Pre-Disaster Mitigation Plan 2012 Update

Mineral County
Town of Superior
Town of Alberton

February 14, 2012

Atkins Project Number: 100011970

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Plan Design Enable

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1.0 INTRODUCTION

The Mineral County Pre-Disaster Mitigation (PDM) Plan Update (Plan Update) was prepared for Mineral County, and the Towns of Superior and Alberton, Montana updating the original PDM Plan of 2004. Pre-Disaster Mitigation planning is a tool for assessing and prioritizing projects for mitigating damage and casualties from disasters. It helps communities focus on the actual risks from hazards by profiling each potential threat and comparing the relative risks between hazards. A thorough profile of each hazard is analyzed, including economic and structural losses, injury, casualties, and the probability of recurrence. Sometimes historical data provides clues in estimating the potential losses or hazard zones where properties and populations are at risk. For other hazards, assessment models have been created to simulate a hazard and the potential damage from the hazard. The goal is to assess the relative risks and then have an objective analysis of projects designed to cost-effectively reduce or eliminate the risks and their threat to infrastructure, structures, and the population.

The Plan Update is intended to review progress made on the previous PDM plan, update the risk assessment to natural and man-caused hazards, and outline a new mitigation strategy for Mineral County and participating communities. This Plan Update assesses the risks from natural hazards including earthquake, flooding, extreme storms, wildfire, and landslides. It also looks at the risks from hazardous material transport and isolation issues in the County.

The Plan Update has been prepared in accordance with local PDM guidance provided by the Federal Emergency Management Agency (FEMA) under the Disaster Mitigation Act of 2000 (DMA 2000). The 2004 PDM Plan provides the background and essentials for evaluating risks and exposures to hazards. This Plan Update has been prepared according to "Local Multi-Hazard Mitigation Planning Guidance" (FEMA, 2008) and adds to the 2004 PDM Plan. The Plan Update is a dynamic plan reflecting the current risks to the communities and a roadmap for reducing hazard exposure in the future. The Mineral County PDM Plan Update will allow the County and incorporated communities to qualify for pre-disaster and post-disaster Hazard Mitigation Grant Program (HMGP) funds available through FEMA.

1.1. Project Area Location

Mineral County covers approximately 1,223 square miles in the western part of Montana (**Figure 1-1**). The estimated 2009 population was 3,833 persons with an average density of 3.2 persons per square mile. Approximately 83% of the land area in Mineral County is owned by the federal government and managed through the Lolo National Forest. Private timber lands account for 8% of the property and state land accounts for 4%. These forested lands border private lands along the Clark Fork River and the St. Regis River and make up the remaining 5% of the county land mass. The County seat is in the Town of Superior, the largest community in the County. The Towns of Superior and Alberton are the only incorporated towns in the County.

1.2. Regional Economy

The Western Montana population and economy have experienced significantly growth since the 1990s, but the Town of Superior recession beginning in 2008 has resulted in a significant decline in nonfarm labor income (BBER, 2009). In the 1990s, total personal income statewide grew by almost $4 billion. About 73 percent of the income growth occurred in the Western Mountain region where personal income grew by almost $2.9 billion. This rise in total personal income in the west represented a 250 percent increase over the gain of the previous decade. This accelerated income growth in the Western Mountain region follows a similar pattern in population growth. In comparison, personal income in the Central Front region grew by $974 million, an increase of 270 percent over the previous decade. The 21 counties in Montana’s Eastern Plains region accounted for only 2.5 percent of all income growth in the last decade (Fay and Miller, 2003).

The economy of Mineral County is dependent on the service industries and retail trade as the anchor for income. Important industries in Mineral County include retail trade, accommodation, food services and manufacturing. The concentration of jobs in the accommodation and food service industry is 2.28 times

the national average. The basic industries of local, state and federal government, as well as construction employment have remained relatively stable overall since 1970 and there has been a downward trend in manufacturing (including forest products) and mining. The service and professional industry has increased steadily as shown in the following analysis. The total employment in the county in 2000 increased compared to the 1970 level with the highest employment occurring in 2000. Since 2000, the total county employment stayed at a constant level at between 2000 and 2100 employees. The largest gains occurred in manufacturing and health care, while retail trade and forestry declined. Wage and salary employment has declined but still represents over 62% of the total while 28% are in the proprietor classification. Job growth has been slow in the county and the unemployment rate is consistently higher than the state and the nation. (From Mineral County Growth Policy)

1.3. Land Use Trends

Census estimates for Mineral County, Alberton, and Superior are expected to show steady but slow population increases through 2025 (Mineral County, 2008). The forecasted population in 2025 is 4,950 persons, an approximately 700 person increase from 2010 census population count of 4223 (US Census, 2011). The Mineral County Growth Policy expects growth to be tied to existing communities especially those with community wastewater facilities (Mineral County, 2008).

Because of the mountainous and forested nature of the county, it is expected that some development will occur in or near hazard areas. Mineral County has adopted floodplain and subdivision regulations intended to prevent or reduce the exposure to these hazards; these regulations are further discussed in Section 5.3 of this Plan Update.

1.4. Scope and Plan Organization

The Mineral County Pre-Disaster Mitigation Plan Update is intended to outline risks and exposure to natural and human-caused hazards and outlines plans for reduce or eliminate loss of life and property damage resulting from those hazards. . The process for plan development is outlined below:

Planning Process: Identifies methods to compile hazard profiles and integrates the public into the development of the plan. Provides background on the County and its communities and includes an assessment of the current and future development in the County.

Inventorying Assets: The plan inventories the assets of the community including the population, critical facilities, hazardous material facilities, utility and transportation infrastructure, and building stock.

Hazard Profile & Hazard Assessment: Identifies the characteristics and potential consequences of hazards. Where feasible, FEMA models and loss tables are applied to calculate potential losses to vulnerable population and structures within hazard zones. For most hazards, historic data provide a means to make a qualitative assessment of losses.

Mitigation Plan: Development of priorities to mitigate hazards and identification of strategies and projects for mitigation.

The PDM Update is being prepared through the Mineral County Disaster and Emergency Services (DES). George Gupton, DES Director, coordinated the plan development; the PDM Update was drafted by Charlie Vandam, Atkins, of Missoula, Montana.

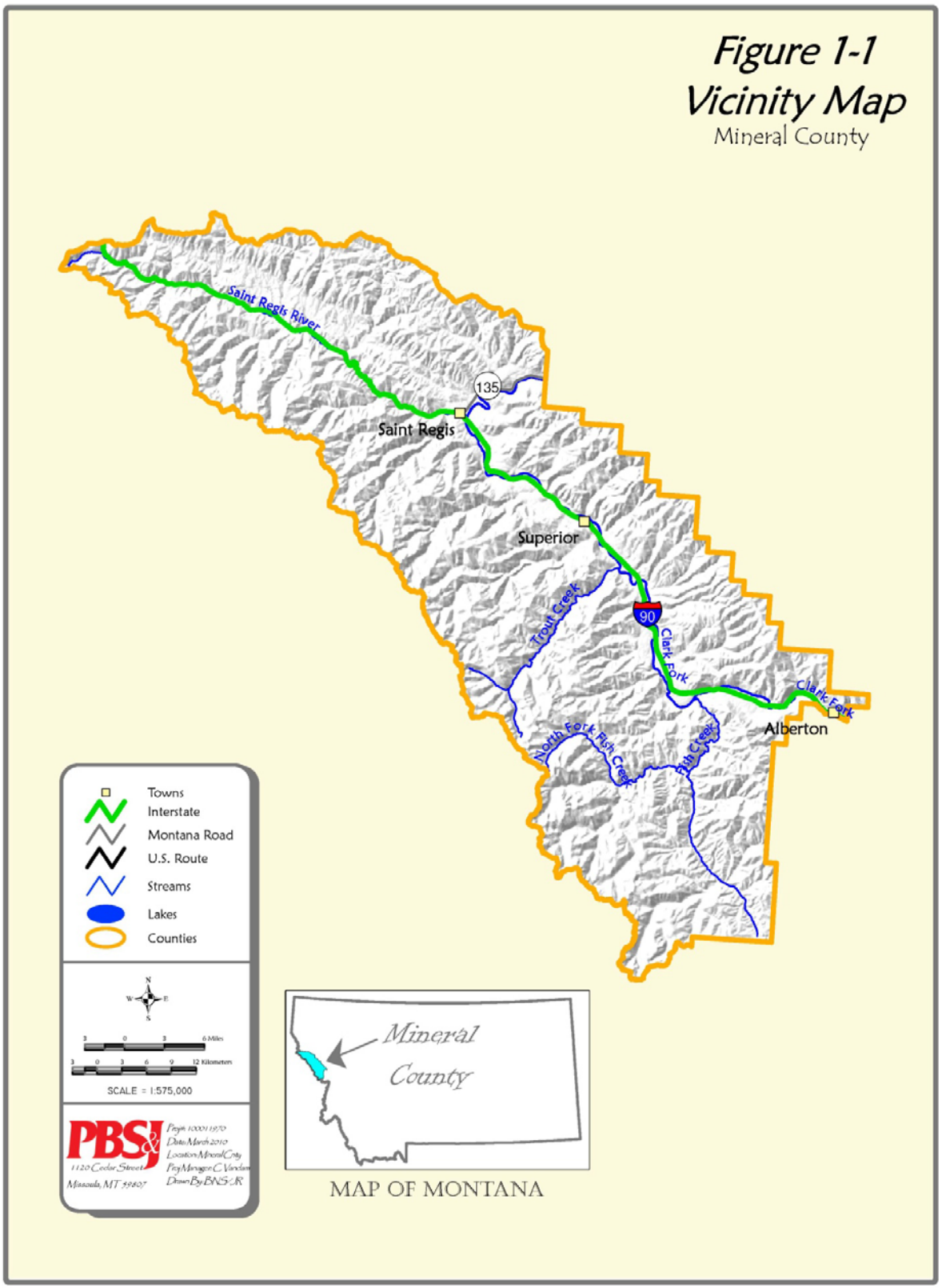


Figure 1-1. Vicinity Map

2.0 PLANNING PROCESS AND PUBLIC INVOLVEMENT

The planning process used in developing this Plan Update incorporates community input and reassess hazards and risks from a wide variety of resources. The development of the Mineral County PDM Plan Update began with meetings of the Local Emergency Planning Committee (LEPC) whose membership includes all of the participating jurisdictions (**Appendix A**) and have specific knowledge and resources regarding disaster prevention, mitigation, planning and response. The process for review, update and adoption followed the following steps:

1. Atkins/LEPC Reassess Goals and Priority Hazards
2. Atkins Update Date and Risk Assessment
3. LEPC Review Updated Risk Assessment, Provide Input to Mitigation Actions
4. Atkins Incorporate Progress on Past Projects and Add New Mitigaiton Actons from LEPC Input
5. Present Draft PDM Update in Public Meeting
6. Atkins Incorporate Comments into Final Draft PDM Update
7. FEMA Review of PDM Update
8. Adoption of PDM Plan Update by Each Jurisdiction

LEPC assisted with the development of a Draft PDM Update plan that was presented to the general public in meetings in Superior. Input from the public meetings was integrated into a Draft Final PDM plan. The planning process is presented in greater detail below.

2.1. PDM LEPC/Stakeholders Group

The LEPC included members representing local public agencies and private entities working in disaster mitigation, emergency management, local government administration, healthcare, transportation, and utilities. A public meeting with the LEPC was held on January 7, 2010. The purpose of the first planning meeting was:

1. Explain the Purpose of the PDM Update,
2. Update the hazards to include in the plan,
3. Identify plans and documents that demonstrate ongoing disaster mitigation work, and
4. Identify resources documenting hazard occurrence throughout the County.

Attendance and Meeting Notes of the LEPC Meeting are included in **Appendix A**. All jurisdictions were represented in this preliminary Plan Update meeting (**Appendix A**).

The original PDM Plan prioritized the hazards to be included in the plan. At that time, the stakeholders completed an exercise to assess the relative risks from all potential hazards in the County. They were asked to assess the potential for any particular hazard to occur and estimate potential impacts to the County. The hazards shown in bold in **Table 2-1** were to be addressed in the plan. Other hazards considered, but dismissed from detailed analysis included: aircraft accidents, civil disorder, drought, radiological or biological incident, subsidence, and structure fires. There were no changes made to the list of hazards in the plan based on comments in the January 7, 2010 LEPC meeting,

Table 2-1. Stakeholders Hazard Prioritization

Type of Hazard	No Potential to Occur	Potential Impact					
		Population			Property		
		low	med	high	low	med	high
Aircraft Accident							
Avalanche							
Civil Disorder							
Communication							
Dam Failure							
Drought							
Earthquake							
Flood							
HazMat Incident							
Landslide							
Utility Interruption							
Radiological							
Subsidence							
Thunderstorm							
Tornado							
Transportation							
Fire							
Volcanic Ash							
Winter Storm							

2.2. PDM Update Workshop

An open public workshop on Draft PDM Update was held on November 15, 2010 in Superior. The purpose of the public forum was to confirm hazard prioritization and identify potential mitigation projects. A press release was issued to media outlets on November 1, 2010. Attendance for these meetings is listed in **Appendix A**. All jurisdictions were represented in this public meeting to review and comment on the draft Plan Update (**Appendix A**).

The public meetings discussed the results of the hazard assessment and asked attendees about specific projects for mitigation. The outcome of these meetings is presented in Section 5.0, Mitigation Strategy.

3.0 INVENTORY OF COMMUNITY ASSETS

Community assets include the population, buildings and infrastructure that are important to maintain a healthy and functional community. The inventory of these assets will provide a basis for assessing potential losses from a disaster. Losses could be in the form of loss of life, actual structure damage, damage to critical infrastructure, business loss, or losses to key government functions and operations.

The inventory identifies critical facilities: essential facilities (hospitals, police and fire stations, and emergency operations centers), lifeline utilities (water, sewer and power supplies), transportation systems (airports, roads, and rail facilities), and hazardous material facilities (major facilities storing or transporting hazardous materials). It includes a summary of building stock and its value. The inventory also describes the population and population characteristics.

3.1. Critical Facilities

3.1.1. Essential Facilities

Essential facilities are those buildings and infrastructure that are essential to the health and welfare of the whole population and are especially important following hazard events. The potential consequences of losing them are so great, that they must be carefully inventoried. Essential facilities include hospitals and other medical facilities, police and fire stations, emergency operations centers, evacuation shelters, and schools.

In Mineral County, essential medical facilities include one small hospital in Superior, the Mineral County Hospital. Fire response agencies include the Superior Fire Department, and many volunteer fire districts across the County. The Mineral County Sheriff is the primary law and order agency in the County. There are no local municipal police departments in the incorporated towns and cities. The Montana Highway Patrol is responsible for managing highway traffic safety on state and federal highways. Emergency operations centers are located in the Mineral County Courthouse and in local public school buildings.

Table 3-1. Essential Facilities

Type of Essential Facility	Name of Facility	Location	Note
Hospitals	Mineral County Hospital	Superior	10 beds
Fire	Superior Rural Fire District	Superior	Jurisdiction: 15 sq mi in center of County
	St Regis Rural Fire District	St. Regis	Jurisdiction: 10 sq mi from West End district to Superior district
	West End Rural Fire District	DeBorgia	Jurisdiction: 16 sq mi west of St Regis district
	Alberton Rural Fire District	Contracted services with Frenchtown RFD in Missoula County	Jurisdiction: 8 sq mi on eastern edge of County
Police/Sheriff	Mineral County Sheriff	Superior	
	Montana Highway Patrol	Missoula	
Emergency Operations	Mineral County Courthouse	Superior	
Ambulance Service	Superior Ambulance	Superior	Superior/St Regis/ center and west end of County
	Frenchtown Fire	Alberton	Alberton/Petty Creek east end of County
Quick Response Units	Superior	Superior	
	West End	De Borgia	

3.1.2. Lifeline Utility Systems

Lifeline utility systems include utilities for potable water, wastewater, electricity, and communication systems. **Table 3-2** describes the major utility systems by category in Mineral County.

Table 3-2. Lifeline Utility Systems

Type of Utility	Utility System	Location	Population	Note
Water (over 250 persons)	Town of Superior	Superior	890	groundwater
	Town of Alberton	Alberton	402	groundwater
Wastewater	Town of Superior	Superior		Lagoon system
	Town of Alberton	Alberton		Lagoon system
	St Regis	St Regis		Lagoon system
Electricity/Gas	Northwestern Energy			
	Missoula Electric Coop			
Communications	Clark Fork Communications			

3.1.3. Transportation Systems

Transportation systems include all airports, highways and railways systems. Maintaining transportation systems is critical to ensure the health and safety of the population during a disaster. These systems may be crucial for bringing necessary supplies or maintaining response routes.

One public airport is located in Superior and the closest commercial airport is the Missoula International Airport 60 miles southeast of Superior. There is one primary highway through the County, Federal Interstate 90. An interstate rail system runs east west through the County and is owned and maintained by Montana Rail Link.

3.1.4. Hazardous Material Facilities

There are no facilities in Mineral County that are listed as large-quantity generators of hazardous wastes or report waste under the Toxic Release Inventory requirements. Transportation of hazardous materials through the County, by rail and highway, present the greatest exposure of hazardous materials to residents of the County.

3.1.5. Other Essential Buildings and Facilities

Other buildings that are essential to public functions include schools, public shelters, banking institutions, grocery stores, hardware stores, gas stations, and public health assistance centers.

3.2. Building Structures and Improvements

Prior to completing the hazard assessment, an inventory of all building stock is completed to identify the total amount and value of structures of various types within the County. **Table 3-3** shows a breakdown of total properties and their total value. Throughout Mineral County there is an almost $238 million in structural improvements, where about 81% of this value is in residential type (residential and farmstead) structures. This is an estimated 250% increase in structure value since the 2004 PDM plan was completed.

Table 3-3. Inventory of Properties and Private Building Stock Update

	Properties	Improvement $	Property $	Total $
agricultural	678	834,620	58,536,639	59,371,259
farmstead	230	32,383,946	17,527,391	49,911,337
commercial	196	34,220,282	13,531,538	47,751,820
residential	2,116	160,524,507	98,890,420	259,414,927
exempt	1,532	5,024,510	429,044,256	434,068,766
industrial	11	3,312,760	1,050,801	4,363,561
vacant	1,003	923,950	59,711,262	60,635,212
other	18	317,200	580,175	897,375
totals	5,784	237,541,775	678,872,482	916,414,257

Source: Montana Department of Revenue Computer Assisted Mass Appraisal database, 2010.

