this first system merged with a southern stream upper low over the central plains Christmas Eve night, and intensified as the merged system moved slowly northeast into the Midwest on Christmas Day. As this occurred, areas of snow redeveloped from east to west Thursday night into Friday. The main forcing mechanism for snow across west and central North Dakota during this second wave of snow was a persistent TROWAL (Trough Of Warm Air Aloft) which developed and resulted in the continuous generation of moderate to heavy snow bands over central and portions of western North Dakota early Christmas Day into Saturday. ||Additionally, already strong northerly winds of 20 to 30 mph Wednesday and Thursday increased on Friday, with gusts up to 45 mph developing

across the state as surface low pressure retrograded northwest into western Iowa, resulting in a significant pressure gradient over the Dakotas. These strong winds accompanied the snow and produced widespread blizzard conditions over much of west and all of central North Dakota from Christmas Day through much of Saturday the 26th. ||The significant blowing and drifting of snow resulted in nearly impossible travel throughout the event, especially on the 25th and 26th when the strongest winds occurred. Numerous no travel advisories were issued from the North Dakota Department of Transportation, along with several road closures including all of Interstate 94 and portions of U.S. Highways 83 and 2. Needless to say, holiday commerce across west and central North Dakota was severely impacted by this intense storm system.
Event Narrative See the winter storm entry from December 23, 24, and 25. Winds increased and gusted as high as 45 mph, and coupled with additional snow and blowing snow, resulted in near zero visibility. By 10:30 AM on December 25 the North Dakota Department of Transportation issued a no travel advisory for nearly the entire state.

Event Extreme Cold/Wind Chill State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 12/12/2009 23:00:00 CST-6 End Date 12/15/2009 12:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title December 12-15 Warning Criteria Wind Chills over West and Central North Dakota
Episode Narrative A prolonged period of advisory to warning criteria wind chills occurred across portions of west and central North Dakota from the evening hours of December 12th through the morning hours of December 15th. North Dakota experienced a series of reinforced shots of cold Arctic air underneath northerly upper level flow, along with winds of 5 to 15 mph as Arctic high pressure systems surged south into the region. Wind chill temperatures of 35 to 50 below zero were common across the northwest and central during this period.
Event Narrative Cold Arctic air combined with winds of 10 to 15 mph to create wind chill temperatures of 40 below to near 50 below zero.

Event Blizzard State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 03/24/2009 01:00:00 CST-6 End Date 03/24/2009 18:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title March 22-24 Significant Spring Storm over much of West and Central North Dakota.
Episode Narrative A significant low pressure system developed in the lee of the Rocky Mountains over Colorado and Wyoming Sunday, March 22nd, strengthening and ejecting northeast into the upper Midwest by Tuesday, March 24th. Strong southerly flow ahead of this storm system brought ample Gulf of Mexico moisture all the way into southern Canada, setting the stage for significant precipitation accumulations across the region. Winter storm and blizzard watches and warnings were posted well in advance of the storm. Warning lead time averaged nearly 25 hours. ||Precipitation started in the form of rain and thunderstorms Sunday into Monday morning, before changing over to all snow west to east Monday afternoon through Tuesday morning. Additionally, strong northwest winds of 20 to 45 mph accompanying the snow, produced widespread blizzard conditions west during the day on Monday, then across central North Dakota Monday evening and into Tuesday morning. Further east, around the James River Basin area, winter storm warnings were in effect due to a wintry mix of rain, snow, and sleet and for lighter snow accumulations. ||Blizzard conditions continued across much of southwestern and central North Dakota on Tuesday, with conditions then gradually improving Tuesday night as the snow ended and the winds subsided. Storm total snow amounts ranged from 12 to 22.5 inches across southwest North Dakota, to five to 11 inches central. No travel advisories, road closures, power outages, and school and business closures were common during this significant spring storm.
Event Narrative Moderate to heavy snow accompanied by strong northwest winds resulted in widespread blizzard conditions.

Event Winter Weather State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 01/16/2009 12:00:00 CST-6 End Date 01/18/2009 18:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K

Episode Title January 16-18 Blowing Snow Event over All of West and Central North Dakota
Episode Narrative Significant travel problems developed due to blowing and drifting snow through the entire weekend of Friday, January 16th, through Sunday, January 18th. Surface low pressure to the east and high pressure to the west kept a strong pressure gradient in place across the state for much of the weekend. North to northwest winds of 15 to 30 mph with a few higher gusts were common Friday, Saturday, and Sunday. Due to these winds and daytime temperatures near freezing, blowing and drifting snow developed resulting in low visibilities and snow sticking to roadways. Law enforcement, Department of Transportation officials, and media reported numerous accidents and rollovers on North Dakota highways due to the icy roadway conditions throughout the weekend.

Event Blizzard State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 01/11/2009 21:00:00 CST-6 End Date 01/12/2009 09:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title January 11-12 Blizzard over All of West and Central North Dakota
Episode Narrative A significant winter storm impacted all of western and central North Dakota beginning Sunday evening, January 11th, and lasting through the morning hours of Monday, January 12th. A blizzard warning was posted well in advance of this storm, with the warning lead time around twenty hours. The blizzard warning encompassed the entire National Weather Service Bismarck County Warning Area, 36 counties, all of which had a blizzard. ||Periods of light to moderate snow and blizzard conditions, very strong winds creating significant blowing and drifting snow and near zero visibilities forced numerous road closures and the issuance of no travel advisories by law enforcement officials throughout the event. Conditions improved northwest to southeast later Monday morning as snow ended and the strong winds subsided. ||Strong surface low pressure developed across the high plains of Alberta during the day Sunday then moved rapidly southeast across western and central North Dakota Sunday evening through early Monday morning. Isentropic up glide ahead of the surface low resulted in a band of light to moderate snow developing Sunday afternoon and evening west to east, with anywhere from one to five inches of snow being reported by Monday morning. The heaviest snow (three to five inches) fell from far northwest North Dakota through much of central North Dakota and into the James River Valley area. ||As this intense Alberta Clipper moved across the state Sunday night, strong northwest winds developed. Wind speeds were 25 to 45 mph sustained with gusts of 40 to near 60 mph for several hours. The strong winds combined with falling snow and abundant loose snow already on the ground to create a widespread and prolonged blizzard.
Event Narrative Strong northwest winds of 25 to 35 mph, with gusts up to 45 mph, combined with falling snow and existing loose snow cover to create widespread and prolonged blizzard conditions across the county. Storm total snowfall accumulations by Monday morning ranged from one to three inches.

Event Heavy Snow State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 01/08/2009 21:00:00 CST-6 End Date 01/09/2009 18:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title January 8-9 Winter Storm across much of West and Central North Dakota
Episode Narrative A strong winter storm system brought moderate to heavy snow, areas of freezing rain, and considerable blowing and drifting snow to much of west and central North Dakota from early morning Thursday, January 8th, through Friday afternoon, January 9th. This significant storm resulted in numerous no travel advisories being issued by law enforcement throughout the event due to freezing precipitation, heavy snow accumulations, and blowing and drifting snow blocking roadways. ||A strong low pressure system developing in north central Montana early Thursday pushed southeast into the western Dakotas by Thursday night. Ahead of this storm system, a mixture of freezing rain and ice pellets resulted in the warm sector of the surface low across southwest and south central portions of the state Thursday afternoon and evening, resulting in several no travel advisories being issued by law enforcement due to ice covered roadways. Reported freezing rain accumulations through Thursday afternoon and evening ranged from a tenth to near one quarter of an inch.||As the surface low progressed southeast Thursday night, precipitation turned to all snow north to south as colder air wrapped into the

storm system, and winds increased. A moderate to heavy band of snow developed from northwest North Dakota into central portions of the state Thursday night, before gradually dissipating Friday. In addition, considerable blowing and drifting snow developed due to the strong winds Thursday night into Friday afternoon, resulting in numerous blocked roads. Total snow accumulations by Friday evening ranged from two to three inches on the perimeter of the heavy snow band to near ten inches within the center.
Event Narrative Cooperative observer and public reports indicate four to around six inches of snow fell across far southwestern Pierce County.

Event Heavy Snow State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 01/02/2009 16:00:00 CST-6 End Date 01/03/2009 04:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title January 2-3 Winter Storm over Northwest and North Central North Dakota
Episode Narrative An area of low pressure moving east into the central plains developed a band of moderate to heavy snow across portions of northwest and north central North Dakota beginning Friday afternoon, January 2nd, lasting into the early morning hours of Saturday, January 3rd. In addition to around six inches of snow accumulation across this area, gusty east to northeasterly winds of 20 to 35 mph created areas of significant blowing and drifting snow, which prompted the issuance of no travel advisories by law enforcement Friday night into Saturday morning.
Event Narrative An estimated three to six inches of snow fell across Pierce County. The heaviest snow accumulations occurred in northern portions of the county. In addition, gusty easterly winds of 20 to 35 mph resulted in significant blowing and drifting snow.

Event Extreme Cold/Wind Chill State NORTH DAKOTA County/Area Pierce WFO BIS
Begin Date 12/20/2008 22:00:00 CST-6 End Date 12/21/2008 12:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title December 20-21 Warning Criteria Wind Chills over West and Central North Dakota
Episode Narrative Strong cold air advection combined with gusty northwest winds resulted in wind chill temperatures of 40 below to near 50 below zero from Saturday the 20th, through Sunday morning the 21st.
Event Narrative Cold Arctic air combined with winds of 15 to 25 mph to create wind chill temperatures of 40 below to near 50 below zero.

Event Extreme Cold/Wind Chill State NORTH DAKOTA County/Area Pierce WFO BIS
Begin Date 12/14/2008 23:59:00 CST-6 End Date 12/15/2008 12:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title December 14-15 Warning Criteria Wind Chills over West and Central North Dakota
Episode Narrative After a significant winter storm that brought a blizzard to western and central North Dakota moved out of the Northern Plains, wind chill continued to be a problem. Strong cold air advection combined with gusty northwest winds and resulted in wind chill temperatures of 40 to 55 below zero from Sunday night the 14th, through Monday morning the 15th.
Event Narrative Cold Arctic air combined with winds of 15 to 25 mph to create wind chill temperatures of 40 below to near 55 below zero.

Event Blizzard State NORTH DAKOTA County/Area Pierce WFO BIS
Begin Date 12/13/2008 17:00:00 CST-6 End Date 12/14/2008 22:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title December 13-14 Blizzard over All of West and Central North Dakota
Episode Narrative A significant winter storm impacted all of western and central North Dakota beginning Saturday, December 13th, and lasting through much of Sunday, December 14th. A blizzard warning was posted well in advance of the storm, with the warning lead time more than a full day in advance. The blizzard warning encompassed the entire National Weather Service Bismarck County Warning Area, 36 counties, all of which verified.||Heavy snow and blizzard conditions, significant snow combined with very strong winds and near zero visibility, forced numerous road closures and the issuance of no travel advisories throughout Saturday and Saturday night. A statewide no travel advisory was then issued early

Sunday morning by the North Dakota Department of Transportation. Conditions improved west to east later Sunday afternoon and into Sunday evening as snow ended and winds subsided. Wind chill warnings were then issued in the storm's wake, Sunday afternoon through Monday morning, for wind chill temperatures ranging from 40 below to near 55 below zero (See Storm Data entry for December 14 and 15).||A significant upper level trough moved onshore into the Pacific Northwest Friday afternoon the 12th, then deepened southeastward into the Intermountain West Friday night. This resulted in southwest flow aloft and large scale ascent spreading east-northeast towards the Northern Plains early on Saturday, as well as triggering lee-side cyclogenisis across the high plains of Wyoming. Surface low pressure then pushed east into the central plains Saturday afternoon and evening, coinciding with several shortwave impulses ejecting from the base of the upper trough and into North Dakota. Moderate to heavy snow spread across west and central North Dakota Saturday morning through Saturday night, then slowly dissipated west to east early Sunday morning through Sunday evening. Total snow amounts by Monday morning the 15th were as much as 13.8 inches at Williston. Bismarck had a foot, and six to eight inches of snow was common from Minot through Jamestown. The least amount of snow, two to five inches, fell across the far southwest and far south central areas, along the South Dakota border, and the far northeast, Rolette County.||Strong north to northeast winds of 25-35 mph, with gusts to 40 mph, combined with the moderate to heavy snow, as well as the deep snow cover already of the ground, to create widespread blizzard conditions across all of western and central North Dakota.
Event Narrative Winds of 25 to 35 mph, and gusts to near 40 mph, combined with falling snow and snow on the ground to create widespread and prolonged blizzard conditions. The storm total snowfall amount was two inches at Rugby. Higher amounts, closer to five inches, were estimated across southern Pierce County.

