Madison County Strategic Wildland Fire Plan

Adopted December 2003

firelogistics INCORPORATED

PMB 2164, 1 Jackson Creek, Montana City, MT 59634

I. Introduction

The Madison County Strategic Wildland Fire Plan (Fire Plan), is intended to summarize plans and activities targeted at reducing the risk of a catastrophic wildland/urban interface (WUI) fire event in Madison County, and provide coordination and guidance to first responders and their respective jurisdictions in the event of a wildland or wildland/urban interface fire. By implementing this planning document Madison County can ensure that the health, safety and welfare of its citizens remain secure from the threat of a wildland/urban fire. The Fire Plan will improve planning tools for the county, which will result in better subdivision and development regulation codes, as they relate to growth in the wildland/urban interface. This Fire Plan may also aid economic development of forest products by the potential development of a sustainable forest by-product industry from fuels reduction and mitigation efforts.

The goals of the Fire Plan are to:

- Prevent loss of life and health
- Prevent destruction of property
- Preserve and restore natural and beneficial function of our forests and watersheds
- Control future increases in damage from wildland fire
- Educate citizens and local businesses

Objectives to be accomplished by the Fire Plan include:

- Identify, inventory and prioritize the risks associated with developing areas of the county
- Recommend projects and programs intended to reduce the above risks
- Identify areas of concern between Beaverhead, Gallatin and Madison Counties
- Provide Madison County with maps associated with development of the Fire Plan
- Through the Madison County Local Emergency Planning Committee (LEPC), begin educating the citizens of Madison County.

Planning priorities of the Fire Plan in order of importance are:

- Protect human life and health
- Protect critical community infrastructure
- Protect private property
- Protect natural resources

Madison County contracted with Fire Logistics, Inc. to develop a Strategic Wildland Fire Plan with consultation and input from:

- The Madison County Local Emergency Planning Committee
- The Madison County Planner
- The Madison County Fire Warden
- The Beaverhead/Deerlodge National Forest
- The Montana Department of Natural Resources and Conservation, Dillon District
- The Southwest Montana Fire Council
- The fire agencies of Madison County

The information contained in this planning document is organized to correspond to the five strategies of the National Fire Plan:

- Community Fire Planning,
- Wildland Urban Interface Fuel Treatment
- Economic Development
- Forest Restoration
- Community Education and Outreach.

The intent of this planning document is to provide direction for future actions, fuels projects, training, administrative regulation, fire protection organization needs, and facilitate the public safety, health and general welfare of the residents of Madison County.

II. Background

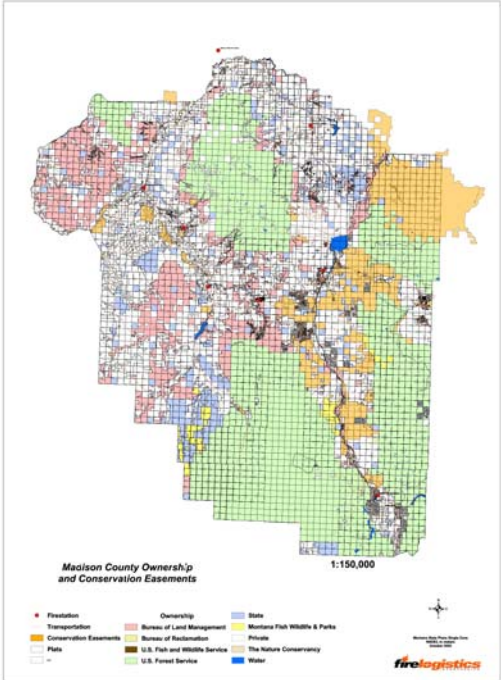
COMMUNITY DESCRIPTION

Madison County is located in southwestern Montana and has a population of approximately 7,000 people. It is one of Montana's larger counties covering 3,600 square miles or 2.3 million acres. Over one half of this acreage is owned by either the federal or state government while the remaining 48% is in private ownership. The major communities in the county include Big Sky, Ennis, Sheridan, Twin Bridges and Virginia City.

There are several mountain ranges in Madison County, the principals being Madison Range, Gravely Range and Tobacco Roots. Elevations range up to 11,000 feet. The basins associated with these mountain ranges dominate the landscape and is where most development is occurring. In addition to the mountains, there are two major waterways in the county. These are the Madison and Jefferson Rivers along with the Ruby, Beaverhead and Big Hole tributaries. Ennis Lake, Ruby Reservoir, Wade Lake, Cliff Lake and Willow Creek Reservoir are also located within the county. These waterways offer excellent fishing opportunities and have become destination attractions for many sportsmen and especially fly fishing enthusiasts.

Upland bird, migratory waterfowl and big game hunting are major attractions in the fall. With 48% of the county in national forest ownership, elk and deer hunting are particularly popular.

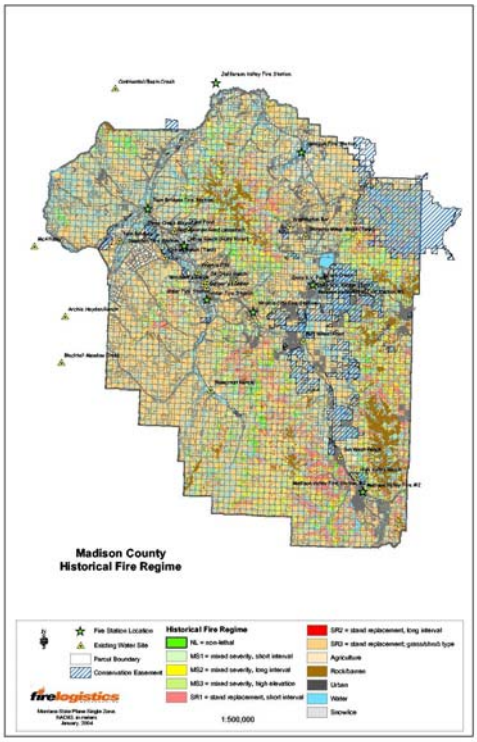
Of the private land within the county, 75% is classified as rangeland, 12% cropland/hay ground and 9% forested (1998 figures). Approximately 100,000 acres of private landholdings have been subdivided through the county planning process. Thousands of odd shaped acres have been subdivided without subdivision approval. The most recent statistics indicate that about 19% of these lots have been built on. Another 150, 000 acres of private ground has been placed in conservation easements. These lands cannot be subdivided. (See Ownership and Conservation Easements Map 1 in Map Section).



The population grew over 16% between 1990 and 2000. Most of that increase is in the 35+ age class that corresponds with many adults with established incomes looking for a rural setting to live in, at least on a part time basis. This is supported by the fact that the vacancy rate on existing housing dropped from 39% in 1990 to less than 5% in 1998.

FIRE HISTORY

The fire history for Madison County began long before European settlement advanced into Montana. Data from the Beaverhead area, as well as some from the greater Yellowstone ecosystem (Houston 1973, Loope and Gruell 1973, Romme and Despain 1989, Barrett 1994a) indicate that major fires occurred during severe droughts in the early to mid-1700s.



Some of the worst droughts and severe fire years in the Pacific Northwest occurred between the late 1800s and 1930s. However, fire scar – and fire atlas data for the Beaverhead National Forest indicates a general decline in large wildland fires beginning as early as the late 1800's. Fire scar samples suggest that these large fires had occurred on an average of every 2 or 3 decades during the pre-settlement era (mean: 33 years).

Since European settlement began in the county during the late 1800's, large fire occurrence had been significantly decreased. These changes were the direct result of homesteading and grazing from sheep and cattle modified the fuel complexes to the extent that the sizes of the fires in this ecosystem were reduced significantly.

Beginning in the late 1980's and continuing through 2003, Madison County has been under a long-term drought. Due primarily to the drought impact on fuels, the county has experienced a number of significant large wildland fire events. Years of significant fire activity were: 1988, 1996, 1998, 1999, and 2000 (See Madison County Historical Fire Regime Map 2 in Map Section).

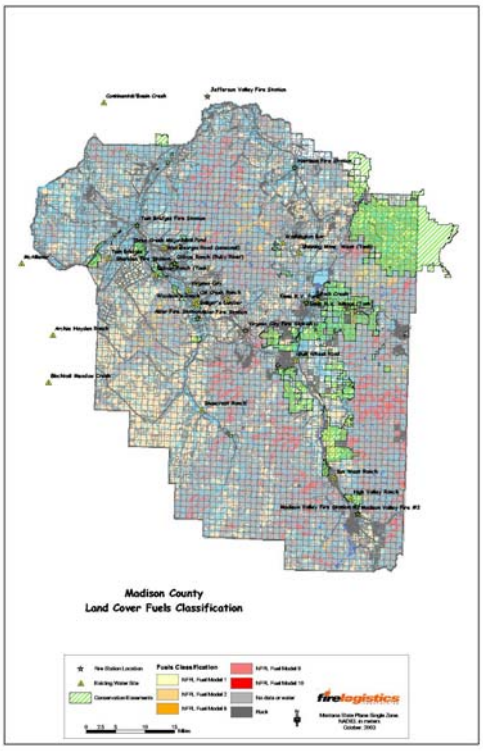
FIRE ECOLOGY

The fire ecology of the forest and grassland habitat types is an integral part of the changing dynamics of the fuel conditions. By understanding fire's role within these plant communities coupled with the knowledge of the subdivision development, one can further understand the present day risks.

A method of placing various forest and grassland habitats type into fire groups is commonly used to determine response of vegetation to fire and the path certain species take during succession. Fire groups describe the natural role of fire following a sequence from low to high elevation vegetative categories (Fisher, et. al. 1983). They paint an average picture of fire intensities and frequencies, and describe the natural role of fire prior to active fire suppression efforts. Fire groups correlate directly to Pfister's Habitat Types of Montana (1977), in how they respond to fire disturbance, and are grouped in this analysis based on vegetation similarities.

FORESTED ECOLOGY

Three timber fire groups represent Madison County: Cool Dry Douglas fir, Moist Douglas fir and cool habitats dominated by lodgepole pine. The following will describe the fire ecology of each type and how fire plays a role.



Cool Dry Douglas fir

This group exists on dry sites that are generally too dry for lodgepole pine and to cold for ponderosa pine. Rocky Mountain Juniper, limber pine and subalpine fir can be found as minor species within these stands. This fire group includes big sagebrush, common juniper, wax current, russet buffaloberry, white spirea and mountain snowberry (See Land Cover Fuels Classification Map 3 in Map Section)

Downed dead fuel loads for this group average about 10 tons/acre. While downed, dead woody fuel loading can, at times, be significant, live fuels are less of a problem, due to the harsh site conditions. This factor plus the usual open nature of these stands results in a low probability of a crown fire. Individual trees will often have branches close to the ground and if sufficient ground fuels are available, torching can occur.

The role of fire in this fire group is not well defined. Fire probably occurred less frequently than in the warmer Douglas fir habitat types. The relatively light fuel load, sparse undergrowth, and generally open nature of the stands would appear to favor a long fire-free interval. However, fire history studies have estimated a fire interval of 35 to 40 years (Arno and Gruell, 1983). Fire plays an important role in

favoring ponderosa pine within this group. Without fire, Douglas fir would slowly replace ponderosa pine. Fire's role in seedbed preparation on most of these fire group sites is confounded by the difficulty of regeneration beyond the seedling stage on these droughty sites because of undergrowth and overstory competition. Where dense regeneration does occur, fire probably played the role as a thinning agent in sapling and pole-sized stands. Ground fire probably maintains many mature stands in an open, park like condition. Many pre-settlement stands were actually scattered groves. Modern fire suppression has allowed these groves to become forest stands.

Opportunities for fire use may be limited in some stands in this group, due to the normally sparse fuels. Where sufficient surface fuels exist, prescribed fire can be used to accomplish timber, range and wildlife management objectives.

Fire can be used following timber harvest activities to prepare the seedbed and to reduce wildland fire hazards from the harvest related slash. Care needs to be taken in controlling the fire intensity when prescribed burning in partial-cut stands. The hazard reduction objective in these situations should be only to remove the fine fuels. Burning under moist conditions is recommended.

Moist Douglas fir

This group exists at elevations of about 4,800 ft. to 7,200 ft. 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. Lodgepole pine is a major seral component in many stands. Whitebark pine is usually well represented at higher elevations.

Shrubs and moist forbs dominate the undergrowth along with pine grass, bear grass, and elk sedge. Common shrubs include ninebark, snowberry, white spirea, oceanspray, blue huckleberry, grouse whortleberry, kinnikinnick, twinflower, and common juniper.

Downed dead fuel loads average 13 tons/acre, but can often be much heavier. Fuel conditions will vary according to stand density and species composition. The most hazardous fuel conditions occur in well-stocked stands with dense Douglas fir understories. These stands are usually characterized by relatively large amounts of downed twigs and small branch wood less than 3 inches in diameter beneath partially fallen and standing dead sapling and small pole-sized stems.

The absence of a dense understory results in a reduced fire hazard. However, the density of overstory trees and the presence of dead branches near ground level, create ladder fuels leading to crown fire potential under severe burning conditions.

Fuel conditions in stands dominated by lodgepole pine tend to be less hazardous than in stands dominated by Douglas fir. Ladder fuels are much less prevalent, so the probability of fire going from the forest floor to the crown is not as great.

The tendency toward overstocking and the subsequent development of dense understories is the main reason for high-hazard fuel conditions in many of these stands. Fuel accumulation due to fire suppression, natural mortality, snow breakage, blowdown, insect and disease mortality operate at a high level in many stands. Relatively deep duff develops and contains a lot of rotten logs. Fires may often sit and smolder undetected in the duff until burning conditions become favorable for fire spread, resulting in a large acreage being burned.

Historically, fire was important as a thinning agent and as a stand replacement agent. Low to moderate severity fires converted dense pole-sized or larger stands to a fairly open condition. Subsequent light burning maintained stands in park like conditions. Severe fires probably occurred in dense, fuel-heavy stands and resulted in stand replacement. Fire's role as a seedbed-preparing agent is less important in this group than in dry Douglas fir.

Fire has a demonstrable effect on wildlife habitat through its effect on food plants. The combination of opening up stands by killing overstory trees, reducing competition by removing understories, and rejuvenation of sprouting plants through top kill, can significantly increase the availability of palatable browse and forage.

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. Most stands within the group are quite variable depending on site conditions, stand history, and successional stages. Fire management considerations must, therefore, be attuned to this variation. Protection from unwanted fire may be a major fire management consideration in those stands where combinations of live and dead fuels result in a severe fire behavior potential. It may be difficult and impractical to abate the fire hazard in such stands except in conjunction with a timber harvest operation. Pre-attack planning coupled with rapid detection and initial attack may be the only reasonable means to deal with this situation until such time as harvest operations can be scheduled.