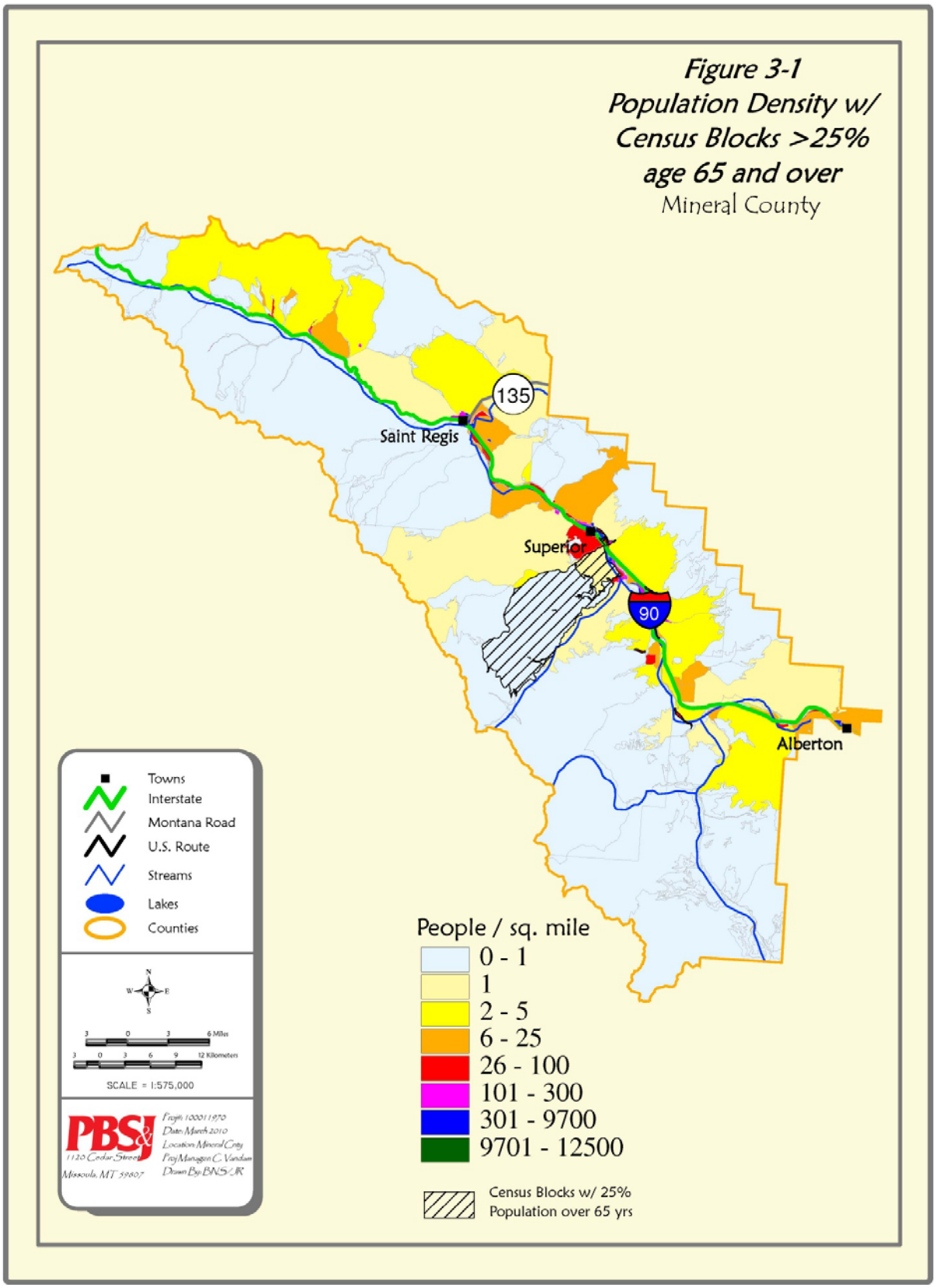


Figure 3-1. Population Density with Census Blocks Mineral County

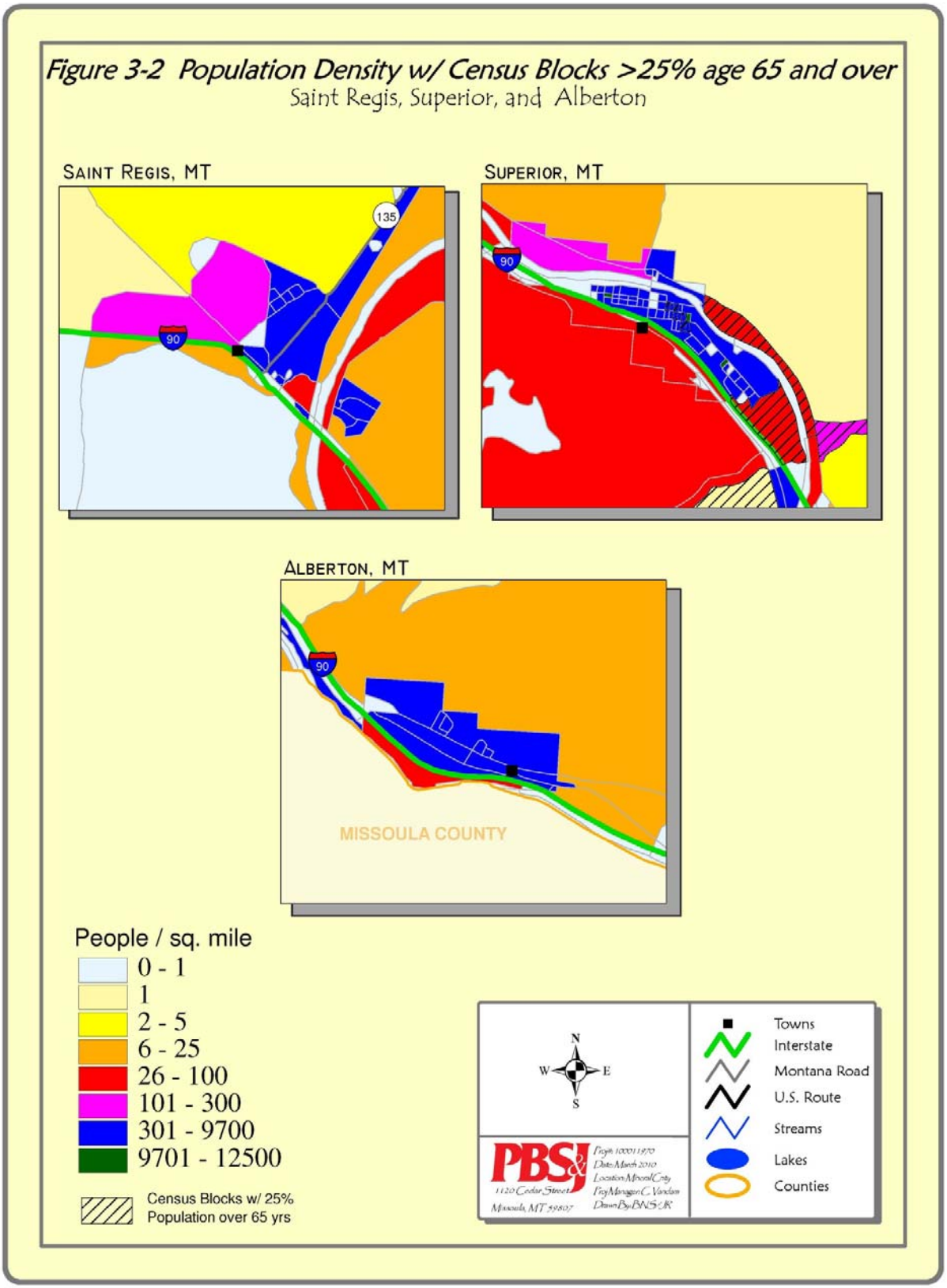


Figure 3-2. Population Density with Census Blocks St. Regis, Superior, Alberton

3.3. Population

3.3.1. Total Population

Mineral County had a 2009 estimated population of 3,833, based on the US Census Bureau population forecasts. This represents a slight increase from the 2002 population estimates for the County, but a decrease from the 2000 census count of 3884 persons. Census population estimates are not available for the census designated place level in Mineral County. **Table 3-4** shows 2000 population, housing, and income data for the County and census designated places and comparisons to the 2010 population counts for the whole of Mineral County.

Table 3-4. Mineral Co Population and General Demographics by Census Designated Place

Census Designated Places (CDP)	Total Population: Total	Total Population: Median age	% Population Over 65	Households: Total	Housing units: Total	Median Income in Dollars
Mineral County	3,884	41.1	14.52	1,584	1,961	27,143
Alberton Town	374	35.9	6.89	152	175	26,000
De Borgia CDP	69	54.5	36.36	34	42	22,917
Riverbend CDP	442	43.8	23.81	179	216	27,813
St. Regis CDP	315	39.2	16.24	135	161	23,750
Superior Town	893	39.5	17.78	358	410	25,333
Mineral County (2010)	4,223	Not Avail	21.9%	1,760	2,446	$37,256

Source: US Census Bureau, 2000 Data and 2010

4.0 HAZARD RISK ASSESSMENT

4.1. Overview

4.1.1. Hazard Assessment Methodology

Many types of hazards have the potential to cause casualties and losses throughout Mineral County. Damage and casualties, in both location and severity, will vary between hazards. Hazards were identified and profiled through several different means. A history of past events and their impacts was compiled to assess the potential for future events. These past occurrences and associated losses are used to make comparisons between hazards. Where possible, hazard zones were inventoried, along with the relative impact on structures, infrastructure, and business losses within those hazard zones. The intent is to determine the possible damage that can be expected by a hazard event and compares the relative risk and losses between hazards.

The hazards considered in the Plan Update are shown in **Table 4-1** and are the same hazards addressed in the 2004 PDM Plan. Other hazards considered, but dismissed from detailed analysis included: aircraft accidents, civil disorder, drought, radiological or biological incident, subsidence, and structure fires.

Table 4-1. Mineral County Hazards

Hazard	Background Sources	Loss Estimation Methods
Earthquake	Montana Bureau of Geology and Mines HAZUS®MH Earthquake model USGS National Seismic Hazard Mapping Project USGS National Earthquake Information Center State MDES	HAZUS®MH Earthquake model Montana CAMA Data
Flooding	State MDES Mineral County DES FEMA National Weather Service National Climatic Data Center COE Cold Climate Research & Engineering Lab	Loss Estimate in Mapped Floodplains FEMA Flood Loss Estimation Tables Historic Losses
Hazardous Material/ Transportation Accidents	Missoulian National Transportation Safety Board	Historic Losses
Landslide	USGS National Study USDA Forest Service Land System Inventory	Landslide History Landslide Prone areas
Utility/Communication Disruption	US Census Bureau	Not estimated
Volcano	State MDES Cascades Volcano Observatory (USGS, 2003)	Historic Losses
Weather (Storms and Wind)	State MDES National Climatic Data Center National Weather Service Western Regional Climate Center	Historic Frequency and Losses
Wildfire	State MDES USDA Forest Service (2003)	Mapped Fire Crown Potential Zones Montana CAMA data

4.2. Earthquakes

4.2.1. Previous Occurrence

Earthquakes can strike communities without warning and damage buildings and infrastructure on a large scale. Mineral County is considered to be a region of low seismicity and therefore has a low earthquake hazard rating (Qamar and Stickney, 1983). According to Mike Stickney of the Montana Bureau of Mines and Geology (Stickney, 2003), Mineral County is west of the main part of the Intermountain Seismic Belt and is thus devoid of larger historical quakes (earthquakes greater than 5.5 in magnitude on the Richter Scale). Seismic activity within Mineral County in historic times has been limited to earthquakes of magnitude 3.9 or less on the Richter scale (ANSS, 2003; see Appendix F for a description of the Richter scale.)

Many of the seismic events within and adjacent to Mineral County originate near the Montana/Idaho border near Wallace, Idaho. These events are usually less than 4.0 on the Richter scale and are associated with rock bursts from mining operations in the Coeur d'Alene mining district (Qamar and Stickney, 1983). In Mineral County, there are no known Quaternary-age faults (faults with movement at any time from 1.6 million years ago to present).

The US Geological Survey's National Seismic Hazard Mapping Project (USGS 2003) produces peak ground acceleration maps. The maps, including the one for Mineral County (**Figure 4-1**) shows the strength of seismic shaking that has a 10% probability of being exceeded in a 50-year period. The strength of the shaking is measured as a percent of the acceleration of gravity (%g). The acceleration ranges shown correspond approximately to seismic zones on the International conference of Building Official's seismic zonation map of the United States. The earthquake zones listed in **Table 4-2** and shown on **Figure 4-1** indicate that most of Mineral County is located in Zone 1, and the southern edge of the County is located in Zone 0.

Table 4-2. Earthquake Zones in Mineral County

Zone	Location within Mineral County	Percentage of the Acceleration of Gravity
Zone 0	Southern edge of Mineral County	<7.5% g
Zone 1	Majority of Mineral County	7.5 - 15% g

Source: Stickney and others, 2000.

4.2.2. Probability of Occurrence/Estimated Losses Update

The potential earthquake loss was estimated by simulating nearby historic earthquake activity and calculating losses through the FEMA HAZUS®MH Earthquake model. Historic earthquakes nearest to Mineral County were two 5.0 magnitude earthquakes in 1947 and 1950 along the Swan Fault in the Seeley Swan Valley of Missoula County. The model's loss estimation software was used to calculate structure loss, economic loss, and loss to critical infrastructure based on the simulated quake at Seeley Lake, Missoula County. The earthquake simulation and loss estimate was based on default building and income data in the HAZUS®MH Earthquake model and no user specific data were incorporated into the model to develop a refined loss estimate. The results indicated no building/structure damage, injuries or casualties, nor damage to county infrastructure based on a 5.0 magnitude earthquake in northern Missoula County.

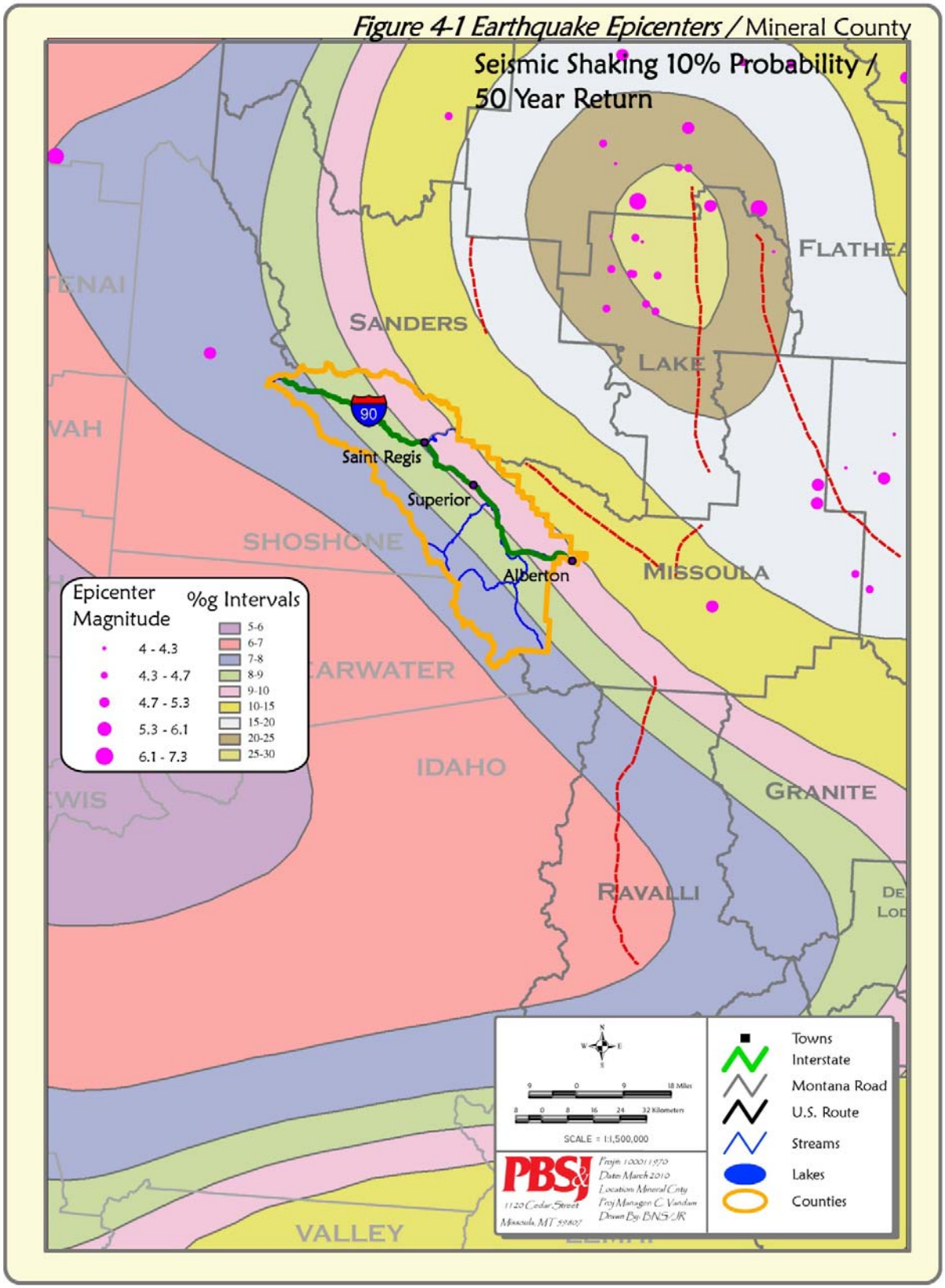


Figure 4-1. Earthquake Epicenters

4.2.3. Summary of Vulnerability and Impact

All jurisdictions within Mineral County are within areas of low potential for a magnitude 5.0 or greater earthquake to occur. Using the nearest known historic earthquake event, the HAZUS model showed that there would be no structural damage or injuries from a 5.0 magnitude quake in adjacent Missoula County. Mineral County and other jurisdictions within the County have a low potential for structural damages and a low potential for injuries/fatalities from an earthquake.

4.3. Flooding

During the 20th century, floods were the number-one natural disaster in the United States in terms of the number of lives lost and property damage (USGS, 2000). Floods are the result of a multitude of naturally occurring and human-induced factors, but they all can be defined as the accumulation of too much water in too little time in a specific area.

Flood plains are lands bordering rivers and streams that normally are dry but are covered with water during floods. Buildings or other structures placed in flood plains can be damaged by floods. They also can change the pattern of water flow and increase flooding and flood damage on adjacent property by blocking the flow of water and increasing the width, depth, or velocity of flood waters (FEMA, 2003).

The USGS (2000) offers the following facts about floods:

- Most flood-related deaths are due to flash floods.
- Fifty percent of all flash-flood fatalities are vehicle related.
- Most homeowners insurance policies do not cover floodwater damage.
- Individuals and business owners can protect themselves from property losses by purchasing flood insurance through FEMA's National Flood Insurance Program.

Types of floods include regional floods, flash floods, ice-jam floods, storm-surge floods, dam- and levee-failure floods, and debris, landslide, and mudflow floods. Judging from historic flood patterns and the type of County facilities, Mineral County has the greatest potential for damage from regional, flash, and ice jam floods. Each of these types of flooding is described below.

4.3.1. Flooding – Regional and Flash

Flooding along the Clark Fork River and numerous other creeks and streams within Mineral County have caused property damage during historic times. Flash floods have the potential to occur, especially after a wildfire. The following descriptions and illustrations of regional and flash floods were provided by the USGS (2000).

Regional Floods: Some regional floods occur seasonally when winter or spring rains coupled with melting snow fill river basins with too much water too quickly. The ground may be frozen, reducing infiltration into the soil and thereby increasing runoff. Extended wet periods during any part of the year can create saturated soil conditions, after which any additional rain runs off into streams and rivers, until river capacities are exceeded.

Flash Floods: Flash floods can occur within several seconds to several hours, with little warning. Flash floods can be deadly because they produce rapid rises in water levels and have devastating flow velocities.

Several factors can contribute to flash flooding. Among these are rainfall intensity, rainfall duration, surface conditions, and topography and slope of the receiving basin. Urban areas are susceptible to flash floods because a high percentage of the surface area is composed of impervious streets, roofs, and parking lots where runoff occurs very rapidly. Mountainous areas also are susceptible to flash floods, as steep topography may funnel runoff into a narrow canyon. Floodwaters accelerated by steep stream slopes can cause the flood wave to move downstream too fast to allow escape, resulting in many deaths.

4.3.1.1. Previous Occurrence

Mineral County flood events noted by FEMA and other federal and state agencies are listed in **Table 4-3**. Information is supplied from USGS monitoring station 12353000 on the Clark Fork River below Missoula because it is upstream from Mineral County. The only monitoring station on the Clark Fork within Mineral County is 12354500 on the Clark Fork River at St. Regis. Station 12353000 below Missoula has been monitored from 1929 to the present. Station 12354500 at St. Regis has been monitored from 1910 to the present.

Table 4-3 shows historical anecdotes, emergency and disaster declarations, and 10-year flood events and greater. The 10-year flood stage is determined by studying a long period of flow records for a stream and estimating the size of a flood that would have a 10-year recurrence interval (called a 10-year flood). A 10-year flood is one that would occur, on the average, once every 10 years. In Mineral County, 10-year floods (or greater) occurred in 1913, 1947, 1948, 1964, 1972, 1974, 1997. The flood stages and flood plains for 50-year and 100-year events have not been modeled but the estimated flood hazard zones (called Zone A) are delineated by FEMA.

Although a 100-year flood is expected to happen only once in a century, there is a 1 percent chance that a flood of that size could happen during any year. Based on upstream data, the 1908 flood was probably a 100-year flood (FEMA, 1988). Numerous un-gauged small streams within the County probably also exceeded their 100-year flood plain during 1908.

Table 4-3. Major Floods in Mineral County

Date	Gauge Number & Name	Qflow (cfs)	Gauge (ft) measured	Gauge (ft) flood stage1	Flood Type2 and Damages	Peak Flow References
May and June, 1908	Clark Fork in Mineral County					FEMA, 1988; GenWeb, 2003
May 30, 1913	12354500-Clark Fork @ St Regis	63,500	19.2	19.00	10-year flood	USGS, 2003
December 1933	Mineral County flood					GenWeb, 2003
May 10, 1947	12353000-Clark Fork below Missoula	45,900	11.18	11.00	10-yr flood	USGS, 2003
May 23, 1948	12353000-Clark Fork below Missoula	52,800	12.08	11.00	10-yr flood	USGS, 2003
May 24, 1948	12354500-Clark Fork @ St Regis	68,900	19.96	19.00	Town of Superior Flooded	USGS, 2003; GenWeb, 2003
June 10, 1964	12353000-Clark Fork below Missoula	50,100	11.45	11.00	10-yr flood	USGS, 2003
June 3, 1972	12353000-Clark Fork below Missoula	52,200	11.71	11.00	10-yr flood	USGS, 2003; NRCS, 1998
June 3, 1972	12354500-Clark Fork @ St Regis	63,900	19.5	19.00	10-year flood	FEMA 1998; USGS 2003

Date	Gauge Number & Name	Qflow (cfs)	Gauge (ft) measured	Gauge (ft) flood stage1	Flood Type2 and Damages	Peak Flow References
January 1974					Mineral, Missoula and 4 other counties- Federal Disaster Declaration FDAA-417-DR-MT - $603,144.45	DES, 2003
June 18, 1974	12353000-Clark Fork below Missoula	47,900	11.5	11.00	10-yr flood	USGS 2003
June 18, 1974	12354500-Clark Fork @ St Regis	61,900	19.39	19.00	10-year flood	Northwest River Forecast Center, NOAA
June 21, 1975	12353000-Clark Fork below Missoula	49,200	11.67	11.00	10-yr flood	USGS 2003
December 27, 1995					EO 15-95 - Missoula, Ravalli Mineral and 4 other counties - On-system highway damage. EO is for purposed of qualifying for FHWA emerg. funds	DES, 2003
March 12, 1997					Emerg declaration of whole state due to the imminent threat of flooding; FEMA-1183-DR-MT - Missoula, Ravalli and 20 other counties - (FEMA) $5,762,964 (state) $541,434 (local) $1,397,520 estimates	DES, 2003
April 10 - July 1, 1997					EO 5-97; E0 6-97; EO 7-97; EO 12-97; Emerg declaration of whole state due the imminent threat of flooding.	DES, 2003
May 1, 1997					In Mineral County, snowmelt flooding caused four-25 foot sections of guardrail from Interstate 90 to hang into the Clark Fork River. A 60-foot section of frontage road along the interstate was washed away seven miles east of Superior.	NWS, 2003
May 18, 1997	12353000-Clark Fork below Missoula	55,100	12.18	11.00	10-yr flood	USGS 2003
May 18, 1997	12354500-Clark Fork @ St Regis	68,900	20.27	19.00	10-year flood	USGS 2003
April 14, 2002	Superior				Small stream flooding occurred in many areas of Lincoln and Sanders County due to snowmelt. In Mineral County, water overflowed private property near the confluence of Timber and Packer Creeks.	NWS, 2003

1Flood stage information from: FEMA , 1988; NWS, 2003
2Flood type information from: FEMA, 1988; FEMA, 1998.

As shown in **Table 4-3**, federal or state emergencies or disasters were declared for Mineral County floods in 1974, 1995 and 1997. In December 1995, Mineral and 6 other counties suffered on-system highway damage and the emergency was declared for purposed of qualifying for Federal Highway Administration funds. In 1997, there was an emergency declaration for the whole state due to the imminent threat of flooding. In Mineral County, snowmelt flooding caused four-25 foot sections of guardrail from Interstate 90 to hang into the Clark Fork River. A 60-foot section of frontage road along the interstate was washed away seven miles east of Superior. The 1997 declaration for Mineral and 20 other counties listed the following damages: $5,762,964 Federal, $541,434 state, and $1,397,520 local (MDES, 2003).

4.3.1.2. Participation in the Flood Insurance Program

Mineral County and the Town of Superior participate in the National Flood Insurance Program (NFIP), the Town of Alberton does not participate Initial Flood Insurance Rate Maps (FIRM) Maps were developed in 1996 for Mineral County and in 2001 for the Town of Superior. The Initial FIRMs are current for both jurisdictions. Within Mineral County there are 27 NFIP policies in force representing $6.1 million insured value. The Town of Superior has 3 NFIP policies in force representing $803,000 in insured value. Since 1996 there have been 3 NFIP claims for flood damage in Mineral County, representing$10,411 in losses (Montana DNRC, 2010). Superior has had one claim for a $356 loss. There have been no repetitive losses for flooding under the NFIP.

4.3.1.3. Probability of Occurrence/Loss Estimate Update

The loss from flooding was estimated by assessing the number and type of structures located within the mapped 100-year floodplain and projecting structure and income related losses to those properties on a possible flood scenario. The 100-year floodplain was generated for Mineral County using FEMA HAZUS®MH Flood model (**Figure 4-2**). The loss estimate was based on flood water inundating the entire 100-year flood zone of the mapped floodplain throughout Mineral County. The flood scenario did not take into account localized flood problems and damage caused by debris dams, ice jams, and tributary flooding. In reality, there is a high likelihood for this to occur but it is very difficult to pinpoint where these events will occur and to calculate the losses.