Event Heavy Snow State NORTH DAKOTA County/Area Pierce WFO BIS
Begin Date 11/06/2008 08:00:00 CST-6 End Date 11/07/2008 09:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 30.00K Crop Damage 0.00K
Episode Title November 5-7 Significant Winter Storm over Much of West and Central North Dakota
Episode Narrative A significant and complex winter storm impacted much of western and central North Dakota beginning Wednesday, November 5th, and lasting into Friday, November 7th. Winter storm warnings and blizzard warnings were posted well in advance of the storm. Warning lead time averaged nearly 27 hours. The warnings encompassed the entire National Weather Service Bismarck County Warning Area, 36 counties, though not all counties had events or reached warning criteria. Counties in the Williston area and the Jamestown area were basically missed by the storm.||Blizzard conditions, or significant snow with near blizzard conditions, forced many schools and businesses to close and stranded travelers. Numerous roads were closed or no travel was advised due to the conditions. In addition, numerous power outages were reported across central North Dakota due to a wintry mix of rain, freezing rain, and sleet that fell Wednesday night and early Thursday morning, preceding the stronger winds and change over to heavy snow.||On November third and fourth, an open wave upper level trough moving east across the central Rocky Mountains became a closed upper level low pressure system, and triggered lee-side cyclogenisis across the high plains of Wyoming. By Wednesday morning and afternoon, November fifth, the surface low moved into central and eastern parts of South Dakota, with a TROWAL (trough of warm air aloft) feature developing across the northern plains, along with plenty of moisture advection from the Gulf of Mexico. Warm air advection ahead of the surface low wrapped around into western and central North Dakota, producing moderate to heavy rain Wednesday, setting daily rainfall records. An addition, scattered thunderstorms in east-central North Dakota prompted one severe thunderstorm warning and yielded a report of large hail in Stutsman County. Farther west, rain quickly changed over to all snow Wednesday evening as colder air was pulled into the system.||Moderate to heavy snow continued across western North Dakota Wednesday night into Thursday morning, coinciding with increasing northwesterly winds which produced widespread blizzard conditions over the southwest part of the state. A band of thundersleet developed early Thursday morning over central areas. Later Thursday morning the storm system's dry slot worked into the Bismarck area cutting off precipitation altogether, at least

temporarily.||By daybreak Thursday morning, as the initial TROWAL feature was dissipating across western North Dakota, a secondary TROWAL developed over southern Alberta and advancing south into north central North Dakota. Colder air aloft had also advected across the entire area by mid-morning Thursday. By early Thursday afternoon, this secondary TROWAL continued to advance south, producing a band of heavy snow which lasted through Thursday night, and finally decreased Friday morning.||Additionally, strong north to northwest winds accompanying the snow produced widespread blizzard conditions central, with blizzard conditions continuing southwest due to the strong winds and existing heavy snow cover.||Conditions slowly improved statewide Friday as areas of snow dissipated and the strong northwest winds diminished. Storm total snowfall ranged from one to three inches around Williston and Jamestown, to six to twelve inches southwest through central, to a maximum of twenty inches in McHenry County. The strong wind resulted in blowing and drifting snow and so amounts had to be estimated. Snow drifts were four to six feet deep.
Event Narrative Ten to around twenty inches of total snowfall was reported by Friday morning across Pierce County. Broadcast media relayed a public report of 22 inches of snow in Orrin. Cooperative observers reported snowfall amounts of twelve inches around Drake, McHenry County, and 13.5 inches in Rugby. Newspaper reports indicated roof damage to buildings in the Rugby area due to the heavy wet snow.

Event Extreme Cold/Wind Chill State NORTH DAKOTA County/Area Pierce WFO BIS
Begin Date 02/09/2008 08:00:00 CST-6 End Date 02/10/2008 11:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title February Ninth and Tenth Warning Criteria Wind Chills over much of West and Central North Dakota
Episode Narrative Bitter cold arctic air with temperatures of 15 to 30 below zero, and winds of 15 to 35 mph and gusts up to 45 mph, resulted in wind chills of 40 to near 60 below zero. These conditions developed over west and central North Dakota Saturday the ninth, and continued into the morning and early afternoon hours of Sunday the tenth. These conditions followed blizzard or near blizzard conditions on the eighth and ninth.
Event Narrative Wind chills of 40 to 55 below zero with wind speeds of 15 to 35 mph persisted for over 24 hours. The lowest wind chill recorded was 54 below zero at Rugby.

Event **Blizzard** State NORTH DAKOTA County/Area Pierce WFO BIS
Begin Date 02/08/2008 23:00:00 CST-6 End Date 02/09/2008 05:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title February Eighth and Ninth Blizzard over Parts of Central North Dakota
Episode Narrative Recent snowfall of 2 to 6 inches, along with gusty northwest winds of 25 to 40 mph with gusts up to 50 mph, created ground blizzard conditions Friday evening of the eighth, through Saturday morning of the ninth over parts of central North Dakota. Conditions were much worse in the open country, where visibilities were less than one quarter of a mile for many hours. These conditions were followed by wind chills in the warning criteria the ninth and tenth.

Event Extreme Cold/Wind Chill State NORTH DAKOTA County/Area Pierce WFO BIS
Begin Date 01/28/2008 23:00:00 CST-6 End Date 01/30/2008 13:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title January 28, 29 and 30 Warning Criteria Wind Chills over West and Central North Dakota
Episode Narrative Bitter cold arctic air with temperatures of 10 to 25 below zero, and winds of 30 to 40 mph with gusts up to 55 mph, resulted in wind chills of 40 to 60 below zero. These conditions began across west and central North Dakota Monday night the 28th and continued into Wednesday afternoon the 30th.
Event Narrative Wind chills of 40 to 55 below zero with wind speeds of 30 to 50 mph persisted for over 36 hours. The lowest wind chill recorded was 55 below zero at Rugby.

Event **Blizzard** State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 03/02/2007 09:00:00 CST-6 End Date 03/02/2007 15:00:00 CST-6

Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title March 2 Blizzard over Central North Dakota
Episode Narrative The winter storm system that brought heavy snow to West and Central North Dakota Wednesday February 28th (See Storm Data entries for February) through early Thursday March 1st, intensified as it moved towards and into Wisconsin later Thursday and Friday March 2nd. In addition to additional light snow accumulations (1 to 3 inches), strong northwest winds developed early Friday morning, and continued into Friday evening. |Winds of 30 to 45 mph were recorded across central North Dakota for much of Friday. These winds, in combination with recent snowfall of 5 to 12 inches, created widespread areas of significant blowing and drifting snow with near zero visibilities. Conditions were much worse in the open country than they were within urban areas, as numerous rural roadways became impassable due to large snow drifts. As a result, no travel was advised for much of central North Dakota, along with several highways being closed including Interstate 94 from Bismarck to Fargo.
Event Narrative Strong northwest winds with gusts in excess of 35 mph, reduced visibilities in blowing snow to 1/4 mile or less at times, and created treacherous road conditions with ice and snow cover. No travel was advised for most of Pierce County.

Event Winter Storm State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 03/01/2007 00:00:00 CST-6 End Date 03/01/2007 04:00:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title March 1 Significant Winter Storm continued over central North Dakota
Episode Narrative A low pressure system ejecting out of the Northern Rockies and into Wisconsin, continued to bring snow across portions of central North Dakota from late Tuesday night of February 27th through Thursday morning of March 1st. (See Storm Data entries for February). |In addition to the heavy snow, light freezing rain and sleet also fell early Thursday morning over the eastern counties of the Bismarck County Warning Area (CWA).
Event Narrative Nine inches of snow was reported twenty-one miles east-northeast of Rugby in rural Pierce County, along with light freezing rain and sleet. Precipitation continued from February 28.

Event Winter Storm State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 02/28/2007 08:00:00 CST-6 End Date 02/28/2007 23:59:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Title February 28 Significant Winter Storm over Western and Central North Dakota
Episode Narrative A low pressure system ejecting out of the Northern Rockies and into Wisconsin brought snow across western and central North Dakota from late Tuesday night February 27th into Wednesday night February 28th. The heaviest snow (9 to 12 inches) fell over far south central and southeastern North Dakota. Accumulating snow, along with freezing drizzle and blowing and drifting snow, continued over the eastern forecast area into Thursday morning of March 1st. (See Storm Data entries for March, 2007).|In addition to the heavy snow, light freezing rain and sleet also fell Wednesday afternoon and night over the central and eastern counties of the Bismarck County Warning Area (CWA).
Event Narrative Six to seven inches of snow fell over Pierce County from Wednesday afternoon, February 28, through Thursday morning, March 1st.

Event Winter Storm State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 28 Feb 2007, 08:00:00 AM CST, Begin Location: Not Known, End Date: 28 Feb 2007, 23:59:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0K, Crop Damage: $ 0.0K, , State: North Dakota, Zones affected: McHenry, Pierce Description: EVENT NARRATIVE: Six to seven inches of snow fell over McHenry County from Wednesday afternoon, February 28, through Thursday morning, March 1st. EPISODE NARRATIVE: A low pressure system ejecting out of the Northern Rockies and into Wisconsin brought snow across western and central North Dakota from late Tuesday night February 27th into Wednesday night February 28th. The heaviest snow (9 to 12 inches) fell over far south central and southeastern North Dakota. Accumulating snow, along with freezing drizzle and blowing and drifting snow, continued over the eastern forecast area into Thursday morning of March 1st. (See Storm Data entries for March, 2007). In addition to the heavy snow,

light freezing rain and sleet also fell Wednesday afternoon and night over the central and eastern counties of the Bismarck County Warning Area (CWA).

Event Heavy Snow State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 12/30/2006 09:00:00 CST-6 End Date 12/30/2006 23:30:00 CST-6
Deaths Direct/Indirect 0/0 Injuries Direct/Indirect 0/0 Property Damage 0.00K Crop Damage 0.00K
Episode Narrative A unique meteorological condition led to very significant heavy snow over central and eastern North Dakota on December 30, 2006. An upper level low cut off over the southwest part of the United States and transported Gulf of Mexico moisture northward. At the same time a second upper level low cut off along the Montana and North Dakota border and acted to pull this moisture into North Dakota. The event was a heavy snow event as the surface low and pressure gradient were relatively weak and did not cause gusty wind or blowing snow. The highest snow totals, in excess of 10 inches, were from Bismarck, to Hazelton, Wishek, and Ashley, and through parts of Stutsman and Foster counties. These were the most significant snow amounts in these areas, from a single storm, in about seven winter seasons. The sheriff in several counties advised no travel. Snow plows were pulled off the highways from Wishek and Gackle, through Medina, Jamestown, and Carrington, to Rolla, due to the low visibility in heavy falling snow. There were many accidents and vehicles in ditches, at least 41 in the Bismarck area and more than 50 in the Jamestown area alone. A church in Jamestown was used as a shelter for 86 stranded people.
Event Narrative Nine inches of snow fell at Rugby. Snow plows were pulled off highways.

Event Heavy Snow, State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 30 Dec 2006, 09:00:00 AM CST, Begin Location: Not Known, End Date: 30 Dec 2006, 23:30:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0K, Crop Damage: $ 0.0K, , State: North Dakota, Zones affected: Mchenry, Pierce, Rolette
Description: EVENT NARRATIVE: Nine inches of snow fell at Rugby. Snow plows were pulled off highways. EPISODE NARRATIVE: A unique meteorological condition led to very significant heavy snow over central and eastern North Dakota on December 30, 2006. An upper level low cut off over the southwest part of the United States and transported Gulf of Mexico moisture northward. At the same time a second upper level low cut off along the Montana and North Dakota border and acted to pull this moisture into North Dakota. The event was a heavy snow event as the surface low and pressure gradient were relatively weak and did not cause gusty wind or blowing snow. The highest snow totals, in excess of 10 inches, were from Bismarck, to Hazelton, Wishek, and Ashley, and through parts of Stutsman and Foster counties. These were the most significant snow amounts in these areas, from a single storm, in about seven winter seasons. The sheriff in several counties advised no travel. Snow plows were pulled off the highways from Wishek and Gackle, through Medina, Jamestown, and Carrington, to Rolla, due to the low visibility in heavy falling snow. There were many accidents and vehicles in ditches, at least 41 in the Bismarck area and more than 50 in the Jamestown area alone. A church in Jamestown was used as a shelter for 86 stranded people.

Event Cold/wind Chill State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 16 Feb 2006, 06:00:00 PM CST, Begin Location: Not Known, End Date: 18 Feb 2006, 12:00:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Dickey, Divide, Dunn, Emmons, Foster, Golden Valley, Grant, Hettinger, Kidder, La Moure, Logan, Mchenry, Mcintosh, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Stutsman, Ward, Wells, Williams
Description: Temperatures were in the 15 to 25 degree below zero range with wind speeds of 15 to 25 mph resulting in wind chills mainly in the 40s below. The lowest wind chills were -55 in Rolette County and -50 in Foster, Kidder, and Mountrail counties. Wind chill warnings were posted a full day in advance, on the 15th. Event: High Wind, Begin Date: 31 Aug 2005, 12:15:00 PM CST, Begin Location: Not Known, End Date: 31 Aug 2005, 02:45:00 PM CST, End Location: Not Known, Magnitude: 59, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones

affected: Bottineau, Burke, Mchenry, Mclean, Mountrail, Pierce, Renville, Rolette, Sheridan, Ward, Wells
Description: Trees and tree branches were broken. Some trees fell onto electric power lines in Bottineau and McHenry counties and power was out for a time. Minor roof damage to homes in Rolette County. Highest sustained wind speed was at the Minot Air Force Base with 40 mph. Highest gust was 68 mph at Rugby. Both speeds were measured.

Event Blizzard State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 05 Oct 2005, 05:00:00 AM CST, Begin Location: Not Known, End Date: 05 Oct 2005, 10:00:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 1.2M, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Bottineau, Burke, Divide, Mchenry, Mckenzie, Mclean, Mountrail, Pierce, Renville, Rolette, Ward, Williams
Description: October 5, 2005, brought an early and very significant blizzard to the Northern Plains including western and northern North Dakota. A large band of 15 plus inches of snow fell from the southwest into the north central including from Bowman, through Amidon, New England, Medora, Dickinson, Halliday, Grassy Butte, Garrison, Max, Tioga, Berthold and Minot, to Towner. The heaviest snow was at Dunn Center, Manning, Marshall and Bowbells all with 22 inches, Beach with 20 inches, and Fairfield, Hebron, and Richardton all with 18 inches. Visibility dropped to zero for an extended period of time at Dickinson and Minot and to less than a quarter mile at Hettinger and Williston in snow and blowing snow. Winds gusted to 48 mph at Minot, 45 mph at Hettinger, 40 mph at Williston, and 35 mph at Dickinson. Heavy wet snow pulled down trees and power lines, halted transportation, and disrupted the lives of thousands. In many areas you needed a yardstick to measure the snow. Power outages were reported in Bottineau, Bowman, Burke, Dunn, Golden Valley, McHenry, McKenzie, McLean, Mercer, Oliver, Rolette, Sheridan, and Ward counties. Transportation came to a standstill as the storm forced the closure of major highways. Interstate 94 was closed from Mandan to the Montana line, a distance of 155 miles. Other major highways including 83, 52, 5, and 2 were made impassable and were shut down. The county sheriff in no fewer than 28 counties advised no travel as drifts were reported as deep as four feet. Snow plow operators were ordered off the roads as concern for their safety grew. National Guard soldiers were called out to rescue stranded motorists. Hundreds of motorists and occupants of three buses were rescued. Over a 23 mile stretch of Interstate 94, from Dickinson to Richardton, 100 vehicles with folks inside were stranded. In Dickinson snowplows accompanied emergency vehicles on calls. The storm was preceded on October 1 by temperatures in the 90s, as high as 96 at Beulah. Following the storm, on October 6, temperatures dropped into the teens and single digits above zero, as low as 4 degrees at Powers Lake.