Cool Habitat Types Lodgepole Pine

Fire group 7 contains two groups of habitat types. The first consists of lodgepole pine climax series habitat types that support essentially pure stands of lodgepole pine. The second group consists of those Douglas fir, spruce, and subalpine fir habitat types that, regardless of potential climax species, are usually found in nature supporting lodgepole pine dominated stands. These stands seldom reach a near climax condition. Periodic wildfires seem to recycle the stand before a substantial amount of mature lodgepole pine dies out. Subalpine fir, spruce, Douglas fir and whitebark pine occur in varying amounts with lodgepole pine on most of these habitat types.

Undergrowth in this group often consists of dense mates or layers of grasses or shrubs. The most common graminoid species are pinegrass, bluejoint and elk sedge. Common shrubs include grouse whortleberry, blue huckleberry, dwarf huckleberry, myrtle whortleberry, twinflower, kinnikinnick, white spirea, bunchberry dogwood, snowberry, common juniper, bitterbrush, buffaloberry and Oregon grape.

The average downed dead woody fuel load in this group is 15 tons/acre, but maximum loads may greatly exceed this value. This group's fuel load is characterized by relatively large amounts of material 3 inches and larger.

Live fuels in this group can be a problem. The primary live fuel consideration is related to the occurrence of dense patches or entire stands of young lodgepole pine with intermingled crowns and lower branches extending down to the surface fuels. When ignited under favorable burning conditions, such stands are usually destroyed in a few minutes.

Densely stocked, clean-boled trees characterize many mature stands with large amounts of deadfall on the forest floor. An immediate source of deadfall in a young lodgepole pine stand is the snags created by a previous fire.

The role of fire in the seral lodgepole pine forest is almost exclusively as the agent that perpetuates or renews lodgepole pine. Without periodic disturbance, the shade-tolerant species replaces the lodgepole pine because it does not regenerate well on duff or under shaded conditions. Fire interrupts the course of succession and increases the proportion of lodgepole with each burn. Within 50 to 100 years following a severe fire, a lodgepole pine forest will exist even though shrubs and herbaceous cover may become dominant immediately following the burn.

Large stand replacement fires play a definite role in the ecology of lodgepole pine forests. The natural range of fire in seral lodgepole pine stands range from less than 100 years to about 500 years. The interval between any two fires in one area might be only a few years. Recurring cool fires may thin a stand or otherwise rejuvenate it without doing serious damage. Stands greater than 60 to 80 years old, however, become increasingly flammable due to overcrowding. Eventually an ignition sets off a major conflagration. In certain areas such a stand replacement fire can cover thousands of acres. Vast tracts of lodgepole can develop in this way as the serotinous cones open and shower the burn with seeds.

The exclusive dominance of lodgepole pine in the lodgepole community types is attributed in a large part to fire for the following reasons:

1. Historic repeated wildfires over large areas may eliminate seed sources of potential shade-tolerant competitors.
2. Light ground fires may remove invading shade-tolerant competitors from the understory.
3. Dense stands may prevent regeneration of all conifers for up to 200 years in the absence of disturbance or stand deterioration.
4. Sites may be unfavorable for the establishment of other conifers.

The primary fire management consideration in this group's habitat types is protection from unwanted fire during extended periods of drought and during severe fire weather conditions. Stand replacement fires at such times often crown and become holocausts that result in complete stand mortality.

Opportunities for use of prescribed fire are limited in natural stands because of the low heat resistance of lodgepole pine, spruce and subalpine fir. The other problem is that burning during conditions that would allow for low fire intensities, make it difficult to sustain a prescribed fire in these stands.

RANGELAND ECOLOGY

Rangeland and the ecology of the plant species that occupy these sites have their own relation to wildland fire. The grass species can be a contributor to fire behavior, but can easily be modified through agricultural practices, such as grazing (Bunting, Kilgore, Bushey, 1987).

The sagebrush grass range is fairly extensive within the county. Mountain Big Sagebrush and Silver Sagebrush are the predominate species.

Mountain Big Sagebrush is the most productive sagebrush type. It is not known to re-sprout following a fire. It is well adapted, however, to become established following a fire through seed germination. These plants grow rapidly and reach maturity within 3 to 5 years. The combination of these two factors favors rapid reestablishment of a new sagebrush field. Sagebrush may return to preburn density and cover within 15 to 20 years following a fire. Establishment after a severe fire may proceed much more slowly and sage may not dominate the area for 30 years. Bitterbrush is often found in communities within the Mountain Big Sagebrush series. It is normally a decumbent form and is moderately adapted to spring and fall fire. If rabbitbrush occupies a site, it usually re-sprouts following a fire.

Silvertip Sagebrush dominates areas within the county. It is a noted sprouter but apparently can be controlled by fire in some areas of its range. Others authors refer to Silvertip Sagebrush as an occasional re-sprouter following fire. In some instances it re-sprouts vigorously following spring burns, but fall burns result in greater mortality and low vigor of sprouts.

Climate

Climate directly affects fire behavior, with wind being the major influencing factor. Generally, winds in this area prevail out of the southwest, and are moderate to strong depending on the elevation and aspect. South and west facing slopes are more exposed to the prevailing wind, which relates to increased fire behavior activity. Fires generally spread from southwest to northeast. During calm days, fire spread will be dictated by topographic configuration and local upslope-downslope winds. During strong wind events fire spread will be dictated by wind direction and the winds will override the effects of the topographic features.

Moisture regimes can be defined in terms of storm tracks, which generally move across the county from southwest to northeast. The storm track affecting the analysis area starts along the southwestern edge of Madison County and tracks from the southwest to the northeast across the county. Typically, any significant moisture associated with these storm tracks are depleted before reaching the northern half of the county. However, lightning associated with these storms can continue to contribute to a significant number of fire starts along the storm's path.

These dry lightning events increase in number as the sun angle increases in elevation. This dries the atmosphere and increases the elevation of building cumulus clouds. Strong down drafts are produced and are often accompanied by dry lightning. Moisture associated with these building cumulus rarely hit the ground, but becomes virga and evaporates before reaching the ground.

Climatic seasonal changes can influence fire behavior as well. Winter months of December through February are generally non-fire months, but snow pack accumulations can be a key factor in potential fire activity for any given summer. Spring seasons (April through June) are generally moist months with low frequencies. The ignitions that do occur during this period result in low fire intensity fires. Minor fire activity can occur in early spring prior to green-up conditions. As the season turns to summer, grasses and shrubs begin to lose their live fuel moisture, down fuels begin to dry, and fire conditions begin to peak by August. As autumn approaches, conditions generally begin to cool, but the presence of dry cold frontal passages become quite common and can promote conditions of extreme fire behavior. Late fall conditions in November mark the transition into winter, but again, dry cold frontal passages at this time of year and the lack of snow pack can lead to conditions of rapid fire growth and high intensity fire behavior.

The normal weather pattern for Madison County can best be understood by looking at the summer weather pattern for the western United States. As the Bermuda High makes it way across Texas and New Mexico in July, it cuts off a supply of low-level moisture. As this moisture diminishes, general thunderstorm activity decreases across Montana and allows the lower atmosphere to dry. This is timed with the development of a high-pressure system that sets up across Montana with subsidence in the high pressure that dries the atmosphere. This subsidence does two things: it brings very warm temperatures to the area and it lowers the humidities. The lower humidities begin to dry the fuels of all size classes (1 hour, 10 hour, 100 hour, 1000 hour and 1000 hour plus time lag fuels). The 1-100 hour time lag fuels will show evidence of drying within 3-5 days. The 1000-hour time lag fuels will take significantly longer to dry, usually in the 3-5 week range.

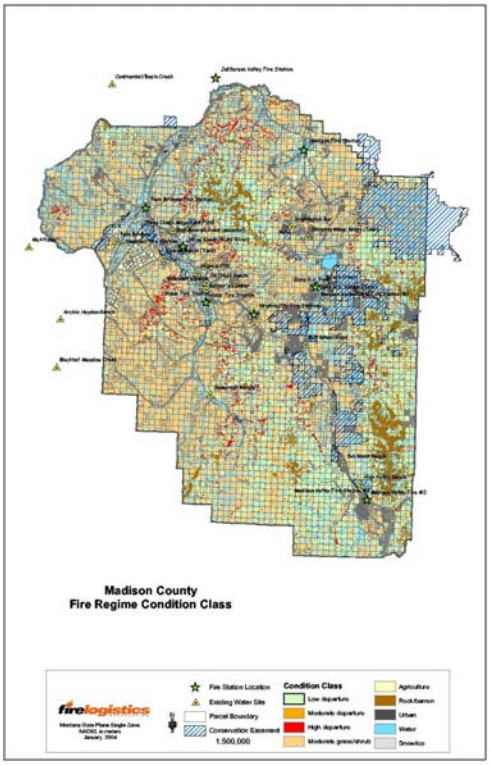
The drying of the lower atmosphere also affects thunderstorms that might develop. These thunderstorms are usually five to seven miles wide at the base and are sufficiently dry to evaporate any moisture falling from these cells.

These “Dry” thunderstorms are good at developing strong outflow winds. These thunderstorms also can produce lightning that can occur within 25 miles of the thunderstorm’s path.

Long-term drought poses another significant challenge because of its effect on current vegetation conditions, i.e., reduction in live fuel moisture content. Fire records for Madison County indicate that the current wildland fire suppression

actions are effective when the Energy Release Component (ERC) is below the 97th percentile. When the ERC is above the 97th percentile, wildland fire suppression actions are historically not effective. Since 1988, Madison County area has experienced five significant fire seasons. The fire seasons of 1988 and 2000 are considered benchmark years for the county.

III. Current Fire Hazards and Problems



The potential fire hazards can best be discussed by reviewing the large fire history for the county. The Beaverhead NF fire history study indicated a significant reduction in large fires toward the end of the 19th century. That reduction in size may have resulted from changes in the land use patterns and previous stand replacement fires that treated over mature stands.

During the 20th century, those stands of timber matured under a successful fire suppression policy to the extent that fire has had very limited opportunity to play its natural role in the forested communities.

As we enter the 21st century, Madison County is living with stands of mature and over mature Douglas fir and lodgepole pine. The age class and condition of these stands make them very susceptible to infestation from insects and disease, which increases the risk for a stand replacement wildland fire (See Madison County Fire Regime and Conditions Class Map 4 in Map Section).

During the last three decades of the 20th century, land use patterns have changed the historic look of Madison County. Development, of rural areas from primarily agricultural use to home sites for permanent and seasonal residents, presents a significant problem to the fire protection agencies that provide wildland fire suppression.

In many cases the builder or homeowner give limited consideration of the risks from a wildland/urban interface fire when choosing a home site. Poor planning in many cases have placed homes and in some cases entire subdivisions in a vulnerable situation. This risk is not limited to the structures and homeowners, but to the fire fighters who will be asked to protect the structures and improvements in these locations.

Long-term drought is another factor that needs to be considered a potential hazard. In reviewing the climatic conditions that Madison County has experienced since 1988, the droughts significance is very evident in both the forested and brush vegetative communities. Mortality as a result of the drought will continue to increase the natural fuel loading, which in turn raises the county's potential for significant wildland fire incidents.

WILDLAND FIRE USE

Lee Metcalf Wilderness area borders the eastern side of Madison County for forty plus miles. This wilderness area is managed jointly by the Beaverhead and Gallatin National Forests and the Bureau of Land Management. During the 1990's, the U.S. Forest Service and the Bureau of Land Management approved a fire management plan which allows wildland fires started by a natural ignition to play it's natural role in the ecosystem.

Implementation of this plan would concur with mid summer tourist season and could have several impacts to Madison County and its residents. A fire that is allowed to burn under a prescription potentially will place residual smoke into the valley during the life of the fire. The second impact would come from developing and implementing an information and education on fires for resource benefits. With this in mind, the county could expect to expend time, energy, and resources with the Forest Service during such events to educate and inform the counties citizens and tourists on this project and its outcomes.

WILDLAND/URBAN INTERFACE

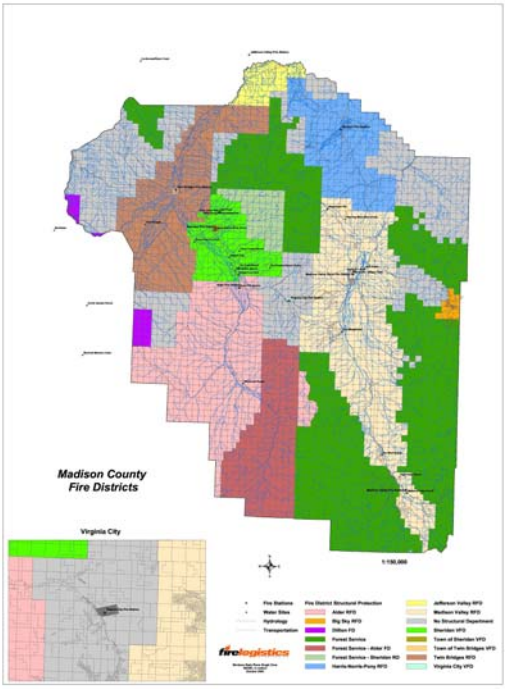
During the past several fire seasons of 2000, 2001 and 2002, it has become evident that wildland/urban interface fire losses have increased throughout the Western United States. The expectation under the Federal Fire Policy is "that losses will increase in the future."[1]

[1] Federal Fire Policy, 2001

The wildland/urban interface is defined as the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.[2] Similar terms are wildland/residential interface and wildland/urban intermix.

The development of portions of Madison County into residential lots of varying sizes is contributing to the wildland/urban interface fire problem for the fire protection agencies in Madison County. This leads to several complex problems which need to be addresses in the Fire Plan:

- Subdivision Development
- Defensible Space Requirements
- Building Construction Requirements
- Fuel Reduction on all ownerships
- Fire Protection of structures outside of existing fire protection agencies.



Current Fire Protection Overview

Madison County is providing fire protection through eight fire protection agencies. There are significant developed areas that are outside the boundaries of the existing rural fire district (See Fire District Map 5 in Map Section). These agencies differ greatly in their capability, operational effectiveness, staffing, equipment and training as portrayed in the Community Profiles (See Appendix 1).

Highly Capable

The Gallatin Canyon Consolidated Rural Fire District in Big Sky provides service to a portion of Madison County adjacent to Gallatin County. This department provides most of the services expected by the residents of the area.