The mapped floodplains, or flood hazard zones, were related to the Structures dataset prepared by the State of Montana NRIS Mapping System. The structures dataset identifies each building location and type of building as a point dataset. All points falling within the flood-prone zone generated by HAZUS was assumed to be exposed to flooding in a 100 year event. The average cost of structure by type was generated from values shown on **Table 3-3**. Most of these exposed structures are located within St Regis. The results of the flood loss estimates are shown in **Table 4-4**.

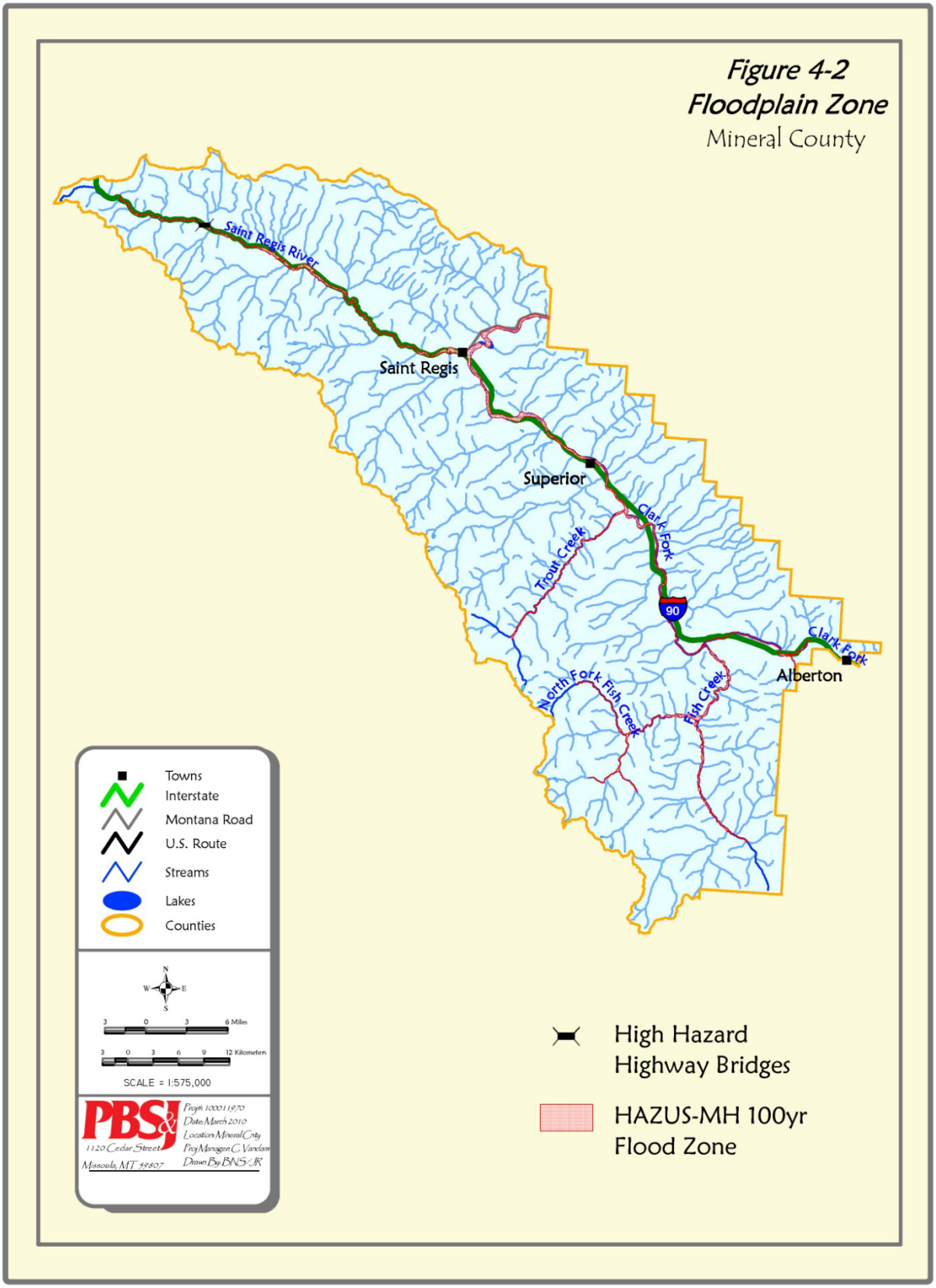


Figure 4-2. Floodplain Zone

Table 4-4. Loss Estimate for 100-year Flood Zones in Mineral County

				Estimated Damages		
Type	Count	Estimated	Total	Structure	Content	Total
Building (generic)	16	174,593	$2,793,492	$754,243	$1,131,364	$1,885,607
Commercial or retail site	42	174,593	$7,332,918	$1,979,888	$2,969,832	$4,949,719
Dwelling, single-family	201	75,862	$15,248,311	$4,117,044	$6,175,566	$10,292,610
Farm / ranch	4	140,800	$563,199	$152,064	$228,096	$380,159
Fire station	1	174,593	$174,593	$47,140	$70,710	$117,850
Garage	4	17,622	$70,489	$19,032	$28,548	$47,580
Gas station	2	174,593	$349,187	$94,280	$141,421	$235,701
Religious facility	1	174,593	$174,593	$47,140	$70,710	$117,850
School (K-12)	1	174,593	$174,593	$47,140	$70,710	$117,850
U.S. government facility	1	174,593	$174,593	$47,140	$70,710	$117,850
Total			**$27,055,969**	**$7,305,111**	**$10,957,667**	**$18,262,779**

1 Structure Loss Estimated at 27% of Improvement Value
2 Content Loss Estimated at 40.5% of Improvement Value

No losses were calculated for transportation infrastructure. State highway bridges are typically designed to withstand a 500-year flood. The national inventory of bridges rates the scour potential for bridges, which is used as a risk factor for possible failure. Bridges with a scour index of 3 or below have a greater than 0.25 to 1% risk of damage in a 100-year flood. The bridges in Mineral County with a low scour potential index are shown in **Table 4-5** below.

Table 4-5. Low Scour Potential Bridges

Highway	Bridge Owner	Stream/River	Length	Year built	Scour index	Location
Interstate 90 (MT000413)	MT Dept of Transportation	unknown	47 meters	1973	3	Saltese

The loss in the event of a 100 year flood is estimated to be over $18 million. The estimated annualized loss from flooding is $182,628.

Summary of Vulnerability and Impact

Mineral County and Town of Superior, have a high potential for structural damages from flooding and high potential for injuries/fatalities. There are an estimated 273 properties that are within flood hazard zones, representing about $27 million in structural value. Future losses are estimated to be approximately $182 thousand each year. There is low potential for structural damages and low potential for injuries/fatalities from major flooding within the Town of Alberton.

4.3.2. Flooding – Ice Jams

Ice-jam floods occur on rivers that are totally or partially frozen. A rise in stream stage will break-up a totally frozen river and create ice flows that can pile up on channel obstructions such as shallow riffles, log jams, or bridge piers. The jammed ice creates a dam across the channel, over which the water and ice mixture continues to flow, allowing more jamming to occur. Backwater upstream from the ice dam can rise rapidly and overflow the channel banks. Flooding moves downstream when the ice dam fails, and the water stored behind the dam is released. At this time the flood takes on the characteristics of a flash flood, with the added danger of ice flows that, when driven by the energy of the flood wave, can inflict

serious damage on structures. An added danger of being caught in an ice-jam flood is hypothermia, which can quickly kill (USGS, 2000).

4.3.2.1. Previous Occurrence

The dates and descriptions of past ice jams in Mineral County are listed in **Table 4-6**. The table includes known ice jams since 1977; records prior to that time are incomplete. As shown in the table, ice jams occurred on the Clark Fork River in 1995 and 1996. Available damage estimates for these ice jams are itemized in the table.

Table 4-6. Ice Jams in Mineral County

Date	Stream	Description	References
December 27, 1995	Clark Fork	EO 15-95 - Missoula, Ravalli, Mineral and 4 other counties - On-system highway damage. EO is for purposed of qualifying for FHWA emergency funds	MDES, 2003
February 7, 1996		EO3-96; FEMA-1105-DR-MT - Activation of MT National Guard, Mineral, Missoula, Ravalli and 11 other counties. (FEMA) $1,820,739 (state) $241,888 (local) $365,006.	MDES, 2003
		NWS: Warmer temperatures, after an extended cold and snowy period, caused numerous flooding problems across central Montana during the second week of February. Snowmelt over frozen ground caused streams and rivers to go out of their banks, washing out roads and bridges. Flooding problems ranged from minor inundation of fields to portions of towns being under water. Ice jams also caused flooding problems as snowmelt ran into frozen streams and rivers. Statewide: $733K Property Damage.	CREEL, 2003

4.3.2.2. Probability of Occurrence/Loss Estimate Update

Predicting location, magnitude, and impact of ice jams are problematic. Historic occurrences can provide insight into frequency but ice jams usually occur in shorter sections of rivers than riverine floods, thereby making it difficult to predict area impacted and losses from the ice jam event. Ice jams are expected to cause localized flooding and there may be damage to structures, non-structural content, and transportation infrastructure. Future ice jam events will likely occur every 25 years with the potential to cause $500,000 in losses. Estimated annualized losses are $20,000 in property damages.

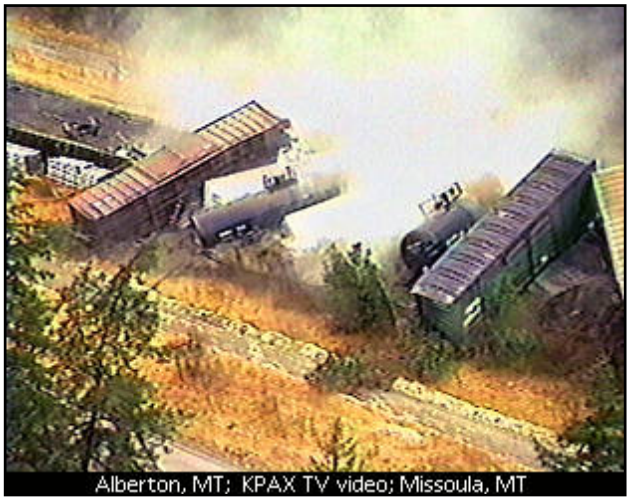
4.3.2.3. Summary of Vulnerability and Impact

Mineral County and Town of Superior, have a low potential for structural damages from ice jam flooding and low potential for injuries/fatalities related to ice jam flooding. There is very low potential for structural damages and very low potential for injuries/fatalities from major flooding within the Town of Alberton.

4.4. Hazardous Material Incident

4.4.1. Previous Occurrence

Mineral County has the unfortunate distinction as having the largest mixed chemical spill in railroad history (DEQ, 2003). Sometime between 4:00 and 4:15 am, on Thursday morning, April 11, 1996, a 72-car train derailment on a Montana Rail Link line occurred 1 mile west of Alberton, Montana. Four tanker cars containing chlorine derailed, at least one pressurized chlorine tanker ruptured creating a 24-inch gap, venting a dangerous plume of chlorine gas across the Clark Fork River over Interstate 90 and into local residences. Two additional tankers containing potassium cresylate and sodium chlorate also reportedly leaked. Interstate 90 remained closed for several days (Missoulian, 4-19-96, 4-21-96). Montana governor Marc Racicot issued an emergency declaration for the spill on April 11, 1996.


Alberton, MT; KPAX TV video; Missoula, MT

One person died and over 352 people were checked at nearby hospitals because of the spill. Approximately 1,000 people were evacuated from an 8- to 12-square mile zone for 17 days (Missoulian, 4-15-96, 4-16-96, 4-19-96; ACCEH, 2003). People exposed to the toxic chemical fumes reported a number of health effects: burning eyes and nose, lung irritation and inflammation, sore throats, difficulty breathing, wheezing, coughing up yellow or green sputum, nose bleeds, coughing up blood, headaches and dizziness, and other symptoms or reactions including, depression, lack of motor skills, hopelessness, and anxiety. Exposed animals and livestock also developed reactions: including eye lesions, difficulty breathing, wheezing, indicative of lung irritation (Missoulian, 4-12-96, 4-16-96, 4-17-96, 4-25-96).

Each derailed tanker car had the capacity to carry 90 tons or 180,000 pounds of chlorine. Approximately 122,000 pounds of chlorine leaked from Tanker 3 (Missoulian 4-19-96). Chlorine concentrations in the air near the leaking cars ranged from 12 to 20 parts per million to as high as 48 to 52 parts per million. When the No. 4 chlorine tanker was taken off the No. 3 chlorine tanker, the movement caused a release of chlorine from the soil, spiking concentrations to 1,400 parts per million -- lethal levels, according to an EPA toxicologist (Missoulian, 4-16-96, 4-20-96).

The US Department of Transportation tracks hazardous material releases related to transportation accidents. **Table 4-7** shows the transportation related hazardous material releases in Mineral County since 1993.

Table 4-7. Transportation-Related Releases in Mineral County, 1993-2010

Mode	Date	Community	Commodity	Trade Name	Quantity	Unit
Highway	6/22/2003	Haugan	Corrosive Liquids N.O.S.	Diaminocycly Hexyl A	1.00	Gal
Highway	10/29/2002	St Regis	Gasoline	Transmix,3,UN1203	3000.00	Gal
Highway	4/26/1996	Haugan	Fuel Aviation Turbine		10.00	Gal
Highway	4/5/1995	Lookout	Potassium Hydro fluoride	EZE 485B	220.00	Gal
Highway	6/27/1994	St Regis	Petroleum Distillate N.O.S.	Off Road Interface	2300.00	Gal
Highway	4/3/1999	Superior	Gasoline		2000.00	Gal
Rail	4/11/1996	Alberton	Potassium Hydroxide Solution	Potassium Hydroxide	17000.00	Gal
Rail	4/11/1996	Alberton	Chlorine	Chlorine	16250.00	Gal
Rail	4/11/1996	Alberton	Sodium Chlorate	Sodium Chlorate	680.00	Lbs

Source: USDOT, 2010

4.4.2. Probability of Occurrence/Loss Estimate Update

Predicting the location, magnitude, and type of hazardous material release is impractical, but if an accident occurred it would likely occur in the major transportation corridor through Mineral County. Over 75% of the County's residents live within and the Towns of Alberton and Superior lie within 1 mile of the two major transportation routes: the Montana Rail Link railroad and Interstate 90 (**Figure 4-3**). A future accident poses the same threat as the damage incurred in 1996. Structural damage from a possible accident is expected to be low, but the casualties could be moderate depending on the type of material released. Estimated losses are estimated to be $1 million from income and business revenue losses and have a potential occurrence once every 100 years. Annualized income and business revenue losses are estimated to be $10,000.

Since 2004, there have been no reported hazardous material releases in Mineral County that have been reported to the US Department of Transportation for either highway, rail, and air related accidents.

4.4.3. Summary of Vulnerability and Impact

Because of the proximity of populations to major transportation routes, Mineral County, Town of Superior, and Town of Alberton have a moderate potential for injuries/fatalities related to transportation hazardous material releases.

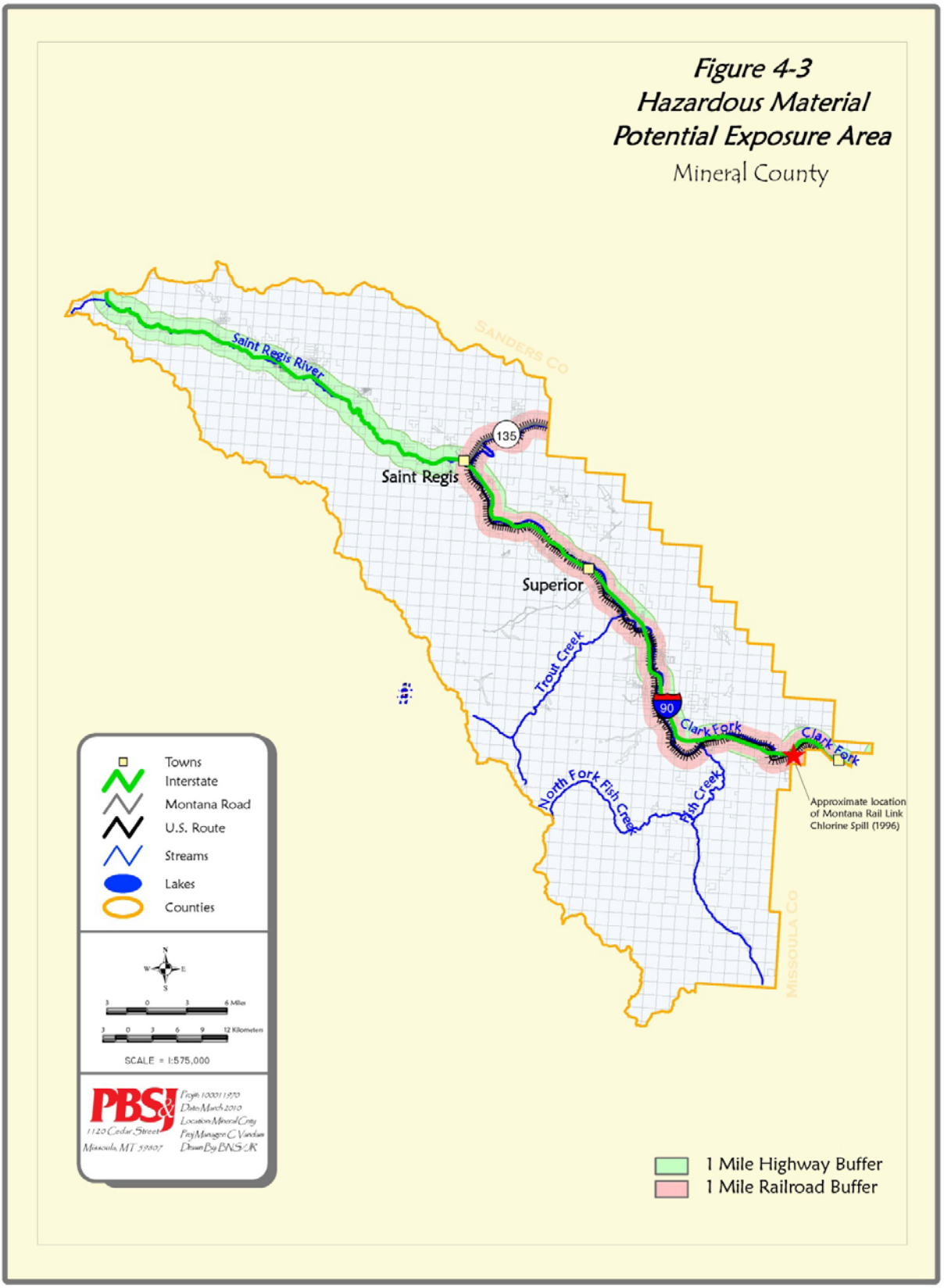


Figure 4-3. Hazardous Material Potential Exposure Area

4.5. Landslide

The term landslide as used here includes all types of gravity-caused mass movements of earth materials, ranging from rock falls through mudslides, and debris flows. Landslides occur in all 50 of the United States. In the conterminous United States, the areas most seriously affected are the Pacific Coast, the Rocky Mountains, and the Appalachian Mountains (USGS, 2001).

4.5.1. Previous Occurrence

Given the steep terrain in parts of Mineral County, a potential does exist for landslides. The USGS (1982) mapped the incidence and susceptibility of landslides on a nationwide basis. The areas identified in the USGS (1982) study are not exact on the county scale. Their study did not identify any landslide susceptibility areas within Mineral County.

The Lolo National Forest has recorded two locations within the County with slope stability problems along Forest Service roads. The slides have been attributed to cut slopes related to road construction and occurred on national forest property.

A very large existing landslide on the Lolo National Forest is located along the South Fork of Little Joe Creek, about 10 miles southwest of St. Regis, Montana. The Little Joe Slide involved huge pieces of rock that removed a Forest Service road and a large portion of the mountainside (Kennedy, 2003). The only other mapped landslide deposits is on Dry Creek, approximately 4 miles west of Superior, also on the Lolo National Forest (Lewis, 1998).

4.5.1.1. Slides after Wildfires

Mud and debris flows have a greater potential to occur after forest fires. During the 2000 fire season, wildfires burned large areas northeast of Superior along the Ninemile Divide. The first rain storm of the season on September 2, 2000, triggered several mudslides in the headwaters of Johnson Creek and Flat Creek (USDA Forest Service, 2001). This rainstorm dropped over ½ inch of rain on some of the more intensely burned drainages of these watersheds. These drainages had extensive jammer road systems with inadequate or no culverts, and were very steep. The runoff on these burned soils was captured and routed down old jammer road prisms, and blew out several draws where there were no culverts or the culverts were too small to pass the water and debris. These sediment and debris flows continued to the mainstem of Johnson and Flat Creek in several places.

In other areas of Johnson and Flat Creeks, runoff on open roads that were being used to fight the fires delivered large mudflows to the main channels (USDA Forest Service, 2001). The Type I fire teams that had been assigned to these fires had graded large berms on the outside edge of most of the roads in the watersheds to catch rolling debris that might start fires downhill. These berms did not allow water to get off the road surface, so the roads turned into stream courses during the storm. This water routing, combined with the powdered surface of the roads from all of the vehicle traffic, resulted in large mudflows to the main stream channels in places.

4.5.2. Probability of Occurrence/Loss Estimate Update

A precise accounting of losses from landslides was not calculated. Most of the landslide hazard zones are located in remote, undeveloped portions of the Lolo National Forest. When landslides have occurred they have been relatively small and only caused localized damage to forest roads.

The structures that are most vulnerable are homes located immediately below severely burned areas on moderate to steep slopes and have unstable soils. It is unlikely the slides will occur on a large scale but will occur in isolated basins potentially impacting individual homes and transportation infrastructure. Potential damages may be up to $500,000 and estimated to be 1 in 50 year occurrence. Annualized structural losses are estimated to be $1,000.

4.5.3. Summary of Vulnerability and Impact

Mineral County, Town of Superior, and Town of Alberton have a low potential for structural damages from landslides and very low potential for injuries/fatalities related to landslides.

4.6. Utility Disruption

4.6.1. Previous Occurrence

Mineral County is a remote, sparsely-populated county that can be considered highly vulnerable to utility disruptions. The entire population of the County is considered rural by the Census Bureau and 47% of the population lives outside of census designated places. Due to the sparse population there is little redundancy in utility infrastructure and failure at one point in the infrastructure can pose large impacts across the County. The County also relies on one major transportation and utility corridor, the Clark Fork River and St Regis River valleys. A disaster that impacts access and disrupts power and communications can leave populations isolated and vulnerable to severe weather and lack of proper communication to deal with the hazard.

There are no records that systematically track the occurrence of power failure or disruption of communication systems. Without records, it is difficult to assess the potential or likelihood of utility disruption. Large-scale power failure and communication disruption is not common but small disruptions commonly occur that can usually be considered inconvenient but not life threatening. There are periods of time, typically during a disaster, where both communication and availability of power is crucial to protecting lives. Electricity and heat during winter storms is essential in protecting lives, particularly for sensitive populations. Telephone and data lines are critical for communicating messages to exposed populations for precautionary measures or possible evacuations. It is during those times where the loss of power or the loss of communication can potentially become a disaster.