Event Extreme Cold/wind Chill State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date 13 Jan 2005, 02:58:00 PM CST,** Begin Location: Not Known, End Date: 15 Jan 2005, 12:00:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Dickey, Divide, Dunn, Emmons, Foster, Golden Valley, Grant, Hettinger, Kidder, La Moure, Logan, Mchenry, Mcintosh, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Stutsman, Ward, Wells, Williams Description: An arctic high pressure system dropped southeast out of central Canada on the evening of the 13th of January. The system brought bitter cold temperatures to western and central North Dakota the night of the 13th. The air temperatures overnight dropped between 20 to 35 below zero with daytime temperatures ranging 10 to 20 below zero. The subzero temperatures lasted through the morning of the 15th. Northwest winds up to 20 mph accompanied the cold air producing extreme wind chills of 40 to 60 below zero across the region. Many schools and outdoor activities were cancelled due to the bitter cold.

Event Winter Storm State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 01 Jan 2005, 12:00:00 AM CST, Begin Location: Not Known, End Date: 01 Jan 2005, 09:54:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property

Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Bottineau, Burke, Divide, Dunn, Mchenry, Mckenzie, Mclean, Mountrail, Pierce, Renville, Rolette, Sheridan, Ward, Wells, Williams Description: A low pressure system moved into the plains and intensified. The storm system brought a band of heavy snow across portions of northern and central North Dakota on New Years' day. Snow amounts ranged from 6 to 10 inches across the area. Arctic air followed the snow on New Years' day dropping temperatures between 5 to 15 below zero. The heaviest snow fell from Williston to Stanley to the Minot Air Force Base where 8 to 10 inches of snow was reported.

Event Winter Storm State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 10 Feb 2004, 11:00:00 AM CST, Begin Location: Not Known, End Date: 10 Feb 2004, 02:49:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Billings, Bottineau, Burke, Burleigh, Dickey, Divide, Dunn, Emmons, Foster, Golden Valley, Grant, Kidder, La Moure, Logan, Mchenry, Mcintosh, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Stark, Stutsman, Ward, Wells, Williams
Description: A strong low pressure system over Alberta Canada moved rapidly southeast into eastern North Dakota resulting in strong northwest winds and snow over western and central North Dakota. Wind gust to 50 mph were reported over various locations of the region. Conditions deteriorated rapidly in the early afternoon hours on the 10th when visibilities lowered to less than a quarter mile (>1/4) producing "white out" conditions. The winter storm warning was upgraded to a blizzard warning by midafternoon on the 10th.

Event Blizzard State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 10 Feb 2004, 02:49:00 PM CST, Begin Location: Not Known, End Date: 11 Feb 2004, 12:00:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota,
Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Dickey, Divide, Dunn, Emmons, Foster, Golden Valley, Grant, Hettinger, Kidder, La Moure, Logan, Mchenry, Mcintosh, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Stutsman, Ward, Williams
Description: The winter storm warning for western and central North Dakota was upgraded to a blizzard warning in the afternoon of the 10th. Strong winds of 50 mph combined with snow had reduced visibilities to zero at times by the late afternoon hours and remained at or near zero through the night. A gradual improvement began in the morning of the 11th. Snow drifts to 20 feet were reported in the northwestern areas of the state. Local and county snow removal equipment was not sufficient to move the snow and local and county governments requested state assistance. Many roads and parts of Interstate 94 were closed stranding numerous motorist and bringing travel to a standstill. The railroad system in the northern part of the state were also halted due to the large snow drifts. An Amtrak train became stuck near Epping North Dakota and had to backup to Williston North Dakota, about 15 miles to the southwest. Numerous vehicles went into ditches, stalled out or became stuck in the heavy snowdrifts. Only minor injuries (indirect) were reported. Snowfall from the storm only amounted to around an inch, however snowpack from previous snow events combined with the strong winds created blizzard conditions throughout western and central North Dakota. Conditions rapidly improved by the late morning on the 11th as the storm system exited the region.

Event Extreme Cold/wind Chill State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 27 Jan 2004, 06:00:00 PM CST, Begin Location: Not Known, End Date: 28 Jan 2004, 11:30:00 AM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Dickey, Divide, Dunn, Emmons, Foster, Golden Valley, Grant, Hettinger, Kidder, La Moure, Logan, Mchenry, Mcintosh, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Stutsman, Ward, Wells, Williams

Description: An approaching arctic high pressure system over southern Canada and exiting low pressure system over the northern plains brought extremely cold temperatures and bitter wind chills to western and central North Dakota. Ambient temperatures ranging 20 to 35 below zero combined with northwest winds to 30 mph resulted in widespread wind chill factors of 40 to 65 below zero. In southwest North Dakota, in Adams County, icy roads and reduced visibilities in blowing snow resulted in a fatality (indirect) when a 35 year old male lost control of his vehicle and rolled several times. The driver was ejected from the vehicle. The arctic high pressure system settled over the region late Wednesday morning on the 28th of January and brought diminishing winds to the area.

Event Winter Storm State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 24 Jan 2004, 08:00:00 AM CST, Begin Location: Not Known, End Date: 25 Jan 2004, 04:00:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Billings, Bottineau, Burke, Burleigh, Dickey, Divide, Dunn, Emmons, Foster, Kidder, La Moure, Logan, Mchenry, Mcintosh, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Stutsman, Ward, Wells, Williams Description: Low pressure over the central Rockies intensified into a major winter storm impacting North Dakota on the weekend of January 24th and 25th. A persistent snow event produced 6 to 12 inches of snow over most of western and central North Dakota. The heaviest band of snow fell from the northwest through central North Dakota where snowfall amounts ranged from 9 to 12 inches. The storm began as freezing rain and sleet over north central North Dakota before turning over to all snow. Gusty winds of 15 to 25 mph accompanied the storm resulting in considerable blowing and drifting snow and wind chills to 30 below zero. Travel throughout the region was impacted due to reduced visibilities and blocked roads. Numerous vehicle accidents were reported with some minor injuries but no details on the injured.

Event Extreme Cold/wind Chill State NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date 04 Jan 2004, 06:00:00 PM CST,** Begin Location: Not Known, End Date: 05 Jan 2004, 12:00:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Dickey, Divide, Dunn, Emmons, Foster, Golden Valley, Grant, Hettinger, Kidder, La Moure, Logan, Mchenry, Mcintosh, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Stutsman, Ward, Wells, Williams
Description: A strong arctic high pressure system over British Columbia Canada moved southeast into the northern plains Sunday, the 4th of January and brought extremely cold temperatures and gusty winds to western and central North Dakota. Temperatures reached 20 to 30 below zero Sunday night and remained between 10 and 20 below zero on Monday. West winds of 10 to 25 mph combined with the subzero temperatures created wind chills ranging from 45 to 58 below zero over western and central North Dakota. The winds also created low visibilties in blowing snow in many areas of the region. Some roads were closed due to the blowing and drifting snow over parts of northern North Dakota. The frigid temperatures lead to power outages and water line breaks in several areas.

Winter Weather Pierce County
Begin Date 4/12/2003
Fatalities .21 Injuries .43 Property Damage 0 Crop Damage 0 (Source: Sheldus)

Event Winter Storm State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 02 Apr 2003, 03:24:00 PM CST, Begin Location: Not Known, End Date: 03 Apr 2003, 08:07:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 3, Injuries: 6, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Bottineau, Burke, Divide, Foster, Mchenry, Mckenzie, Mclean, Mountrail, Pierce, Renville, Rolette, Sheridan, Ward, Wells
Description: A third in a series of low pressure systems over Wyoming and western South Dakota moved east...southeast and intensified over the Northern Plains during the day reaching southern Minnesota and northern Iowa on Thursday, April 3rd. A stationary surface frontal boundary extended from northeastern Montana through central North Dakota into the area of low pressure. This promoted overrunning snow

across North Dakota with areas of heavy snow across northern North Dakota. The snowfall combined with easterly winds to 25 mph created areas of blowing and drifting snow and dangerous driving conditions. Snowfall across northern North Dakota ranged 6 to 10 inches with isolated reports of 14.5 inches. Numerous accidents were contributed icy and snow covered roads resulting in 6 serious injuries and 3 deaths across northern North Dakota.

Event Winter Storm State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 01 Apr 2003, 03:09:00 PM CST, Begin Location: Not Known, End Date: 02 Apr 2003, 04:00:00 AM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Bottineau, Foster, Mchenry, Mclean, Mercer, Pierce, Renville, Rolette, Sheridan, Ward, Wells
Description: A second in a series of low pressure systems moved out of Montana and brought an area of heavy snow across northern third of North Dakota overnight of the 1st of April and lasted through the day on the 2nd. Snowfall amounts ranged between 5 to 7 inches across the northern areas of the region. Gusty winds to 30 mph produced low visibilities and dangerous driving conditions. The system moved southeast Tuesday night to be followed by another winter storm system in the west.

Event Winter Storm State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 17 Jan 2003, 03:45:00 AM CST, Begin Location: Not Known, End Date: 17 Jan 2003, 08:15:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Bottineau, Bowman, Burke, Golden Valley, Mchenry, Mountrail, Pierce, Renville, Rolette, Ward
Description: A strong cold front moved across the region producing gusty northwest winds to 35 mph and scattered snow showers. The front moved quickly through western and central North Dakota exiting the region in the evening. As a result the system did not produce the winter weather conditions earlier forecast. The winter storm warning was cancelled Friday evening of the 17th

Event Winter Storm State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 17 Dec 2002, 02:52:00 PM CST, Begin Location: Not Known, End Date: 19 Dec 2002, 04:00:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Dickey, Divide, Dunn, Emmons, Foster, Golden Valley, Grant, Hettinger, Kidder, La Moure, Logan, Mchenry, Mcintosh, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Stutsman, Ward, Wells, Williams
Description: A low pressure system developed over southwestern South Dakota, intensified and moved northeast to northwestern Minnesota during the day on the 17th of December. A band of heavy snow fell across north central and parts of east central North Dakota. A upper level system dropped south out of Canada bringing bands of snow from north central to east central North Dakota on the 18th and 19th of December. In addition to the snow, winds of 25 to 40 mph caused considerable blowing and drifting of the snow. Areas of freezing rain preceded the snowfall. The heaviest snowfall occurred over north central North Dakota where 12 to 19 inches accumulated and drifts over 6 feet reported in some areas. Over east central North Dakota 6 to 8 inches of snow fell and in the far west and far south central North Dakota 3 to 5 inch snowfall was common. After a relatively mild autumn, it was the first major arrival of winter weather to affect the region.

Event Winter Storm State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 07 May 2002, 02:30:00 PM CST, Begin Location: Not Known, End Date: 08 May 2002, 03:00:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Divide, Dunn, Foster, Golden Valley, Grant, Hettinger, Mchenry, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Ward, Wells, Williams
Description: A low pressure system at the surface and upper atmosphere came together to produce heavy snow across northwest and north central North Dakota. Heavy wet snow accumulated between 6 to 10

inches, with some local reports up to 15 inches fell in a band from Williston through Minot to Bottineau and Rolla. The storm system moved out of the area by noon on the 9th of May.

Event Heavy Snow State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 05 Dec 2001, 07:00:00 AM CST, Begin Location: Not Known, End Date: 05 Dec 2001, 09:00:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Bottineau, Mchenry, Pierce, Renville, Rolette Description: Low pressure over Nebraska moved northeast into Minnesota and intensified. The storm brought heavy snow to north central North Dakota with up to 10 inches reported. The heaviest band of snow, 6 to 10 inches fell from Divide and Williams counties expanding eastward to eastern Bottineau and western McHenry counties. The snow reports were from cooperative observers across northern North Dakota.

Event Winter Storm State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 28 Dec 2000, 02:00:00 AM CST, Begin Location: Not Known, End Date: 28 Dec 2000, 10:00:00 AM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Bottineau, Burke, Foster, Mchenry, Pierce, Renville, Rolette, Ward, Wells
Description: A strong low pressure system over Alberta Canada moved rapidly southeast tracking from northwest to southeast North Dakota. The system brought winds and snow across the region. A band of heavy snow, 6 to 8 inches, fell across eastern Bottineau and Rolette counties southeast to Foster County. Three to five inches fell across Burke...Ward and McHenery counties. Gusty northwest winds to 35 mph caused reduced visibilities to less than a quarter mile and considerable blowing and drifting snow.

Event Blizzard State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 15 Dec 2000, 08:00:00 PM CST, Begin Location: Not Known, End Date: 16 Dec 2000, 08:00:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota,
Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Dickey, Divide, Dunn, Emmons, Foster, Golden Valley, Grant, Hettinger, Kidder, La Moure, Logan, Mchenry, Mcintosh, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Stutsman, Ward, Wells, Williams
Description: A strong low pressure system moved rapidly across southern Canada ushering frigid arctic air and strong northwest winds across western and central North Dakota. Wind gust to 60 mph were common throughout the region. The frigid arctic air kept daytime temperatures 5 to 10 below zero. The cold temperatures coupled with the high winds brought dangerous wind chills to 75 below zero. Snowfall was light, around an inch total, however existing snow on the ground created near zero visibilities in blowing and drifting snow for an extended period of time. This prompted the closing of many roads throughout western and central North Dakota.