Moderately Capable

Madison Valley Rural Fire District ranks in the upper portion of the moderate capability ranking. This district provides most of the services that are expected

[2] *Ibid.*

from the residents. Limitations of the service delivery are specific to Hazmat, Special Rescue and an increasing pressure in the wildland/urban interface.

The following fire jurisdictions fell in the lower end of the moderate capability ranking - Virginia City, Alder, Jefferson Valley, Sheridan City/Rural and Twin Bridges. These jurisdictions need to seriously consider improvements in the kinds, types and levels of service they provide to their customers.

Limited Capability

The Harrison RFD has limited capability in all fire protection areas.

Discussion

As in most rural areas, volunteers are hard to find and keep motivated; recruiting is a problem due to the limited number of people available for community service organizations, commitment of jobs limit the time available for training and the increasing documentation requirements overload the majority of volunteer Fire Chief's. This leads to difficulty in recruiting and filling the position of fire chief with skills and experience.

There are still areas in Madison County that do not have any fire protection except for a limited wildland response from the existing fire departments. The health, safety and general welfare of the Madison County citizens in these areas are not being considered. In addition, this situation creates confusion between response agencies and may have a devastating effect if a wildland fire escapes local suppression efforts and outside agencies and incident management are called upon to assist. With the current structure in Madison County, the conflicts between the assisting agencies and the county agencies will surely exist and compromise the effectiveness of the suppression effort for this type of large fire.

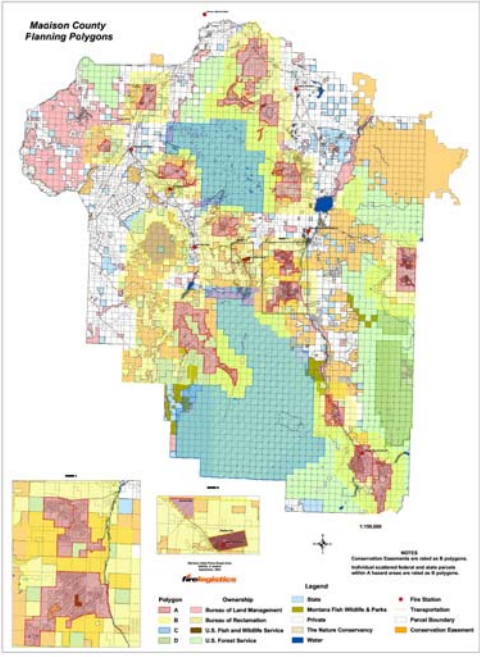
Madison County currently has a subdivision review process that limits the fire department's ability to require the needed infrastructure to provide the minimum service. This is also compounded by the limited expertise of the local fire chief when or if they provide recommendations to the Board of County Commissioners for conditions of approval of a development project. Currently there is no impact fee process available to the rural fire districts in Madison County to assist in the funding of capital improvements directly related to subdivision development growth and service delivery requirements.

Some fire agencies don't even participate in the subdivision review process. This leaves the conditions of approval open to general terms that will not work.

Current coordination between fire agencies in Madison County is very limited at this time. Since this is a rural county with limited resources, coordinated efforts are needed to expand the capabilities of the entire fire service. Madison County fire protection agencies currently participate in the Southwest Montana Fire Council, which is composed of the fire protection agencies in both Madison County and Beaverhead County.

The Big Sky Fire Management Strategy plan is in place and adopted by Madison County and provides recommendations that are currently being used in the Big Sky area. (See Appendix 2)

IV. Fire Planning Categories



Risk Areas (Polygons) - In an attempt to help officials in their efforts to maximize fire protection effectiveness, the following classification of county lands is proposed (See Map 3 in Map Section). These broad characterizations should help prioritize where protection capability should be improved and where fuel treatments could be most effective. A projection is made in recognition that any private land not currently protected by a conservation easement is subject to being subdivided. Once subdivided it would become an A polygon. It is possible that some of the acreages now in the undeveloped private category may be covered by a conservation easement, i.e., a B polygon, at some point in the future. (See Planning Polygons Map 6 in Map Section)

- High Risk Areas (A-Polygons) - These are areas where wildland fire is highly undesirable. Fire has the potential to cause major property damage or resource loss, will result in major suppression costs and will create a high risk to firefighters. Fire suppression actions will be aggressive and the acreage burned will be kept as small as possible within these areas. Prevention will also be emphasized to keep the numbers of person caused ignitions to a minimum.

  These areas are characterized as those areas where subdivisions are located or planned and where the current fuel conditions are significantly more hazardous.

- Moderate Risk Areas (B-Polygons) -These are areas where wildland fire is undesirable under current fuel conditions. Like High Risk Areas, fuel conditions are hazardous and fire suppression actions will be aggressive in order to keep fires small. Again, fire prevention will be emphasized in these areas.

  Although wildland fire under current conditions is unacceptable, appropriate fuel treatment measures may permit some restoration of the fire adapted landscape over time. Once this condition is reached, fire intensities and long term damage from wildland fires will be reduced and prescribed fire could be used periodically to maintain a healthier ecosystem less prone to catastrophic wildfire.

- Low Risk Areas (C-Polygons) - These are areas where prescribed fire can be returned immediately to the fire adapted landscape without significant negative effects. Prescribed fire should be used regularly to maintain the

desirable conditions already present. Suppression of wildland fires can be made with consideration of the lowest suppression costs and resource loss. It may not always result in minimizing the burned area.

- Special Areas (D-Polygons) - These are areas where wildland fire is acceptable or desirable and where the potential for damage is insignificant. Prevention and fuels treatments will be relatively uncommon in these areas. Fires that start may be managed to enhance natural resource or ecological values. Suppression will be limited to times and situations where continued burning might pose some special risk to values outside the polygon.

- Areas of common concern - The scope of work required an analysis of the areas of common concern between Beaverhead and Madison Counties. While there are many areas along the county boundaries where large wildland fires may occur, they do not provide the challenges of the fire problem along the boundaries of Madison and Gallatin Counties.

  Madison and Gallatin Counties have a common boundary that includes one of the largest destination ski resorts in the west, Big Sky. This mountainous area along with an average snowfall of 400 inches per year, create several challenges for both counties. The base of the resort is in Madison County. These structures do create significant tax revenue but also places an extraordinary high demand on services. The fire protection is provided by the Gallatin Canyon Consolidated Rural Fire District in Big Sky. This department is a combination department with a limited career staff and a volunteer staff to provide fire protection and Advanced Life Support Transport Ambulance.

  An additional gated community is being developed to the south of the Big Sky in and around Pioneer Mountain. The Yellowstone Club is an exclusive development composed of large high value homes, a ski resort, golf course, and a hotel/condominiums. Fire protection plans for the project include significant fuel modification, defensible space, built in fire sprinklers, water supplies, and eventually an on-site fire department.

  The other issue in this area is the continued growth in the wildland/urban interface. Structures are being built in areas that are extremely hard to find and to get to in the winter. These structures create a threat to the wildland fuels if a structure fire spreads to the forest adjacent to the structures. The resulting wildland/urban interface fire creates a significant hazard to the other structures in vicinity.

Both counties and the Madison/Gallatin National Forests recognized these issues and a study of the situation, conclusions and recommendation are contained in the Big Sky Fire Management Strategy. (See Appendix 2)

MUTUAL THREAT FIRES

Management of fires occurring within the mutual threat zone could be a significant issue to Madison County. Mutual threat zones are defined as a predetermined area on either side of a jurisdictional boundary. Since 1947, ninety seven ignitions have occurred within that mutual threat zone between the counties, State of Montana and the federal agencies.

All the fire protection agencies providing fire protection in these mutual threat areas are separate governmental entities. However, they need to work together cooperatively on mutual threat zone incidents. Preplanning concerning responses, unified command potential, evacuation, coordinated command and operation, and cost share agreements should be agreed upon by the agencies annually.

Strategies

The National Fire Plan's *key point components* focus on building community capacity to develop and implement citizen driven solutions in wildland fire and wildland/urban interface prevention planning. These solutions, in the form of strategies are listed below:

- Community Fire Planning: A strategy that develops prevention based capacity and organizational infrastructure, identifies and inventories hazards, and establishes treatment plans; while it also develops response based capacity and organizational infrastructure, and crafts response plans and exercise programs.
- Wildland/Urban Interface Fuel Treatments: In the wildland/urban interface this strategy will reduce the impacts of wildland fires on communities, natural resources, and cultural resources. Past disruptions of natural fire cycles, and use of certain management practices, have resulted in wildland fires of increasing size, intensity and severity. Treatment of hazardous fuels i.e., grazing, will help reduce the impacts of wildland fires on communities and restore health to fire-adapted ecosystems.
- Economic Development: This strategy involves identifying, developing and expanding economic opportunities related to traditionally underutilize wood products and to expand the utilization of biomass removed through hazardous fuel reduction treatments.
- Forest Restoration: A strategy whose work is broadly defined, and the efforts intended for lands that are unlikely to recover naturally from fire damage. The work is often implemented over the course of several years.
- Community Education and Outreach: A strategy that develops and disseminates information to help wildland/urban interface residents and the general residents of Madison County to make sensible choices about living in and around a fire-prone ecosystem. The FIREWISE programs and Defensible Space Workshops are aimed at informing homeowners,

firefighters, builders, developers, landscapers, insurance agents and public officials about the concepts of living FIREWISE.

Other strategies that have been utilized by Madison County are:

- Conservation Easements: Conservation easements are an effective strategy to limit wildland/urban interface encroachment into areas of high wildland fire potential.
- Big Sky Fire Management Strategy: (See Appendix 2).

A. Community Fire Planning

Current Activities and Programs

Programs addressing Madison County's community fire planning efforts are already in place. Additional projects are recommended and will be discussed further in this section.

1. Fire Planning

Madison County is in the process of developing this Strategic Wildland Fire Plan, which will describe the wildland fire hazards, risks to developments in the wildland/urban interface, recommended projects and programs to reduce the risks to the citizens of Madison County. In addition, Madison County participated with Gallatin County, the Gallatin NF, Gallatin Canyon Consolidated RFD, landowners, and the Beaverhead-Deerlodge NF developed the Big Sky Fire Management Strategy (See Appendix 2).

The Madison County Local Emergency Planning Committee (LEPC) is also in the process of developing a pre-disaster mitigation plan, which will incorporate the Strategic Wildland Fire Plan as a component of the pre-disaster mitigation plan.

A report was written for the Virginia City Fire Department by *Fire Logistics, Inc.* which analyzed the capability of the fire department and made fire protection recommendations for the communities of Virginia City and Nevada City (See Appendix 3). Parts of the recommendations are being implemented.

2. Fire Prevention Specialist Program

Several years ago, Madison County developed a program where the County would hire fire prevention specialist(s) to work with developers and to ensure fire protection measures, based on the County's Subdivision Regulations, were incorporated into development projects occurring in Madison County.

3. Dry Hydrant Program

The Madison County fire agency has been installing dry hydrants throughout their fire protection jurisdictions.

4. Response Planning

National Standards

There is a concept of operations that currently believes the fire service agencies are providing the best services possible at this time with the current funding levels. To fully evaluate these operations, national standards and other local jurisdiction's operations should be used to properly establish the criteria needed to operate and provide the base standard service levels. This allows the county to look outside the local area and evaluate current trends, operational conditions at present and in the future, potential new funding sources, opportunities to attract additional staff for the fire protection agencies, retention strategies for current volunteer's and provide the best possible services for the funds available. The appendices will contain a list of recommended national standard documents for this purpose (See Appendix 4).

Expectations of Service

The people moving into the county have a preconceived expectation of service levels. Normally the expectation of service is derived from the service received by the new resident at their previous community. These service levels may include but are not limited to the following:

- Full service delivery emergency service organizations that include wildland fire response, structure fire response, motor vehicle accident rescue, vehicle fire response, emergency medical response, hazardous materials response, special rescue response, and etc.
- Response times that are quick, with arrival of the emergency response agency shortly after they hang up the phone.
- Professional well trained personnel with adequate equipment and apparatus.
- The ability to acquire fire insurance at a reasonable rate.

Fire Fighting

This strategy includes building and maintaining a cost effective level of preparedness and response to fires in the wildland/urban interface. Initial attack and suppression allocation modeling should incorporate the resources of the Madison County fire protection agencies.

Protection of All Structures

There are significant areas of Madison County that are not covered by a rural fire district for structure fires and other all risk responses. A plan to include all of these unprotected areas, needs to be developed by Madison County. The Nevada City area in particular needs to be a priority due to its historical significance (See Appendix 3).

Fire Stations

There is a direct need for additional fire stations in most areas of the county. Criteria for establishing these stations should be within 5 road miles of all developed or developing areas and future stations within 5 road miles of areas expected to develop. Using these criteria will also reduce fire insurance costs to most residences within the road mile travel distance.

Fire Apparatus and Equipment

The apparatus and equipment needed for each fire station should be a minimum of one interface engine, one smaller wildland engine and one water tender. More urban locations such as Ennis, Virginia City/Nevada City, Alder, Sheridan, Twin Bridges and Big Sky will need additional apparatus such as structure engines, larger water tenders, ladder trucks, ambulances and specialized apparatus for specific duty.

All apparatus will need to be equipped with compliant, modern equipment for the safety and working effectiveness of the personnel. Current National Fire Protection Association (NFPA) standards should be used to ensure compliance of all equipment.

Staffing

The staffing component for Madison County fire agencies will be predominantly volunteer fire fighters. As the county continues to grow, the need for career staff to coordinate training, maintenance, code management, administration, mandatory reporting procedures, subdivision review and planning will become unmanageable for volunteers. This may currently be the case and should be considered as soon as possible to manage the growth of the county and the resulting impacts to the fire organizations.

New recruiting techniques will need to be deployed to staff the additional stations and keep up with the expanding need for services delivered to the citizens. Maintaining a volunteer workforce continues to challenge the fire service. Recruitment and retention strategies need to be developed and implemented throughout the county.

Training

Training programs, which are in compliance with National Standards, typically will serve to motivate a high quality work force of fire fighters. High quality training programs help ensures the safety of the fire fighters in a hostile work environment.

Communications

Communications systems need to be implemented to allow interoperability between local fire agencies and the land management agencies, other emergency services and each other from all areas of the county.

Sun Ranch West Opportunities

Sun Ranch West owns a structure engine and has offered the engine to the Madison Valley RFD. The timing for the district to accept this engine was not good. Apparently the offer to give the engine to the fire district is still in place. The only condition is that if a fire were on the ranch, it would stay on the ranch and fight that fire. All other times, the engine would be the property of the district and could be used as all other equipment. The ranch also has a facility to house the engine and would help with training and adding as many staff as possible for the fire district.