4.6.2. Probability of Occurrence/Loss Estimate Update

An estimate of potential losses was not calculated. There is little risk to structures and property from utility disruption. The potential risk to human lives is high. Power outages can put sensitive populations at risk and areas with larger elderly populations more vulnerable than others. Expected annualized losses will be less $1,000 in income related losses, but fatalities may be high to elderly and sensitive populations.

4.6.3. Summary of Vulnerability and Impact

Mineral County, Town of Superior, and Town of Alberton have a low potential for structural damages from utility disruption but have a moderate potential for injuries/fatalities related to the loss of power.

4.7. Volcano

Although no active volcanoes exist within Mineral County, an eruption hundreds of miles away can blanket the County given the right conditions. Some of the effects of volcanic ash include:

- Short-circuits and failure of electronic components, especially high-voltage circuits and transformers (wet ash conducts electricity).
- Eruption clouds and ash fall commonly interrupt or prevent telephone and radio communications.
- Volcanic ash can cause internal-combustion engines to stall by clogging air filters and also damage the moving parts. Engines of jet aircraft have suddenly failed after flying through clouds of even thinly dispersed ash.
- Roads, highways, and airport runways can be made treacherous or impassable because ash is slippery and may reduce visibility to near zero. Cars driving faster than 5-miles per hour on ash-covered roads stir up thick clouds of ash, reducing visibility and causing accidents.
- Ash also clogs filters used in air-ventilation systems to the point that airflow often stops completely, causing equipment to overheat.

- Crop damage can range from negligible to severe, depending on the thickness of ash, type and maturity of plants, and timing of subsequent rainfall.
- Like airborne particles from dust storms, forest fires, and air pollution, volcanic ash poses a health risk, especially to children, the elderly, and people with cardiac or respiratory conditions, such as asthma, chronic bronchitis, and emphysema.

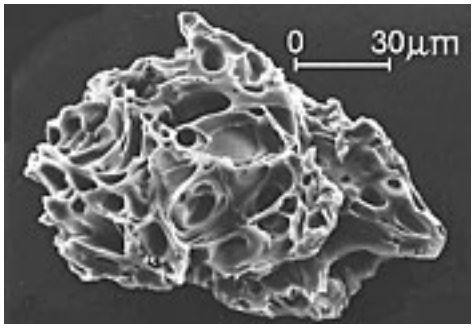


Figure 4-4. Volcanic ash, like this 1980 ash from Mount St. Helens, Washington, is made up of tiny jagged particles of rock and glass (photo on right; magnified 200 times).

Source: U.S. Geological Survey Fact Sheet 027-00 Online Version 1.0 (USGS 2003)

4.7.1. Previous Occurrence

A summary of some of the volcanic ash events affecting Montana is shown in **Table 4-8**. The trajectory of ash fall events is heavily dependent upon the size of the eruption and the prevailing weather and ambient winds.

Table 4-8. Some Recent Volcanic Ash Events Affecting Montana

Volcano	Most Recent Eruption (Years before Present)	Location Affected	Thickness of Ash in Montana
Yellowstone Caldera	665,000	Eastern Montana	--
Glacier Peak	14,500	Western Montana	1.2 inches (compacted)
Crater Lake (Mt. Mazama)	7,600	Western Montana	Up to 6 inches (compacted)
Mt. St. Helens	30	Entire State	Up to 0.2 inches (uncompacted)

Source: MDES, 1996; Sarna-Wojcicki and others, 1981; USGS, 2003; Nimlos, 1981.

The nearest active volcanoes to Mineral County are within the Cascade Range of British Columbia, Washington, Oregon and California and to the south in the Yellowstone Caldera of Wyoming and Northeastern Idaho. **Table 4-9** shows the active volcanoes within the United States.

Table 4-9. Active and Potentially Active Volcanoes in the United States

Volcano	Eruption type(s)	Number of eruptions in past 200 years	Latest activity (in years before present or year(s) A.D.)	Remarks
Washington State				
Mount Adams	Lava, ash	0	More than 3,500 years ago	Debris flows are the most recent events
Mount Baker	Ash, lava	1	1870	Increased heat output and minor melting of summit glacier in 1975; some debris flows not related to eruption. History of extensive pyroclastic flows
Glacier Peak	Ash	More than 1?	Before 1800	
Mount Rainier	Ash, lava	1?	1882	History of massive debris avalanches and debris flows. Occasional very shallow seismicity
Mount St. Helens	Ash, dome, lava	3-Feb	1980 to present	Continuing intermittent volcanic activity
Oregon				
Crater Lake	Lava, ash, dome	0	4,000 years ago	Largest known eruption from Cascade Range volcano. Catastrophic, caldera-forming eruption 7,000 years ago; post-caldera lava and domes
Mount Hood	Ash, dome	2?	1865	Occasional seismic swarms
Mount Jefferson	Ash, lava	0	More than 50,000 years ago	Debris flows in 1934, 1955; young basaltic flows in nearby area
Newberry Crater	Ash, lava	0	600	Latest eruption was obsidian flow
Three Sisters	Ash, lava	0	950?	Debris flows in this century
California				
Clear Lake	Lava, ash	0	Not known	Geothermal energy and long-period (volcanic) seismicity suggest "active" status
Coso Peak, California	Lava, ash, dome	0	About 40,000 years ago	Geothermal energy production and seismic activity suggest "active" status
Lassen Peak	Ash, dome	1	1914-1917	Lateral blast occurred in last eruption
Long Valley Caldera, California (Inyo-Mono-Mammoth)	Ash, dome, ashflow	3?	About 1400	Youngest activity represented by nearly simultaneous eruptions of rhyolite at several of the Inyo craters; currently restless, shown by seismicity and ground deformation
Medicine Lake	Ash, lava	0	1065	Latest eruption formed Glass Mountain
Mount Shasta	Ash, dome	1	1786?	Debris flows in this century
Arizona, Idaho, Montana, New Mexico, and Wyoming				
Bandera Field (McCarty's Flow), New Mexico	Lava	1	About 1,000	Most voluminous lava within past 1,000 years
Craters of the Moon, Idaho	Lava	About 1	2,100 years ago	Youngest activity in the Snake River Plain

Volcano	Eruption type(s)	Number of eruptions in past 200 years	Latest activity (in years before present or year(s) A.D.)	Remarks
Arizona, Idaho, Montana, New Mexico, and Wyoming				
San Francisco Field, Arizona	Lava	2	1065-1180	Sunset Crater; disrupted Anasazi settlements
Yellowstone Caldera, Wyoming, Montana, and Idaho	Ashflow	0	70,000 years ago	Numerous hydrothermal explosions, geysers, geothermal activity; currently restless, shown by seismicity and ground deformation

From: Wright and Pierson, 1992,
Living with Volcanoes, The U.S. Geological Survey's Volcano Hazards Program: USGS Circular 1073, 57p

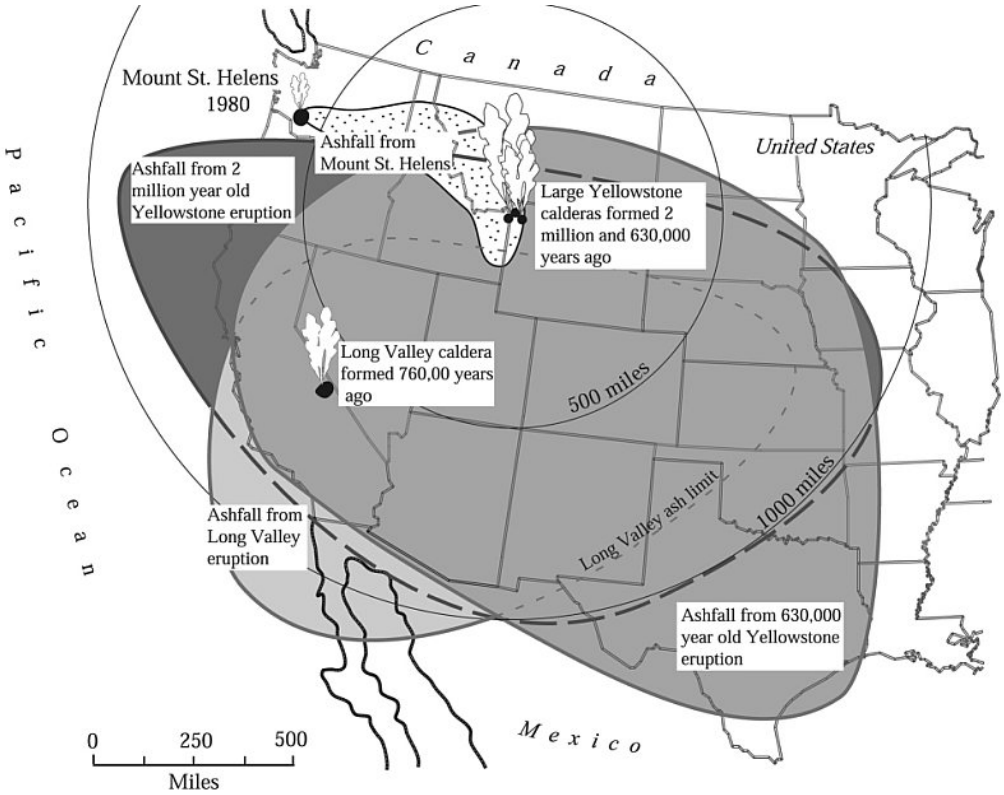


Figure 4-5. Areas of the United Stated that once were covered by volcanic ash from Yellowstone's giant eruptions 2 million and 630,000 years ago, compared with ash fall from the 760,000-year-old Long Valley caldera eruptions at Mammoth Lakes, California, and the 1980 eruption of Mount St. Helens, Washington. (Adapted from Sarna-Wojcicki, 1991.)

The Yellowstone Caldera is one of the largest and most active calderas in the world. The spectacular geysers, boiling hot springs, and mud pots that have made Yellowstone famous are surface manifestations of a magma chamber at depth. Cataclysmic eruptions 2.0, 1.3, and 0.6 million years ago ejected huge volumes of rhyolite magma; each eruption formed a caldera and extensive layers of thick pyroclastic-flow deposits. The youngest caldera is an elliptical depression, nearly 80 kilometers long and 50 kilometers wide, which occupies much of Yellowstone National Park. The caldera is buried by several extensive rhyolite lava flows erupted between 75,000 and 150,000 years ago (USGS, 1994).

The Cascade Range includes 27 volcanoes, many of which have been active in the last 10,000 years (**Table 4-9**). The only threat these volcanoes pose to Montana is ash fall. The likely extent of such ash fall can be estimated on the basis of past eruptions.

Table 4-8 shows the thicknesses of recent ash deposits within Montana. The most recent ash was deposited in May 1980 after the Mt. St. Helens eruption in Washington state.

After the eruption of Mount St. Helens in May 1980, a coating of about 5.0 mm (0.2 inches) of ash fell on Mineral County (Sarna-Wojcicki and others, 1981). Ash deposits tended to be slightly thicker in the western portions of the County. Travel was restricted in Mineral County for approximately 5 days because of concerns for public health, but the ash was determined to be a physical respiratory irritant, but not a toxic substance. The main hazards in Mineral County included reduced visibility (and resulting closed roads and airports), clogging of air filters, and a health risk to children, the elderly, and people with cardiac or respiratory conditions, such as asthma, chronic bronchitis, and emphysema. Claims for state-wide damage totaled approximately $55,000 according to MDES (2003).

4.7.2. Probability of Occurrence/Loss Estimate Update

The northwest volcanoes remain active and the potential for future eruptions and ash fall is possible over the next 100 years. Estimating the impact and loss is difficult because there are so many variables that relate to the volcanic hazard in Mineral County. The type of eruption, the magnitude of eruption and prevailing wind and speed all factor into the potential for impacts. To estimate potential losses, the impact and costs from the Mt. St. Helens May 1980 eruption were updated and adjusted to reflect current economic activity in the County.

The 1980 eruption is estimated to have disrupted up to 50% of all economic activity for 5 days in western Montana but there was no available data on income-related losses within Mineral County. Expected losses may have been similar to Ravalli County where there was an estimated $177,000 in income related losses throughout the county. Adjusted for 2010 dollars, the losses could equal $469,000 on a similar event, or represent annualized losses of $4,690.

4.7.3. Summary of Vulnerability and Impact

Mineral County, Town of Superior, and Town of Alberton have a low potential for structural damages from volcanic eruptions and low potential for injuries/fatalities related to volcanic eruptions.

4.8. Weather (Storms and Wind)

4.8.1. Severe Thunderstorms

A “severe thunderstorm” is defined by the National Weather Service as a thunderstorm which produces tornadoes, hail 1.0 inches or more in diameter, or winds of 53 knots (60 mph) or more. Structural wind damage may imply the occurrence of a severe thunderstorm. A thunderstorm is “approaching” severe levels when it contains winds of 35 to 49 knots (40 to 57 mph), or hail 1/2 inch or larger but less than one inch in diameter. Although not considered “severe”, lightning and heavy rain can also accompany thunderstorms.

4.8.1.1. Previous Occurrence

PBS&J (Atkins) compiled storm losses from the Spatial Hazard Events and Losses Database (SHELDUS™) developed by the University of South Carolina's Hazards & Vulnerability and Research Institute at the. SHELDUS™ is a county-level hazard data set for the U.S. for 18 different natural hazard events types such as thunderstorms, hurricanes, floods, wildfires, and tornados. For each event the database includes the beginning date, location (county and state), property losses, crop losses, injuries, and fatalities that affected each county. The events with reported damage or injury are shown below in **Table 4-10**.

Table 4-10. Storms in NCDC and MDES Files

Date	Type Event	Injuries	Fatalities	Prop Damage	Crop Damage
6/20/1985	Hail - Wind	0.02	0	1,163	1,163
5/22/1980	Severe Storm/Thunder Storm	0	0	8,333	0
4/30/1987	Severe Storm/Thunder Storm - Wind	0	0	16,666	0
5/15/1994	Severe Storm/Thunder Storm - Wind	0	0	50,000	0
7/13/2002	Severe Storm/Thunder Storm - Wind	1	0	360,000	0
12/13/1988	Wind	0	0	10,000	0
11/25/1990	Wind	0	0	5,555	0
10/16/1991	Wind	0	0	102,040	0
11/3/1993	Wind	0	0	500	5,000
11/13/2008	Wind	0	0	8,333	0
	Totals	**1.02**	**0**	**562,590**	**6,163**

4.8.1.2. Probability of Occurrence/Loss Estimate Update

A precise accounting of potential losses from storms was not calculated. Extreme storms can occur anywhere within the County. The magnitude of the event can include wind storms up to 80 knots and hailstorms with hail up to 2 inches in diameter. There are records of numerous events, but data on losses are limited. Based on data from the last 30 years and adjusted for inflation, there has been $768,000 in property and $10,000 in crop damage. Annualized losses are expected to be $25,600 in property and $333 in crop damage with an estimated fatality rate of 0/100 years.

4.8.1.3. Summary of Vulnerability and Impact

Mineral County, Town of Superior, and Town of Alberton have a low potential for structural damages from weather events but a high potential for injuries/fatalities related to wind and extrme storm events.

4.8.2. Winter Storms and Cold Spells

4.8.2.1. Previous Occurrence

Snow storms and cold temperatures are common occurrences in Mineral County and generally do not cause problems, as residents are used to winter weather and winter driving. Sometimes, however, winter storms can cause automobile accidents, close schools, damage buildings, down power lines, and break trees. Extreme cold may harm residents if unprotected outdoors or if heating mechanisms are disrupted.

Daily Climate Summaries from the Western Regional Climate Center (2003) for Superior from 1914-2003 show that temperatures have reached –36 degrees Fahrenheit, snowfall has reached up to 18 inches in 24 hours, and snow depths have reached up to 44 inches in 24 hours. The NCDC (2003) has no tabulations of winter storm frequency or damages for Mineral County.

PBS&J (Atkins) compiled winter storm losses from the Spatial Hazard Events and Losses Database (SHELDUS™) developed by the University of South Carolina's Hazards & Vulnerability and Research Institute at the. SHELDUS™ is a county-level hazard data set for the U.S. for 18 different natural hazard events types such as thunderstorms, hurricanes, floods, wildfires, and tornados. For each event the database includes the beginning date, location (county and state), property losses, crop losses, injuries, and fatalities that affected each county. The events with reported damage or injury are shown below in **Table 4-11**.

Table 4-11. SHELDUS™ Reported Damage or Injury

Date	Type Event	Injuries	Fatalities	Property Damage	Crop Damage
12/23/1983	Winter Weather	0	1	0	0
2/3/1986	Winter Weather	0	0	1,000	0
3/18/1987	Winter Weather	0	0.25	1,250	125
1/31/1989	Winter Weather	0	0	15,152	152
2/1/1989	Winter Weather	0	0	87,719	88
8/23/1992	Winter Weather	0	0	217	21,739
8/25/1992	Winter Weather	0	0	0	877
2/24/1994	Winter Weather	0	0	8,772	0
4/26/1994	Winter Weather	0	0	4,167	0
11/17/1994	Winter Weather	0	0	4,167	0
11/26/1994	Winter Weather	0	0	7,143	0
3/27/1995	Winter Weather	0	0	50,000	0
11/18/1996	Winter Weather	0.09	0.18	0	0
6/11/2008	Winter Weather	0	0	77	0
1/2/2009	Winter Weather	0	0	1,250	0
	Totals	**0.09**	**1.43**	**180,914**	**22,981**

4.8.2.2. Probability of Occurrence/Loss Estimate

A precise accounting of potential losses from winter storms was not calculated. There were no available records to suggest structure losses or income-related losses from winter storms. The greatest risk will be in combination with power outages, either localized or County-wide, where there may be deaths associated with severe and prolonged cold.

Based on recent winter storm data over the last 30 years there has been one reported fatality, $230,000 in property damage and $340,000 in crop damages adjusted for inflation. Based on this data, the annualized losses are $19,019 ($7,673 property and $11,346 crop) with estimated fatality rate of 1/20 years.

4.8.2.3. Summary of Vulnerability and Impact

Mineral County, Town of Superior, and Town of Alberton have a low potential for structural damages from winter weather events but a high potential for injuries/fatalities related to severe winter storms and utility disruption related to those storms.

4.9. Wildfire

Mineral County completed a Community Wildfire Protection Plan (CWPP) in May 2005 to identify the hazards and risks from wildfire and make recommendations for mitigation of wildfire hazards (Reeves,

2005). The CWPP was prepared in response to the Healthy Forest Restoration Act (HFRA) in 2003 allowing the County to prioritize and receive federal assistance for fuel reduction projects within designated Wildland Urban Interface (WUI) zones. The CWPP is a more thorough and detailed analysis of the risks from wildfire and identifies where fuel reduction, on both private and public lands, could best mitigate the impacts from wildland fires. This Plan Update incorporates the hazard/risk analysis and recommended mitigation plan from the CWPP by reference. The summary below is background on the wildfire hazard presented in 2004.

4.9.1. Previous Occurrence

Mineral County's history with wildfires, the mountainous terrain, and large areas of the County encompassed by forested land, has prompted the community to identify wildfires as a significant hazard. The recent fires in 2000 and 2003, as devastating and threatening as they were, did not measure up to the devastation caused by the 1910 fire. On August 20, 1910 "hurricane" winds swept over the divide driving a wildfire that had already hit Wallace and Mullan, Idaho. High winds drove the fire down the St. Regis Valley burning all the structures in Haugen and DeBorgia. Six people died from the fire within Mineral County but many others outside of the County died, including 10 miners near Borax consumed by smoke and fire near the mouth of a mine portal. While fire is a common occurrence in Western Montana forests, drought conditions, heavy fuel build up, high winds, and lightning storms can create a firestorm that has the potential to have devastating impacts on this rural County.

Federal and/or state disasters or emergencies for forest fires were declared for Mineral County in 1979, 1988, 1991, 1994, 1996, 1998, 2000, 2001 and 2003 (MDES, 2003). Costs for fire suppression and structure damage during these years are not itemized for Mineral County, but are grouped for either the whole state or several counties.

The USDA Forest Service (2002) Western Montana Planning Zone, Cohesive Fire Plan Team data for "fire starts" in Mineral County from 1981 to 2000 indicate that there were 887 "fire start" events during this time, which affected a total of 178,829 acres. Of these 887 events, 796 were caused by lightning, and the remaining were "man-caused". Most of the fires (754) were smaller than one acre in size. A total of 13 fires were larger than 100 acres in size. Fire perimeters from the 2000 and 2003 are shown in **Figure 4-6**.

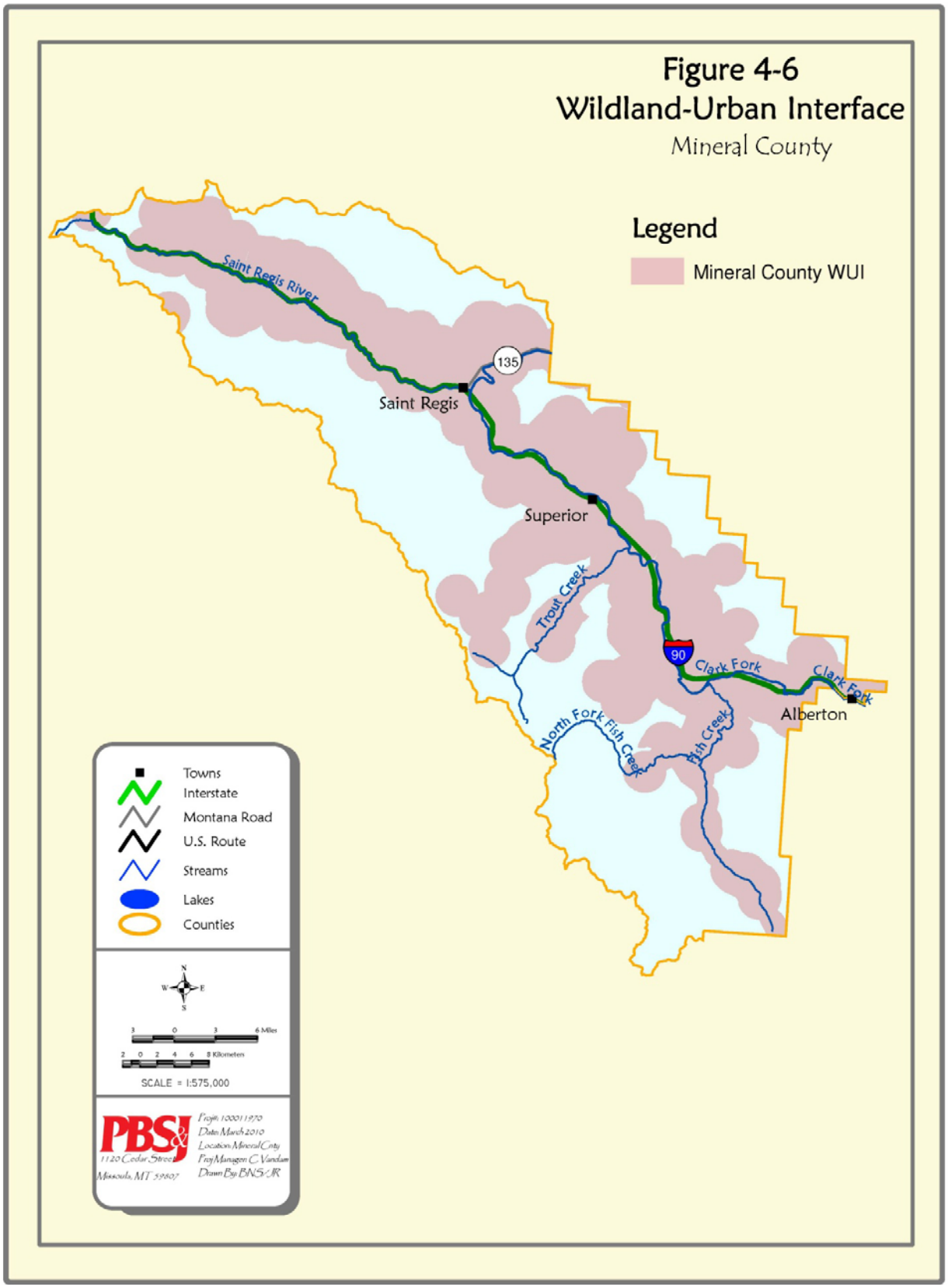


Figure 4-6. Wildland Urban Interface

4.9.1.1. Mineral County Fires of 2000-2009

Severe drought conditions resulted in large forest fires within Mineral County during 2000 and 2003. Federal disaster declarations were issued for Mineral County and the rest of Montana. Air quality was heavily impacted by smoke, and nearby public lands were closed to access.