Event Winter Storm State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 07 Nov 2000, 01:00:00 AM CST, Begin Location: Not Known, End Date: 08 Nov 2000, 12:00:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Dickey, Divide, Dunn, Emmons, Foster, Golden Valley, Grant, Hettinger, Kidder, La Moure, Logan, Mchenry, Mcintosh, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Stutsman, Ward, Wells, Williams
Description: A strong low pressure system along the Kansas/Missouri border moved northward to western Minnesota. Abundant amount of moisture was drawn northward with this system and wrapped around much colder air to the west and north of the low pressure center. Heavy snow fell across western and central North Dakota with accumulations of 6 to 18 inches reported. Up to 18 inches fell in the city of Alexander in McKenzie county causing widespread power outages due to 40 power lines downed. In Divide county at Crosby, reports of two dozen sheep were buried alive in four foot snow drifts. The sheep

were rescued with no lost of the livestock. Other areas received an average of 4 to 8 inches. The snow was accompanied by gusty northwest winds up to 40 mph causing widespread reduced visibilities less than a half mile and wind chills to 30 below zero.

Event Winter Storm State NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 02 Nov 2000, 08:00:00 AM CST, Begin Location: Not Known, End Date: 02 Nov 2000, 09:00:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 7, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Divide, Dunn, Golden Valley, Hettinger, Mchenry, Mckenzie, Mclean, Mercer, Mountrail, Pierce, Renville, Rolette, Slope, Stark, Ward, Williams

Description: A low pressure system over Colorado moved northeast over the plains and intensified. Heavy snow fell across north central and western North Dakota with snow amounts ranging from 6 to 14 inches. In Divide county 14 inches of snow fell in the city of Fortuna. Other snow amounts include 12 inches at Beach in Golden Valley County and Rhame in Bowman County received up to 10 inches of snow. Wind gust to 50 mph were reported in many areas resulting in many roads being closed and caused a tour bus accident in Bowman county resulting in seven serious injuries. Power outages were widespread across the northwest area of the state where up to 500 power lines were downed causing an estimated 1 million dollars in damage.

Event Winter Storm NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 02 Nov 2000, 08:00:00 AM CST, Begin Location: Not Known, End Date: 02 Nov 2000, 09:00:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 7, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Divide, Dunn, Golden Valley, Hettinger, Mchenry, Mckenzie, Mclean, Mercer, Mountrail, Pierce, Renville, Rolette, Slope, Stark, Ward, Williams
Description: A low pressure system over Colorado moved northeast over the plains and intensified. Heavy snow fell across north central and western North Dakota with snow amounts ranging from 6 to 14 inches. In Divide county 14 inches of snow fell in the city of Fortuna. Other snow amounts include 12 inches at Beach in Golden Valley County and Rhame in Bowman County received up to 10 inches of snow. Wind gust to 50 mph were reported in many areas resulting in many roads being closed and caused a tour bus accident in Bowman county resulting in seven serious injuries. Power outages were widespread across the northwest area of the state where up to 500 power lines were downed causing an estimated 1 million dollars in damage.

Event Winter Storm NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 14 Apr 2000, 12:00:00 AM CST, Begin Location: Not Known, End Date: 14 Apr 2000, 08:55:00 AM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Bottineau, Burke, Divide, Dunn, Foster, Mchenry, Mckenzie, Mclean, Mercer, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Ward, Wells, Williams
Description: An upper level disturbance over the central Rockies moved into the plains the night of the 13th. Cold Canadian high pressure system pushed southward over North Dakota. The combination of warmer air from the south...overriding the colder air in the north brought a mixture of precipitation to western and central North Dakota. The storm system brought 4 to 8 inches of snow to the northern half of North Dakota...at times mixed with freezing rain and sleet. Gusty northerly winds brought blowing and drifting snow to the region which caused numerous automobile accidents.

Event Winter Storm NORTH DAKOTA County/Area PIERCE WFO BIS
Begin Date 13 Apr 2000, 02:55:00 PM CST, Begin Location: Not Known, End Date: 13 Apr 2000, 11:59:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota,
Zones affected: Bottineau, Burke, Divide, Dunn, Foster, Mchenry, Mckenzie, Mclean, Mercer, Mountrail,

Oliver, Pierce, Renville, Rolette, Sheridan, Ward, Wells, Williams Description: None Reported
Event Winter Storm NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date 26 Feb 2000, 12:00:00 AM CST,** Begin Location: Not Known, End Date: 26 Feb 2000, 07:30:00 AM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Divide, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, Mchenry, Mcintosh, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Ward, Wells, Williams Description: Low pressure developed over Eastern Colorado on the 24th of February then moved east northeast into Nebraska and intensified before moving into the northern plains during the early morning hours of the 25th. The storm moved quickly northeast to southern Manitoba Canada by the early morning hours on the 27th of February. The storm system maintain abundant amount of moisture which began as rain. As colder air spilled on the back side of the storm system the rain turned to wet snow. A wide band of heavy wet snow fell from south central North Dakota through portions of extreme north central North Dakota.. along the Canadian border. Scattered areas of 8 to 12 inches of wet snow fell over this area with numerous reports of 3 to 6 inches within this band. The maximum snowfall reported was 12 inches along the Grant county/Morton county line in central North Dakota. The eastern edge of the heavy snow-band extended from Lemmon South Dakota to Devils Lake and the western edge extended from Dickinson to Bottineau. Winds with this storm generally ranged between 30 to 45 mph which caused some blowing and drifting snow.
Event Winter Storm NORTH DAKOTA County/Area PIERCE WFO BIS **Begin Date 25 Feb 2000, 04:20:00 AM CST,** Begin Location: Not Known, End Date: 25 Feb 2000, 11:59:00 PM CST, End Location: Not Known, Magnitude: 0, Fatalities: 0, Injuries: 0, Property Damage: $ 0.0, Crop Damage: $ 0.0, State: North Dakota, Zones affected: Adams, Billings, Bottineau, Bowman, Burke, Burleigh, Divide, Dunn, Emmons, Golden Valley, Grant, Hettinger, Kidder, Logan, Mchenry, Mcintosh, Mckenzie, Mclean, Mercer, Morton, Mountrail, Oliver, Pierce, Renville, Rolette, Sheridan, Sioux, Slope, Stark, Ward, Wells, Williams

Identified Risks

- Auto Accidents
- Utility and Communication Disruptions
- Livestock Death, Animal Casualty
- Closure of Schools, Jobs, and Shopping
- Blocked Roads- because of heavy snow, ground drifting, or stalled vehicles
- Building Collapse-due to excessive snow buildup on roofs.
- Business Interruptions
- Delayed Emergency Response-when roads become blocked or there is a loss of communication.
- Downed Power Lines-from ice build-up and high winds.
- DownedTrees-from ice build-up and high winds.
- Evacuation (localized)
- Increased Fire Potential
- Increased Public Safety Runs
- Loss of Power- from weather-related conditions (ice buil-up and high winds).
- Property Damage- in the form of ice and snow build-up on roofs to building freeze-up.

- Hazardous Material Release.
- Personal Injury/Death risk
- Agriculture and Related Business
- Wind Chill Exposure Risks for People, Pets, Livestock, and Wildlife.

Sheldus Totals 01/01/1960 through 12/31/2010 Winter Weather No Inflation

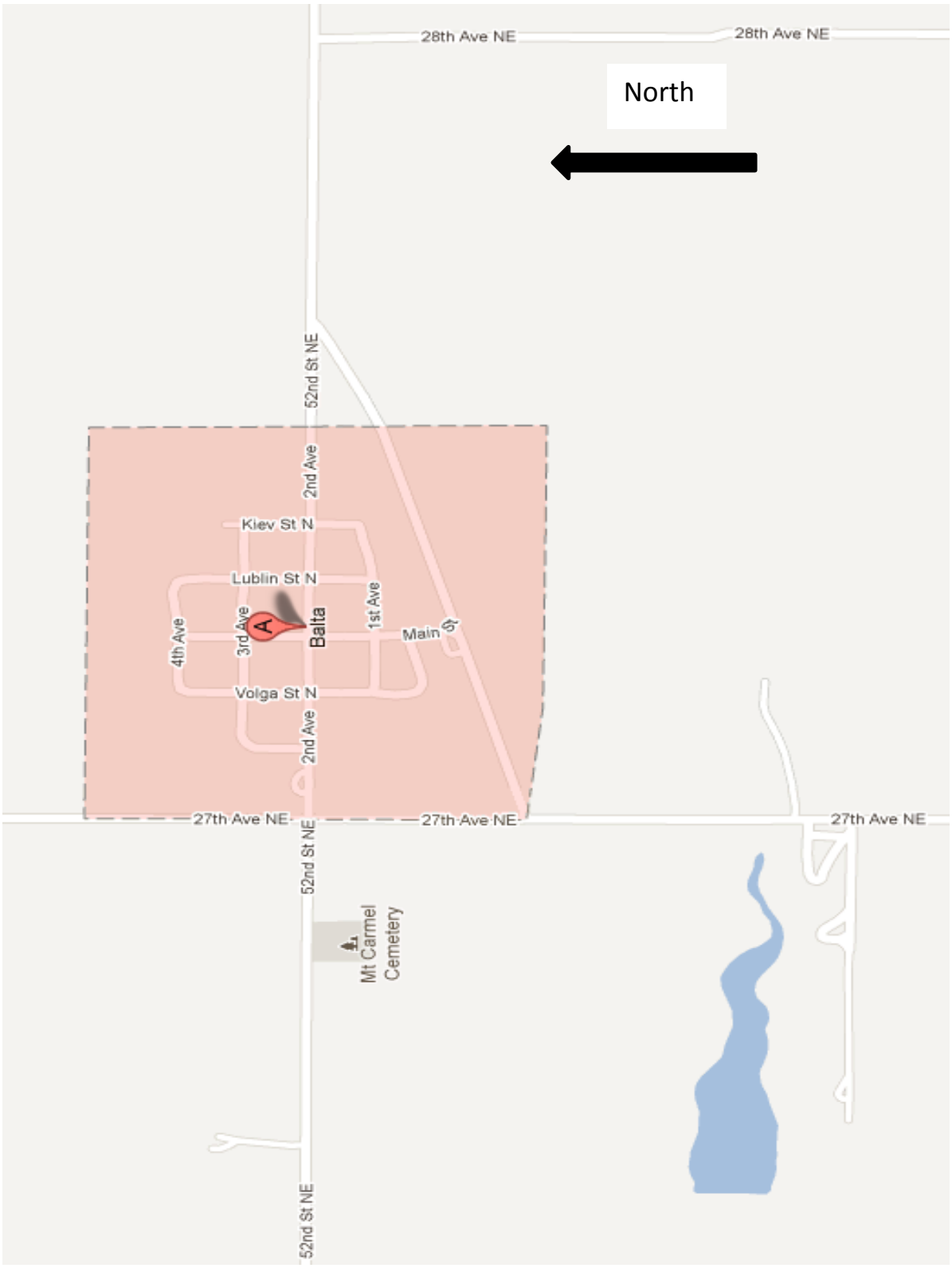
Begin Date	End Date	Hazard/Type/Combo	Injuries	Fatalities	Property Damage	Crop Damage	Remarks
2/1/1986	2/5/1986	Fog - Winter Weather	0	0	27777.78	0	Fog and Freezing Drizzle
5/11/1983	5/11/1983	Severe Storm/Thunder Storm - Winter Weather	0	0	2380.95	0	Severe Storm-Snow
3/4/1983	3/4/1983	Severe Storm/Thunder Storm - Winter Weather	0	0	94339.62	0	Severe Storm-Snow
4/25/1966	4/28/1966	Severe Storm/Thunder Storm - Winter Weather	0	0	943.4	0	RAIN, FREEZING RAIN AND HEAVY SNOW
1/31/2009	1/31/2009	Wind	0	0	2727.27	0	High wind
12/11/2004	12/12/2004	Wind	0.02	0	833.33	0	High Wind
10/31/1999	10/31/1999	Wind	0	0	108333.33	204166.67	HIGH WIND
11/16/1993	11/16/1993	Wind	0	0	4545.45	0	High Winds
1/10/1990	1/11/1990	Wind	0	0.02	943.4	0	High Wind
3/12/1982	3/13/1982	Wind	0	0	94.34	0	High Winds
3/12/1979	3/13/1979	Wind	0	0	0.94	0	Windstorm
11/4/1978	11/4/1978	Wind	0	0	94.34	0	Windstorm
2/20/1965	2/20/1965	Wind	0	0	943.4	0	High Winds
11/18/1977	11/20/1977	Wind - Winter Weather	0	0.04	943.4	0	Blizzard, Wind, Snow
11/6/2008	11/7/2008	Winter Weather	0	0	10000	0	Heavy snow
3/2/2007	3/2/2007	Winter Weather	0	0	833.33	0	Blizzard
12/30/2006	12/30/2006	Winter Weather	0	0	6470.59	0	Heavy Snow
10/5/2005	10/5/2005	Winter Weather	0	0	100000	0	Blizzard
4/2/2003	4/3/2003	Winter Weather	0.43	0.21	0	0	
2/25/1998	2/28/1998	Winter Weather	0.21	0	8333.33	0	BLIZZARD
4/4/1997	4/7/1997	Winter Weather	0.48	0.06	1354545.45	0	BLIZZARD
1/9/1997	1/11/1997	Winter Weather	1.25	0.06	1530555.56	0	BLIZZARD