Evacuation Planning

Evacuation planning needs to be accomplished by the Madison County Sheriff and the Madison County Disaster & Emergency Services Coordinator for areas that are at threat from a large wildland fire and well as from other disasters. A coordinated effort needs to be worked out with the Gallatin County Sheriff regarding the Big Sky area since evacuation through Madison County is not possible during the winter. (See the Big Sky Fire Management Strategy – Appendix 4).

Insurance Services Organization

ISO grades fire protection agencies and their ratings are used by many insurance companies to establish the cost of fire insurance in the area. The individual fire protection agencies should request a grading if one has not been completed in the recent past. This process will assist in establishing the deficiencies in the agencies and needs to provide better rates for the residents. Some insurance companies will not insure structures that are outside of the 5 road miles from a fire station.

Organization of Fire Protection Agencies

The current fire protection agencies should maintain a written statement or policy establishing the following:

- Existence of the fire department according to state law.
- Services that the fire department is required to provide.

- Basic organizational structure.
- Expected number of fire department members.
- Functions that the fire departments are expected to perform are:
    - Structural Fire Suppression
    - Emergency Medical Services
    - Special Operations
    - Aircraft Rescue Fire Fighting
    - Marine Rescue and Fire Fighting
    - Motor Vehicle Crash Rescue
    - Hazardous Materials Mitigation
    - Wildland Fire Suppression
    - Subdivision Review
    - Public Education
    - Emergency Response Planning

Authority and References for the Fire Protection Agencies

A clear understanding of the laws governing the fire protection authorities in Madison County needs to be accomplished by all jurisdictions before any organization and responsibilities for action are established. Compliance with state laws is the first step. Next a clear understanding needs to be developed of the authority and responsibility of a trustee regarding the planning, funding, operations and organization of the fire protection agencies. These laws can be referenced in the Montana Codes Annotated.

Recommended Projects and Programs

1. **Defensible Space Workshops** - *Madison County & the Beaverhead-Deerlodge NF*

Our ability to live more safely in a wildland/urban interface fire environment depends on pre-incident activities. Pre-incident activities are actions taken by homeowners before a wildland fire occurs which improve the survivability of people and homes; by providing for proper vegetation management around the home, (known as defensible space), use of fire resistant building materials, and appropriate subdivision design. Untreated shake and shingle roofs, narrow roads, limited access, lack of firewise landscaping, and inadequate water supplies are some of the issues that need to be addressed.

A representative program would focus on creating an effective “defensible space” and guide the participants through a process including:

- Defining the defensible space, a minimum of 30 foot non-combustible area around the home depending on the adjacent fuels;
- Reducing flammable vegetation, trees and brush around the home, choosing plants with loose branching, non-resinous woody material, and high moisture content;

- Removing or pruning trees, thinning overcrowded or weakened trees, pruning low hanging branches, and limbing up “ladder fuels;”
- Cutting grass and weeds regularly, keeping vegetation well watered;
- Relocating wood piles and leftover building materials; stacking all wood, building debris and other burnable materials at least 30 feet away from the home, and clearing flammable vegetation within ten feet of wood/debris piles;
- Keeping both roof and yard clean; especially the roof, clearing pine needles, leaves and debris from roof, gutters and yard to eliminate ignition sources;
- Signs, addresses, and access: easy-to-read non-combustible road signs and address numbers that are visible from the road allow fire fighters to find homes quickly. Safe and easy access include two-way roads that can accommodate emergency vehicles and give them space to turn around;
- Rating roofs: The roof is the most vulnerable part of the house in a wildland/urban interface fire. If not already fire resistant, roofs should be replaced with approved fire resistant materials;
- Recycling yard debris and branches; check into alternative disposal methods like composting, recycling, or selling the material to small wood/bio mass businesses;
- What to do when fire strikes; monitor your local radio and television stations for fire reports and evacuation procedures and centers. Keep an emergency checklist handy. Proper actions also include closing all windows and doors, arranging garden hoses so they can reach any area of the house, and packing the car for quick departure.

2. Subdivision Regulation Revisions - *Madison County Planner*

Madison County should revise its subdivision regulations to eliminate the permissive language and replace it with mandatory language, especially as it relates to fire protection. Madison County should consider developing in conjunction with the local rural fire districts a fire department permit system similar to the system used by Frenchtown RFD.

3. Alert/Warning System - *Disaster & Emergency Services Coordinator*

Development of a county alert/warning system is critical to continued health, safety and welfare of Madison County citizens. Currently there is no warning system in place to alert citizens of impending danger from wildfire. There are three systems available that would dramatically improve warning. They include Weather Radio System, a Radio/TV Emergency Alert System and automated dial up telephone alert system. A project is needed to select and implement a system.

4. Fire Station Location Study - *Rural Fire District Boards, in cooperation with the Madison County Planner*

The rural fire districts need to follow the lead of Madison Valley RFD and evaluate their needs for additional fire stations, especially in light of the ISO stance on the 5 mile limit.

5. Plan for Unprotected Areas - *Rural Fire District Boards, County Fire Warden, County Sheriff, Madison County Planner and the Board of County Commissioners.*

The rural fire districts need to ***immediately*** develop an out of district response policy and billing procedure.

In a longer term, Madison County, the rural fire districts, the County Fire Warden, the County Planner and the Board of County Commissioners need to address areas that are outside the recognized jurisdiction's boundaries, including the community of Mammoth and the areas around Virginia City.

6. Develop fire protection master plans – *Rural Fire District Chiefs, Boards of Trustees, and Madison County Planner*

An overall fire protection master plan should be developed for each rural fire district in Madison County. Master Plans typically include:

- Need for facilities
- Fire-rescue apparatus
- Personnel
- Training
- Fire Prevention
- Revenues
- Emergency Preparedness

Implementation strategies, time frames, and funding mechanisms for each area are typically established.

7. Develop capital replacement programs – *Rural Fire District Boards*

Each rural fire district should develop a capital replacement program (Capital Improvement Plan) to include funding sources, capital items needing replacement and time frames for replacement and future additional facility and apparatus needs.

8. Adopt Impact Fees: *Rural Fire District Boards, County Planner, and Madison County Commissioners*

General information about impact fees is included in Appendix 5. The rural fire districts and/or the county as a whole should investigate and study the need for fire protection and other impact fees.

9. Evaluate current mil levy and increase if necessary – *Fire District Chiefs and Board of Trustees*

The administration of each rural fire district should frankly evaluate their ability to provide mandated services and ensure appropriate funding is available to ensure meeting those requirements. If additional funding is needed, rural fire districts should consider asking the public for a mil levy increase to fund the service delivery levels. Consideration for the safety of the district's fire fighters and the public should be given the highest priority!

10. Establish a Madison County Fire Council – *Fire Chiefs and Fire Management Officers, County Fire Warden, County Sheriff and Disaster & Emergency Services Coordinator*

To foster improved relationships with local, state and federal partners a Madison County Rural Fire Council should be established. A county fire council, which meets on a regular basis, enables and fosters interagency partnerships, cooperation before and during incidents, establishes county-wide communications plans, deployment standards, operational SOP's, and mutual aid requirements.

Benefits of a county fire council would be:

- A consistent subdivision process and standards
- A unified voice of the fire service
- Cooperative efforts for funding of apparatus, equipment, and facilities.
- Procedures to operate at emergency incidents in a unified manner.
- Maximize the use of individual resources.

11. Request Reverse 911 Funds – *Madison County Sheriff*

The Madison County Sheriff should investigate the ability to put a reverse 911 system in place for emergency notification of the public.

12. Pressurized Water System Standard – *Madison County Planner, Madison County Fire Agencies*

Madison County should establish a fire protection water supply standard that requires pressurized water to be delivered out of storage tanks, ponds or other water sources. This eliminates the need to commit a scarce resource (fire engine) to the water supply point, it further minimizes the need for additional water tenders, and reduces the risk of additional equipment and personnel during emergency water supply operations.

13. Coordinated Planning – *Madison County Planner, Madison County Road Department, Madison County Fire Agencies*

Additional fire stations are being planned by the Madison Valley RFD in the vicinity of North Meadow Creek/South Meadow Creek and near the Fish Hatchery. Improvements, such as these, should be coordinated with the county so that bridges that are inadequate for fire apparatus are being replaced at the same time.

14. Road Signs – *Madison County Road Department, Madison County Planner and Board of County Commissioners*

A road sign standard needs to be developed and adopted and implemented throughout the County.

B. Wildland/Urban Interface Fuel Treatments

Strategies

The fuels mitigation challenge for Madison County is somewhat unique in that there are fewer examples of subdivisions being located in heavily forested areas with historical records of high fire occurrence. The subdivisions are more likely to be located in somewhat open areas with vast expanses of sagebrush or grass and shrub species around them. This still makes them vulnerable to fire loss during high wind events but their probability of survival is higher than subdivisions located in a dense, forested environment.

There are several of strategies that may be undertaken to improve the survivability of a given subdivision. The best strategy will depend on the type and quantity of fuel present in and around any given subdivision, the prevailing wind direction and the aspect and slope present.

The first strategy is isolation. This strategy would entail placement of a fuel modification zone around the outside perimeter of the development. Heavier fuels like Douglas fir and Mountain Big Sage would be removed and replaced by light vegetation or a non-combustible material. The width of the fuel modification zone would vary according to the factors listed above but would need to be a minimum of 10 feet and in most cases at least 50-60 feet to be effective. This would give fire fighters a chance to establish anchor points and locate fire lines for an approaching wildfire. It would also keep the fire out of the interior of the subdivision and the associated structures.

Another version of the above premise is to conduct a risk assessment of a subdivision and conduct the fuels modification work only on those specific areas where there is a high probability of a wildland fire actually spreading into the subdivision from outside. It would require fewer disturbances since only a portion of the perimeter would be treated and it should be 70-90% as effective as total isolation.

The second major strategy would be to treat around individual structures within the subdivision using criteria established in a number of publications. It would require more fuel modification overall, assuming at some point all lots become occupied. The burden of performance falls to the individual lot owner in this instance versus an association or developer type effort with isolation or partial isolation.

A third strategy is to implement community meeting with homeowner groups to educate them on the need for and benefits of fuel reduction programs.

Current Activities and Programs

Recommended Projects and Programs

1. Revise Covenants – *Madison County Planner and Homeowner Association*

Vacant lots, or un-built upon lots, are a perennial problem for fire protection agencies. Subdivision homeowner groups need to revise their covenants to ensure vacant lots do not become a fire hazard to the rest of the development. Grazing and other fuel reduction techniques can be used.

2. Fuel Management Plan – *Madison County Planner*

The Madison County Subdivision Regulations require a forest management plan as a component of the final plat approval. This concept could be extended to include all fuels in a project area.

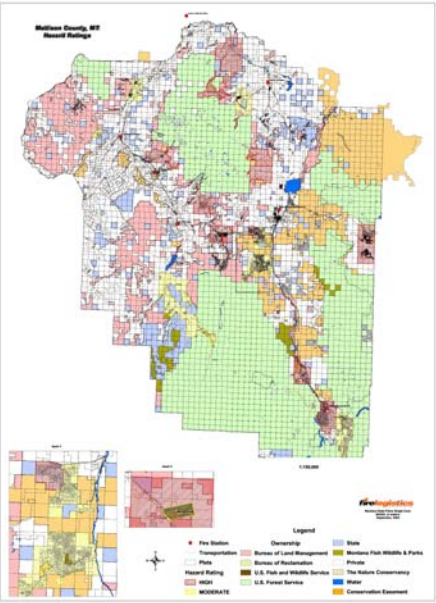
3. Hazard Reduction Programs- *Madison County & Beaverhead-Deerlodge NF*

Madison County and the Beaverhead-Deerlodge NF should collaborate on hazard reduction programs, through the National Fire Plan, sited in strategic locations for fire protection purposes.

Hazard reduction projects should be prioritized according to the following matrix.

	Polygon A	Polygon B
High Hazard	1	3
Moderate Hazard	2	4
Low Hazard	5	6

See Appendix 7 (See Hazard Ratings Map 7 in Map).



The treatments for hazard reduction may include:

- Construction of fuel breaks
- Mechanized treatments
- Prescribed burning
- Grazing
- Timber harvest
- Hand piling and burning
- Machine piling and burning
- Chipping
- Firewood gathering

4. Vegetation Management – *Madison County Fire Agency and Madison County Planner*

Encourage the county and landowners to undertake vegetative management practices, which would include the following:

- Develop a comprehensive fuels management/pre-attack plan for the county. This plan would include the following elements:

    - A fuel break system utilizing strategic fuels modification projects and incorporating the transportation system right-of-ways.
    - The objective of the fuel break system are:

        1. To provide anchor points and fireline locations.
        2. To reduce the risk of a wildland fire encroaching on a subdivision.
        3. To break up large areas of continuous fuels (sage or timber).

5. Landowner Assistance Program- *MT DNRC and the Madison County Soil and Water Conservation District*

Madison County should request funding for a Landowner Assistance Program that involves cost sharing between the State and the landowner for fuel treatments that reduce the fire hazard on state and private lands in Madison County. The goals of the program would be to:

- Assist private landowners in developing defensible space around their homes:
- Construct fuel breaks; and
- Thin adjoining stands on private lands where the federal agencies have either constructed or will construct fuel breaks.

These actions will ensure private lands are better protected from fires originating on federal lands and ensure federal lands will be better protected from fires originating on private lands.

6. Grants – *Madison County*

The county should explore the opportunity to participate in all available grant programs, which include the following:

- Department of Commerce – Economic Action Grants
- USFS and BLM – Fuels Mitigation Grants
- FEMA – Mitigation Planning Grant
- FEMA – Fire Act

Some of these programs provide financial incentives to the county and/or homeowners. These grants may be used to purchase equipment, develop and establish prevention programs, and to reduce the fuel loading around homes and

improvements. Homeowners in the Bitterroot Valley, Lake County and Lewis and Clark County have taken advantage of these types of programs, and the creation of defensible space on a significant number of homes has been accomplished.

After an area has been treated, the survivability of the improvements and larger trees are greatly enhanced. The treatment must be maintained periodically as the vegetative cover types are very dynamic and will constantly produce new biomass. Without maintenance they will revert to pre-treatment conditions within a few years. Normally, the cheapest method to maintain the treated areas is through the application of prescribed fire at a periodic interval.

A combination of treatments may be considered, see page 26.

C. Economic Development

Current Activities and Programs

The Madison County Economic Development Council's Strategic Plan contains goals: "to encourage location of new businesses in conservation with natural resources and improvement in employment opportunities and wages. "Research, Identify, Prioritize and Implement opportunities for value added agriculture opportunity for Madison County".