Dry conditions in July and August 2000 resulted in 70 fires on approximately 12,484 acres of the Lolo National Forest (USDA Forest Service, 2002). During 2000, the Lolo NF and Montana DNRC were able to suppress more than 80 percent of all fire starts and no homes were damaged or destroyed. Fuel conditions were so dry that 80 percent of all ground lightning strikes resulted in fires (USDA Forest Service, 2001).

During 2003, another year of drought, Mineral County was hit by more forest fires. The affected acres, suppression costs, structures destroyed, and structures threatened for the major fires of 2003 within and adjacent to Mineral County are listed in **Table 4-12**.

Table 4-12. Summary of Large Fires during 2003 within and Adjacent to Mineral County

Fire Name	Location	Acres	Suppression Costs	Structures Destroyed	Structures Threatened
Fish Creek Complex (merged with N. Howard Creek)	35 miles west of Missoula	36,950	$22,471,000*	0	195 residences, 1 commercial, 15 outbuildings

Source: USDA Forest Service (2003)
*As of September 10, 2003.

In 2007, fire season arrived early due to faster than normal snow melts and fueled by record dry conditions in July and August of that year. That summer there were 200 reported fires in the Lolo National Forest, burning over 139,000 acres in Mineral, Lolo, and Sanders County.

4.9.1.2. Probability of Occurrence/Loss Estimate

All structures in Mineral County are located within the WUI as shown and indicates all properties are at risk. The CWPP does identify some communities in the St Regis Valley (Haugan, Saltese, and DeBorgia) are at higher risk because they border lodgepole pine forest in an area of significant pine beetle killed trees. The Mineral County CWPP indicates that large stand replacement fires may occur every 2-6 years (Reeves, 2005). While fire suppression will focus on protecting structures, structures losses could occur and likely will occur due to the predominance of structures within and near forests lands. To estimate potential losses, a fire causing significant structure loss could occur every 50 years and the estimated losses would include 1% of structures within the county. The losses could include 53 structures at an estimated value of $2.38 million. Annualized wildfire losses are estimated to be $47,600.

4.9.1.3. Summary of Vulnerability and Impact

Mineral County, Town of Superior, and Town of Alberton have a very high potential for structural damages from wildfire events and a high potential for injuries/fatalities related to wildfires.

4.10. Other Hazards

Other hazards considered, but dismissed from detailed analysis by the Mitigation Planning Committee (see meeting minutes on file), included: aircraft accidents, civil disorder, flooding-dam failure, drought, and land subsidence. These hazards were eliminated from detailed analysis in this Plan because either the hazards were being evaluated in other County, State, or Federal processes, or the risks from these hazards were determined to be so low in Mineral County that additional study and evaluation was not necessary.

4.11. Hazard Summary

Table 4-13. Summary of Potential Losses - Mineral County

Hazard	Occurrence w Significant Losses	Estimated Annualized Losses	Potential for Casualties
Earthquake	100 years	$0	none
Flooding-Flash & Regional	100 years	$18,628	moderate
Flooding-Ice Jams	25 years	$20,000	low
HazMat/Transportation Incidents	50 years	$10,000	moderate
Landslide	20 years	$1,000	low
Utility/Communication Disruption	20 years	< $1,000	high
Volcano	100 years	$4,690	low
Weather- Extreme Wind & Thunderstorms	10 years	$26,000	low
Weather-Winter Storms	10 years	$19,000	high
Wildfire	50 years	$48,000	high

5.0 MITIGATION STRATEGY

5.1. Hazard Prioritization

The mitigation strategy is the recommended actions by the Towns of Alberton and Superior and Mineral County to prevent or reduce losses from disasters in the future. These actions represent the best strategy, considering the exposure to hazards throughout the community and the likelihood a disaster will occur. The actions are prioritized based on the risk and exposure to the community from the hazards listed in **Table 5-1**.

Table 5-1. Hazard Prioritization

Hazard	Frequency (F) for a Significant Event (possibility in any given year)	Potential Impact (I) to Community	Potential for Casualties (C)	Overall Risk F(I+C)
Wildfire	high	very high	high	36
Weather- Extreme Wind & Thunderstorms	high	low	high	24
Weather-Winter Storms	high	low	high	24
Flooding-Flash & Regional	moderate	high	moderate	21
Hazardous Material Release	moderate	moderate	moderate	18
Utility Disruption	moderate	moderate	moderate	18
Flooding-Ice Dams	moderate	low	low	12
Earthquake	low	moderate	low	10
Landslide	moderate	low	very low	9
Volcano	low	low	low	8

Very low -1
Low -2
Moderate -3
High -4
Very High -5

Public meetings with stakeholder groups and the general public were held to determine mitigation goals, objectives and specific projects. Public meetings were held in the Superior on November 15, 2010. Input from the meetings has been synthesized into the goals and objectives shown in Section 5.2 below.

5.2. Progress on Completed Mitigation Actions

The 2004 PDM plan included 5 mitigation goals and 12 objectives for actions to help the county and communities within the county reduce vulnerability to natural hazards. **Table 5-2** is a list of each of these mitigation actions and summary of actions completed or not completed.

Table 5-2. Mineral County Pre Disaster Mitigation Goals/Objectives/Projects Current Status

Goals	Objectives	Projects	Status
Reduce Wildland Fire Risk in Wildland Urban Interface	Public Education on Wildfires	o Provide/prepare educational material to inform public about wildfire risks o Map/locate structures within WU	Many Resources are available Complete
	Thinning of Public and Private Land with Heavy Fuels	o Encourage/provide financial incentives for fuel reduction around homes. o Encourage/support fuel mitigation projects on federal lands o Implement fuel mitigation projects as designated in the Community Wildfire Protection Plan	Refer to the Community Wildfire Protection Plan (see Section 5.4 below)
	Effective Response to Wildland Fires	o Develop safe ingress/egress routes for homes in the WUI o Encourage Greater Initial Response and Active Nighttime Fighting of Wildland Fires o Training of Local officials to Effectively Coordinate Evacuations	Refer to the Community Wildfire Protection Plan
Reduce Exposure to Flooding	Reduce Environmental Impacts from Flooding	o Build community sewer systems away from 100 year floodplain o Ensure water supplies are protected from bacterial contamination after flooding events	Subdivision Regulations address these requirements
	Identify flood prone zones throughout the County	o More detailed floodplain determination in areas of frequent flooding (St Regis) o Debris removal from culverts in developed areas	
	Safe and Orderly Evacuations During Flooding	o Training of Local officials to Effectively Coordinate Evacuations	Some accomplished, but due to staff changes this need still exists.
Enhance Communication for Hazard Warnings	Upgrade EAS System for all Hazard Warning/ Communication	o Evaluation of possible communication systems that can effectively reach all portions of the County o Mapping locations of all residences within the County o Additional cell towers to improve cellular communication	Complete, MT Cadastral (Structures) Two Cell Towers completed, three more planned
	Install Weather Stations to Enhance Storm Prediction	o Install Additional early warning weather stations to predict hazardous weather conditions	Not Completed

Goals	Objectives	Projects	Status
Reduce Vulnerability to Hazardous Material Releases	Infrastructure Improvements to Reduce Potential Accidents	o Improve 25 mph railroad curves near Superior o Cooperative agreements with MRL and County to ensure rail lines are effectively inspected and maintained o Examine high accident rates on Interstate 90, work with MDT to reduce the hazards causing truck accidents and hazmat spills	Ongoing efforts, with some improvement accomplished.
	Improve County Readiness to Hazardous Material Spills	o Ensure fixed facilities have toxic release plans that identify hazards and potential exposed areas in the event of a release. o Obtain regular reports from MRL on the hazardous material flow through the County. o Conduct training exercises for hazardous material spills from both railroad and highway transport	Completed, through regular response exercises
Reduce Associated Impacts from Hazards	Reduce County's Vulnerability to Power Failure and Utility Disruption	o Provide generators for essential facilities to ensure operations during power disruption. o Develop program for affected communities/vulnerable populations to acquire generators during power failures.	Completed Completed, small portable generators are available
	GIS/Mapping throughout County	o Mapping and location of each residence within the County. o Mapping and location of potential egress routes from communities during disasters.	Near Completion, MT Cadastral (Structures) Add Emergency Response Functionality
	Public Education	o Develop educational materials regarding snow loads & safe removal. o Information about the potential hazards that can affect the community. o Education on safe egress from communities during disasters.	Continue

5.3. Mitigating Exposure and Risk for New Development

The best means to mitigate risk is to encourage or regulate development to placed out of harm's way. Through floodplain and subdivision regulations, Mineral County restricts development within designated floodplains and other unsuitable lands. The subdivision regulations also require design standards for building within the wildland urban interface.

Mineral County subdivision regulations prohibit subdivisions for building or residential purposes to be located within the floodway of a 100-year flood zone or in areas that could increase flood hazards.

Outside of delineated flood zones, any proposed subdivision within 2,000 horizontal feet and 20 vertical feet of a live stream draining an area of 25 square miles or more, must complete a flood hazard evaluation identifying the 100-year frequency water surface elevations and the 100-year floodplain boundaries.

Mineral County subdivisions must be planned and designed to minimize the risk of fire and to permit the effective and efficient suppression of fires in order to protect persons, property, and forested areas. Planned subdivisions in high hazard fire areas must prepare a Fire Prevention and Control Plan that

addresses forest management procedures to reduce localized fire hazards, ingress and egress routes designed to permit firefighting vehicles, and proof of adequate water supply to support firefighting suppression.

5.4. Mitigation Goals and Objectives

Goal #1: Reduce Wildland Fire Risk in Wildland/Urban Interface (WUI)

The Mineral County Community Wildfire Protection Plan (CWPP) addresses mitigation projects for reducing wildland fire risk in Mineral County and its incorporated communities. Its stated purpose is to position fire protection agencies, County leaders, rural communities, valley residents, and forest owners and managers to be better prepared to protect the County's residents and its natural resources from the potentially devastating impacts of wildfire. Input from Stakeholders meetings and the public during the development of the PDM plan were consistent with the goals and objectives identified in the CWPP. The CWPP listed the following ten areas that were identified as priority hazard fuels treatment areas and progress made on these specific treatment areas:

North facing slopes across the river from the Trestle Creek Golf Course (St. Regis)	St Regis South fuel reduction in progress
Tin Can Alley (St. Regis)	Fuel reduction program complete (Mayo Gulch)
North facing slopes on Superior	Currently in planning
Slopes above Johnson Lane (Superior)	Portions of project completed
Slopes above Spirit Walk Lane (Superior)	Within roadless area, no work has been completed
Drainage area above Alberton water supply	To be completed
Slopes above the town of Alberton	To be completed
East and West Twin Creek drainages (DeBorgia)	Portion completed as part of DeBaugen timber sale
Savenac Creek drainage(Haugan)	Portion completed as part of DeBaugen timber sale
Packer Creek drainage (Saltese)	Yet to be completed as part of DeBaugen timber sale

The PDM accepts the Mineral County CWPP and incorporates all proposed strategic actions as part of the Mineral County PDM mitigation plan (see **Appendix D**). .

Goal #2: Reduce Exposure to Flooding

<u>Objective 2.1: Complete digital floodplain mapping and modeling within flood prone zones in the County</u>

Specific Projects:

1. LIDAR (Light, Imaging Detection and Ranging) flights and mapping of Mineral County to prepare for digital flood map production.
2. Digital Flood Insurance Rate Maps (DFIRM) and RiskMap of the Clark Fork River, St Regis River, and principal tributaries to the Clark Fork.
3. Feasibility Study to Address Flat Creek Flooding through Town of Superior.

Objective 2.2: Safe and Orderly Evacuations During Flooding

Specific Projects:

1. Ongoing training of local officials to effectively coordinate evacuations.

Goal #3: Enhance Communication for Hazard Warnings

Objective 3.1: Upgrade Communication System for all Hazard Warning/Communication

Specific Projects:

1. Expand Reverse 911 with Enhanced 911 capabilities

Objective 3.2: Install Weather Stations to Enhance Storm Prediction

Specific Projects:

1. Install enhanced warning weather stations to predict hazardous weather conditions at the Superior Airport

Goal #4: Reduce Associated Impacts from Hazards

Objective 4.1: Public Education

Specific Projects:

1. Develop educational materials regarding snow loads on roofs and safe removal
2. Information about the potential hazards that can affect the community
3. Education on safe egress from communities during disasters.

Object 4.2: Improve GIS Functionality for Emergency Responders

Specific Projects:

1. Increased GIS functionality to allow routing emergency responders to incidents.

5.5. PDM Project Ranking

The projects listed above were scored in **Table 5-3** below based on the ability to address higher priority hazards, relative cost, ability to implement the project, and benefit to the population. The score for each factor is summed and multiplied by the hazard ranking. Each factor is defined below:

Hazard Ranking: based on priorities established in the risk assessment and scoring of exposure shown in **Table 5-3**.

Costs: The costs to the general public. The cost estimate does not account for the fiscal impact of regulations that may be imposed on individual facilities, property owners or developers.

Reduced Casualties: Relative evaluation of whether the project effectively reduces the potential for casualties.

Reduced Structural Damage: Relative measure of whether the project effectively reduces the potential for structural and property damage

Each factor was ranked high, medium, or low based on the following definitions.

Table 5-3. PDM Project Ranking Format

	High (3)	Medium (2)	Low (1)
Hazard Ranking	Score >20	Score 11-20	Score <11
Cost	< $ 50,000	$50,000-$500,000	>$500,000
Reduced Casualties	Prevents Loss of Life	Reduces Potential Casualties/Injuries	Minimal Reduction
Reduced Property Damage	Prevents Property Damage	Reduces Damage to Property	Minimal Reduction

The ranking system is intended to identify projects that will be most effective in hazard mitigation and be cost effective. **Table 5-4** shows each project was assigned a value for each of these ranking factors. Projects that are already been implemented or specific projects that will be included in the Community Fire Plan were not included. The type of hazard each project addressed was considered the most important factor in trying to prioritize projects and was thus used as a multiplier. The other three hazards were summed and multiplied by the Hazard Ranking. For example, a flood mitigation project that helped a small portion of the population and was very costly, but offered significant reduction of risk to life and property damage would be scored as follows:

Example

Proj #	PDM Project	Hazard	Cost	Reduced Casualties	Reduced Property Damage	Score
x.x.x.	Remove Houses from Small Stream Floodway	3	1	3	3	21

Table 5-4. Project Prioritization Scoring

Proj #	PDM Project	Hazard	Cost	Reduced Casualties	Reduced Property Damage	Score
2.1.1	LIDAR Mapping of County Floodplains	3	2	2	1	15
2.1.2	DFIRM/RiskMap Production for Flood prone Areas	3	2	2	1	15
2.1.3	Feasibility Study for Flat Creek	3	1	1	3	15
2.2.1	Training for Safe & Orderly Evacuations	3	3	1	1	15
3.1.1	Enhanced 911	2	2	2	1	10
3.1.2	Superior Airport Enhanced Weather Station	3	3	2	1	18
4.1.1-3	Public Education Regarding Community Hazards	2	3	2	1	12
4.1.2.1	Improve GIS Functionality for Emergency Responders	3	3	3	2	24

6.0 IMPLEMENTATION & PLAN MAINTENANCE

6.1. Implementation Plan

The mitigation projects in **Table 5-4** that received the highest score will be given the highest priority. As funding and opportunities arise, the costs and benefits to the project can be refined. The implementation for some of the higher priority projects are shown in **Table 6-1**. The table provides a description of the project, the jurisdiction responsible for the project (Mineral County, Town of Superior, Town of Alberton), the agency or department responsible for implementing the project, and its potential funding sources.

Table 6-1. Implementation Plan for Mineral County and Towns of Superior & Alberton

Project Description	Jurisdiction	Agency/Department	Funding Source (s)	Priority Score	Timeframe
Improved GIS Functionality	Mineral County	Mineral Co DES West End Fire	DNRC/RRDLG Superior/Mineral Co	24	1-3 Years
Enhanced Weather Station	Mineral County Town of Superior	Mineral County DES	FAA/NOAA	18	1-3 Years
LIDAR Mapping	Mineral County Town of Superior	Mineral County Planning	DNRC/RRDLG Superior/Mineral Co	15	1-3 Years
DFIRM/RiskMap	Mineral County Town of Superior	Mineral County Planning	DNRC Risk Map Superior/Mineral Co	15	1-3 Years
Flat Creek Study	Town of Superior	Town of Superior	Superfund DNRC/RRDLG	15	<1 Year

The fuel reduction mitigation actions are addressed in the CWPP and includes actions in or near all of the jurisdictions participating in the PDM Plan Update.

The approval of this plan shows that hazard mitigation is a high priority for Mineral County and its incorporated communities. Any current or future planning will incorporate these goals, objectives, and disaster mitigation projects into the decision making process. Incorporating these objectives and projects into growth plans, subdivision regulations, floodplain regulations, and other land use tools can help reduce exposure and losses from natural hazards and reduce public costs for response and disaster assistance.

6.2. Plan Maintenance Procedures

This plan is maintained for Mineral County and its incorporated communities by the Mineral County Local Emergency Planning Committee (LEPC). The Mineral Co. LEPC has representatives from all local jurisdictions and these jurisdictions were active in the development of this plan. The plan will be reviewed by the LEPC annually in their January meeting. Changes or modifications to the plan must be approved by the LEPC and all such changes will be submitted to the Montana Department of Emergency Services. An updated PDM Plan will be reviewed and approved by both jurisdictions every 5 years. The next updated plan will be submitted to the Montana Department of Emergency Services and Federal Emergency Management Agency Regional Office in 2017.

Public comments, inputs, and modifications are a necessary part of the plan. This input will be addressed in the annual updates. All input shall be submitted in writing to the Mineral County Disaster and Emergency Services.

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Appendix A Meeting Attendance

Pre-Disaster Mitigation Plan 2012 Update

Mineral County, Town of Superior, Town of Alberton

Mineral County Local Emergency Planning Committee

Name	Affiliation	Email	Phone Number
Howard M. Hogan	Town of Alberton		406-722-4942 hm 406-722-3404 wk
Richard Hader	MT Highway Dept.	rhader@mt.gov	406-529-3240
Susan Charles	St. Regis-WEVFD	SJCharles@aol.com	406-678-2000
Bruce Charles	St. Regis-WEVFD	DeBorgiaFirePlan@aol.com	406-678-2000
Dick Darne	Town of Alberton	drgravely@hotmail.com	406-722-4575
Dnorm Brovold	Town of Alberton	normb@blackfoot.net	406-722-3370
John L. Bibler, II	Town of Frenchtown	jbibler@frenchtownfire.org	406-626-5791
Kirsten Locke	Mineral Comm. Hospital	kalocke@mchospital.net	
Tim Read	Mineral County	tread@co.mineral,mt.us	
B. J. McComb	Mineral County Comm.	mccommissioners@co.mineral.mt.us	
Sharon Bladen	RSVP Volunteers	rsvp@montana.com	
Peggy Stevens	Mineral County Health	mchd@montana.com	
Joe Hanson	Alberton-Town Mayor		406-722-3404
Martha Smith	MT-DES	desdist1@blackfoot.net	406-827-8200
John Woodland	Superior-Fire Dept.	firechief@blackfoot.net	406-529-4317
Duane H. Simons	County Commissioner	doughboy@blackfoot.net	406-240-0043
Dennis Hildebrand	Supervisor Area Ambulance Service	spr3335@blackfoot.net	406-822-3335
Bruce Berry	Blackfoot	spr4800@blackfoot.net	406-822-4800
Mary Jo Berry	Supervisor	spr4800@blackfoot.net	406-822-4800
Richard Werst	Clark Fork Chronicle	rbwerst@gmail.com	406-722-2614
Jerry Dockston	St. Regis-Fire Dept.	str-2607@blackfoot.net	
George Gupton	Mineral County-DES	mincodes@blackfoot.net	

Grant Year and Name

Meeting/training PDM Plan - Mineral Co LEPC

Location Alberton **Date** 1/7/10

Time of meeting/training 4:00 PM Side Track Cafe

Instructor/Staff Person

Name & Affiliation	E-mail and phone number	Federally Funded (Yes or No)	Number of Hours	Miles Traveled	Total
Name: Charlie Vandam Organization: PBS&J	cvandam@pbsj.com 406 ~~728~~ 532.7275				
Name: Howard M. Holan Organization: Town of Alberton	4942 406-722-3404				
Name: Richard Hader Organization: Montana Highway Patrol	RHADER@MT.GOV 406-529-3240				
Name: Susan Charles Organization: WEVFD	406 678-2000				
Name: Bruce Charles Organization: WEVFD	678-2000				
Name: DICK DARNE Organization: ALBERTON	722 4575 drgravely@hotmail.com				
Name: Norm Brovold Organization: Alberton	722-3370 normb@blackfoot.net				
Name: John L. Bibler II Organization: FRENCHTOWN	626-5791 JBIBLER@FRENCHTOWNFIRE.ORG				
Name: Kirsten Locke Organization: Mineral Comm Hosp	Kalocke@mchospital.net				
Name: TIM READ Organization: MINERAL COUNTY	TREAD@COMINERAL.MT.US				
Name: B.J. McCann Organization: Mineral Co Comisn	MCcommissioners@Co.Mineral.MT.US				
Name: SHARON BLADEN Organization: RSVP VOLUNTEERS	RSVP@MONTANA.COM	yes	4	RT 180	
Name: Peggy Stevens Organization: ~~Mineral County Health~~	mchd@montana.com				
Name: Joe Hanson Organization: Town Mayor	722 3404				
Name: MARTHA SMITH Organization: MT-DES	827-8200 desdist1@blackfoot.net	yes			
Name: John Woodland Organization: Superior Fire Dept	529-4317 firechief@blackfoot.net	Some Grants			
Name: Duane H Simons Organization: County Comm	240-0043 Doughboy@blackfoot.net				
Name: westend Organization:					

Appendix B Public Meeting Documentation

Pre-Disaster Mitigation Plan 2012 Update

Mineral County, Town of Superior, Town of Alberton

an Atkins company

Media Release

November 3, 2010

RE: Pre-Disaster Mitigation Planning Update Workshop

Mineral and Ravalli County

Mineral and Ravalli County Disaster and Emergency Services (DES) Office are hosting public workshops to inform and collect input on mitigating hazards within the county. PBS&J is working with the DES offices to update the Pre-Disaster Mitigation Plan for each county. PDM plans review the hazards the community is exposed to, evaluates the areas and population that may be vulnerable to the hazards, and assesses the potential for future hazards and its impacts on the community. The plans identify methods and projects to mitigate hazards and prioritize projects based on need and cost-effectiveness.