1/16/1994	1/18/1994	Winter Weather	0	0	943.4	0	EXTREME COLD
10/27/1991	10/29/1991	Winter Weather	0	0	21739.13	2173.91	Snow, Ice Storm
12/19/1990	12/22/1990	Winter Weather	0	0	943.4	0	Extreme Cold
11/7/1986	11/8/1986	Winter Weather	0.02	0.06	9433.96	0	Blizzard, Heavy Snow, Ice Storm
4/13/1986	4/14/1986	Winter Weather	0	0	12195.12	0	Blizzard, Heavy Snow, Ice Storm
4/25/1984	4/28/1984	Winter Weather	0	0	142857.14	0	Blizzard/Severe Winter Storm
12/23/1983	12/25/1983	Winter Weather	0	0	943.4	0	Extreme Cold
10/5/1982	10/6/1982	Winter Weather	0	0	172.41	0	Heavy Snow
8/27/1982	8/27/1982	Winter Weather	0	0	0	29411.76	Frost
1/21/1982	1/23/1982	Winter Weather	0.04	0	0	0	Blizzard/Winter Storm
1/14/1982	1/15/1982	Winter Weather	0.06	0	94.34	0	Winterstorm
1/9/1982	1/10/1982	Winter Weather	0	0	9.43	0	Ground Blizzard, Extreme Cold
2/6/1981	2/7/1981	Winter Weather	0.02	0	94.34	0	winter storm
1/5/1980	1/6/1980	Winter Weather	0	0	943.4	0	Blizzard
4/11/1979	4/12/1979	Winter Weather	0	0	943.4	0	Heavy Snow
3/18/1979	3/19/1979	Winter Weather	0	0	1724.14	0	winter storm
2/22/1979	2/23/1979	Winter Weather	0	0	943.4	0	winter storm
2/14/1979	2/15/1979	Winter Weather	0.06	0	0	0	winter storm
12/28/1978	12/29/1978	Winter Weather	0.06	0	0	0	Blizzard (North) Heavy Snow (South)
1/24/1978	1/25/1978	Winter Weather	0	0.04	0	0	Blizzard
12/16/1977	12/16/1977	Winter Weather	0	0	94339.62	0	ICE STORM
1/1/1976	1/2/1976	Winter Weather	0.02	0.02	94.34	0	snow, blizzard
12/30/1975	12/31/1975	Winter Weather	0	0	94.34	0	snowstorm
11/11/1975	11/11/1975	Winter Weather	0.03	0	0	0	Snowstorm
3/26/1975	3/28/1975	Winter Weather	0	0.06	0	0	blizzard
1/10/1975	1/11/1975	Winter Weather	0	0.23	0	0	blizzard
9/25/1972	9/25/1972	Winter Weather	0	0	1.22	12.2	Snow
6/20/1972	6/20/1972	Winter Weather	0	0	0	94.34	Frost
2/17/1972	2/17/1972	Winter Weather	0	0	31.25	0	Blizzard
2/23/1969	2/27/1969	Winter Weather	0	0	943.4	0	SEVERE SNOW AND ICE STORM
1/22/1969	1/24/1969	Winter Weather	0	0.04	0	0	Blizzard
4/29/1967	5/2/1967	Winter Weather	0.2	0.02	10000	0	ICE STORM, BLIZZARD

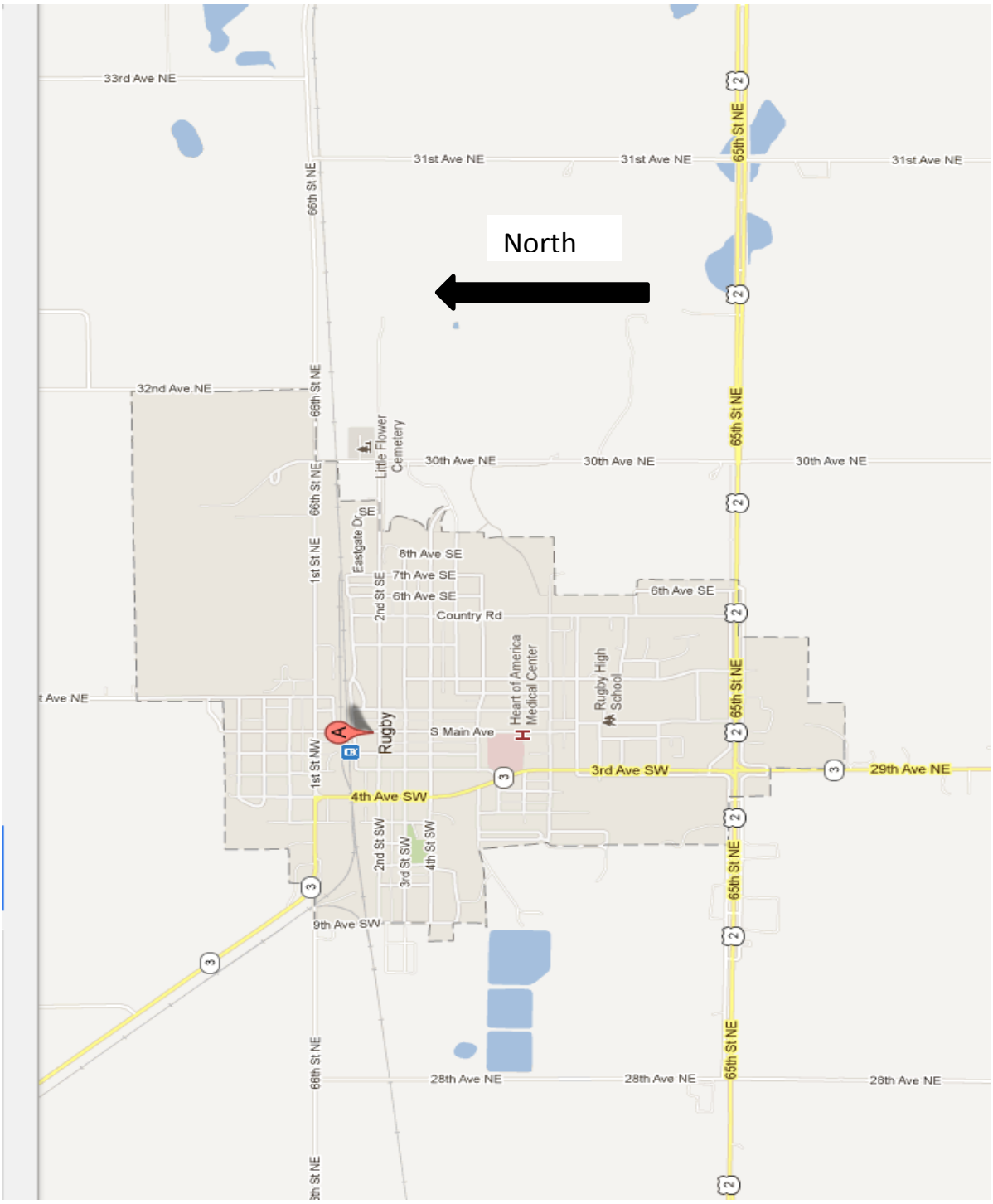
2/23/1967	2/23/1967	Winter Weather	0	0	94.34	0	Blizzard
1/15/1967	1/16/1967	Winter Weather	0	0	200	0	Sever Blizzard
3/2/1966	3/5/1966	Winter Weather	0	0.02	10204.08	0	Blizzard
12/15/1964	12/17/1964	Winter Weather	0	0	943.4	0	BLIZZARD
12/6/1963	12/8/1963	Winter Weather	0	0.08	0	0	Blizzard
11/28/1960	11/28/1960	Winter Weather	0.04	0.04	943.4	0	BLIZZARD COVERED ALL OF STATE BUT HEAVIEST SNOW FELL IN EASTERN HALF OF STATE.
1/1/1960	1/4/1960	Winter Weather	0	0	94.34	0	Cold Wave, Blizzard
			2.94	1.00	$3,567,603.35	$235,858.88	