Recommended Projects and Programs

1. Economic Development Utilizing Harvested Fuels- *Local Emergency Planning Committee & Madison County Economic Development Council*

Once Madison County is successful in implementing fuel reduction projects, there may be a need to begin attracting entrepreneurs to develop products utilizing the wood "bio mass" produced by the hazardous fuels reduction efforts and forest restoration projects (Big Sky area).

D. Forest Restoration

Current Activities and Programs

The Beaverhead-Deerlodge National Forest has forest health and reforestation projects in progress; however, many of them are under appeal.

Recommended Projects and Programs

1. Right to Manage the Ecosystem – *Board of County Commissioners, USFS Beaverhead-Deerlodge NF, & other stakeholders*

The Board of County Commissioners in corporation with their stakeholders should develop a "Right to Manage the Ecosystem" Policy which would be inclusive to all

entities, including private, state and federal lands. This policy would provide the right of such entities to manage the ecosystem within their lands, including but not limited to best management practices (BMP).

E. Community Education and Outreach

Current Activities and Programs

Madison County residents want to live in a natural setting with native vegetation and are reluctant to modify their surroundings to reduce fire hazard. At the same time most of the community is unaware of the beneficial uses of fire. Currently there is no comprehensive community outreach program in place.

Recommended Projects and Programs

1. Community Outreach Program - *Local Emergency Planning Committee*

Funding should be sought to develop a program that would allow comprehensive mitigation of both these citizen misconceptions. The proposal would provide area residents, homeowners, business owners and other opinion-makers with information, education and training on *why* fuel treatments are necessary and *what* constitutes proper fuel treatment and *how* these treatments can be accomplished.

Activities would include development of education modules for homeowners, fire departments, elected officials, students in grades K-12, homebuilders, insurance companies, developers, and planners; public service announcements, brochures, showcase demonstration projects, website development and continued firewise and defensible space workshops.

2. FIREWISE Communities Workshops - *Local Emergency Planning Committee*

The Madison County LEPC should co-sponsor a FIREWISE Communities workshop with the Southwest Montana Fire Council. Program components include the following:

- FIREWISE Website (www.firewise.org): This site provides a wealth of information to protect your home from wildland fire, including Firewise Construction, Firewise Landscaping, and etc.
- Communication tools such as publications and videos: Firewise concepts on landscaping, building, firefighter safety and other topics are available online as well as through other outlets. The latest project is a television documentary called “Keepers of the Flame,” which puts America’s fire history and interface fire problem in context.

- Workshops, Training Sessions and Demonstration Events: These activities are focused on reducing fire risk to property and lives through better community design and retrofit and preparedness planning.
- Technical Assistance to Communities: As FIREWISE spreads across the country, more communities are looking to program organizers for help. This component includes ArcView mapping technology.
- FIREWISE Communities USA Recognition Program: Communities can earn national status for their work to improve planning for and mitigation of wildland fire hazards.

V. Bibliography

Bitter Root Valley Wildland Fire Risk Mitigation Plan (draft), February 2003
Grant County Wildland Urban Interface Fire Mitigation Plan, September, 2002

VI. Maps (11”x17”)

Map 1 – Madison County Ownership and Conservation Easements
Map 2 – Madison County Historical Fire Regime
Map 3 – Madison County Land Cover Fuels Classification
Map 4 – Madison County Fire Regime and Conditions Class
Map 5 – Madison County Fire Districts
Map 6 – Madison County Planning Polygons
Map 7 – Madison County Hazard Ratings

VII. Appendices

Appendix 1 – Community Profile Forms

Appendix 2 – Big Sky Fire Management Strategies

Appendix 3 – Analysis of fire Protection Capability and Fire Protection Recommendations

Appendix 4 – National Fire Protection Association Standards

Appendix 5 – Impact Fee Information

Appendix 6 – Hazard Assessment Field Forms

APPENDIX 1

FORM 2 – COMMUNITY PROFILE

Date: 12/09/02 **Community:** Alder RFD **Surveyor:** Suenram/Waters

Rating Element	High Capability	Moderate Capability	Low Capability	Rating
Communication	Radio, cellular, and pagers for all areas. – (9)	Radio and/or cellular pagers in some areas. – (6)	None. – (3)	6
Community Description	There is a clear line where residential, business, and public structures meet wildland fuels. Wildland fuels do not generally continue into the development area. – (3)	There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area. (10-30%) (2)	The community generally exists where homes, ranches, and other structures are scattered but adjacent to wildland vegetation. – (1)	2
Community Fire Safe Efforts and Programs already in place.	Organized and active groups (Fire Dept.) providing educational materials and programs for their community. (6)	Limited interest and participation in educational programs. Fire Dept. does some prevention and public education. – (4)	No interest or participation in educational programs. No prevention/education efforts by Fire Dept. – (2)	4
Community Planning Practices	County/Local laws and zoning ordinances require use of fire safe residential design and adequate ingress/egress of fire suppression resources. Fire Dept. actively participates in planning process. – (6)	Local officials have an understanding of appropriate community planning practices for wildfire loss mitigation. Fire Dept. has limited input to fire safe development and planning efforts. – (4)	Community standards for fire safe development and protection are marginal or non-existent. Little or no effort has been made in assessing and applying measures to reduce wildfire impact. – (2)	2
Community Support & Attitudes	Actively supports urban interface plans and actions. – (3)	Some participation in urban interface plans and actions. – (2)	Opposes urban interface plans and efforts. (1)	2
Fire Department Equipment Status	Good supply of structure and wildland fire apparatus and misc. specialty equipment. Adequate PPE (wildland & structure). – (9)	Smaller supply of fire apparatus in fairly good repair with some specialty equipment. Limited PPE (wildland). – (6)	Minimum amount of fire apparatus that is old and in need of repair. None or little specialty equip. No PPE. – (3)	6
Fire Department Training and Experience	Personnel meet NFPA or NWCG training requirements are experienced in wildland fire. – (9)	Limited experience and training to fight wildland fire. Some personnel meet NFPA or NWCG standards. – (6)	Limited training, experience and budget with regular turnover of personnel. Do not meet NFPA or NWCG standards. – (3)	6
Local Emergency Operations Group	Active Emergency Operations Group. Evacuation plans in place. – (6)	Limited participation in EOG. Have some form of evacuation procedures. – (4)	No emergency operations group. No evacuation plans in place. – (2)	2
Firefighting Capability	Adequate Structural Fire Dept. Sufficient personnel, equipment and wildland firefighting capability and experience. (9	Fire Dept. with limited personnel and or equipment but with some wildland fire fighting experience and training. – (6)	Fire Dept. non-existent or untrained and/or equipped to fight wildland fire. – (3)	6
Fire Mitigation Ordinances, Laws, or Regulations in place.	Have adopted local ordinances or codes requiring fire safe landscaping, building and planning.– (6)	Have voluntary ordinances or codes requiring fire safe landscaping and building practices. – (4)	No local codes, laws or ordinances requiring fire safe building, landscaping or planning processes.-(2)	2
Water Supply	Adequate supply of fire hydrants and pressure. Open water sources (pools, lakes, reservoirs, rivers, etc.) (NFPA 1231) – (9)	Limited supply of fire hydrants with limited pressure. Limited surface water supply. – (6)	No water systems available near interface. No surface water available. – (3)	6
Scoring	> 65	35 - 65	< 35	**Total** 44

FORM 2 – COMMUNITY PROFILE

Date: 12/09/02 **Community:** Sheriden RFD **Surveyor:** Suenram/Waters

Rating Element	High Capability	Moderate Capability	Low Capability	Rating
Communication	Radio, cellular, and pagers for all areas. – (9)	Radio and/or cellular pagers in some areas. – (6)	None. – (3)	6
Community Description	There is a clear line where residential, business, and public structures meet wildland fuels. Wildland fuels do not generally continue into the development area. – (3)	There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area. (10-30%) (2)	The community generally exists where homes, ranches, and other structures are scattered but adjacent to wildland vegetation. – (1)	2
Community Fire Safe Efforts and Programs already in place.	Organized and active groups (Fire Dept.) providing educational materials and programs for their community. (6)	Limited interest and participation in educational programs. Fire Dept. does some prevention and public education. – (4)	No interest or participation in educational programs. No prevention/education efforts by Fire Dept. – (2)	4
Community Planning Practices	County/Local laws and zoning ordinances require use of fire safe residential design and adequate ingress/egress of fire suppression resources. Fire Dept. actively participates in planning process. – (6)	Local officials have an understanding of appropriate community planning practices for wildfire loss mitigation. Fire Dept. has limited input to fire safe development and planning efforts. – (4)	Community standards for fire safe development and protection are marginal or non-existent. Little or no effort has been made in assessing and applying measures to reduce wildfire impact. – (2)	4
Community Support & Attitudes	Actively supports urban interface plans and actions. – (3)	Some participation in urban interface plans and actions. – (2)	Opposes urban interface plans and efforts. (1)	2
Fire Departme**nt** Equipment Status	Good supply of structure and wildland fire apparatus and misc. specialty equipment. Adequate PPE (wildland & structure). – (9)	Smaller supply of fire apparatus in fairly good repair with some specialty equipment. Limited PPE (wildland). – (6)	Minimum amount of fire apparatus that is old and in need of repair. None or little specialty equip. No PPE. – (3)	6
Fire Departme**nt** Training and Experience	Personnel meet NFPA or NWCG training requirements are experienced in wildland fire. – (9)	Limited experience and training to fight wildland fire. Some personnel meet NFPA or NWCG standards. – (6)	Limited training, experience and budget with regular turnover of personnel. Do not meet NFPA or NWCG standards. – (3)	6
Local Emergency Operations Group	Active Emergency Operations Group. Evacuation plans in place. – (6)	Limited participation in EOG. Have some form of evacuation procedures. – (4)	No emergency operations group. No evacuation plans in place. – (2)	2
Firefighting Capability	Adequate Structural Fire Dept. Sufficient personnel, equipment and wildland firefighting capability and experience. (9	Fire Dept. with limited personnel and or equipment but with some wildland fire fighting experience and training. – (6)	Fire Dept. non-existent or untrained and/or equipped to fight wildland fire. – (3)	6
Fire Mitigation Ordinances, Laws, or Regulations in place.	Have adopted local ordinances or codes requiring fire safe landscaping, building and planning.– (6)	Have voluntary ordinances or codes requiring fire safe landscaping and building practices. – (4)	No local codes, laws or ordinances requiring fire safe building, landscaping or planning processes.-(2)	2
Water Supply	Adequate supply of fire hydrants and pressure. Open water sources (pools, lakes, reservoirs, rivers, etc.) (NFPA 1231) – (9)	Limited supply of fire hydrants with limited pressure. Limited surface water supply. – (6)	No water systems available near interface. No surface water available. – (3)	6
Scoring	> 65	35 - 65	< 35	**Total** 46

FORM 2 – COMMUNITY PROFILE

Date: 12/09/02 **Community:** Virginia City RFD **Surveyor:** Suenram/Waters

Rating Element	High Capability	Moderate Capability	Low Capability	Rating
Communication	Radio, cellular, and pagers for all areas. – (9)	Radio and/or cellular pagers in some areas. – (6)	None. – (3)	6
Community Description	There is a clear line where residential, business, and public structures meet wildland fuels. Wildland fuels do not generally continue into the development area. – (3)	There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area. (10-30%) (2)	The community generally exists where homes, ranches, and other structures are scattered but adjacent to wildland vegetation. – (1)	2
Community Fire Safe Efforts and Programs already in place.	Organized and active groups (Fire Dept.) providing educational materials and programs for their community. (6)	Limited interest and participation in educational programs. Fire Dept. does some prevention and public education. – (4)	No interest or participation in educational programs. No prevention/education efforts by Fire Dept. – (2)	2
Community Planning Practices	County/Local laws and zoning ordinances require use of fire safe residential design and adequate ingress/egress of fire suppression resources. Fire Dept. actively participates in planning process. – (6)	Local officials have an understanding of appropriate community planning practices for wildfire loss mitigation. Fire Dept. has limited input to fire safe development and planning efforts. – (4)	Community standards for fire safe development and protection are marginal or non-existent. Little or no effort has been made in assessing and applying measures to reduce wildfire impact. – (2)	4
Community Support & Attitudes	Actively supports urban interface plans and actions. – (3)	Some participation in urban interface plans and actions. – (2)	Opposes urban interface plans and efforts. (1)	2
Fire Department Equipment Status	Good supply of structure and wildland fire apparatus and misc. specialty equipment. Adequate PPE (wildland & structure). – (9)	Smaller supply of fire apparatus in fairly good repair with some specialty equipment. Limited PPE (wildland). – (6)	Minimum amount of fire apparatus that is old and in need of repair. None or little specialty equip. No PPE. – (3)	3
Fire Department Training and Experience	Personnel meet NFPA or NWCG training requirements are experienced in wildland fire. – (9)	Limited experience and training to fight wildland fire. Some personnel meet NFPA or NWCG standards. – (6)	Limited training, experience and budget with regular turnover of personnel. Do not meet NFPA or NWCG standards. – (3)	3
Local Emergency Operations Group	Active Emergency Operations Group. Evacuation plans in place. – (6)	Limited participation in EOG. Have some form of evacuation procedures. – (4)	No emergency operations group. No evacuation plans in place. – (2)	2
Firefighting Capability	Adequate Structural Fire Dept. Sufficient personnel, equipment and wildland firefighting capability and experience. (9	Fire Dept. with limited personnel and or equipment but with some wildland fire fighting experience and training. – (6)	Fire Dept. non-existent or untrained and/or equipped to fight wildland fire. – (3)	6
Fire Mitigation Ordinances, Laws, or Regulations in place.	Have adopted local ordinances or codes requiring fire safe landscaping, building and planning.– (6)	Have voluntary ordinances or codes requiring fire safe landscaping and building practices. – (4)	No local codes, laws or ordinances requiring fire safe building, landscaping or planning processes.-(2)	2
Water Supply	Adequate supply of fire hydrants and pressure. Open water sources (pools, lakes, reservoirs, rivers, etc.) (NFPA 1231) – (9)	Limited supply of fire hydrants with limited pressure. Limited surface water supply. – (6)	No water systems available near interface. No surface water available. – (3)	6
Scoring	> 65	35 - 65	< 35	**Total** 38