The workshop will review hazard exposure, the risks from those hazards, and collect input on where hazards impact the community and what can be done to eliminate or reduce loss from the hazard.

The PDM plans are submitted to the Federal Emergency Management Agency as a requirement of the federal Disaster Mitigation Act of 2000. Completed and approved plans are required for counties and local jurisdiction to qualify for both pre-disaster and post-disaster mitigation assistance.

Workshops will be held at the following locations & times:

Ravalli County
Monday, November 8th, 4:00-6:00 pm, Ravalli County Commissioners Conference Room
215 S. 4th Street, 3rd Floor, Hamilton

Mineral County
Monday, November 15th, 4:00-6:00 pm, Mineral County Commissioners Meeting Room
300 River St., Superior

For More Information Contact Charlie Vandam, PBS&J, (406) 532-7275.

Vandam, Charlie

From: Vandam, Charlie
Sent: Wednesday, November 10, 2010 9:13 AM
To: rhader@mt.gov; SJCharles@aol.com; DeBorgiaFirePlan@aol.com; drgravely@hotmail.com; normb@blackfoot.net; jbibler@frenchtownfire.org; kalocke@mchospital.net; tread@co.mineral.mt.us; mccommissioners@co.mineral.mt.us; rsvp@montana.com; mchd@montana.com; desdist1@blackfoot.net; firechief@blackfoot.net; doughboy@blackfoot.net; spr3335@blackfoot.net; spr4800@blackfoot.net; spr4800 @blackfoot.net; rbwerst@gmail.com; str-2607@blackfoot.net
Cc: mincodes@blackfoot.net
Subject: Mineral County PDM Update Workshop Nov 15
Attachments: Mineral CoPDM_Update-ver4.pdf

Mineral County DES and PBS&J will hold a workshop on the Pre Disaster Mitigation Plan Update. The workshop will be held on Monday, November 15th from 4:00-6:00 pm in the Mineral County Commissioners Conference Room. The workshop will review the hazard assessment for the Plan Update and collect comment on mitigation projects to include in the plan. I have attached a draft for all to review.

If you cannot attend, I will be accepting comments and suggestions by email. Please email any response or comment to me before November 29th. Thank you, I look forward to your attendance on Monday.

Charlie Vandam
Senior Water Resource Planner, Integrated Water Resources

PBS&J
an Atkins company

1120 Cedar Street, Missoula, Montana, 59802 | Tel: (406) 532 7275 | Fax: (406) 721 0355 | Cell: (406) 531 1121 |
Email: cvandam@pbsj.com | Web: www.pbsj.com www.atkinsglobal.com

Disaster Mitigation planning meeting Nov. 15

Wednesday, November 10 2010 @ 12:14 PM MST

Contributed by: Admin

by Charlie Vandam

Mineral County Disaster and Emergency Services and the Missoula contracting firm PBS&J will hold a workshop on the Pre Disaster Mitigation Plan Update. The workshop will be held on Monday, November 15 from 4:00 p.m. to 6:00 p.m. in the Mineral County Commissioners Conference Room.

The workshop will review the hazard assessment for the Plan Update and collect comment on mitigation projects to include in the plan. Copies of the plan are available by email; please contact me at CVandam@pbsj.com.

If you cannot attend, I will be accepting comments and suggestions by email. Please email any response or comment to me before November 29.
###
Charlie Vandam is a Senior Water Resource Planner, Integrated Water Resources, with PBS&J.

Comments (0)

The Clark Fork Chronicle
http://www.clarkforkchronicle.com/article.php/20101110121414418

Appendix C Meeting Notes

Pre-Disaster Mitigation Plan 2012 Update

Mineral County, Town of Superior, Town of Alberton

Mineral County PDM Update
Public Meeting
Mineral County Courthouse
November 15, 2010

Summary

Charlie Vandam, PBS&J (Atkins), presented the results of the Hazard Assessment and Preliminary Mitigation Plan. The Update incorporates the goals previously adopted in the 2004 Plan. The attendees were asked to comment on the Hazard Assessment and their input on mitigation actions for all jurisdictions.

Below are a summary of the written and verbal comments and responses to those comments (in italics):

The weather loss data appears to miss some significant storms in 1996. Can that be updated?

> *The weather data was compiled from SHELDUS and relies upon NWS weather reports as inputs. SHELDUS is used to provide a documentable means to assess the extent of impacts from particular hazards. It is the most consistent data source and provides a quantitative way of comparing different hazards.*

Automated Weather Station needed at Superior Airport.

> *Noted and added to the Mitigation Plan*

Need to be able to improve and enhance County's Reverse 911 with Enhanced 911.

> *Noted and added to the Mitigation Plan*

Communications are essential in the county and because of the mountainous terrain cell coverage can be spotty.

> *New cell towers were identified in the original plan. Further development of cell towers is left up to the private sector by demand. Addressing new cell towers is not included in the Updated Mitigation Plan. The State is also working on the Montana Interoperability plan that will improve radio communications throughout the state.*

The County needs to redo its floodplain mapping into digital FIRM maps. What are sources for completing some of the baseline LIDAR surveys to be allowed to complete DFIRM mapping?

> *The DNRC administers FEMA Flood Mitigation Grants that can be used for LIDAR mapping. Other sources of funding include Renewable Resource Development Loan and Grants funding administered through the DNRC. The LIDAR mapping and DFIRMs needs were added to the Mitigation plan.*

Interstate 90 is a windy road and accidents, especially with tractor/trailer rigs are frequent, the speed limits on the Interstate need to be reduced for trucks to reduce the frequency of accidents. The burden to respond to these accidents is placed on a financially stretched local fire and rescue teams.

> *That falls within the Emergency Operations Plan and should be addressed with the Montana Department of Transportation which has jurisdiction on the interstate highways.*

The County needs evacuation procedures and map that can be made available to the public.

That falls within the Emergency Operations Plan.

Each Fire District within the County needs to be equipped to handle emergencies because of the potential for isolation in the event a hazard closes off interstate 90. One option is to obtain surplus Department of Defense Equipment through the Fire Fighter Program.

Falls within the Emergency Operations Plan.

Prepared by Charlie Vandam

Appendix D Mineral County Community Wildfire Protection Plan

Pre-Disaster Mitigation Plan 2012 Update

Mineral County, Town of Superior, Town of Alberton

MINERAL COUNTY
COMMUNITY WILDFIRE PROTECTION PLAN

MAY 2005

FIRE PLAN COOPERATORS:

FRENCHTOWN RURAL FIRE DISTRICT
SUPERIOR VOLUNTEER FIRE DEPARTMENT
ST. REGIS VOLUNTEER FIRE DEPARTMENT
WEST END RURAL FIRE DISTRICT
MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
UNITED STATES FOREST SERVICE

TECHNICAL SUPPORT PROVIDED BY:

SONJA REEVES

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1.0 EXECUTIVE SUMMARY

The enactment of the Healthy Forests Restoration Act (HFRA) in 2003 set forth the purpose to reduce the amount of hazardous fuels on federal and non-federal land to reduce wildfire risk to communities, municipal water supplies, and other at-risk federal land. Under the HFRA hazardous fuels reduction projects are given a higher priority when they fall within the boundary of the wildland urban interface (WUI), as defined in the HFRA or the Community Wildfire Protection Plan (CWPP) for the respective area. Hazardous fuels reduction projects on non-federal lands that are to be carried out within the defined WUI of the CWPP are given priority with respect to funding and implementation. Any hazardous fuels reduction projects on federal land within the defined WUI of the CWPP are subject to consider the recommendations made by at-risk communities that have developed a CWPP. These criteria are especially important in Mineral County because of the large amount of Federal land and the small community base. A large wildland fire event is imminent in Mineral County. The amount of standing and fallen dead woody debris that has accumulated over the years from severe insect and disease mortality and the fire regime of the prominent fire groups within the county are indicative of such an event.

The Mineral County Community Wildfire Protection Plan will be used to define and address the core elements of community protection in the event of a wildland fire. The human and natural resources within Mineral County are at risk. The preparation of this CWPP and the coordination of the residents, private timber industries, local and state government, and the USDA Forest Service will provide for future actions that will protect said resources. It is the goal of this CWPP to create and prioritize hazardous fuels reduction projects in high-risk areas so that, in the event of a catastrophic wildland fire, there will be minimal or non-existent damages to life and property.

A working group consisting of local, State, and Federal representatives working within Mineral County started the groundwork for the CWPP process in late 2004. Weekly meetings were subsequently held to assess collected data and to collaborate on decision-making for both the wildfire risk and other community values risk ratings. Once the assessments were finished three community meetings were scheduled throughout the County to acquire public comment on areas in need of fuels reduction projects, preferred treatment methods and the definition of the WUI. After receiving all feedback from the communities, a draft CWPP was prepared for review and final changes made. The intention of the final draft is to be the foundation upon which annual/bi-annual reviews and updates will be made.

2.0 COMMUNITY DESCRIPTION

Mineral County is located on the western edge of Montana extending from the Montana/Idaho border to the east approximately 70 miles (See Map I, Appendix A). The entire county consists of a rural, semi-rural population base, with the 2000 census population totaling 3,884. Table 2.1 below is the breakdown of the Census Designated Places within Mineral County and some relevant statistics.

Table 2-1 Statistical Information for Census Designated Places

CENSUS DESIGNATED PLACES	TOTAL POPULATION	MEDIAN AGE	% POPULATION OVER 65	HOUSING UNITS	MEDIAN HOUSE VALUE	MEDIAN INCOME IN DOLLARS
Mineral County	3884	41.1	14.52	1961	88,300	27,143
Alberton	374	35.9	6.89	175	81,700	26,000
DeBorgia	69	54.5	36.36	42	n/a	22,917
Riverbend	442	43.8	23.81	216	134,600	27,813
St. Regis	315	39.2	16.24	161	73,000	23,750
Superior	893	39.5	17.78	410	70,200	25,333

2.1 Emergency Services

Frenchtown Rural Fire District (Alberton)
Superior Volunteer Fire Department (Superior, rural and town)
St. Regis Volunteer Fire Department (St. Regis, rural and town)
West End Rural Fire District (DeBorgia)
Mineral County Hospital (Superior)
Mineral County Sheriff (Superior)
Montana Highway Patrol (Superior)
Quick Response Units (St. Regis & DeBorgia)
Superior Area Ambulance Service (Superior)
911 - Dispatch (Superior)
Superior Ranger District
Ninemile Ranger District

2.2 Mutual Aid Agreements

The fire agencies serving Mineral County are currently completing a mutual aid agreement. This agreement will identify response levels and responding agencies inside and outside of designated fire district boundaries.

In addition, MCA 7-33-2108 allows for mutual aid between the fire districts when a trustees or their representative makes a request for assistance pursuant to 10-3-209. A mutual aid agreement does exist between the Ninemile Ranger District and the Frenchtown Rural Fire District.

2.3 Infrastructure at Risk

Bonneville Power Authority – high voltage power lines
Power lines and telephone lines
Emergency services and Forest Service repeaters, located on mountaintops
Montana Rail Link - railroad
Municipal water supplies in Alberton and Flat Creek

2.4 Land Use and Development Trends

83% USDA Forest Service (Lolo National Forest)
4% State of Montana
8% Private Industrial Timber
5% Private

3.0 CLIMATE

The general climate of Mineral County is typical of the northern Rockies west of the continental divide. The winter months (November-February) are normally cold and wet, and fires are extremely rare, although the accumulated snow pack during these months is often a factor in the summer fire season. Moderate fire activity can occur in the spring before green-up (March-April) but short days, high fuel moistures and residual snow pack limit this activity to valley bottoms and lower southerly-facing aspects. Late spring (May-June) is normally a moist period with low fire frequencies, and when fires do occur the high live fuel moistures of green-up significantly slow them. Early summer brings high temperatures, low relative humidity, long days and dry thunderstorm activity. Fire danger increases as dead fuels dry and live fuels cure out. Fire frequency normally picks up in early July. Fire activity and danger typically peak sometime in August. By early fall the atmosphere begins to cool and thunderstorm activity decreases, but continued dry fuel conditions and dry cold front passages often create conditions favorable for significant fire behavior. Those fires that do start and those that are still burning can grow rapidly. Many of the largest fire events in the area's history have occurred in September during cold front passages. This late fire season can continue into November during dry years, although normally rain, snow and winter conditions have returned by mid-October.

4.0 FIRE ECOLOGY

"Fire Ecology of Western Montana Forest Habitat Types", General Technical Report INT-223, by William C Fischer and Anne F. Bradley (1987), examines the role of fire in western Montana habitats, and identifies 11 fire groups that have similar forest vegetation, response to fire, forest succession, forest fuels, and fire history. These fire groups can be used to understand and explain past, current and future conditions of the forest and its relationship to fire. Following are brief summaries of the significant fire groups in Mineral County. Complete descriptions of the fire groups can be found in "Fire Ecology of Western Montana Forest Habitat Types".

4.1 Fire Group 4: Warm Dry Douglas-fir Habitat Types

4.1.1 Vegetation

Group Four consists of Douglas-fir habitat types where ponderosa pine usually occurs as a major seral or climax associate especially at lower elevations. Group Four stands may exist as fire-maintained ponderosa pine stands that develop Douglas-fir regeneration beneath the pine in the absence of

disturbance. Douglas-fir is usually present in seral stands, but ponderosa pine often dominates. Sites are too droughty for most other conifer species.

4.1.2 Forest Fuels

As a general rule, fuel loads tend to increase with the stand age as a result of accumulated downfall from insect and disease damage, blowdown, and natural thinning. Sometimes the combined effect of moderate amounts of periodic deadfall and moderate amounts of periodic downfall from natural thinning will result in a heavy fuel load.

Live fuels can be a significant factor in some Group Four stands. Dense thickets of Douglas-fir regeneration may become established during fire-free periods. Overstories become susceptible to stand destroying crown fire when such situations are allowed to develop.

4.1.3 Role of Fire

Frequent fires in seral stands maintained a ponderosa pine "fire climax" condition by killing fire susceptible Douglas-fir seedlings. In this role, fire frequency largely determined the stand composition. Following a prolonged fire-free period, Douglas-fir regeneration became established beneath the canopy. A ground or surface fire that reached a thicket of saplings and small poles could ascend into the overstory, killing or injuring adjacent mature trees through the vegetative "fuel ladder." Fuel ladders increase the potential destructiveness of a fire by providing access to the canopy. During periods of high fire danger, this often resulted in a stand-destroying crown fire.

Historic fire frequency probably was 5 to 25 years between fires. Successful suppression of surface fires in open, fire-maintained stands over the last several decades has increased the potential for a fire to become severe.

4.2 Fire Group 6: Moist Douglas-fir Habitat Types

4.2.1 Vegetation

Fire Group Six habitat types occur throughout western Montana at elevations of about 3,000 to 6,500 feet. Douglas-fir is both the indicated climax species and a vigorous member of seral communities. It is not uncommon for Douglas-fir to dominate all stages of succession on these sites. Ponderosa pine, western larch, and lodgepole pine are seral components whose abundance varies considerably by phase.

At low elevations, Group Six sites can be found on all aspects. On cooler sites, ponderosa pine becomes less important and larch and lodgepole increase in importance.

4.2.2 Forest Fuels

Fuel conditions will vary according to stand density, species composition, age, and stand history. The tendency toward overstocking and the development of dense understories result in high-hazard fuel

conditions in many stands. Natural thinning, snow breakage, blowdown, and insect and disease mortality operate at a high level in many stands.

The most hazardous conditions occur in well-stocked stand with dense Douglas-fir understories. The absence of dense understories results in reduced fire hazard, even in well stocked stands. However, the density of overstory trees and the presence of dead branches near ground level create a crown fire potential under severe burning conditions.

4.2.3 Role of Fire

Fire was an important agent in controlling density and species composition. Low to moderate severity fires converted dense stands of pole-sized or larger trees to a more open condition, and subsequent light burning maintained stands in a park like state. Severe fires probably occurred on dense, fuel-heavy sites and resulted in stand replacement. Stand replacement fires favored lodgepole pine on sites where this species was present.

Fire's role as a stand replacement agent becomes more pronounced when the natural fire-free interval is increased through fire suppression, unless corresponding fuel reduction occurs.

Fire history studies indicate fire-free intervals of 15 to 40 years on these sites.

4.3 Fire Group 8: Dry Lower Subalpine Habitat Types

4.3.1 Vegetation

Fire Group Eight consists of dry lower subalpine habitat types where spruce, subalpine fir, or mountain hemlock are the indicated climax species.

Douglas-fir and lodgepole pine are dominant seral species, with lesser amounts of spruce, and occasional larch or western white pine. The prevalence of Douglas-fir and lodgepole pine may be due, in part, to periodic wildfire that sets back the invasion of subalpine fir and spruce.

4.3.2 Forest Fuels

Stands are characterized by relatively large amounts of downed woody fuels of all sizes, but especially large amounts of material greater than 3 inches in diameter.

As is the case within many subalpine fir habitat types, live fuels can contribute significantly to overall fire hazard during dry conditions. Dense understories develop in many stands and provide fuel ladders to the overstory tree crowns, although some stands are devoid of such understories.

4.3.3 Role of Fire

The occurrence of periodic low to moderate-severity fire favors Douglas-fir and lodgepole pine. Such fires set back invasion by the more tolerant subalpine fir and spruce, which in the absence of fire form dense understories and eventually take over the site. Severe, stand-destroying fire will generally favor lodgepole pine on many of these sites.

Before organized fire suppression, fire intervals probably fell between 50 and 130 years.

4.4 Fire Group 9: Moist Lower Subalpine Habitat Types

4.4.1 Vegetation

Fire Group Nine is a collection of moist and wet lower subalpine habitat types in the spruce and subalpine fir climax series. Soils are moist or wet much of the year. Elevations range from about 2,900 to 7,500 feet.
Engelmann spruce is usually a major component of seral stands along with lodgepole pine and Douglas-fir. Older stands are usually dominated by subalpine fir and spruce, although Douglas fir and lodgepole pine may be well represented in the overstory.

4.4.2 Forest Fuels

Fire Group Nine fuels are similar to those found in Fire Group Eight.

A large percentage of the downed woody fuel is material greater than 3 inches in diameter. The combination of deep duff and large amounts of dead rotten fuel can result in severe surface fire during unusually dry moisture conditions. Where dense understories exist, such fires can easily spread to the tree crowns and destroy the stand. Even if a severe surface fire does not crown, there is a good chance the overstory trees will be killed by cambium heating.

Under normal moisture conditions for these sites, a lush undergrowth of shrubs and herbs usually serves as an effective barrier to the rapid spread of fire.

4.4.3 Role of Fire

Fire history for moist, lower subalpine habitat types is limited. Mean fire-free intervals are probably longer than those of the drier upland sites in Fire Group Eight.

The impact of fire on Group Nine sites west of the Continental Divide in Montana is indicated by stand conditions and species composition. The general absence of spruce, subalpine fir, or mountain hemlock climax condition is evidence of disturbance by past fires. The dominance of lodgepole pine, Douglas-fir, larch or spruce on many sites suggests these stands developed on a fire-created mineral soil seedbed.

Available evidence indicates that fires on such sites are infrequent and are mostly low severity or stand-replacing. Moderate-severity fires are apparently less frequent although they do occur.

4.5 Fire Group 11: Warm, Moist Grand Fir, Redcedar, and Western Hemlock Habitat Types

4.5.1 Vegetation

Fire Group Eleven is composed of moist, warm habitat types often occurring on valley bottoms, benches, ravines, and protected exposures in west-central Montana and more commonly on upland sites in northwestern Montana. This group occurs only west of the Continental Divide in Montana and reflects the influence of the inland maritime climate in west-central and northwestern portions of the state.

Up to ten species of conifers may occur during the successional process. Western hemlock, western redcedar, and grand fir are climax species within the group.

4.5.2 Forest Fuels

Much of the downed woody fuel results from accumulated deadfall and occasional natural thinning. Compared to the other Fire Groups, Group Eleven fuel loadings average higher in all size classes. Despite the heavy fuel loadings that characterize these stands, fire hazard is normally low to moderate under normal weather conditions. The potential for serious conflagrations is usually mitigated by the high humidity of these moist sites.

4.5.3 Role of Fire

The relatively warm, moist conditions sustain the growth of diverse and highly productive stands. These same factors keep the fire frequency generally low. A fire may burn into the edge of a stand, scarring some trees, but it will usually die out when it reaches the moist duff layer.

Moist weather conditions predominate, but the region is occasionally subject to severe summer drought. Heavy fuel loadings exist in most stands because of overall high plant productivity. This, combined with droughty conditions, sets the stage for severe, widespread fires. Stands are replaced and sites revert to pioneer species.

Fire-free intervals are reported from 50 to greater than 200 years.

4.6 Fire Group 0: Miscellaneous Heterogeneous Collection of Special Habitats

Fire Group Zero is considered for sites in western Montana that exist as scree, forest rock, wet meadow, mountain grassland, aspen grove, or alder glade. This fire group is used for areas that do not fit into one of the other categories of Fire Groups or for areas that there is no data available for.

The higher elevation areas of Fire Group Zero within Mineral County are primarily alpine meadows. The lower elevation portion is largely private lands in which there is no current data available for and can be assumed that these areas are similar to the areas that surround them.

4.7 Distribution of Fire Groups

The Lolo National Forest, which accounts for 83% of the land area in Mineral County, has surveyed, identified and mapped the fire groups within its boundaries (See Map II, Appendix A). Approximate percentages of land in each fire group are:

Fire group 4	16%	123,000 acres
Fire group 6	23%	181,000 acres
Fire group 8	12%	91,000 acres
Fire group 9	13%	104,000 acres
Fire group 11	15%	116,000 acres
All other fire groups	4%	32,000 acres

The remaining 17% of land, about 133,000 acres, held by state and private interests, has not been assessed for fire groups. The map indicates that a great majority of this land is within the lower elevations and valley bottoms, where fire groups 4 and 6 are predominate.