Pierce County

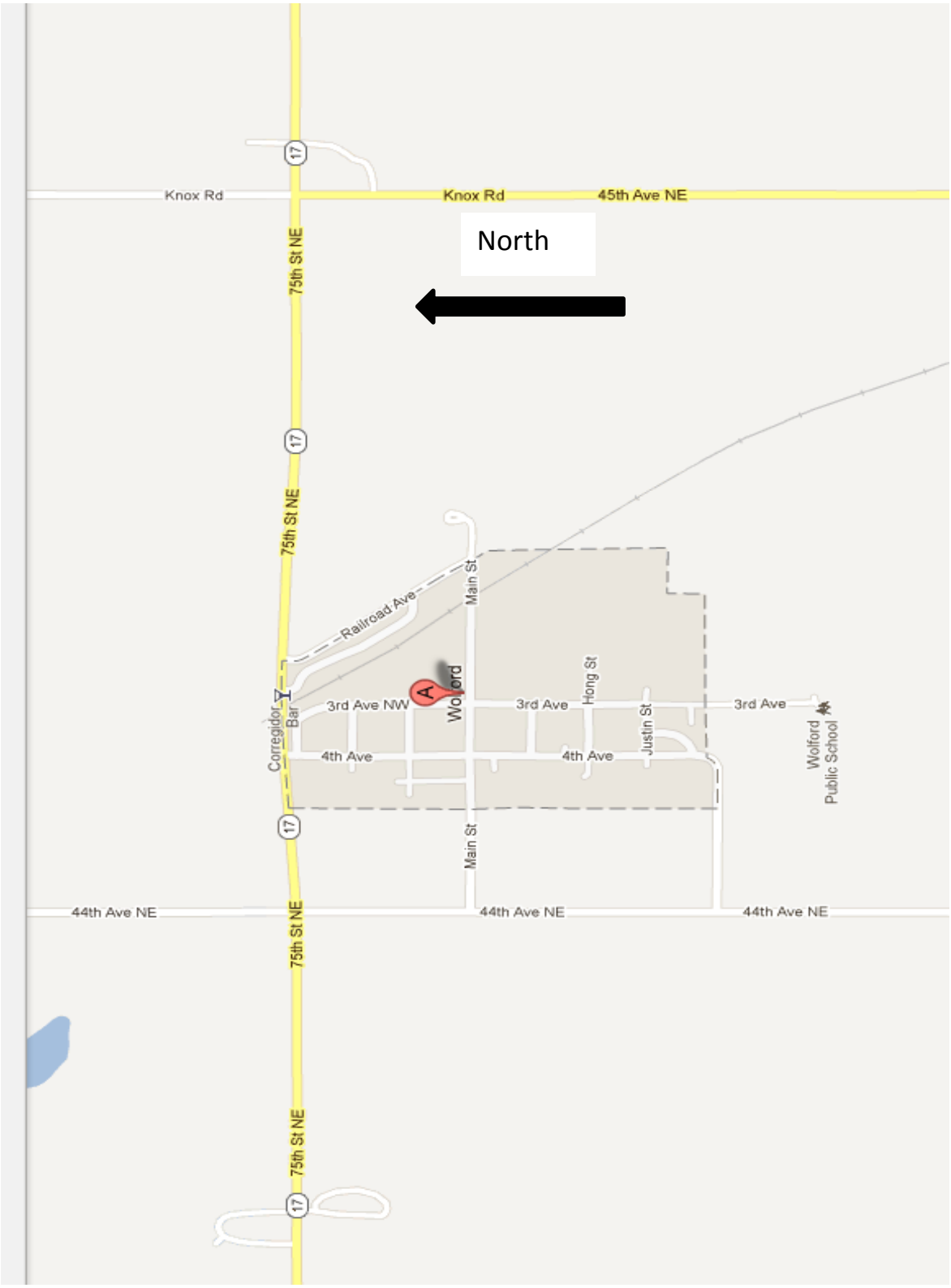
City of Balta



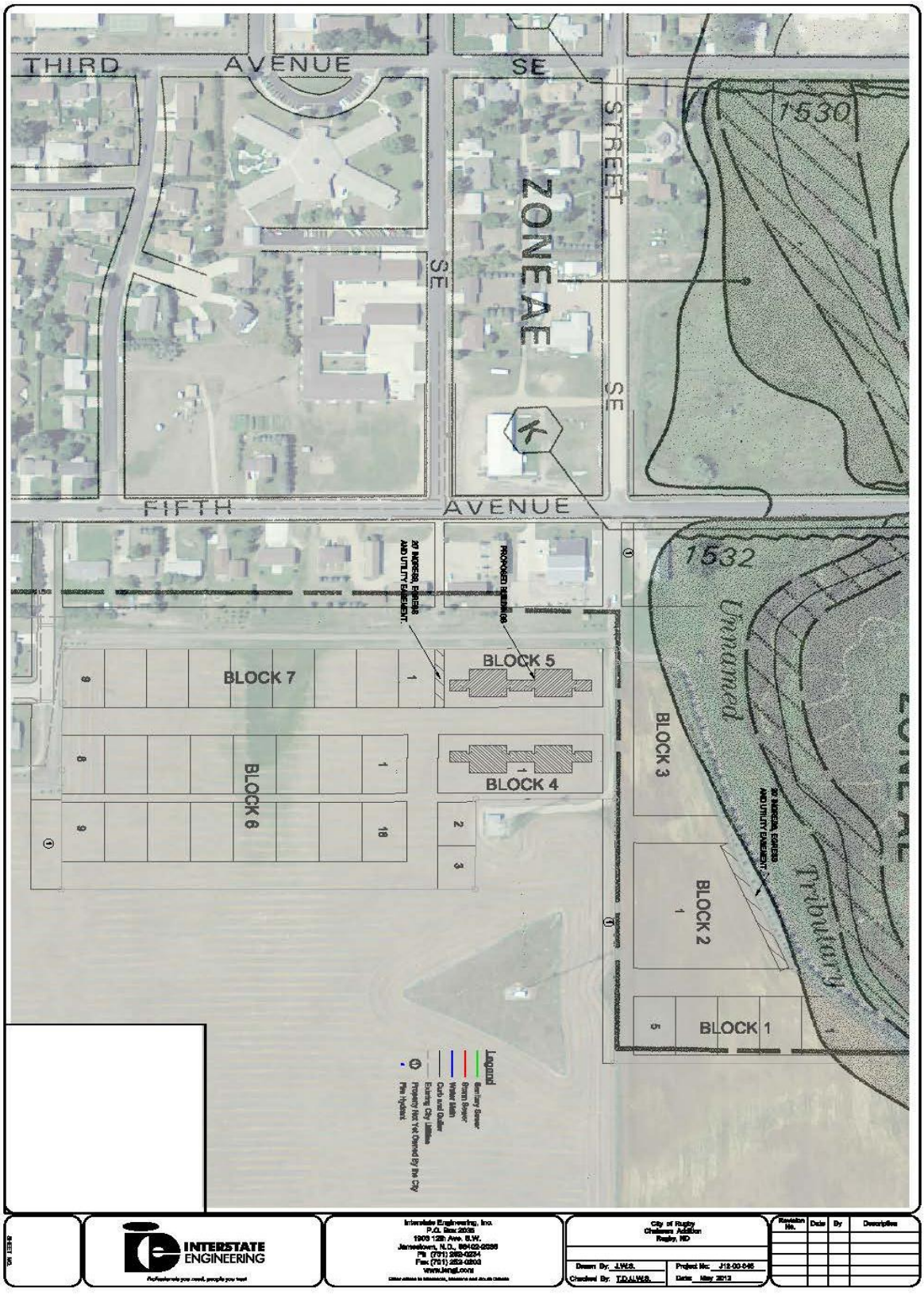
City of Rugby



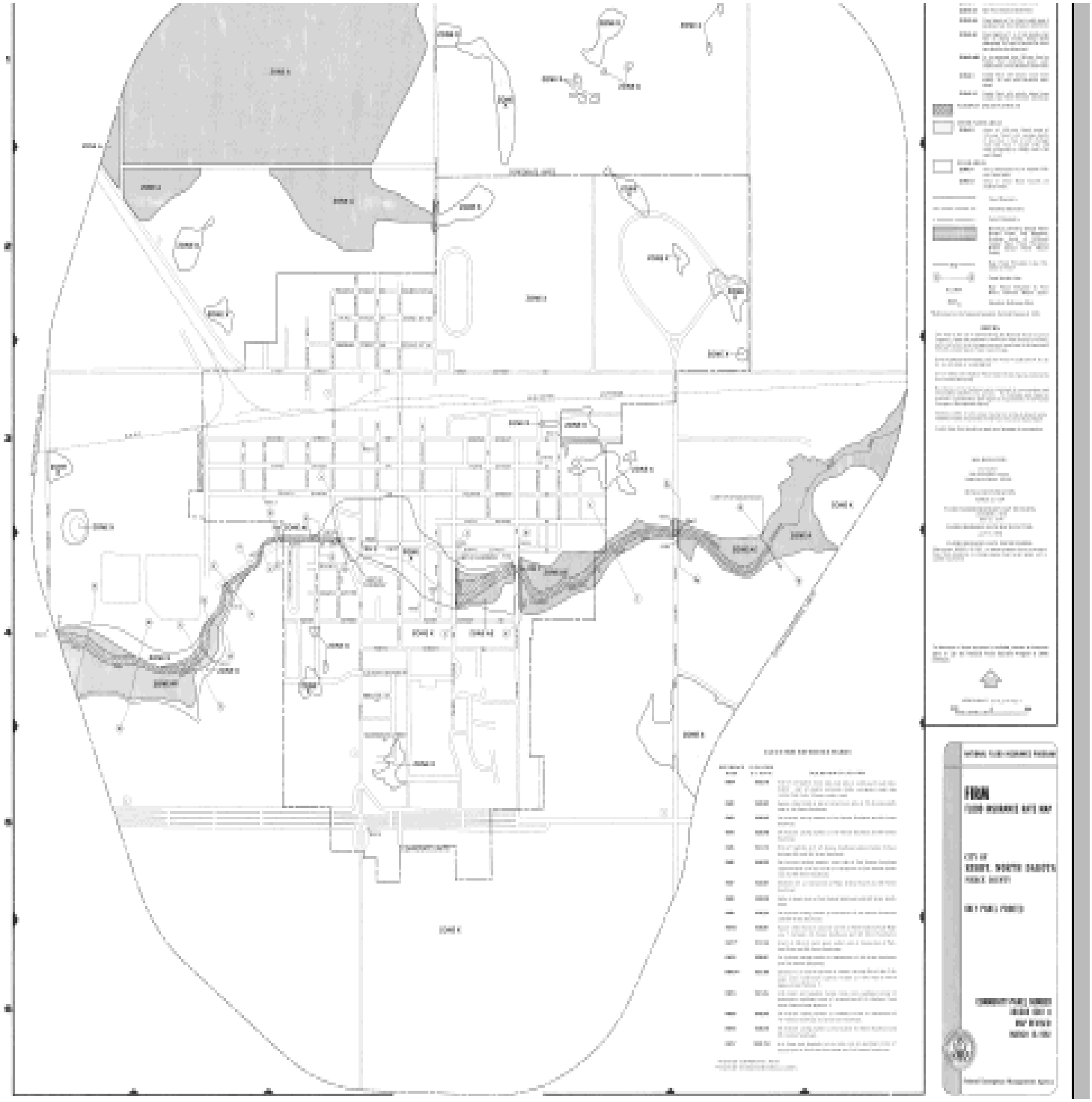
City of Wolford



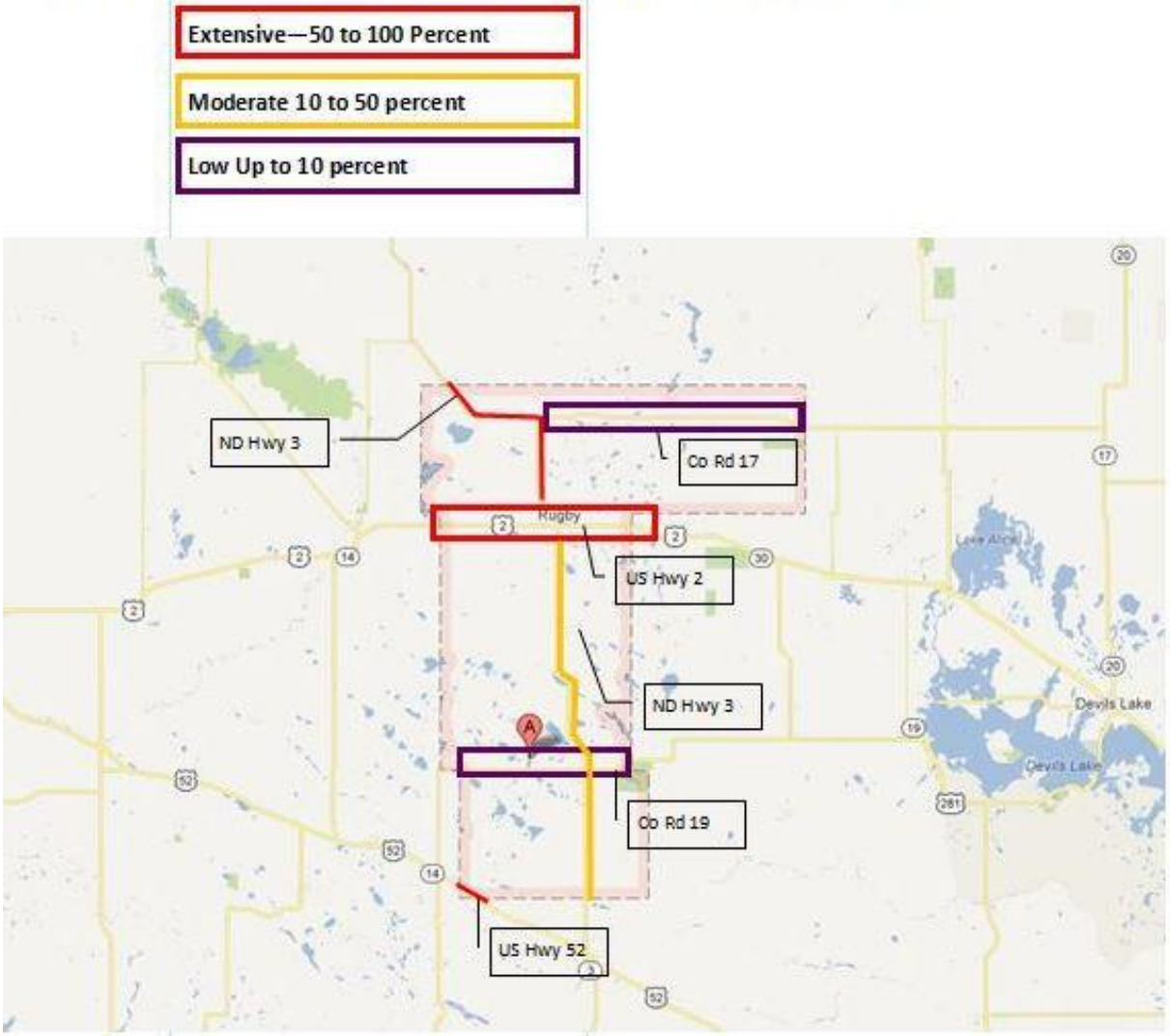
Proposed Housing Development Overlay on Rugby Flood Map



Rugby Flood Map



Pierce County Profile of Location of Areas Affected by Transportation Accidents



Mitigation Strategy

The objective of the 2013 Pierce County Multi-Hazard Mitigation Plan is to establish a methodical process to assist in hazard recognition, impact evaluation, and action plan development.

Three goals have been identified to implement the objective:

- Goal 1: Communication, education, and outreach.
- Goal 2: Minimize loss of life and property.

The following objectives and projects were identified under each goal:

Goal 1 Communication, education, and outreach.

Objective 1.1: Communication with stakeholders to mitigate loss of critical infrastructure and safety of special populations.

Projects 1 through 6

Objective 1.2: Educate the public on hazards and hazard mitigation in Pierce County and its jurisdictions so that individuals understand the risks in the county and can make good personal and financial decisions to prepare themselves for a disaster.

Projects 7 through 19

Objective 1.3: Update Pierce County Multi-Jurisdictional Multi- Hazard Mitigation Plan to reduce risks through education and situational awareness of hazards in Pierce County and its jurisdictions and mitigation projects.

Projects 20 through 21

Goal 2 Minimize loss of life and property.

Objective 2.1: Mitigate loss of life and property.

Projects 22 through 31

Objective 2.2: Provide warning systems to keep people safe.

Projects 32 through 36

Objective 2.3: Use land management tools to mitigate disasters to current and future projects.

Projects 37 through 41

The planning committee identified and analyzed 41projects.

The Planning Committee utilized the STAPLEE method to prioritize the projects. STAPLEE criteria refers to seven criteria-Social, Technical, Administrative, Political, Legal, Economic, and Environmental. The committee identified the negative and/or positive impacts and cost-benefit ratio of each proposed mitigation project. The committee used a one to five (1 to 5) scoring for each of the seven criteria. One (1) was low, indicating a negative impact and/or too costly, and five (5) being high, indicating a positive impact and/or a higher benefit compared to cost.

Ranking of priority:

Scores: 25 to 35 as **High**

Scores: 15 to 24 as **Medium**

Scores: 1 to 14 as **Low**

Each project is profiled below, including the STAPLEE score received.

Goal 1: Communication, education, and outreach

Objective 1.1: Communication with stakeholders to mitigate loss of critical infrastructure and safety of special populations.

Mitigation Project 1:

Description	Communication between Heart of America Correctional Center and fire department and county commissioners to ensure critical population is safe. Fire Department walk-thru to address any safety concerns.
Benefits	Lines of communication are opened up between jail officials and fire department and county commissioners and any safety concerns are addressed.
Hazards Addressed	summer storm, winter storm, urban fire and structure collapse, shortage of critical materials, and hazardous materials
Affected Jurisdictions	Pierce County
Priority	High
Responsible Party	Fire Department and County Commission
Partners	
Others to be involved	Rugby JDA, owner of the real estate and structure
Timeframe for Completion	12 months
Cost	TBD
Funding Source	County

S	T	A	P	L	E	E	Total
5	5	4	5	5	5	5	34

Mitigation Project 2:

Description	Maintain open lines of communication between Pierce County and its jurisdictions and Center of America Medical Center
Benefits	Gain situational awareness with one another on courses of actions each will take in any given hazard to assure medical services are available.
Hazards Addressed	All-Communicable Diseases, Dam Failure, Drought, Extreme Heat, Hazardous Materials, Homeland Security Incident, Rural fire and Wildland Fire, Shortage of Critical Materials, Summer Storm. Urban Fire and Structure Collapse, Winter Storms
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	Pierce County, Rugby,
Partners	Balta, Wolford, Hospital Administration
Timeframe for Completion	Annually
Cost	0-$500 Meeting Location
Funding Source	County and City, hospital, state and federal grants

S	T	A	P	L	E	E	Total
5	5	5	5	5	5	5	35

Mitigation Project 3:

Description	Maintaining open lines of communication between Pierce County, Rugby, Balta, Wolford and the School Districts.
Benefits	Gain situational awareness with one another on courses of actions each will take in any given hazard.
Hazards Addressed	All-Communicable Diseases, Dam Failure, Drought, Extreme Heat, Hazardous Materials, Homeland Security Incident, Rural fire and Wildland fire, Shortage of Critical Materials, Summer Storm. Urban Fire and Structure Collapse, Winter Storms
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	Pierce County, Rugby, Balta, Wolford, School Districts
Partners	
Timeframe for Completion	Annually
Cost	0-$500 Meeting Location
Funding Source	County and cities, school districts

S	T	A	P	L	E	E	Total
5	5	5	5	5	5	5	35

Mitigation Project 4:

Description	Communicate with Otter Tail Power on loss of power/power pole.
Benefits	Supply City with Power.
Hazards Addressed	Shortage of Critical Materials, Winter Storm, Summer Storm
Affected Jurisdictions	Wolford
Priority	High
Responsible Party	Wolford
Partners	Otter Tail Power Company
Timeframe for Completion	12 months
Cost	$0
Funding Source	N/A

S	T	A	P	L	E	E	Total
5	5	3	5	4	5	5	32

Mitigation Project 5:

Description	Verify/communicate that Rural Water has backup power.
Benefits	To supply potable water for Wolford during a power outage.
Hazards Addressed	Shortage of Critical Materials, Winter Storms, Summer Storms, Flooding
Affected Jurisdictions	Wolford
Priority	High
Responsible Party	Wolford
Partners	Rural Water
Timeframe for Completion	12 months
Cost	$0
Funding Source	N/A

S	T	A	P	L	E	E	Total
5	5	4	5	4	4	3	30

Mitigation Project 6:

Description	Communicate with church if basement could be used as a shelter and identify steps that would need to be taken. The shelter would be used for people in town without basements and for visitors of the Balta Dam Recreation Area.
Benefits	Keep people safe.
Hazards Addressed	Summer Storms, Winter Storms
Affected Jurisdictions	Balta
Priority	
Responsible Party	Balta
Partners	Pierce County, Church
Timeframe for Completion	1-2 years
Cost	Estimates needed after steps identified
Funding Source	City and County, State and Federal Grants

S	T	A	P	L	E	E	Total

Objective 1.2: Educate the public on hazards and hazard mitigation in Pierce County and its jurisdictions to understand risks. Provide the public with information that allows them to make good personal and financial decisions before a disaster occurs. An informed and educated public can better prepare themselves for any disaster situation.