FORM 2 – COMMUNITY PROFILE

Date: 12/09/02 **Community:** Madison Valley RFD **Surveyor:** Suenram/Waters

Rating Element	High Capability	Moderate Capability	Low Capability	Rating
Communication	Radio, cellular, and pagers for all areas. – (9)	Radio and/or cellular pagers in some areas. – (6)	None. – (3)	6
Community Description	There is a clear line where residential, business, and public structures meet wildland fuels. Wildland fuels do not generally continue into the development area. – (3)	There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area. (10-30%) (2)	The community generally exists where homes, ranches, and other structures are scattered but adjacent to wildland vegetation. – (1)	2
Community Fire Safe Efforts and Programs already in place.	Organized and active groups (Fire Dept.) providing educational materials and programs for their community. (6)	Limited interest and participation in educational programs. Fire Dept. does some prevention and public education. – (4)	No interest or participation in educational programs. No prevention/education efforts by Fire Dept. – (2)	4
Community Planning Practices	County/Local laws and zoning ordinances require use of fire safe residential design and adequate ingress/egress of fire suppression resources. Fire Dept. actively participates in planning process. – (6)	Local officials have an understanding of appropriate community planning practices for wildfire loss mitigation. Fire Dept. has limited input to fire safe development and planning efforts. – (4)	Community standards for fire safe development and protection are marginal or non-existent. Little or no effort has been made in assessing and applying measures to reduce wildfire impact. – (2)	4
Community Support & Attitudes	Actively supports urban interface plans and actions. – (3)	Some participation in urban interface plans and actions. – (2)	Opposes urban interface plans and efforts. (1)	2
Fire Departme**nt** Equipment Status	Good supply of structure and wildland fire apparatus and misc. specialty equipment. Adequate PPE (wildland & structure). – (9)	Smaller supply of fire apparatus in fairly good repair with some specialty equipment. Limited PPE (wildland). – (6)	Minimum amount of fire apparatus that is old and in need of repair. None or little specialty equip. No PPE. – (3)	9
Fire Departme**nt** Training and Experience	Personnel meet NFPA or NWCG training requirements are experienced in wildland fire. – (9)	Limited experience and training to fight wildland fire. Some personnel meet NFPA or NWCG standards. – (6)	Limited training, experience and budget with regular turnover of personnel. Do not meet NFPA or NWCG standards. – (3)	6
Local Emergency Operations Group	Active Emergency Operations Group. Evacuation plans in place. – (6)	Limited participation in EOG. Have some form of evacuation procedures. – (4)	No emergency operations group. No evacuation plans in place. – (2)	4
Firefighting Capability	Adequate Structural Fire Dept. Sufficient personnel, equipment and wildland firefighting capability and experience. (9	Fire Dept. with limited personnel and or equipment but with some wildland fire fighting experience and training. – (6)	Fire Dept. non-existent or untrained and/or equipped to fight wildland fire. – (3)	9
Fire Mitigation Ordinances, Laws, or Regulations in place.	Have adopted local ordinances or codes requiring fire safe landscaping, building and planning.– (6)	Have voluntary ordinances or codes requiring fire safe landscaping and building practices. – (4)	No local codes, laws or ordinances requiring fire safe building, landscaping or planning processes.-(2)	2
Water Supply	Adequate supply of fire hydrants and pressure. Open water sources (pools, lakes, reservoirs, rivers, etc.) (NFPA 1231) – (9)	Limited supply of fire hydrants with limited pressure. Limited surface water supply. – (6)	No water systems available near interface. No surface water available. – (3)	6
Scoring	> 65	35 - 65	< 35	**Total** 54

FORM 2 – COMMUNITY PROFILE

Date: 12/09/02 **Community:** Harrison RFD **Surveyor:** Suenram/Waters

Rating Element	High Capability	Moderate Capability	Low Capability	Rating
Communication	Radio, cellular, and pagers for all areas. – (9)	Radio and/or cellular pagers in some areas. – (6)	None. – (3)	6
Community Description	There is a clear line where residential, business, and public structures meet wildland fuels. Wildland fuels do not generally continue into the development area. – (3)	There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area. (10-30%) (2)	The community generally exists where homes, ranches, and other structures are scattered but adjacent to wildland vegetation. – (1)	2
Community Fire Safe Efforts and Programs already in place.	Organized and active groups (Fire Dept.) providing educational materials and programs for their community. (6)	Limited interest and participation in educational programs. Fire Dept. does some prevention and public education. – (4)	No interest or participation in educational programs. No prevention/education efforts by Fire Dept. – (2)	2
Community Planning Practices	County/Local laws and zoning ordinances require use of fire safe residential design and adequate ingress/egress of fire suppression resources. Fire Dept. actively participates in planning process. – (6)	Local officials have an understanding of appropriate community planning practices for wildfire loss mitigation. Fire Dept. has limited input to fire safe development and planning efforts. – (4)	Community standards for fire safe development and protection are marginal or non-existent. Little or no effort has been made in assessing and applying measures to reduce wildfire impact. – (2)	2
Community Support & Attitudes	Actively supports urban interface plans and actions. – (3)	Some participation in urban interface plans and actions. – (2)	Opposes urban interface plans and efforts. (1)	1
Fire Departmen**t** Equipment Status	Good supply of structure and wildland fire apparatus and misc. specialty equipment. Adequate PPE (wildland & structure). – (9)	Smaller supply of fire apparatus in fairly good repair with some specialty equipment. Limited PPE (wildland). – (6)	Minimum amount of fire apparatus that is old and in need of repair. None or little specialty equip. No PPE. – (3)	3
Fire Departmen**t** Training and Experience	Personnel meet NFPA or NWCG training requirements are experienced in wildland fire. – (9)	Limited experience and training to fight wildland fire. Some personnel meet NFPA or NWCG standards. – (6)	Limited training, experience and budget with regular turnover of personnel. Do not meet NFPA or NWCG standards. – (3)	3
Local Emergency Operations Group	Active Emergency Operations Group. Evacuation plans in place. – (6)	Limited participation in EOG. Have some form of evacuation procedures. – (4)	No emergency operations group. No evacuation plans in place. – (2)	2
Firefighting Capability	Adequate Structural Fire Dept. Sufficient personnel, equipment and wildland firefighting capability and experience. (9	Fire Dept. with limited personnel and or equipment but with some wildland fire fighting experience and training. – (6)	Fire Dept. non-existent or untrained and/or equipped to fight wildland fire. – (3)	6
Fire Mitigation Ordinances, Laws, or Regulations in place.	Have adopted local ordinances or codes requiring fire safe landscaping, building and planning.– (6)	Have voluntary ordinances or codes requiring fire safe landscaping and building practices. – (4)	No local codes, laws or ordinances requiring fire safe building, landscaping or planning processes.-(2)	2
Water Supply	Adequate supply of fire hydrants and pressure. Open water sources (pools, lakes, reservoirs, rivers, etc.) (NFPA 1231) – (9)	Limited supply of fire hydrants with limited pressure. Limited surface water supply. – (6)	No water systems available near interface. No surface water available. – (3)	3
Scoring	> 65	35 - 65	< 35	**Total** 32

FORM 2 – COMMUNITY PROFILE

Date: 12/09/02 **Community:** Gallatin Canyon Consolidated RFD **Surveyor:** Suenram/Waters

Rating Element	High Capability	Moderate Capability	Low Capability	Rating
Communication	Radio, cellular, and pagers for all areas. – (9)	Radio and/or cellular pagers in some areas. – (6)	None. – (3)	9
Community Description	There is a clear line where residential, business, and public structures meet wildland fuels. Wildland fuels do not generally continue into the development area. – (3)	There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area. (10-30%) (2)	The community generally exists where homes, ranches, and other structures are scattered but adjacent to wildland vegetation. – (1)	2
Community Fire Safe Efforts and Programs already in place.	Organized and active groups (Fire Dept.) providing educational materials and programs for their community. (6)	Limited interest and participation in educational programs. Fire Dept. does some prevention and public education. – (4)	No interest or participation in educational programs. No prevention/education efforts by Fire Dept. – (2)	6
Community Planning Practices	County/Local laws and zoning ordinances require use of fire safe residential design and adequate ingress/egress of fire suppression resources. Fire Dept. actively participates in planning process. – (6)	Local officials have an understanding of appropriate community planning practices for wildfire loss mitigation. Fire Dept. has limited input to fire safe development and planning efforts. – (4)	Community standards for fire safe development and protection are marginal or non-existent. Little or no effort has been made in assessing and applying measures to reduce wildfire impact. – (2)	6
Community Support & Attitudes	Actively supports urban interface plans and actions. – (3)	Some participation in urban interface plans and actions. – (2)	Opposes urban interface plans and efforts. (1)	3
Fire Departme**nt** Equipment Status	Good supply of structure and wildland fire apparatus and misc. specialty equipment. Adequate PPE (wildland & structure). – (9)	Smaller supply of fire apparatus in fairly good repair with some specialty equipment. Limited PPE (wildland). – (6)	Minimum amount of fire apparatus that is old and in need of repair. None or little specialty equip. No PPE. – (3)	9
Fire Departme**nt** Training and Experience	Personnel meet NFPA or NWCG training requirements are experienced in wildland fire. – (9)	Limited experience and training to fight wildland fire. Some personnel meet NFPA or NWCG standards. – (6)	Limited training, experience and budget with regular turnover of personnel. Do not meet NFPA or NWCG standards. – (3)	6
Local Emergency Operations Group	Active Emergency Operations Group. Evacuation plans in place. – (6)	Limited participation in EOG. Have some form of evacuation procedures. – (4)	No emergency operations group. No evacuation plans in place. – (2)	6
Firefighting Capability	Adequate Structural Fire Dept. Sufficient personnel, equipment and wildland firefighting capability and experience. (9	Fire Dept. with limited personnel and or equipment but with some wildland fire fighting experience and training. – (6)	Fire Dept. non-existent or untrained and/or equipped to fight wildland fire. – (3)	9
Fire Mitigation Ordinances, Laws, or Regulations in place.	Have adopted local ordinances or codes requiring fire safe landscaping, building and planning.– (6)	Have voluntary ordinances or codes requiring fire safe landscaping and building practices. – (4)	No local codes, laws or ordinances requiring fire safe building, landscaping or planning processes.-(2)	4
Water Supply	Adequate supply of fire hydrants and pressure. Open water sources (pools, lakes, reservoirs, rivers, etc.) (NFPA 1231) – (9)	Limited supply of fire hydrants with limited pressure. Limited surface water supply. – (6)	No water systems available near interface. No surface water available. – (3)	9
Scoring	> 65	35 - 65	< 35	**Total** 69

FORM 2 – COMMUNITY PROFILE

Date: 12/09/02 **Community:** Jefferson Valley RFD **Surveyor:** Suenram/Waters

Rating Element	High Capability	Moderate Capability	Low Capability	Rating
Communication	Radio, cellular, and pagers for all areas. – (9)	Radio and/or cellular pagers in some areas. – (6)	None. – (3)	6
Community Description	There is a clear line where residential, business, and public structures meet wildland fuels. Wildland fuels do not generally continue into the development area. – (3)	There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area. (10-30%) (2)	The community generally exists where homes, ranches, and other structures are scattered but adjacent to wildland vegetation. – (1)	2
Community Fire Safe Efforts and Programs already in place.	Organized and active groups (Fire Dept.) providing educational materials and programs for their community. (6)	Limited interest and participation in educational programs. Fire Dept. does some prevention and public education. – (4)	No interest or participation in educational programs. No prevention/education efforts by Fire Dept. – (2)	2
Community Planning Practices	County/Local laws and zoning ordinances require use of fire safe residential design and adequate ingress/egress of fire suppression resources. Fire Dept. actively participates in planning process. – (6)	Local officials have an understanding of appropriate community planning practices for wildfire loss mitigation. Fire Dept. has limited input to fire safe development and planning efforts. – (4)	Community standards for fire safe development and protection are marginal or non-existent. Little or no effort has been made in assessing and applying measures to reduce wildfire impact. – (2)	2
Community Support & Attitudes	Actively supports urban interface plans and actions. – (3)	Some participation in urban interface plans and actions. – (2)	Opposes urban interface plans and efforts. (1)	2
Fire Departme**nt** Equipment Status	Good supply of structure and wildland fire apparatus and misc. specialty equipment. Adequate PPE (wildland & structure). – (9)	Smaller supply of fire apparatus in fairly good repair with some specialty equipment. Limited PPE (wildland). – (6)	Minimum amount of fire apparatus that is old and in need of repair. None or little specialty equip. No PPE. – (3)	6
Fire Departme**nt** Training and Experience	Personnel meet NFPA or NWCG training requirements are experienced in wildland fire. – (9)	Limited experience and training to fight wildland fire. Some personnel meet NFPA or NWCG standards. – (6)	Limited training, experience and budget with regular turnover of personnel. Do not meet NFPA or NWCG standards. – (3)	6
Local Emergency Operations Group	Active Emergency Operations Group. Evacuation plans in place. – (6)	Limited participation in EOG. Have some form of evacuation procedures. – (4)	No emergency operations group. No evacuation plans in place. – (2)	2
Firefighting Capability	Adequate Structural Fire Dept. Sufficient personnel, equipment and wildland firefighting capability and experience. (9	Fire Dept. with limited personnel and or equipment but with some wildland fire fighting experience and training. – (6)	Fire Dept. non-existent or untrained and/or equipped to fight wildland fire. – (3)	6
Fire Mitigation Ordinances, Laws, or Regulations in place.	Have adopted local ordinances or codes requiring fire safe landscaping, building and planning.– (6)	Have voluntary ordinances or codes requiring fire safe landscaping and building practices. – (4)	No local codes, laws or ordinances requiring fire safe building, landscaping or planning processes.-(2)	2
Water Supply	Adequate supply of fire hydrants and pressure. Open water sources (pools, lakes, reservoirs, rivers, etc.) (NFPA 1231) – (9)	Limited supply of fire hydrants with limited pressure. Limited surface water supply. – (6)	No water systems available near interface. No surface water available. – (3)	6
Scoring	> 65	35 - 65	< 35	**Total** 42