The map shows that fire groups 8, 9 and 11 primarily occur along the State Line area and in the drainages that originate there, and on the CC Divide and the Ninemile Divide. Due to the after effects of the 1910 fire and earlier fires in the 1890's, these areas tend to be dominated by stands of lodgepole pine.

Fire groups 4 and 6 dominate the lower elevations along the major rivers and creeks, especially in the drier east side of the county. These areas are generally characterized by stands of ponderosa pine and Douglas-fir.

5.0 FIRE HISTORY

Written records documenting fire history in Mineral County begin in the latter half of the 19th century, with the influx of miners and other settlers into the country. J.B. Leiberg, describing his reconnaissance of western Montana and northern Idaho for the U.S. Geological Survey at the turn of the century, records that "immense fires have ravaged the district both in past and recent times…...one meets with burnt areas everywhere – in the old growth, in the second growth, in the young growth……the burnt tracts are in large blocks, thousands of acres in extent, and in small patches of 15 to 50 acres which extend in all directions throughout the forest." Fire history studies indicate that this was the norm for thousands of years. Fire burned freely throughout the area according to different fire regimes – vegetation, slope, aspect, elevation and weather all played a role in how frequently and how severely a patch of forest burned. Large, stand replacement fires were not uncommon.

In 1910, the historic "year of the Great Fires", over a hundred thousand acres burned within the county, which was at that time still a part of Missoula County. Large tracts of Fish Creek, Trout Creek, Cedar Creek and the canyon west of St. Regis were burned, as was the entire west end of the county, including the towns of Taft, Saltese, Haugan and DeBorgia. In 1919 another large fire burned tens of thousands of acres around St. Regis, though the town was spared.

In response to these catastrophic events government agencies initiated a policy of strict fire suppression that remains in place today. For decades this policy has been successful, protecting people and property by eliminating destructive fires. But the lack of fire has also led to a buildup of fuel in the forest, and has over time created conditions that have apparently led to a new era of large fires. In the last 20 years the northern Rockies have experienced a series of particularly bad fire seasons, in 1985, 1988, 1994, 1996, 2000 and 2003. In Mineral County, in 2000 and again in 2003, dry weather and heavy fuel loadings combined to produce large fires in Flat Creek, Trout Creek, First Creek and Fish Creek.

Fire occurrence can vary dramatically from year to year. The county can experience anywhere from 20 to well over 200 fires in a year (with an average of 60-80), depending on the length and severity of the fire season. Temperature, precipitation, wind, fuel conditions, lightning, human carelessness, arson, snow pack, relative humidity and long-term drought are all important variables in determining the severity of each fire season. Significant rainfall – a "season ending event" - can occur anytime from late August to early November, but normally occurs some time in September.

6.0 CURRENT CONDITIONS

It is well established that fire suppression over the past century has led to a dramatic increase of fuel, both live and dead, in the forests of the west. As a result, firefighters are encountering numerous, more intense fires that are becoming more and more difficult, if not impossible, to control.

In fire groups 4 and 6, where ponderosa pine and Douglas-fir are predominate, fire exclusion has led to an unnatural buildup of both deadfall and Douglas-fir regeneration. These areas have missed several natural fire cycles. The frequent understory burns that in the past have kept the forest floor clean of debris and ladder fuels have been eliminated, and many stands are now susceptible to stand replacement fires as a result. Most of the wildland-urban interface in Mineral County occurs within these fire groups. This increasing threat of crown fire in the wildland urban interface brings with it an increased likelihood of loss of life and property.

Land management practices, where implemented, have both helped and hindered the situation. Where slash buildup is disposed of after logging, fuel breaks are created where fires may slow and give firefighters a chance to stop them. Where logging has occurred and the slash remains on site, the increased dead fuel load can significantly boost fire intensities and make a fire even more difficult to control. Examples of both situations can be found scattered throughout the county. Prescribed fire has been used to underburn some stands and reduce the hazard, and fuel reduction program projects have been undertaken, but these programs so far have been able to treat only a small percentage of the stands at risk.

In the portions of fire groups 8, 9 and 11 where lodgepole pine is predominate, the fire cycle that began with the 1910 fire and the other large fires around the turn of the century is concluding. Large expanses of dead trees are obvious throughout the county, the result of an ongoing mountain pine beetle epidemic. A Forest Service aerial survey in 2003 estimated that 47,000 acres of lodgepole pine forest were infested on the Superior Ranger District alone, and that the epidemic was continuing to expand. On these sites dead fuel loadings are increasing exponentially, and the probability of large, stand replacement fire is high. While these areas are generally removed from private land, the communities of Saltese, Haugan and DeBorgia are bordered by lodgepole pine forest. Even where the lodgepole mortality is a distance from communities, there is a significant concern that large fires that start and grow in the high hazard areas will become overwhelmingly large and then move into town during a wind event, incurring catastrophic results.

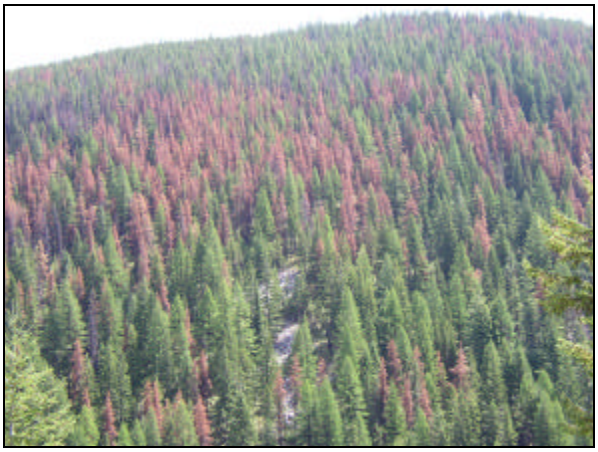

Figure 6-1 Lodgepole pine mortality in Thompson Creek, Fire Group 6

Figure 6-2 Lodgepole pine mortality on CC Divide, Fire Group 9

Figure 6-3 Lodgepole pine mortality in Rock Creek, Fire Group 8

Figure 6-4 Douglas-fir ladder fuels in Wolf Creek, Fire Group 4

7.0 FIRE BEHAVIOR

The general weather pattern during fire season in western Montana flows from southwest to northeast. Large fires tend to burn in that direction over a period of weeks and months, but daily variations occur that make fire spread unpredictable.

Fire behavior is dependent on fuel, weather and topography. On relatively calm days a fire will follow slope and fuels, burning generally uphill and up canyon, burning hot and fast where the slope is steepest and the fuels are most dry – a fuel driven or plume dominated fire. A recent, fairly typical example of such an event occurred during the Fish Creek fire in 2003, when about 8,000 acres burned in one afternoon, in a high-intensity stand replacement fire. A similar example, see Figure 7.1, is the Cherry Creek fire on the CC Divide, which burned about 3,000 acres in one afternoon.

Figure 7-1 Cherry Creek Fire, 2003. Stand replacement fire in mountain pine beetle killed lodgepole.

On windy days a fire will generally follow the wind direction. While Mineral County has not experienced a major wind-driven fire event for some time, there are recent examples of what can happen, in similar fuel types. One such example is the Canyon Creek fire, which occurred east of Missoula in 1988. It burned over 180,000 acres during a 24-hour firestorm, pushed by a cold front passage.

Recent fire history records indicate that a severe fire season, capable of supporting large, stand replacement fires, can be expected to occur every 2-6 years. Most recently severe conditions occurred in 2000 and 2003. During less severe seasons most fires will be caught quickly by initial attack forces and those that escape initial attack will be caught within a few days. But on hot, dry days during severe seasons initial attack is less likely to succeed and those fires that escape quickly grow out of control. It is

under these conditions that life and property are at greatest risk, and that large catastrophic fires such as those described above will occur. Stand replacement fire has been normal for this area, and will continue to be common in the future. As fuel conditions in the forest continue to deteriorate, larger and more destructive fires will inevitably occur.

8.0 ISSUES OF CONCERN

8.1 Wildland Fire Response

Wildland fire response in Mineral County is divided into two categories; forested zone and non-forested zone.

The **Non-forested Zone** includes approximately 660 acres in the Tarkio area and fire response in this area is the responsibility of the Mineral County Commissioners because it lies outside of any organized fire jurisdiction. Additionally, the incorporated cities of Superior and Alberton have some non-forested areas. Fire response to the Tarkio area may be provided under the Montana State County Co-op Plan if requested by the County Commissioners through the Mineral County Fire Warden. The Fire Warden may request response from County fire agencies for fires within this non-forested zone.

The **Forested Zone** includes the remainder of Mineral County not identified as non-forested zone. Wildfire response in the forested zone is the direct protection responsibility of the USFS Lolo National Forest, Superior and Nine Mile Ranger Districts. Their direct protection includes all of the forested zone areas in Mineral County including the forested areas within the boundaries of the four fire districts. Wildfire responses includes response from the four fire districts in Mineral County; Superior Rural Fire District, St. Regis Rural Fire District, West End Rural Fire District and the Frenchtown Rural Fire District also respond to wildland fires within their legal boundaries and outside their boundaries as part of automatic or mutual aid with the USFS.

8.2 Structure Protection

Structure fire protection is the act of protecting structures from the threat of wildfire and does not include suppression of a structure already on fire. This protection may be conducted by either a wildland agency or fire district and is part of coordinated wildland suppression. Structure fire suppression is not the responsibility of the USFS; they are neither trained nor equipped for such a response. However, the USFS will participate as partners in structure protection efforts prior to and during a wildland fire.

8.3 Community Preparedness/Evacuation

Emergency evacuation procedures are the responsibility of the Mineral County Sheriff's Office. The Incident Commander, in coordination with, and with the approval of the agencies having jurisdiction, will recommend evacuation during a wildfire. Evacuation centers and routes will be identified by the Mineral County Sheriff's Office depending on the location of fire and number of individual property owners affected.

8.4 Reducing Structure Ignitability

This CWPP identifies methods and options of removing and reducing vegetation to lower the risk from wildfire. The other component to reducing that risk is preventing the ignition of structures by use of improved fire resistant construction materials, Firewise landscaping, and homeowners assuming responsibility for protection of their own property.

Building Codes and Subdivision Regulations should require structures that are built within the wildland urban interface (WUI) to utilize non-combustible roofing materials, a water supply, placement of underground utilities and access road standards. Regulations for subdivisions within Mineral County are in the process of being developed. Homeowners assuming responsibility for fuels mitigation around the home and landscaping that limits the chance fire can move from the forest and ignite a home are also parts of reducing structural ignitibility. For information and tips on how to make homes less susceptible to wildfire through different types of construction and landscape design, go to www.firewise.org.

8.5 Watersheds

The municipal water supplies that provide for the communities of Alberton and Superior are an important issue to address when setting priorities for fuel reduction projects. Reducing the fuels in and around these watersheds, which fall within the defined WUI boundary, will decrease the potential risks, such as erosion and increased sediment loading, brought about by a wildland fire.

9.0 DEFINING THE WILDLAND URBAN INTERFACE

For the purposes of this plan and the assessment that accompanied it, the wildland urban interface (WUI) was defined as one mile and a half from structures within Mineral County (See Map III, Appendix A). This mile and a half buffer is the minimum mandated under the HFRA because of the topographical and geographical features within Mineral County.

The community involvement and collaboration process yielded agreement that the mile and a half buffer from structures was the initial objective and also an understanding that in some instances it would be more logical to use natural boundaries, such as ridges, where appropriate. The intention of this CWPP is to set forth priorities in order to protect communities at risk from wildfire. Setting the WUI at one mile and a half and targeting fuels reduction within this area will provide for the best protection of public safety and community infrastructure.

Expanding the buffer and working in other areas outside the one mile and a half area are also encouraged to aid in the long term protection from catastrophic wildfire and to improve forest health.

10.0 ASSESSMENT OF HAZARDS AND RISKS

The hazard and risk assessment for the Mineral County CWPP was conducted with the use of a Geographic Information System (GIS). Through the consultation within the working group the county

was divided into nine separate communities based on the clusters of structures and continuity of geographic features. The communities were then clipped at the north-south boundary of the WUI (See Map IV, Appendix A). Once the communities were defined, the working group decided on the critical hazards that influence the risk of wildfire to life and property.

The critical hazards included the following: insect and disease mortality, slope, fuels, structure density, and protection and response capabilities. Table 10.1 represents the wildfire risk rating for each of the nine communities and the methods and data used to arrive at the individual ratings for each category are subsequently identified. Table 10.2 represents the identified "other community values" within each of the communities and assesses the distribution and density of each of the values. The other community values addressed were designated historical sites, designated recreational sites, taxable valuation, and municipal water supplies. The methods and data used to rate each of the values are later described. Table 10.3 illustrates the combined totals from each of these assessments to address the overall risk rating for each of the nine communities.

Table 10-1 Wildfire Risk Rating

Community	I&D Mortality	Fuels	Slope	Structure Density	Protection/ Response	Totals
Haugan/DeBorgia	8	3	1	6	6	24
Cabin City	7	3	1	5	7	23
Superior	6	3	2	9	3	23
Sevenmile	9	3	1	2	5	20
Riverbend to Fish Creek Exit	4	3	3	4	4	18
Saltese	3	3	1	3	8	18
St. Regis	5	3	1	7	2	18
Fish Ck/Hole in the Wall	1	3	3	1	9	17
Fish Creek Exit to Alberton	2	3	2	8	1	16

10.1 Insect and Disease Mortality

The analysis for the percent of insect and disease mortality within each of the communities was done with data aerially collected by the Lolo National Forest. Flights have been completed annually since 1980. The compilation of these data provided a clear and concise way to measure the number of acres killed between 1980 and 2004, subsequently adding to the fuel loading.

The nine communities were individually assessed for the percentage of insect and disease mortality by totaling the number of acres killed between 1980 and 2004 and dividing that number by the total number of acres within that community. Each community was then ranked on a scale of one to nine, nine having the highest percent of insect and disease mortality.

10.2 Slope

The slope analysis was completed using digital elevation models from the Montana Natural Resource Information System. Using capabilities within the GIS these models were converted to convey the slope distribution throughout Mineral County. The next step involved classifying the slope classes. Slope Class 1, characterized as low, includes all slopes between 0 and 35%. Slope Class 2, characterized as moderate, includes all slopes between 35 and 65%. Slope Class 3, characterized as high, includes all slopes greater than 65%. The amount of each community falling into each of the slope classes allowed for the delineation between communities for the overall ranking. Communities were ranked on a scale of one to three, three being the highest, depending on the amount of the community that fell within Slope Class 1. A rating of one is classified has having between 56 and 70%, a two rating being between 41 and 55%, and a three rating for having less than 40%.

10.3 Fuels

There was an attempt to differentiate the fuels within the borders of Mineral County into low, moderate and high categories. All fuels were rated as high and not set apart any further. Different treatment options were displayed for each type of stand as most are in need of fuels reduction. It is important to note that all fuel types present within Mineral County will burn at high severity under average summer conditions due to the increased fuels, extended drought and amount of insect and disease mortality.

10.4 Structure Density

During the fire season of 2000 the Superior Ranger District initiated a project to acquire the GPS locations of structures outside of the limits of incorporated areas within Mineral County, excluding the very east end of the county. The east end GPS points were acquired by the Frenchtown Rural Fire District during and after the 2003 fire season. These GPS points were used as well as an estimated number of residences within the towns of Alberton and Superior to calculate the number of structures per square mile. Each of the nine designated communities were analyzed and ranked on a scale of one to nine, nine being the highest.

10.5 Protection and Response Capabilities

The protection and response capabilities were evaluated through the collaboration of the Mineral County fire agencies. There are four factors that primarily affect the delivery of fire response: available resources, firefighters and fire engines; time, from fire start to notification of the fire agency; and distance, from the fire stations to the fire. All of these factors were considered in determining the overall score for various areas of this CWPP. An area with good resource availability, such as Upper Fish Creek, might score very low on response capability because of the long travel distance or increased notification time because of the remoteness of the area. In contrast an area with limited resources, such as St. Regis, might score high in a populated area where early notification would be more likely and a short travel time from the fire station to the fire exists.

10.6 Designated Historical Sites

The National Register of Historic Places was used to identify the designated historic places within Mineral County. Once the locations were identified their exact position was recorded using a GPS device and subsequently downloaded into the GIS. The assessment for the historical sites was done by counting the number of historical sites within each of the nine communities. Those communities with or without historical sites were ranked accordingly.

10.7 Designated Recreational Sites

A number of different kinds of recreational sites were documented in the GIS using data acquired from the Lolo National Forest. Boat launches, campgrounds, fishing accesses, interpretive sites, lookouts, picnic areas, points of interest, trailheads and a category of others were mapped within Mineral County. An assessment was done on the number of designated recreational sites within the nine communities and scored from highest to lowest.

Table 10-2 Other Community Values Risk Rating

Community	Designated Historical Sites	Designated Recreational Sites	Taxable Valuation	Municipal Water Supply	Totals
Superior	1	9	9	1	20
St. Regis	0	7	8	0	15
Riverbend to Fish Creek Exit	0	8	7	0	15
Fish Creek Exit to Alberton	2	6	6	1	15
Fish Ck Drainage Hole in the Wall	0	7	5	0	12
Haugan/DeBorgia	1	5	4	0	10
Saltese	0	3	3	0	6
Cabin City	0	4	1	0	5
Sevenmile	0	2	2	0	4

10.8 Taxable Valuation

The taxable valuation was calculated for all parcels, federal and private, within the nine designated communities of Mineral County. The CAMA data used was made available through the Montana Department of Administration and the Montana Department of Revenue. The total land value was used for analysis and includes the value of the land and any improvements on that land. Each of the nine communities were assessed separately by their total taxable value and then ranked accordingly from highest to lowest.

10.9 Municipal Water Supplies

Superior and Alberton are the only two out of the nine designated communities in Mineral County that rely on a municipal water supply. The ranking in this situation was done by assigning a "1" for yes; there is a municipal water supply and a "0" for no; there is not a municipal water supply.

Table 10-3 Combined Risk Ratings

Community	Wildfire Risk	Other Values at Risk	Total
Superior	23	20	43
Haugan/DeBorgia	24	10	34
Riverbend to Fish Creek Exit	18	15	33
St. Regis	18	15	33
Fish Creek Exit to Alberton	16	15	31
Fish Ck Drainage Hole in the Wall	17	12	29
Cabin City	23	5	28
Sevenmile	20	4	24
Saltese	18	6	24

11.0 HAZARD REDUCTION AREAS AND TREATMENT OPTIONS

11.1 High Priority Areas for Fuels Reduction

The following priority areas were identified by the communities during the public meetings. Each area is a description of a large area in which no specific project boundaries have been delineated. For a geographical reference as to the location of these areas see Map V in Appendix A.

? North facing slopes across the river from the Trestle Creek Golf Course (St. Regis)
? Tin Can Alley (St. Regis)
? North facing slopes on Superior
? Slopes above Johnson Lane (Superior)
? Slopes above Spirit Walk Lane (Superior)
? Drainage area above Alberton water supply
? Slopes above the town of Alberton
? East and West Twin Creek drainages (DeBorgia)
? Savenac Creek drainage(Haugan)
? Packer Creek drainage (Saltese)

11.2 Preferred and Non-preferred Treatments

An overall consensus on treatment methods was reached during the community meetings process. The issue of cost was the most important factor in choosing the best treatment for an area. There was also an expressed desire to boost the local economy, when and where possible, by utilizing local timber companies and mills. The preservation of the viewshed/aesthetics was also a chief concern in the consideration of the different treatment options available.

? Thinning, leaving large timber in a fire resistant pattern
? Chipping
? Intermingled methods to ease visual aspect of some treatments
? Temporary roads okay, if they are left can be used for fire fighting purposes
? Helicopter treatments may be feasible on north facing slopes on Superior
? If slash piles are a chosen method, removal in a timely manner is preferred. No piles left on site.
? If and when burning is utilized, it should be done at times smoke is least likely to settle in valleys

11.3 Treatment Options

The following are treatment methods for hazardous fuels reduction and the descriptions for federally managed lands within the wildland urban interface.

? Slashing and Underburning: Trees less than six inches in diameter are felled with mechanized equipment, left on site to cure and the area is underburned. Access with existing roads is usually required.

? Slashing and Pile Burning: Trees less than six inches in diameter are felled with mechanized equipment, piled on site by hand or with equipment and then the piles are burned. Access with existing roads is usually required.

? Commercial Harvest and Underburning: Trees of merchantable diameter would be harvested and whole tree yarded with ground based equipment or skyline systems and remaining activity fuels could be underburned. Access with existing roads is required, short temporary roads allowed.

? Commercial Harvest and Chipping: Trees of merchantable diameter would be harvested and yarded with ground based equipment or skyline systems, utilization specifications would have unmerchantable material yarded to landing and chipped. Access with existing roads is required, short temporary roads allowed.

? Commercial Harvest and Pile Burning: Trees of merchantable diameter would be harvested and yarded with ground based equipment or skyline systems and remaining activity fuels would be piled by hand or with mechanized equipment and burned. Access with existing roads is required, short temporary roads allowed.

? Commercial Harvest and No Fuels Treatment: Trees of merchantable diameter would be harvested and whole tree yarded with ground based equipment or skyline systems and remaining activity fuels would be left on site to decompose. Access with existing roads is required, short temporary roads allowed.

? Thinning: Area would be (pre-commercially or commercially) thinned to spacing and species specifications to improve conditions for growth of remaining trees. Thinned trees would remain on the site to decompose. Access with existing roads is required. Access by hiking reasonable distances is adequate.

? Thinning with Underburning: Area would be thinned to spacing and species specification to improve conditions for the growth of remaining trees. Thinned trees would be left on site to drop needles then the stand would be underburned. The right tree species is required for underburning. Access with existing roads and access by hiking reasonable distances is adequate.

? Prescribed Fire: Area would be treated with hand ignition or an aerial ignition method to reduce stand density, reduce ground fuels and reduce ladder fuels. Access can be limited.

? Commercial Harvest with Helicopter Yarding and Underburning: Trees of merchantable diameter would be harvested and yarded with helicopters and remaining activity fuels would be underburned by hand or aerial ignition. Access can be limited. Helicopter landings need to be accessed by existing roads and within short turn around distances from harvest areas.

? Commercial Harvest with Helicopter Yarding and Utilizations Specifications for Chipping at Landings: Trees of merchantable diameter would be harvested and whole tree yarded with helicopters, included in the yarding would be smaller diameter trees for chipping at the landing site. Access can be limited. Helicopter landings need to be accessed by existing roads and within short turn around distances from harvest areas. These landings would need to be large to accommodate chipping operations. The market for chips would drive the feasibility of this option.

? Commercial Harvest with Helicopter Yarding and No Fuels Treatment: Trees of merchantable diameter would be harvested and whole tree yarded with helicopters. The activity fuels generated would be left on site to decompose. Access can be limited. Helicopter landings need to be accessed by existing roads and within short turn around distances from harvest areas.