Mitigation Project 7:

Description	Use literature to inform and prepare residents/travelers/visitors in county and its jurisdictions how to stay safe in summer storms and winter storms. Provide information on location of shelters, warning systems, local news media sources to obtain weather reports and road reports. Use the National Weather Service StormReady program to enhance community awareness.
Benefits	Safety to travelers and residents
Hazards Addressed	Summer Storms, Winter Storms
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	Emergency Manager
Partners	
Timeframe for Completion	12 months
Cost	$5000 for fliers available at Hotels, Campgrounds, on-line, Chamber, JDA, City Hall
Funding Source	County and city budgets, state and federal grants

S	T	A	P	L	E	E	Total
5	5	5	5	5	3	5	33

Mitigation Project 8:

Description	Educate public on insurance options associated with hazards. Educate those in flood hazard as to participation in National Flood Insurance Program. Educate agricultural producers on how crop insurance may decrease financial losses from drought, hail, and severe weather.
Benefits	Protection of property and reduced financial losses
Hazards Addressed	Summer Storms, Flood, Drought
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	Emergency Manager
Partners	Insurance Companies, Extension Agents
Timeframe for Completion	Continuous
Cost	$500-$1000 Workshops/literature
Funding Source	County and city budgets, state and federal grants

S	T	A	P	L	E	E	Total
5	5	5	5	5	3	5	33

Mitigation Project 9:

Description	Public awareness campaign on the hazard of rural fires including grass fires and agricultural fires. Educate on proper fire extinguisher use and the importance to carry them on farm equipment. Educate on control burns and optimal burning conditions.
Benefits	Protection of property and people
Hazards Addressed	Rural Fire
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	Fire Departments, Emergency Manager
Partners	
Timeframe for Completion	12 months
Cost	$1000-$2000 Workshops/Media/Print Literature
Funding Source	County and city budgets, state and federal grants

S	T	A	P	L	E	E	Total
5	5	5	5	5	3	5	33

Mitigation Project 10:

Description	Inform farmers/ranchers/public of water conservation techniques and alternative water sources. Implement water bans if needed during a drought situation.
Benefits	Awareness on how to handle water shortages
Hazards Addressed	Drought
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	Emergency Manager, County Commissioners
Partners	City works
Timeframe for Completion	Ongoing/seasonal
Cost	$500-$1000 Media
Funding Source	City budget, state and federal grants

S	T	A	P	L	E	E	Total
5	5	5	5	5	3	5	33

Mitigation Project 11:

Description	Public awareness campaigns on the importance of replacing batteries in smoke detectors/fire extinguisher safety/fire escape route in place
Benefits	Public is prepared in an event of fire
Hazards Addressed	Urban Fire
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	Fire Department, Emergency Manager
Partners	Cities
Timeframe for Completion	Ongoing
Cost	$1000-$2000 Media/Print/Add to Booklet
Funding Source	County and city, state and federal grants

S	T	A	P	L	E	E	Total
5	5	5	5	5	3	5	33

Mitigation Project 12:

Description	Inform public of health hazards from extreme heat. Inform public on the importance to maintain air conditioners/cooling sources. Promote neighborhood watch for special populations that may not have access to air conditioning during high temperatures. Education sports teams on sign on heat stroke/exhaustion/necessary breaks and fluid intake. Farmer/Rancher education on crop irrigation/animal safety during extreme heat. Educating on OSHA guidelines (chart of work/break times) for those with outdoor jobs during high temperatures. Public awareness on how to read heat index chart.
Benefits	Human and animal safety
Hazards Addressed	Extreme Heat
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	Emergency Manager
Partners	Fire Departments, Hospital
Timeframe for Completion	Annually
Cost	$1000-$3000 Media/Print/Add to Booklet
Funding Source	County and city, state and federal grants

S	T	A	P	L	E	E	Total
5	5	5	5	5	3	5	33

Mitigation Project 13:

Description	Get information out to public to create alert awareness on Homeland Security issues. Have a website list available to reference current alert levels and general information. Set up drills and workshop in schools, workplace, and government offices.
Benefits	Create situational awareness
Hazards Addressed	Homeland Security
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	Emergency Manager
Partners	State, Law Enforcement, Schools, All Businesses, Media
Timeframe for Completion	Ongoing
Cost	$500 Drills/Workshops/Print/Media
Funding Source	County and city, state and federal grants

S	T	A	P	L	E	E	Total
4	5	5	4	5	4	5	32

Mitigation Project 14:

Description	Provide information on prevention/spread of diseases. Include information to include diseases affecting people, crops, and livestock.
Benefits	Lessen number of people exposed/shorten duration of outbreak/decrease mortality for the at risk population (old/very young/immune compromised)
Hazards Addressed	Communicable Disease
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	Pierce County, Cities, Public Health
Partners	NDSU Extension, NDDoH, Vet Services, NDDoA
Timeframe for Completion	Annual education based on epidemiological evidence/Hx of disease outbreaks/Expected vs. unexpected diseases/outbreak occurrence
Cost	$500-$1000 Print/Media/Workshops
Funding Source	Department of Health, media public service announcements, state and federal grants

S	T	A	P	L	E	E	Total
5	5	3	5	5	4	5	32

Mitigation Project 15:

Description	Public awareness of dangers of winter storms. Educate public to have access to snow routes and closed road reports. Literature on importance to carry winter survival kits in cars/trucks/school buses. Literature on what to do if your car becomes stuck in a winter storm.
Benefits	Safety of travels.
Hazards Addressed	Winter Storms
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	Emergency Manager
Partners	City and County Road Departments, Sheriff Department, Department of Transportation, Highway Patrol, Media
Timeframe for Completion	Annually
Cost	$500-$1000 Media/Print
Funding Source	County and city, state and federal grants

S	T	A	P	L	E	E	Total
5	5	3	5	5	3	5	31

Mitigation Project 16:

Description	Situational awareness of resources in Pierce County. List of supplies to keep on hand. List of available sources to access critical materials.
Benefits	Public is prepared in the event of a shortage of critical materials and understands what they can do to keep themselves safe.
Hazards Addressed	Shortage of Critical Materials
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	City and County Officials, Emergency Manager
Partners	Fire Department, DES, Power Company
Timeframe for Completion	On going
Cost	$500-$1000 Media/Print
Funding Source	County and city, state and federal grants, local food pantry, volunteer groups

S	T	A	P	L	E	E	Total
5	5	3	5	5	3	4	30

Mitigation Project 17:

Description	Educate public on current road conditions/alternative routes, seat belt use, defensive driving, and bike and walk path awareness to promote safe driving practices.
Benefits	Decrease in the amount and severity of transportation accidents.
Hazards Addressed	Transportation Accidents
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	Emergency Manager, Law Enforcement
Partners	
Timeframe for Completion	Ongoing/Annually
Cost	$500 Media/Print
Funding Source	County and city, state and federal grants

S	T	A	P	L	E	E	Total
5	5	5	5	5	5	5	35

Mitigation Project 18:

Description	Survey residents on disasters.
Benefits	Compare knowledge gained from survey to survey and use data in plan updates. Find hazards that may still need to be addressed
Hazards Addressed	All-Communicable Diseases, Dam Failure, Drought, Extreme Heat, Hazardous Materials, Homeland Security Incident, Rural fire and Wildland fire, Shortage of Critical Materials, Summer Storm. Urban Fire and Structure Collapse, Winter Storms
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	Emergency Manager
Partners	
Timeframe for Completion	3 to 4 years
Cost	$1,500 printing/postage/fuel/labor
Funding Source	County, state and federal grants

S	T	A	P	L	E	E	Total
3	3	4	5	5	3	4	27

Mitigation Project 19:

Description	Ensure pipeline companies do hazard media/advertisement to educate public on pipeline safety.
Benefits	Public Safety and Create Public Awareness
Hazards Addressed	Urban Fire and Structure Collapse
Affected Jurisdictions	Pierce County
Priority	High
Responsible Party	Fire Department
Partners	Pipeline Companies, City Officials, County Officials,
Timeframe for Completion	Within six months
Cost	0-$500
Funding Source	Pipeline Companies

S	T	A	P	L	E	E	Total
5	5	4	5	5	4	5	33

Objective 1.3: Maintain up to date plans in Pierce County to reduce risks through education and situational awareness of hazards in Pierce County and its jurisdictions and proper mitigation projects.

Mitigation Project 20:

Description	Update Pierce County Multi-Jurisdictional Multi-Hazard Mitigation Plan
Benefits	Pierce County will have available a FEMA-approved plan to reference.
Hazards Addressed	All Hazards - Communicable Diseases, Dam Failure, Drought, Extreme Heat, Hazardous Materials, Homeland Security Incident, Rural fire and Wildland fire, Shortage of Critical Materials, Summer Storm. Urban Fire and Structure Collapse, Winter Storms
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	Emergency manager,
Partners	Participating Jurisdictions
Timeframe for Completion	4 years
Cost	$20,000 to $30,000
Funding Source	County, state and federal grants, i.e. FEMA Hazard-Mitigation Grant

S	T	A	P	L	E	E	Total
5	5	5	5	5	5	5	35

Mitigation Project 21:

Description	Update location of hazardous materials containment and verify they are stored out of harm's way.
Benefits	Safety
Hazards Addressed	Hazardous Materials
Affected Jurisdictions	Pierce County , Rugby, Balta, Wolford,
Priority	High
Responsible Party	Pierce County
Partners	Pierce County , Rugby, Balta, Wolford, owners of hazardous materials
Timeframe for Completion	6 months and then annually
Cost	Need to acquire estimates
Funding Source	County and cities, state and federal grants

S	T	A	P	L	E	E	Total
5	5	5	5	5	5	5	35

Goal 2: Minimize loss of life and property

Objective 2.1: Mitigate loss of life and property.

Mitigation Project 22:

Description	Install back-up generator at the Memorial Hall designated storm shelter.
Benefits	Public safety during power outages due to summer storms/winter storms/flooding/shortage of critical materials
Hazards Addressed	Flooding, Shortage of Critical Materials, Summer Storms, Winter Storms
Affected Jurisdictions	Pierce County, Rugby
Priority	High
Responsible Party	County Commissioners, City Officials, Emergency Manager
Timeframe for Completion	2 years
Cost	Need estimates/pad/generator/fuel tank/propane 150 kw generator, automatic transfer switch and others $176,000
Funding Source	County and city, state and federal grants

S	T	A	P	L	E	E	Total
5	5	5	4	5	4	3	31

Mitigation Project 23:

Description	Generator for Lift Station
Benefits	To prevent sewer backup in the city's homes and businesses.
Hazards Addressed	Shortage of Critical Materials, Summer Storms, Winter Storms
Affected Jurisdictions	Balta
Priority	
Responsible Party	City Council
Timeframe for Completion	1-2 years
Cost	To Be Determined
Funding Source	City, State & Federal Grants

S	T	A	P	L	E	E	Total

Mitigation Project 24:

Description	Backup power source for sewer lifts, water plant, storm shelters-Armory, City Hall.
Benefits	Health and safety of people. Shelter of people.
Hazards Addressed	Shortage of Critical Facilities, Winter Storms, Extreme Heat
Affected Jurisdictions	Rugby
Priority	High
Responsible Party	Rugby
Partners	Armory-ND National Guard
Timeframe for Completion	5 years
Cost	Switching-$40,000 each Generator-$150,000 to $175,000 each
Funding Source	City, State, and Federal Grants

S	T	A	P	L	E	E	Total
5	5	5	5	5	3	5	33

Mitigation Project 25:

Description	Investigate/designate a Storm Shelter
Benefits	Safe location during storm
Hazards Addressed	Summer Storm, Winter Storm
Affected Jurisdictions	Wolford
Priority	High
Responsible Party	Wolford
Partners	
Timeframe for Completion	12 months
Cost	Estimates needed
Funding Source	To Be Determined

S	T	A	P	L	E	E	Total
5	4	4	5	5	4	4	31

Mitigation Projects 26:

Description	Communicate with Rugby veterinarian and other for discussion of establishing a pet shelter for a disaster.
Benefits	People's pets would have a shelter.
Hazards Addressed	Shortage of Critical Facilities, Winter Storms, Extreme Heat, Summer Storms, Flooding
Affected Jurisdictions	Rugby, Pierce County
Priority	High
Responsible Party	Rugby
Partners	Veterinarian
Timeframe for Completion	5 years
Cost	To Be Determined
Funding Source	City, State, and Federal Grants, Local donations

S	T	A	P	L	E	E	Total
4	4	5	5	4	5	5	32

Mitigation Project 27:

Description	Water rationing through water plant.
Benefits	Ample water supply.
Hazards Addressed	Drought
Affected Jurisdictions	Rugby
Priority	High
Responsible Party	Rugby
Partners	Department of Transportation
Timeframe for Completion	On going
Cost	To Be Determined
Funding Source	City, state and federal grants

S	T	A	P	L	E	E	Total
3	4	5	3	5	5	5	30

Mitigation Project 28:

Description	Create snow ridges and snow fences program. Plan to educate and begin to start planting within three years.
Benefits	Keep roads open for people to use and for emergency vehicles.
Hazards Addressed	Winter Storms
Affected Jurisdictions	Pierce County
Priority	High
Responsible Party	County Commission/Road Department
Timeframe for Completion	Annually
Cost	$500
Funding Source	County

S	T	A	P	L	E	E	Total
3	5	5	5	5	4	5	32

Mitigation Project 29:

Description	Communicate with elevators to assure that train cars to not block all streets-train crossings to maintain access for emergency vehicles.
Benefits	Public safety and to keep roads open for emergency services.
Hazards Addressed	Transportation Accidents
Affected Jurisdictions	Pierce County, Rugby
Priority	High
Responsible Party	Fire Department
Partners	Emergency Services
Timeframe for Completion	3-6 months
Cost	0
Funding Source	0

S	T	A	P	L	E	E	Total
5	5	5	5	5	5	5	35

Mitigation Project 30:

Description	Maintain drain field through city of Rugby. Assure foliage is eliminated to assure water can flow through and to eliminate stagnant water for reduction of insects and rodents.
Benefits	Public Safety
Hazards Addressed	Flood, Communicable Disease
Affected Jurisdictions	Rugby
Priority	High
Responsible Party	Rugby
Partners	North Dakota Department of Transportation
Timeframe for Completion	Ongoing
Cost	Open
Funding Source	To Be Determined

S	T	A	P	L	E	E	Total
5	5	5	5	5	5	4	34

Mitigation Project 31:

Description	Culvert improvements and upgrades
Benefits	Stop flooding basements; eliminate standing water in low lying areas.
Hazards Addressed	Flooding, Summer Storms
Affected Jurisdictions	Wolford
Priority	High
Responsible Party	Wolford
Partners	
Timeframe for Completion	24 months
Cost	To Be Determined
Funding Source	City, state and federal, Water District Board

S	T	A	P	L	E	E	Total
5	5	4	5	4	5	5	33

Objective 2.2: Provide warning systems to keep people safe.