FORM 2 – COMMUNITY PROFILE

Date: 12/09/02 **Community:** Twin Bridges RFD **Surveyor:** Suenram/Waters

Rating Element	High Capability	Moderate Capability	Low Capability	Rating
Communication	Radio, cellular, and pagers for all areas. – (9)	Radio and/or cellular pagers in some areas. – (6)	None. – (3)	6
Community Description	There is a clear line where residential, business, and public structures meet wildland fuels. Wildland fuels do not generally continue into the development area. – (3)	There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area. (10-30%) (2)	The community generally exists where homes, ranches, and other structures are scattered but adjacent to wildland vegetation. – (1)	2
Community Fire Safe Efforts and Programs already in place.	Organized and active groups (Fire Dept.) providing educational materials and programs for their community. (6)	Limited interest and participation in educational programs. Fire Dept. does some prevention and public education. – (4)	No interest or participation in educational programs. No prevention/education efforts by Fire Dept. – (2)	4
Community Planning Practices	County/Local laws and zoning ordinances require use of fire safe residential design and adequate ingress/egress of fire suppression resources. Fire Dept. actively participates in planning process. – (6)	Local officials have an understanding of appropriate community planning practices for wildfire loss mitigation. Fire Dept. has limited input to fire safe development and planning efforts. – (4)	Community standards for fire safe development and protection are marginal or non-existent. Little or no effort has been made in assessing and applying measures to reduce wildfire impact. – (2)	4
Community Support & Attitudes	Actively supports urban interface plans and actions. – (3)	Some participation in urban interface plans and actions. – (2)	Opposes urban interface plans and efforts. (1)	2
Fire Departme**nt** Equipment Status	Good supply of structure and wildland fire apparatus and misc. specialty equipment. Adequate PPE (wildland & structure). – (9)	Smaller supply of fire apparatus in fairly good repair with some specialty equipment. Limited PPE (wildland). – (6)	Minimum amount of fire apparatus that is old and in need of repair. None or little specialty equip. No PPE. – (3)	6
Fire Departme**nt** Training and Experience	Personnel meet NFPA or NWCG training requirements are experienced in wildland fire. – (9)	Limited experience and training to fight wildland fire. Some personnel meet NFPA or NWCG standards. – (6)	Limited training, experience and budget with regular turnover of personnel. Do not meet NFPA or NWCG standards. – (3)	6
Local Emergency Operations Group	Active Emergency Operations Group. Evacuation plans in place. – (6)	Limited participation in EOG. Have some form of evacuation procedures. – (4)	No emergency operations group. No evacuation plans in place. – (2)	2
Firefighting Capability	Adequate Structural Fire Dept. Sufficient personnel, equipment and wildland firefighting capability and experience. (9	Fire Dept. with limited personnel and or equipment but with some wildland fire fighting experience and training. – (6)	Fire Dept. non-existent or untrained and/or equipped to fight wildland fire. – (3)	6
Fire Mitigation Ordinances, Laws, or Regulations in place.	Have adopted local ordinances or codes requiring fire safe landscaping, building and planning.– (6)	Have voluntary ordinances or codes requiring fire safe landscaping and building practices. – (4)	No local codes, laws or ordinances requiring fire safe building, landscaping or planning processes.-(2)	2
Water Supply	Adequate supply of fire hydrants and pressure. Open water sources (pools, lakes, reservoirs, rivers, etc.) (NFPA 1231) – (9)	Limited supply of fire hydrants with limited pressure. Limited surface water supply. – (6)	No water systems available near interface. No surface water available. – (3)	6
Scoring	> 65	35 - 65	< 35	**Total** 46

APPENDIX 2

Big Sky Fire Management Strategies

Executive Summary

According to the Federal Wildland Fire Management Policy and Program Review adopted by the Federal land management agencies in December 1995, "nearly every state has experienced **wildland/urban interface*** fire losses." The Federal Fire Policy further states that the wildfire hazard "has become a major fire problem that will escalate as the nation moves into the 21st century....It is clear from recent episodes that losses will increase in the future."

The findings in the Federal Fire Policy are true in Montana due to the unprecedented amounts of fuel that have accumulated due to past fire suppression policies. In addition, the population has shifted to the rural areas of Montana. More and more people are living in or near areas that are prone to **wildland fires**. In the recent past, the number of people living in the heavily vegetated areas of the Big Sky area has increased. These new wildland/urban residents rarely give thought to the wildfire hazard. The result is that more homes, developments and people's lives are at risk from wildland/urban interface fires. Because of these concerns and due to the fact that significant areas of the Big Sky Fire Planning Area do not have structural fire protection services, a group of interested landowners and agencies formed the Big Sky Fire Planning Committee in the spring of 1998. In the fall of 1998, they commissioned this report which analyzes the fire protection issues in the Big Sky Fire Planning Area.

Chapter I provides an overview of the Big Sky Fire Planning Area, outlines the purpose of the document, identifies the Big Sky Fire Planning Committee, and describes the planning area outlined on the map on the following page. In describing the current situation in Big Sky, the Federal Wildland Fire Management Policy and Program Review is reviewed along with its impacts on the long-term fire protection in the Big Sky Fire Planning Area. A desired future condition for fire protection is described.

Agency and landowner roles and responsibilities are described in some detail in Chapter II. The partners and their roles, responsibilities, capabilities, and statutory duties are delineated. Other partner agency functions, such as the planning and zoning organizations are discussed in relation to their role in the overall fire protection system for the Big Sky Fire Planning Area. A key part of this chapter is the discussion of the roles and responsibilities of the private homeowner and developer.

The vegetation, fire history and fire behavior of the Big Sky Planning Area's fuels and their relationships are addressed. Next several example fires are modeled

using normal and extreme fire weather for the Big Sky area; the resulting predictions for the fires are mapped at the end of Chapter III.

Chapter IV deals with the wildland/urban interface and is intended to be used primarily by homeowners, developers, and fire officials. The current situation of the wildland/urban interface is described and the values at risk in the Big Sky Fire Planning Area are enumerated. Strategies are addressed in this chapter that should be employed by the homeowner to make their home safer from an encroaching wildland fire.

In Chapter V, several pre-planning issues are explored to better prepare the fire agencies to respond to a wildland/urban interface fire in the Big Sky Fire Planning Area. Chapter VI outlines several approaches to educating the public about the fire protection issues in the Big Sky area. A series of recommended implementation, monitoring and evaluation components are suggested in Chapter VII. The appendices contain additional useful information to which the reader should refer for further information.

To view the complete report on the web, go to:

http://www.fs.fed.us/r1/gallatin/index.php?page=fire.bigsky_management_strategy

APPENDIX 3

Analysis of Fire Protection Capability

and

Fire Protection Recommendations

for the

Montana Heritage Commission's Properties

in

Virginia City & Nevada City

1997

Prepared for

Virginia City FD

by

Fire Logistics, Inc.
PO Box 2164
Montana City, MT 59634
Bruce Suenram, President
406-449-9761

Virginia City Fire Department

The Virginia City Fire Department (VC Fire) is an all volunteer municipal fire department, organized under Section 7-33-4101 MCA. The fire department has a staff of approximately 20 volunteer fire fighters, including a volunteer fire chief. The fiscal support to the fire department by the Town of Virginia City is approximately $9,000.00 per year.

The Fire Department•s structural fire protection responsibility is confined to the city limits of the Town of Virginia City. The Fire Department does have some wildland fire fighting responsibility outside of the city limits as a part of Madison County•s Cooperative Fire Protection Agreement with Montana Dept. of Natural Resources and Conservation (DNR).

Over the past three years, the fire department has responded to an average of 1 structure fire a year. As a result, the fire department does not have significant experience in structural fire fighting. In addition, the maximum available staffing during daytime responses is 6-7 fire fighters. Their ability to mount a maximum attack is further hindered by the availability of seven (7) self-contained breathing apparatus. An effective fire attack requires the response of 10 to 15 fire fighters.

The Virginia City Fire Department•s fire apparatus consists of:

Engine 2 -	A 230 gallons per minute (gpm), mini-pumper carrying 250 gallons of water.
Engine 3 -	A 750 gpm engine, carrying 500 gallons of water. **Engine 3 is a Federal Excess property apparatus that is not owned by the fire department. MT DNRC has the ability to remove that engine at any time or dispatch it to a fire anywhere in the state.**
Water tender -	a 250-500 gpm water tender, carrying 3400 gallons of water.

The Virginia City Fire Department is rated as an Insurance Services Office Class 8, which means that the fire department can develop and sustain a fire flow of 250 gallons per minute.

Response Time

Response time, as defined in the International Association of Fire Chiefs - National Fire Service Accreditation Program, is composed of three primary elements:

Alarm Processing or Dispatch Time - is the period of time that is required for the communications center to identify the fact that an emergency is in progress, collect the information pertinent to making the appropriate dispatch and access the methodology used by the agency to deploy its resources. The benchmark for this element of response time is 50 seconds.
Turnout Time - is defined as the period of time that it takes for response personnel to discontinue the activities that they are engaged in, properly attire themselves and board the vehicle in readiness for response. For **staffed** fire stations, the benchmark is 60 seconds. **Because VC Fire is all volunteer, we will assume a turnout time of 5 minutes for their personnel.**

Travel Time - is defined as the period of time between the wheels beginning their uninterrupted response and the actual time that the emergency response vehicle arrives at the address or location to which it has been dispatched.

Two standard methodologies exist for quantifying response time:

1. The Insurance Services Office - Commercial Risk Services uses the formula T= 0.65 + 1.7D, where T equals time and D equals distance.

2. The IAFC Accreditation guide uses a standard of 35 mph or 53.1 feet per second.

VC Fire Station

Response time for fire department apparatus, to Nevada City is:

1. ISO = 9.54 minutes

2. IAFC = 8.81 minutes

Mutual Aid

Mutual aid resources from other Madison County fire organizations will have response times much longer than VC Fire.

For example, Madison Valley RFD (Ennis) is located 14 miles away there response time to Virginia City is:

1. ISO = 30.28 minutes

2. IAFC = 29.03 minutes

Alder RFD is located 10 miles away:

1. ISO = 23.48 minutes

2. IAFC = 22.40 minutes

Sheridan RFD is located 20 miles away:

1. ISO = 40.48 minutes

2. IAFC = 38.97 minutes

Resources Required - Available

The *Fire Operations in the Urban Interface* course establishes the rules of thumb, which are widely used by the fire service, for resources needed in an urban/wildland interface fire. They are:

1. For separated homes mostly surrounded by wildland fuels: one (1) fire engine per home.
2. For continuous structures, less than 50 feet apart: one (1) fire engine per two (2) homes.
3. For every five (5) engines assigned to specific homes: provide an additional engine to float.
4. For clusters of homes, less than 50 feet apart, count the number of homes on the perimeter, divide by four (4), this number equals the number of single fire engines required, plus one (1) strike team of five (5) fire engines.
5. For combustible roofs: add one (1) additional strike team of engines.
6. For each engine strike team: add three (3) water tenders.

If a wildland fire were encroaching on the Heritage Commission•s properties in Nevada City, the Virginia City Fire Department and DNR would require substantial mutual aid from South Western Montana fire agencies to provide any level of reasonable fire protection to the properties.

RISK ASSESSMENT OF MT HERITAGE COMMISSION PROPERTIES

General

Historic structures are susceptible to many perils, but fire is the most serious because it can destroy quickly and completely. Even small fires can quickly inflict massive damage to decorative features and building contents. A greater concern is the threat to the lives of the guests and visitors inside a burning building in Nevada City or Virginia City. Historic buildings, such as those in Nevada City and Virginia City owned by the MT Heritage Commission, tend to be combustible and seldom have adequate means of egress as measured by current standards. Open stairways, absence of smoke and fire barriers, and flammable finishes will allow fire to develop and spread rapidly.

The MT Heritage Commission and it•s staff have a significant responsibility to preserve and protect the property purchased by the citizens of Montana and entrusted to their care. This responsibility includes preventing fires, reducing losses and responding appropriately to fire emergencies, and ensuring the life safety of the visitors and guests to the properties.

Historic Building Fire Experience

Common causes for fires in historic structures include faulty electrical wiring, arson, careless smoking, malfunctioning heating equipment, improper use of heating appliances, open flames and sparks, exposures from nearby burning buildings, storage or vegetation. Fires can occur at any time, however, experience shows that fire hazards increase when a structure is undergoing renovation.

Fire growth and spread occurs because of inadequate barriers, delayed detection and reporting, absence of automatic suppression systems, and delayed or difficult manual suppression. The first few minutes following ignitions are critical. A small fire can grow large in only a few minutes. This is particularly true in historic structures, which are often of combustible construction or contain combustible contents. In the absence of automatic fire suppression or detection, discovery is left to an occupant, passerby, security personnel, or chance. At the point of discovery, the fire could be well established and the loss will be substantial.

Fire Safety Problems

Building construction deficiencies include inadequate fire resistance of interior and exterior walls, inadequate interior compartmentation, no fire stopping, combustible construction that is not protected, and combustible materials and flammable finishes.

Building system deficiencies include inadequately sized mechanical and electrical systems, insufficient dampers, inadequate chimney design, inappropriate mechanical enclosures.

Egress deficiencies include not enough exits, inadequate exit width, dead-end corridors, excessive exit travel distances, and lack of panic hardware.

Fire protection system deficiencies include no automatic fire suppression systems, lack of manual fire fighting equipment, i.e., fire extinguishers, no water supply for fire suppression in Nevada City, no monitored fire detection, lack of clearance of flammable vegetation and debris around buildings, and nonexistent lightning protection. **Most importantly, there is no organized fire protection provided by a public entity for Nevada City.**

Wildland/Urban Interface Fires

DNR has developed a fire risk rating system for existing and planned urban/wildland interface developments. The risk rating system assesses the potential wildfire hazards faced by an existing or new development and would then allow the owner or developer to design mitigation measures into the project.

A risk rating was done on the Nevada City area and the risk rating score is 160. This score places the development into DNR•s very high risk - very high priority category. ***This score can be reduced by incorporating mitigation measures.***

For comparison purposes, especially to highlight the benefits of having fire protection and water supply, a risk rating was conducted on Virginia City. The risk rating score for Virginia City was 135, placing it in DNR•s moderate risk - moderate priority category. The risk ratings are attached.

Other Fire/Safety Issues

A fuel tank has been installed in Nevada City for the train. It is located approximately 75 feet from Highway 287. Depending on its capacity, it may require an SPCC plan. Certainly the tank should be installed in conformance with the Uniform Fire Code requirements for aboveground storage tanks.

FIRE PROTECTION RECOMMENDATIONS

The Virginia City Fire Department would recommend that a comprehensive Fire Safety Plan be developed for the MT Heritage Commission Properties in both Virginia City and Nevada City. The Fire Safety Plan should incorporate at a minimum the following components.

Fire Prevention

Most of the Virginia City Fire Department•s concerns revolve around fire prevention issues.

Life Safety

Life safety is the single most important issue to be addressed by the MT Heritage Commission. The following should be incorporated into an annual fire inspection that should occur prior to the tourist season each year:

1. Ensure that adequate exits are provided for the occupant loads of all the buildings.

2. Ensure that exit doors work as designed.

3. Ensure that there are working smoke detectors in every sleeping room, and on every level of occupancies where guests, or employees sleep.

4. Ensure that a local gas company checks every gas operated appliance in every structure on an annual basis, especially those where guests or employees are sleeping.