APPENDIX A:
PROJECT MAPS

Appendix E Crosswalk

Pre-Disaster Mitigation Plan 2012 Update

Mineral County, Town of Superior, Town of Alberton

LOCAL MITIGATION PLAN REVIEW SUMMARY

The plan cannot be approved if the plan has not been formally adopted. Each requirement includes separate elements. All elements of the requirement must be rated "Satisfactory" in order for the requirement to be fulfilled and receive a score of "Satisfactory." Elements of each requirement are listed on the following pages of the Plan Review Crosswalk. A "Needs Improvement" score on elements shaded in gray (recommended but not required) will not preclude the plan from passing. Reviewer's comments must be provided for requirements receiving a "Needs Improvement" score.

Prerequisite(s) (Check Applicable Box)	**NOT MET**	**MET**
1. Adoption by the Local Governing Body: §201.6(c)(5) **OR**		
2. Multi-Jurisdictional Plan Adoption: §201.6(c)(5) **AND**		
3. Multi-Jurisdictional Planning Participation: §201.6(a)(3)		

Planning Process	**N**	**S**
4. Documentation of the Planning Process: §201.6(b) and §201.6(c)(1)		

Risk Assessment	**N**	**S**
5. Identifying Hazards: §201.6(c)(2)(i)		
6. Profiling Hazards: §201.6(c)(2)(i)		
7. Assessing Vulnerability: Overview: §201.6(c)(2)(ii)		
8. Assessing Vulnerability: Addressing Repetitive Loss Properties. §201.6(c)(2)(ii)		
9. Assessing Vulnerability: Identifying Structures, Infrastructure, and Critical Facilities: §201.6(c)(2)(ii)(B)		
10. Assessing Vulnerability: Estimating Potential Losses: §201.6(c)(2)(ii)(B)		
11. Assessing Vulnerability: Analyzing Development Trends: §201.6(c)(2)(ii)(C)		
12. Multi-Jurisdictional Risk Assessment: §201.6(c)(2)(iii)		

*States that have additional requirements can add them in the appropriate sections of the Local Multi-Hazard Mitigation Planning Guidance or create a new section and modify this Plan Review Crosswalk to record the score for those requirements.

Scoring System

Please check one of the following for each requirement.

N – Needs Improvement: The plan does not meet the minimum for the requirement. Reviewer's comments must be provided.

S – Satisfactory: The plan meets the minimum for the requirement. Reviewer's comments are encouraged, but not required.

Mitigation Strategy	**N**	**S**
13. Local Hazard Mitigation Goals: §201.6(c)(3)(i)		
14. Identification and Analysis of Mitigation Actions: §201.6(c)(3)(ii)		
15. Identification and Analysis of Mitigation Actions: NFIP Compliance. §201.6(c)(3)(ii)		
16. Implementation of Mitigation Actions: §201.6(c)(3)(iii)		
17. Multi-Jurisdictional Mitigation Actions: §201.6(c)(3)(iv)		

Plan Maintenance Process	**N**	**S**
18. Monitoring, Evaluating, and Updating the Plan: §201.6(c)(4)(ii)		
19. Incorporation into Existing Planning Mechanisms: §201.6(c)(4)(ii)		
20. Continued Public Involvement: §201.6(c)(4)(iii)		

LOCAL MITIGATION PLAN APPROVAL STATUS

PLAN NOT APPROVED	
See Reviewer's Comments	
PLAN APPROVED	

Local Mitigation Plan Review and Approval Status

Jurisdiction: Mineral County, Montana	**Title of Plan:** Pre Disaster Mitigation Plan 2011 Update	**Date of Plan:** March 20, 2011
Local Point of Contact: George Gupton	**Address:** Disaster & Emergency Services Mineral County Courthouse Superior, Montana 59820	
Title: Director, Disaster & Emergency Services		
Agency: Disaster & Emergency Services		
Phone Number: (406) 240-9355	**E-Mail:** mincodes@blackfoot.net	

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

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

	DFIRM		**NFIP Status***			
Jurisdiction:	**In Plan**	**NOT in Plan**	**Y**	**N**	**N/A**	**CRS Class**
1. Mineral County			X			
2.Town of Alberton				X		
3.Town of Superior			X			
4.						
5.						

*** Notes: Y = Participating N = Not Participating N/A = Not Mapped**

PREREQUISITE(S)

1. Adoption by the Local Governing Body

Requirement §201.6(c)(5): [The local hazard mitigation plan shall include] documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).

Element	Location in the Plan	Reviewer's Comments	SCORE NOT MET	SCORE MET
A. Has the local governing body adopted the **new or updated** plan?	*pending*			
B. Is supporting documentation, such as a resolution, included?	*pending*			
		SUMMARY SCORE		

2. Multi-Jurisdictional Plan Adoption

Requirement §201.6(c)(5): *For multi-jurisdictional plans, each jurisdiction requesting approval of the plan* ***must*** *document that it has been formally adopted.*

Element	Location in the Plan	Reviewer's Comments	SCORE NOT MET	SCORE MET
A. Does the **new or updated** plan indicate the specific jurisdictions represented in the plan?	Section 1.0 Page 1-1			
B. For each jurisdiction, has the local governing body adopted the new or updated plan?	*pending*			
C. Is supporting documentation, such as a resolution, included for each participating jurisdiction?	*pending*			
		SUMMARY SCORE		

3. Multi-Jurisdictional Planning Participation

Requirement §201.6(a)(3): *Multi-jurisdictional plans (e.g., watershed plans) may be accepted, as appropriate, as long as each jurisdiction has participated in the process … Statewide plans will not be accepted as multi-jurisdictional plans.*

Element	Location in the Plan	Reviewer's Comments	SCORE	
			NOT MET	MET
A. Does the **new or updated** plan describe **how** each jurisdiction participated in the plan's development?	Section 2.0 Page 2-1			
B. Does the updated plan identify all participating jurisdictions, including new, continuing, and the jurisdictions that no longer participate in the plan?	Section 1.0, Page 1-1			
		SUMMARY SCORE		

PLANNING PROCESS: §201.6(b): *An open public involvement process is essential to the development of an effective plan.*

4. Documentation of the Planning Process

Requirement §201.6(b): *In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:*

(1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;

(2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process; and

(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

Requirement §201.6(c)(1): *[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.*

Element	Location in the Plan	Reviewer's Comments	SCORE	
			N	S
A. Does the plan provide a narrative description of the process followed to prepare the **new or updated** plan?	Page 1-2 thru 2-2			
B. Does the **new or updated** plan indicate who was involved in the **current** planning process? (For example, who led the development at the staff level and were there any external contributors such as contractors? Who participated on the plan committee, provided information, reviewed drafts, etc.?)	Page 1-3, 2-2 Appendix A			
C. Does the **new or updated** plan indicate how the public was involved? (Was the public provided an opportunity to comment on the plan during the drafting stage and prior to the plan approval?)	Page 2-2, 5-1 and Appendices A-C			
D. **Does the new or updated plan discuss the** opportunity for neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process?	Page 2-2 and Appendices A-B			
E. Does the planning process describe the review and incorporation, if appropriate, of existing plans, studies, reports, and technical information?	Page 4-1			

F. Does the updated plan document how the planning team reviewed and analyzed each section of the plan and whether each section was revised as part of the update process?	Page 2-0			
		SUMMARY SCORE		

RISK ASSESSMENT: §201.6(c)(2): *The plan shall include a risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.*

5. Identifying Hazards

Requirement §201.6(c)(2)(i): *[The risk assessment shall include a] description of the type … of all natural hazards that can affect the jurisdiction.*

			SCORE	
Element	**Location in the Plan**	**Reviewer's Comments**	**N**	**S**
A. Does the new or updated plan include a description of the types of all natural hazards that affect the jurisdiction?	Page 4-1			
		SUMMARY SCORE		

6. Profiling Hazards

Requirement §201.6(c)(2)(i): *[The risk assessment shall include a] description of the … location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.*

Element	Location in the Plan	Reviewer's Comments	SCORE N	SCORE S
A. Does the risk assessment identify the **location** (i.e., geographic area affected) of each natural hazard addressed in the **new or updated** plan?	Page 4-1 – 4-29			
B. Does the risk assessment identify the **extent** (i.e., magnitude or severity) of each hazard addressed in the **new or updated** plan?	Page 4-1 – 4-29			
C. Does the plan provide information on **previous occurrences** of each hazard addressed in the **new or updated** plan?	Page 4-1 – 4-29			
D. Does the plan include the **probability of future events** (i.e., chance of occurrence) for each hazard addressed in the **new or updated** plan?	Page 4-1 – 4-29			
		SUMMARY SCORE		

7. Assessing Vulnerability: Overview

Requirement §201.6(c)(2)(ii): [*The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.*

Element	Location in the Plan	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan include an **overall summary** description of the jurisdiction's **vulnerability** to each hazard?	Page 4-1 – 4-29			
B. Does the **new or updated** plan address the **impact** of each hazard on the jurisdiction?	Page 4-1 – 4-29			
		SUMMARY SCORE		

8. Assessing Vulnerability: Addressing Repetitive Loss Properties

Requirement §201.6(c)(2)(ii): *[The risk assessment] must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged floods.*

Element	Location in the Plan	Reviewer's Comments	SCORE N	SCORE S
A. Does the new or updated plan describe vulnerability in terms of the types and numbers of *repetitive* loss properties located in the identified hazard areas?	Page 4-8	***Note: This requirement becomes effective for all local plans approved after October 1, 2008.***		
		SUMMARY SCORE		

9. Assessing Vulnerability: Identifying Structures

Requirement §201.6(c)(2)(ii)(A): *The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard area … .*

Element	Location in the Plan	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan describe vulnerability in terms of the **types and numbers** of **existing** buildings, infrastructure, and critical facilities located in the identified hazard areas?		***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
B. Does the **new or updated** plan describe vulnerability in terms of the **types and numbers** of **future** buildings, infrastructure, and critical facilities located in the identified hazard areas?		***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
		SUMMARY SCORE		

10. Assessing Vulnerability: Estimating Potential Losses

Requirement §201.6(c)(2)(ii)(B): [*The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(ii)(A) of this section and a description of the methodology used to prepare the estimate … .*

Element	Location in the Plan	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan estimate **potential dollar losses** to vulnerable structures?		***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
B. Does the **new or updated** plan describe the **methodology** used to prepare the estimate?		***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
		SUMMARY SCORE		

11. Assessing Vulnerability: Analyzing Development Trends

Requirement §201.6(c)(2)(ii)(C): *[The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.*

Element	Location in the Plan	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan describe land uses and development trends?	Page 1-2	***Note: A "Needs Improvement" score on this requirement will not preclude the plan from passing.***		
		SUMMARY SCORE		

12. Multi-Jurisdictional Risk Assessment

Requirement §201.6(c)(2)(iii): *For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan include a risk assessment for each participating jurisdiction as needed to reflect unique or varied risks?	Page 4-1 – 4-29			
		SUMMARY SCORE		

MITIGATION STRATEGY: *§201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.*

13. Local Hazard Mitigation Goals

Requirement §201.6(c)(3)(i): *[The hazard mitigation strategy **shall** include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

Element	Location in the Plan	Reviewer's Comments	SCORE N	SCORE S
A Does the **new or updated** plan include a description of mitigation **goals** to reduce or avoid long-term vulnerabilities to the identified hazards?	Page 5-4 – 5-5			
		SUMMARY SCORE		

14. Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): *[The mitigation strategy **shall** include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan identify and analyze a **comprehensive range** of specific mitigation actions and projects for each hazard?	Page 5-4 to 5-5			
B Do the identified actions and projects address reducing the effects of hazards on **new** buildings and infrastructure?	Page 5-4			
C. Do the identified actions and projects address reducing the effects of hazards on **existing** buildings and infrastructure?	Page 5-4			
		SUMMARY SCORE		

15. Identification and Analysis of Mitigation Actions: National Flood Insurance Program (NFIP) Compliance

Requirement: §201.6(c)(3)(ii): *[The mitigation strategy] must also address the jurisdiction's participation in the National Flood Insurance Program (NFIP), and continued compliance with NFIP requirements, as appropriate.*

Element	Location in the Plan	Reviewer's Comments	SCORE	
			N	S
A. Does the new or updated plan describe the jurisdiction (s) participation in the NFIP?	Page 4-48	***Note: This requirement becomes effective for all local mitigation plans approved after October 1, 2008.***		
B. Does the mitigation strategy identify, analyze and prioritize actions related to continued compliance with the NFIP?	Page 5-4 - 6-1	***Note: This requirement becomes effective for all local mitigation plans approved after October 1, 2008.***		
SUMMARY SCORE				

16. Implementation of Mitigation Actions

Requirement: §201.6(c)(3)(iii): *[The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization* ***shall*** *include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.*

Element	Location in the Plan	Reviewer's Comments	SCORE	
			N	S
A. Does the **new or updated** mitigation strategy include how the actions are **prioritized**? (For example, is there a discussion of the process and criteria used?)	Page 5-5 - 5-6			
B. Does the **new or updated** mitigation strategy address how the actions will be implemented and administered, including the responsible department , existing and potential resources and the timeframe to complete each action?	Page 6-1			
C. Does the **new or updated** prioritization process include an emphasis on the use of a **cost-benefit review** to maximize benefits?	Page 5-5 - 5-6			
D. Does the **updated** plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?	Page 5-2 – 5-4			
		SUMMARY SCORE		

17. Multi-Jurisdictional Mitigation Actions

Requirement §201.6(c)(3)(iv): *For multi-jurisdictional plans, there **must** be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.*

Element	Location in the Plan (section or annex and page #)	Reviewer's Comments	SCORE	
			N	S
A Does the **new or updated** plan include identifiable **action items** for each jurisdiction requesting FEMA approval of the plan?	Section 6.1 Table 6-1 Page 6-1			
B. Does the **updated** plan identify the completed, deleted or deferred mitigation actions as a benchmark for progress, and if activities are unchanged (i.e., deferred), does the updated plan describe why no changes occurred?	Section 5.2 Table 5-2 Page 5-2			
		SUMMARY SCORE		

PLAN MAINTENANCE PROCESS

18. Monitoring, Evaluating, and Updating the Plan

Requirement §201.6(c)(4)(i): *[The plan maintenance process **shall** include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.*

Element	Location in the Plan	Reviewer's Comments	SCORE	
			N	S
A. Does the **new or updated** plan describe the method and schedule for **monitoring** the plan, including the responsible department?	Section 6.2 Page 6-1			
B. Does the **new or updated** plan describe the method and schedule for **evaluating** the plan, including how, when and by whom (i.e. the responsible department)?	Section 6.2 Page 6-1			
C. Does the **new or updated** plan describe the method and schedule for **updating** the plan within the five-year cycle?	Section 6.2 Page 6-1			
		SUMMARY SCORE		

19. Incorporation into Existing Planning Mechanisms

Requirement §201.6(c)(4)(ii): *[The plan **shall** include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.*

Element	Location in the Plan	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan identify other local planning mechanisms available for incorporating the mitigation requirements of the mitigation plan?	i - iii			
B. Does the **new or updated** plan include a process by which the local government will incorporate the mitigation strategy and other information contained in the plan (e.g., risk assessment) into other planning mechanisms, when appropriate?	i – iii			
C. Does the **updated** plan explain how the local government incorporated the mitigation strategy and other information contained in the plan (e.g., risk assessment) into other planning mechanisms, when appropriate?	i – iii			
		SUMMARY SCORE		

Continued Public Involvement

Requirement §201.6(c)(4)(iii): *[The plan maintenance process **shall** include a] discussion on how the community will continue public participation in the plan maintenance process.*

Element	Location in the Plan	Reviewer's Comments	SCORE N	SCORE S
A. Does the **new or updated** plan explain how **continued public participation** will be obtained? (For example, will there be public notices, an on-going mitigation plan committee, or annual review meetings with stakeholders?)	Section 6.2 Page 6-1			
		SUMMARY SCORE		

MATRIX A: PROFILING HAZARDS

This matrix can assist FEMA and the State in scoring each hazard. Local jurisdictions may find the matrix useful to ensure that their plan addresses each natural hazard that can affect the jurisdiction. **Completing the matrix is not required**.

Note: First, check which hazards are identified in requirement §201.6(c)(2)(i). Then, place a checkmark in either the N or S box for each applicable hazard. An "N" for any element of any identified hazard will result in a "Needs Improvement" score for this requirement. List the hazard and its related shortcoming in the comments section of the Plan Review Crosswalk.

Hazard Type	Hazards Identified Per Requirement §201.6(c)(2)(i)	A. Location		B. Extent		C. Previous Occurrences		D. Probability of Future Events	
	Yes	N	S	N	S	N	S	N	S
Avalanche	☐	☐	☐	☐	☐	☐	☐	☐	☐
Coastal Erosion	☐	☐	☐	☐	☐	☐	☐	☐	☐
Coastal Storm	☐	☐	☐	☐	☐	☐	☐	☐	☐
Dam Failure	☐	☐	☐	☐	☐	☐	☐	☐	☐
Drought	☐	☐	☐	☐	☐	☐	☐	☐	☐
Earthquake	X	☐	☐	☐	☐	☐	☐	☐	☐
Expansive Soils	☐	☐	☐	☐	☐	☐	☐	☐	☐
Levee Failure	☐	☐	☐	☐	☐	☐	☐	☐	☐
Flood	X	☐	☐	☐	☐	☐	☐	☐	☐
Hailstorm	X	☐	☐	☐	☐	☐	☐	☐	☐
Hurricane	☐	☐	☐	☐	☐	☐	☐	☐	☐
Land Subsidence	☐	☐	☐	☐	☐	☐	☐	☐	☐
Landslide	X	☐	☐	☐	☐	☐	☐	☐	☐
Severe Winter Storm	X	☐	☐	☐	☐	☐	☐	☐	☐
Tornado	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tsunami	☐	☐	☐	☐	☐	☐	☐	☐	☐
Volcano	X	☐	☐	☐	☐	☐	☐	☐	☐
Wildfire	X	☐	☐	☐	☐	☐	☐	☐	☐
Windstorm	X	☐	☐	☐	☐	☐	☐	☐	☐

To check boxes, double click on the box and change the default value to "checked."

§201.6(c)(2)(i) Profiling Hazards
A. Does the risk assessment identify the location (i.e., geographic area affected) of each hazard addressed in the new or updated plan?
B. Does the risk assessment identify the extent (i.e., magnitude or severity) of each hazard addressed in the new or updated plan?
C. Does the plan provide information on previous occurrences of each natural hazard addressed in the new or updated plan?
D. Does the plan include the probability of future events (i.e., chance of occurrence) for each hazard addressed in the plan?

MATRIX B: ASSESSING VULNERABILITY

This matrix can assist FEMA and the State in scoring each hazard. Local jurisdictions may find the matrix useful to ensure that the new or updated plan addresses each requirement. **Completing the matrix is not required.**

To check boxes, double click on the box and change the default value to "checked."

Note: First, check which hazards are identified in requirement §201.6(c)(2)(i). Then, place a checkmark in either the N or S box for each ***applicable*** *hazard. An "N" for any element of any identified hazard will result in a "Needs Improvement" score for this requirement. List the hazard and its related shortcoming in the comments section of the Plan Review Crosswalk. Note: Receiving an N in the shaded columns will not preclude the plan from passing.*

Hazard Type	Hazards Identified Per Requirement §201.6(c)(2)(i)	§201.6(c)(2)(ii) Assessing Vulnerability: Overview					§201.6(c)(2)(ii) Assessing Vulnerability: Identifying Structures					§201.6(c)(2)(ii) Assessing Vulnerability: Estimating Potential Losses			
		A. Overall Summary Description of Vulnerability		B. Hazard Impact			A. Types and Number of Existing Structures in Hazard Area (Estimate)		B. Types and Number of Future Structures in Hazard Area (Estimate)			A. Loss Estimate		B. Methodology	
	Yes	N	S	N	S		N	S	N	S		N	S	N	S
Avalanche	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Coastal Erosion	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Coastal Storm	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Dam Failure	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Drought	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Earthquake	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Expansive Soils	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Levee Failure	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Flood	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Hailstorm	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Hurricane	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Land Subsidence	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Landslide	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Severe Winter Storm	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Tornado	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Tsunami	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Volcano	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Wildfire	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Windstorm	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Other	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Other	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐
Other	☐	☐	☐	☐	☐		☐	☐	☐	☐		☐	☐	☐	☐

Legend:

§201.6(c)(2)(ii) Assessing Vulnerability: Overview

A. Does the new or updated plan include an overall summary description of the jurisdiction's vulnerability to each hazard?

B. Does the new or updated plan address the impact of each hazard on the jurisdiction?

§201.6(c)(2)(ii)(A) Assessing Vulnerability: Identifying Structures

A. Does the new or updated plan describe vulnerability in terms of the types and numbers of existing buildings, infrastructure, and critical facilities located in the identified hazard areas?

B. Does the new or updated plan describe vulnerability in terms of the types and numbers of future buildings, infrastructure, and critical facilities located in the identified hazard areas?

§201.6(c)(2)(ii)(B) Assessing Vulnerability: Estimating Potential Losses

A. Does the new or updated plan estimate potential dollar losses to vulnerable structures?

B. Does the new or updated plan describe the methodology used to prepare the estimate?

MATRIX C: IDENTIFICATION AND ANALYSIS OF MITIGATION ACTIONS

This matrix can assist FEMA and the State in scoring each hazard. Local jurisdictions may find the matrix useful to ensure consideration of a range of actions for each hazard. **Completing the matrix is not required.**

Note: First, check which hazards are identified in requirement §201.6(c)(2)(i). Then, place a checkmark in either the N or S box for each ***applicable*** *hazard. An "N" for any identified hazard will result in a "Needs Improvement" score for this requirement. List the hazard and its related shortcoming in the comments section of the Plan Review Crosswalk.*

To check boxes, double click on the box and change the default value to "checked."

Hazard Type	Hazards Identified Per Requirement §201.6(c)(2)(i)	A. Comprehensive Range of Actions and Projects	
	Yes	N	S
Avalanche	☐	☐	☐
Coastal Erosion	☐	☐	☐
Coastal Storm	☐	☐	☐
Dam Failure	☐	☐	☐
Drought	☐	☐	☐
Earthquake	☐	☐	☐
Expansive Soils	☐	☐	☐
Levee Failure	☐	☐	☐
Flood	☐	☐	☐
Hailstorm	☐	☐	☐
Hurricane	☐	☐	☐
Land Subsidence	☐	☐	☐
Landslide	☐	☐	☐
Severe Winter Storm	☐	☐	☐
Tornado	☐	☐	☐
Tsunami	☐	☐	☐
Volcano	☐	☐	☐
Wildfire	☐	☐	☐
Windstorm	☐	☐	☐

Legend:
§201.6(c)(3)(ii) Identification and Analysis of Mitigation Actions
A. Does the **new or updated** plan identify and analyze a comprehensive range of specific mitigation actions and projects for each hazard?

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