Mitigation Project 32:

Description	Install yellow flashing lights on reduce speed ahead signs upon entering the City of Rugby. Thus, creating awareness of approaching town and the need to reduce speed.
Benefits	Reduce traffic incidents
Hazards Addressed	Transportation Accidents
Affected Jurisdictions	Pierce County, Rugby
Priority	High
Responsible Party	Pierce County, Rugby
Partners	ND Department of Transportation
Timeframe for Completion	1 year
Cost	Estimates needed
Funding Source	City of Rugby, Pierce County, State (Department of Transportation)

S	T	A	P	L	E	E	Total
5	5	5	5	1	2	5	29

Mitigation Project 33:

Description	Warning siren for city. Siren to provide warning for people to take shelter from approaching storms.
Benefits	Public Safety
Hazards Addressed	Summer Storms
Affected Jurisdictions	Balta
Priority	
Responsible Party	City Council
Timeframe for Completion	1-2 years
Cost	To Be Determined
Funding Source	City and County, State and Federal Grants, Utility Grant programs

S	T	A	P	L	E	E	Total

Mitigation Project 34:

Description	Install Fire Index Signs in towns
Benefits	Create situational awareness of current fire danger index
Hazards Addressed	Rural Fire and Wildland Fire
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	Fire Departments
Partners	Cities, County, Emergency Manager
Timeframe for Completion	Within one year
Cost	Signs need to get estimate
Funding Source	County and city, state and federal grants

S	T	A	P	L	E	E	Total
5	5	5	5	5	5	5	35

Mitigation Project 35:

Description	Create a fire burn ban system.
Benefits	Protect property—house, hay, crop
Hazards Addressed	Rural Fire and Wildland Fire
Affected Jurisdictions	Pierce County
Priority	High
Responsible Party	County Commissioners, Emergency Manager
Timeframe for Completion	Within six months
Cost	$500
Funding Source	County, state and federal grants

S	T	A	P	L	E	E	Total
5	5	5	5	5	5	5	35

Mitigation Project 36:

Description	Portable digital signage to inform travelers of speed they are going.
Benefits	Allow individuals driving to realize how fast they are traveling in order to reduce speeds on highways and residential areas.
Hazards Addressed	Transportation Accidents
Affected Jurisdictions	Rugby
Priority	High
Responsible Party	Rugby and Pierce County
Partners	North Dakota Department of Transportation
Timeframe for Completion	1 year
Cost	$3,000 to $5,000 for portable-size, battery packs, mounting, etc.
Funding Source	City, County, State and Federal Grants

S	T	A	P	L	E	E	Total
4	5	5	5	5	4	5	33

Objective 2.3: Use land management tools to mitigate disasters to current and future projects.

Mitigation Project 37:

Description	Add signage and enforcement of Truck Route in Rugby to avoid hazardous materials going through town. And to keep too large trucks from using under pass.
Benefits	Reduce population and property loss from hazardous materials being transported through Rugby.
Hazards Addressed	Hazardous Materials, Urban Fire
Affected Jurisdictions	Rugby, Pierce County
Priority	High
Responsible Party	Rugby, Pierce County
Timeframe for Completion	To Be Determined
Cost	$500 Signs/Enforcement
Funding Source	City and county, state and federal grants

S	T	A	P	L	E	E	Total
5	5	5	5	5	5	5	35

Mitigation Project 38:

Description	Review and update zoning and ordinances and consider the adoption of State Building Code.
Benefits	Reviewing current zoning and ordinances ensures future development is not occurring in a hazardous area. Adopting the State Building Code can help improve future development will be disaster resistant.
Hazards Addressed	Flooding, Summers Storms, Urban Fire and Structural Collapse, Winter Storms
Affected Jurisdictions	Pierce County, Rugby, Balta, Wolford
Priority	High
Responsible Party	County Commissioner, City Councils
Partners	
Timeframe for Completion	Annually
Cost	0-$500
Funding Source	County and Cities

S	T	A	P	L	E	E	Total
5	5	5	5	5	5	5	35

Mitigation Project 39:

Description	Communicate with North Dakota Department of Transportation to add Rugby Truck Route on its mapping systems.
Benefits	Avoid trucks traffic in local areas.
Hazards Addressed	Transportation Accidents, Hazardous Materials
Affected Jurisdictions	Rugby
Priority	High
Responsible Party	Rugby
Partners	North Dakota Department of Transportation
Timeframe for Completion	1 year
Cost	None
Funding Source	To Be Determined

S	T	A	P	L	E	E	Total
5	5	5	5	5	5	5	35

Mitigation Project 40:

Description	Signage of Rugby Truck Route
Benefits	Keep traffic and hazardous materials outside Rugby. Keep trucks that are too large out of town.
Hazards Addressed	Transportation Accidents, Hazardous Materials
Affected Jurisdictions	Rugby
Priority	High
Responsible Party	Rugby, Pierce County
Partners	North Dakota Department of Transportation
Timeframe for Completion	To Be Determined
Cost	$5,000 to $10,000
Funding Source	County, City, State, and Federal Grants

S	T	A	P	L	E	E	Total
5	5	5	5	5	5	5	35

Mitigation Project 41:

Description	Emergency Response Plan to assure the community and its emergency response entities are prepared to respond to projected oil increase/oil development impact.
Benefits	Responders are prepared for an accident. Limit the loss of life and injury.
Hazards Addressed	Critical Materials, Hazardous Materials, Transportation Accidents
Affected Jurisdictions	Rugby
Priority	High
Responsible Party	Fire Departments, Rugby, Ambulance Service
Partners	Emergency Manager, ND National Guard
Timeframe for Completion	3 years
Cost	Open
Funding Source	City, County, Emergency Response, State and Federal Grants, Otto Bremer Foundation

S	T	A	P	L	E	E	Total
5	3	3	5	5	4	5	30

The following graphic illustrates beneficiaries of the mitigation projects. All jurisdictions benefit from several of the mitigation projects.

Jurisdiction Project Responsible Party:

Jurisdiction	Mitigation Project Number:															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Pierce Co.	X	X	X				X	X	X	X	X	X	X	X	X	X
Rugby		X	X				X	X	X	X	X	X	X	X	X	X
Balta		X	X			X	X	X	X	X	X	X	X	X	X	X
Wolford		X	X	X	X		X	X	X	X	X	X	X	X	X	X

Jurisdiction	Mitigation Project Number:															
	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Pierce Co.	X	X	X	X	X	X				X		X	X			X
Rugby	X	X		X	X	X		X		X	X		X	X		X
Balta	X	X		X	X		X									
Wolford	X	X		X	X				X						X	

Jurisdiction	Mitigation Project Number:															
	33	34	35	36	37	38	39	40	41							
Pierce Co.		X	X		X	X		X								
Rugby		X		X	X	X	X	X	X							
Balta	X	X				X										
Wolford		X				X										

Plan Maintenance

The Pierce County multi-hazard mitigation planning is continuous. An important aspect of any useable plan is the maintenance and upkeep of the document. At any given time planning, risk analysis, updating the situation assessment, research, coordinating, disaster response or other activity is occurring. Thus, ensuring the plan will remain useful in the County for many years.

The Pierce County emergency manager is responsible for monitoring, evaluating and updating the plan. All disaster and emergency incidents will be evaluated for general and specific mitigation recommendations to be added to the plan.

Pierce County Commission is responsible to update the County Emergency Manager of actions taken on the following projects each year using the forms in Chapter 10.

Projects: 1, 2, 3, 14, 16, 21, 22, 28, 32, 35, 36, 37, 38, 40, and 41

City of Rugby is responsible to update County Emergency Manager of actions taken on the following projects each year using the forms in Chapter 10.

Projects: 2, 3, 14, 16, 22, 24, 26, 27, 30, 32, 36, 37, 38, 39, and 40

City of Balta is responsible to update County Emergency Manager of actions taken on the following projects each year using the forms in Chapter 10.

Projects: 3, 6, 14, 16, 23, 33, and 38

City of Wolford is responsible to update County Emergency Manager of actions on the following projects each year using the forms in Chapter 10.

Projects: 3, 4, 5, 14, 16, 25, 31, and 38

The **Emergency Manager** is responsible to update actions on the following projects each year using the forms in Chapter 10.

Projects: 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 20, and 35

The **Fire Departments** are responsible to update County Emergency Manager of actions on the following projects each year using the forms in Chapter 10.

Projects: 1, 9, 11, 12, 13, 14, 16, 19, 29, 34, and 41

The public will be informed of the opportunity to comment on the plan through the advertising of these meetings. The plan will be available to the public at the Pierce County Courthouse and at the city halls in each of the jurisdictions. The plan will also be on the county website. The public is encouraged to share input on the plan.

The comments about the plan, project implementation, and information will be shared through each jurisdiction's minutes, and these minutes will be sent to the county emergency management office. The emergency manager will share this information with the Pierce County Commission. The fire departments, law enforcement departments, county health department, and emergency medical services will be encouraged to constantly inform emergency management office of incidents as they occur so that the data can be considered immediately to better understand the risks in the county and encourage updating of hazard information.

Pierce County –Yearly Documentation of Mitigation Actions Taken

Please complete as part of the February Jurisdictional Meeting:

Return to: Pierce County Emergency Manager
240 2nd St SE
Rugby, ND 58368 Due: March 1

Projects: 1, 2, 3, 14, 16, 21, 22, 28, 32, 35, 36, 37, 38, 40, and 41

City of Balta –Yearly Documentation of Mitigation Actions Taken

Please complete as part of the February Jurisdictional Meeting:

Return to: Pierce County Emergency Manager
240 2nd St SE
Rugby, ND 58368 Due: March 1

Projects: 3, 6, 14, 16, 23, 33, and 38

City of Rugby –Yearly Documentation of Mitigation Actions Taken

Please complete as part of the February Jurisdictional Meeting:

Return to: Pierce County Emergency Manager
240 2nd St SE
Rugby, ND 58368 Due: March 1

Projects: 2, 3, 14, 16, 22, 24, 26, 27, 30, 32, 36, 37, 38, 39, and 40

City of Wolford –Yearly Documentation of Mitigation Actions Taken

Please complete as part of the February Jurisdictional Meeting:

Return to: Pierce County Emergency Manager
240 2nd St SE
Rugby, ND 58368 Due: March 1

Projects: 3, 4, 5, 14, 16, 25, 31, and 38

Emergency Manager –Yearly Documentation of Mitigation Actions Taken

Please complete as part of the February Jurisdictional Meeting:

Return to: Pierce County Emergency Manager
240 2nd St SE
Rugby, ND 58368 Due: March 1

Projects: 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 20, and 35

Fire Departments –Yearly Documentation of Mitigation Actions Taken

Please complete as part of the February Jurisdictional Meeting:

Return to: Pierce County Emergency Manager
240 2nd St SE
Rugby, ND 58368 Due: March 1

Projects: 1, 9, 11, 12, 13, 14, 16, 19, 29, 34, and 41

All jurisdictions please complete and return by March 9

Annual Report of Hazards Incidents

Return to: Pierce County Emergency Manager
240 2nd St SE
Rugby, ND 58368

Please complete as part of the February Jurisdictional Meeting:

Hazard	Dates	Summary of event (use additional pages if necessary) include photos, expenses incurred, number of persons/households affected and other relevant data
Winter Weather		
Summer Storm		
Communicable Disease		
Drought		
Shortage/Outage		
Transportation Accident		
Urban Fire Or Structure Collapse		
Wildland Fire		
Hazardous Materials Release		
Flood		
Homeland Security Incident		
Dam Failure		

Notice of Intent to Apply for Mitigation Grant Funds to Inform Pierce County

To be completed by a jurisdiction in Pierce County, i.e.: cities, fire departments, water districts, school districts, ambulances districts or park districts.

The _____is interested in applying for Hazard Mitigation Funds for the following project:

1. Describe Project:

2. Estimated Cost

Return to: Pierce County Emergency Manager
240 2nd St SE
Rugby, ND 58368