Education and Training

Train all employees and ensure the employees of the contractors or vendors are trained in the following:
Emergency plan procedures
First aid fire fighting
Evacuation procedures

Operations and Maintenance

To reduce the chances of a grass fire extending into the historic structures, remove all flammable and combustible material from around the structures for a distance of 18" - 24".

To prevent a wildland fire from encroaching into the properties of the Heritage Commission, construct a perimeter fire break along the edge of the MT Heritage Commission's property line around Nevada City.

Mow and water all native vegetation in areas around the Commission's properties, if the vegetation is kept green, the potential for grass fires will be less of a threat.

Fire Detection Systems

Provide early detection in all buildings, the buildings that are occupied should be equipped first.

Early detection systems in some of the structures that are not fully enclosed by a sound roof and walls, should be considered carefully. In these circumstances, careful evaluation is needed of the proposed system's sensitivity and it's potential to transmit false alarms.

Fire Extinguishment

Automatic Fire Sprinkler Systems

We recommend that automatic fire sprinkler systems be installed in all the buildings on a priority basis. The first priority being, the buildings that are used for sleeping purposes. The second priority, should be the buildings that are occupied

by large groups of people. The third priority should be buildings that are of the most historical significance, followed by the rest of the buildings.
Buildings equipped with fire suppression systems in the cooking areas should have these systems inspected and cleaned prior to the start of each tourist season.

Manual Fire Fighting

Water barrels and fire buckets should be stationed around the properties in strategic locations. These will allow anybody to extinguish a small fire as soon at it is detected and they would match the aesthetics of the MT Heritage Commission•s properties.

Fire extinguishers stationed on the properties should be inspected monthly by staff and serviced as required by National Fire Protection Association Standard 10.

Public Fire Protection

Since the Nevada City properties are not within the city limits of the Town of Virginia City, the fire department is under no legal obligation to respond or to provide fire protection to them. To remedy this situation, the MT Heritage Commission should enter into a contract with the Town of Virginia City or the Virginia City Fire Department to provide fire protection to the Heritage Commission•s properties in Nevada City.

Develop a pressurized fire protection water supply in Nevada City that is available for use all year.

The MT Heritage Commission should assist the Virginia City FD in obtaining the title to Engine 3, the DNRC federal excess property apparatus.

Rehabilitate the 1952 Green Chevrolet fire engine, equipment it with hose, breathing apparatus and other equipment to ensure it is capable of making an initial attack on a fire in Nevada City.

Provide additional space for housing apparatus, especially in the Nevada City area.

Through revenue generated by the contract for service or some other mechanism assist in obtain additional personal protective equipment, breathing apparatus, and an additional engine (if the title to Engine 3 is not obtained).

Training

Assist in providing training to the Virginia City FD in the following areas:

Initial fire attack
Fire Fighter I
Incident Command

Recruitment

Provide assistance to the Virginia City FD in recruiting, motivating and maintaining a volunteer fire fighting force that meets the needs of the Town of Virginia City and the MT Heritage Commission.

REFERENCES

Publications

____, NFPA 914, Recommended Practice of Fire Protection in Historic Structures, National Fire Protection Association, 1994.

____, The Secretary of the Interior•s Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings, USDI - National Park Service, 1990.

____, Fire Safety Retrofitting in Historic Buildings, Advisory Council on Historic Preservation and the General Services Administration, 1989.

Websites

New York Landmarks Conservancy: http://www.preserve.org/nylc

Existing Development
Form C - Rating Form
(Rev. 3/93)

Rating Area: Nevada City Date: 7/14/99 Rated by: Bruce Suenram

Item	Issue		Score
1)	Number of Primary Access Roads	2	
2)	Number of Alternative Access Routes	0	1
3)	Width of Road Surface + Shoulder on Primary Access Roads	>40	1
4)	Maximum road grade in the area (primary, alternative, secondary)	0-5	1
5)	Secondary roads end as: Loops or 90' + diameter cul-de-sacs 70 - 89' diameter cul-de-sacs or Hammerhead ■T• (40' minimum) < 70' diameter cul-de-sacs Dead ends - no cul-de-sacs	T	1
6)	Bridges on primary access roads are: > 40 ton capacity 20 - 40 ton capacity < 20 ton capacity No bridges	T	1
7)	Bridges on secondary roads are: 20 - 40 ton capacity < 20 ton capacity No bridges	T	1
8)	Predominant slope in and around the inhabited area is: 0 - 10 % 11- 20 % 21 - 30 % > 30 %	T	2
9)	Predominant aspect is: North (316 degrees through 45 degrees) East (46 degrees through 135 degrees) Level South (136 degrees through 225 degrees) West (226 degrees through 315 degrees)	T	2
10)	Dangerous topographic features present are: None Adjacent steep slopes Draws/ravines Chimneys, Canyons, Saddles	T	6
11)	Predominant fuel type is: Grass will be the main fuel type in the rating area around more than 90% of planned structures. Low brush fields, or open timber stands will exist in the rating area around more than 10% of planned structures.	T	10

	Dense timber stands or high brush fields will exist in the rating area around more than 10% of planned structures. Slash and/or bug-killed timber stands will exist in rating area and won't be removed by development or dense stands of lodgepole pine trees will remain around more than 10% of planned structures.		
12)	Risks present are: Campgrounds/Campsites/picnic grounds Children (playgrounds, schools, etc.) Commercial businesses Debris burning Domestic wood heat Farming/Ranching Mills Mines Power lines Railroads Recreation sites (gun clubs, 4X4/motorbike areas, kegger sites) Travel routes (highways, etc.) Other(s) - describe each (*Tourist Attraction*)	 T T T T T T T T T T	 15
13)	Worst-case electrical services is: All utilities planned for the development or existing in rating area are underground. Rating area utilities will include well maintained above ground Power lines with cleared rights-of-way. Trees or improvements which could blow over into power lines do not exist or are properly maintained. Rating area utilities include above ground power lines. Fuel build-up is present in existing/planned rights-of-way, or improvements exist which could blow over onto power lines.	 T	 20
14)	How many homes are planned for the development?	80+	
15)	How many homes will have fire resistant roofing?	10%	20
16)	How many homes have unenclosed balconies, decks, eaves, stilts, cantilevered construction, etc.? < 10% 10 - 20% 21 - 25% > 25%	 T	 5
17)	Homes are spaced: For slopes: 0 -30% > 100' apart 60 - 100' apart For slopes: 31 - 50% > 100' apart 60 - 100' apart		

	< 60' apart T < 60' apart	T	5
18)	How many homes will meet the fire-resistant landscaping guidelines (See Appendix F)?	<10%	9
19)	Will hydrants be available?	Yes: No: T	
20)	If yes, at what spacing?		
21)	If hydrants are planned, are they 500 + gpm?	Yes: No:T	8
22)	Draft sources are: Accessible by hose lay Within 5 miles via primary access roads Available, but need to be developed Distant or unavailable	T	6
23)	Helicopter dip spots are: Under 2 minute turn around (< 1 mile) Within 2 - 5 minute turn around (1 - 2 miles) Within 6 minute turn around (3 miles) Distant or Unavailable	T	1
24)	Is rating area in a rural fire district, fire service area, or municipal fire department jurisdiction?	Yes: No:T	
25)	Fire agency response time: Within 5 minutes In 6 - 15 minutes In 16 - 30 minutes		20
27)	Will there be a way to contact homeowners?	Yes:T No:	
28)	If yes, what type of group(s)? Formal, well organized group Informal, loosely organized group Multiple groups No organized group	T	5
29)	Average number of fires/1000 acres/10 years	1.96	20
Total Score			160
< = 110	Low risk - low priority		
111 - 135	Moderate risk - moderate priority		
136 - 150	High risk - high priority		
151 - 170	Very high risk - very high priority		
> = 171	Extreme risk - extreme priority		

Existing Development
Form C - Rating Form
(Rev. 3/93)

Rating Area: Virginia City Date: 7/14/99 Rated by: Bruce Suenram

Item	Issue		Score
1)	Number of Primary Access Roads	2	
2)	Number of Alternative Access Routes	0	1
3)	Width of Road Surface + Shoulder on Primary Access Roads	>40'	1
4)	Maximum road grade in the area (primary, alternative, secondary)	8-10%	3
5)	Secondary roads end as: Loops or 90' + diameter cul-de-sacs 70 - 89' diameter cul-de-sacs or Hammerhead ■T• (40' minimum) < 70' diameter cul-de-sacs Dead ends - no cul-de-sacs	T	3
6)	Bridges on primary access roads are: > 40 ton capacity 20 - 40 ton capacity < 20 ton capacity No bridges	T	2
7)	Bridges on secondary roads are: 20 - 40 ton capacity < 20 ton capacity No bridges	T	2
8)	Predominant slope in and around the inhabited area is: 0 - 10 % 11- 20 % 21 - 30 % > 30 %	T	4
9)	Predominant aspect is: North (316 degrees through 45 degrees) East (46 degrees through 135 degrees) Level South (136 degrees through 225 degrees) West (226 degrees through 315 degrees)	T	0
10)	Dangerous topographic features present are: None Adjacent steep slopes Draws/ravines Chimneys, Canyons, Saddles	 T T T	8
11)	Predominant fuel type is: Grass will be the main fuel type in the rating area around more than 90% of planned structures. Low brush fields, or open timber stands will exist in the rating area around more than 10% of planned structures.	T	5

	Dense timber stands or high brush fields will exist in the rating area around more than 10% of planned structures. Slash and/or bug-killed timber stands will exist in rating area and won't be removed by development or dense stands of lodgepole pine trees will remain around more than 10% of planned structures.		
12)	Risks present are: Campgrounds/Campsites/picnic grounds Children (playgrounds, schools, etc.) Commercial businesses Debris burning Domestic wood heat Farming/Ranching Mills Mines Power lines Railroads Recreation sites (gun clubs, 4X4/motorbike areas, kegger sites) Travel routes (highways, etc.) Other(s) - describe each (*Tourist Attraction*)	 T T T T T T T T T	15
13)	Worst-case electrical services is: All utilities planned for the development or existing in rating area are underground. Rating area utilities will include well maintained above ground Power lines with cleared rights-of-way. Trees or improvements which could blow over into power lines do not exist or are properly maintained. Rating area utilities include above ground power lines. Fuel build-up is present in existing/planned rights-of-way, or improvements exist which could blow over onto power lines.	T	20
14)	How many homes are planned for the development?	300	
15)	How many homes will have fire resistant roofing?	60%	20
16)	How many homes have unenclosed balconies, decks, eaves, stilts, cantilevered construction, etc.? < 10% 10 - 20% 21 - 25% > 25%	T	2
17)	Homes are spaced: For slopes: 0 -30% > 100' apart 60 - 100' apart For slopes: 31 - 50% > 100' apart 60 - 100' apart		

	< 60' apart T < 60' apart	T	5
18)	How many homes will meet the fire-resistant landscaping guidelines (See Appendix F)?	60%	4
19)	Will hydrants be available?	Yes:T No:	
20)	If yes, at what spacing?	500	
21)	If hydrants are planned, are they 500 + gpm?	Yes:T No:	2
22)	Draft sources are: Accessible by hose lay Within 5 miles via primary access roads Available, but need to be developed Distant or unavailable	T	2
23)	Helicopter dip spots are: Under 2 minute turn around (< 1 mile) Within 2 - 5 minute turn around (1 - 2 miles) Within 6 minute turn around (3 miles) Distant or Unavailable	T	1
24)	Is rating area in a rural fire district, fire service area, or municipal fire department jurisdiction?	Yes:T No:	
25)	Fire agency response time: Within 5 minutes In 6 - 15 minutes In 16 - 30 minutes	T	10
27)	Will there be a way to contact homeowners?	Yes:T No:	
28)	If yes, what type of group(s)? Formal, well organized group Informal, loosely organized group Multiple groups No organized group	T	5
29)	Average number of fires/1000 acres/10 years	1.96	20
Total Score			135
< = 110	Low risk - low priority		
111 - 135	Moderate risk - moderate priority		
136 - 150	High risk - high priority		
151 - 170	Very high risk - very high priority		
> = 171	Extreme risk - extreme priority		

APPENDIX 4

National Fire Protection Association Standards

NFPA 13	Standard for the Installation of Sprinkler Systems 2002 Edition
NFPA 13D	Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes 2002 Edition
NFPA 13R	Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height 2002 Edition
NFPA 295	Standard for Wildfire Control 1998 Edition
NFPA 405	Recommended Practice for the Recurring Proficiency Training of Aircraft Rescue and Fire-Fighting Services 1999 Edition
NFPA 418	Standard for Heliports 2001 Edition
NFPA 422	Guide for Aircraft Accident Response 1999 Edition
NFPA 471	Recommended Practice for Responding to Hazardous Materials Incidents 2002 Edition
NFPA 472	Standard for Professional Competence of Responders to Hazardous Materials Incidents 2002 Edition
NFPA 473	Standard for Competencies for EMS Personnel Responding to Hazardous Materials Incidents 2002 Edition
NFPA 914	Code for Fire Protection of Historic Structures 2001 Edition
NFPA 921	Guide for Fire and Explosion Investigations 2001 Edition
NFPA 1000	Standard for Fire Service Professional Qualifications Accreditation and Certification Systems 2000 Edition
NFPA 1001	Standard for Fire Fighter Professional Qualifications 2002 Edition
NFPA 1002	Standard for Fire Apparatus Driver/Operator Professional Qualifications 1998 Edition
NFPA 1006	Standard for Rescue Technician Professional Qualifications 2003 Edition
NFPA 1021	Standard for Fire Officer Professional Qualifications 1997 Edition
NFPA 1031	Standard for Professional Qualifications for Fire Inspector and Plan Examiner 1998 Edition
NFPA 1033	Standard for Professional Qualifications for Fire Investigator 1998 Edition
NFPA 1035	Standard for Professional Qualifications for Public Fire and Life Safety Educator 2000 Edition
NFPA 1041	Standard for Fire Service Instructor Professional Qualifications 2002 Edition
NFPA 1051	Standard for Wildland Fire Fighter Professional Qualifications 2002 Edition
NFPA 1061	Standard for Professional Qualifications for Public Safety Telecommunicator 2002 Edition
NFPA 1141	Standard for Fire Protection in Planned Building Groups 1998 Edition

NFPA 1142	Standard on Water Supplies for Suburban and Rural Fire Fighting 2001 Edition
NFPA 1144	Standard for Protection of Life and Property from Wildfire 2002 Edition
NFPA 1145	Guide for the Use of Class A Foams in Manual Structural Fire Fighting 2000 Edition
NFPA 1150	Standard on Fire-Fighting Foam Chemicals for Class A Fuels in Rural, Suburban, and Vegetated Areas 1999 Edition
NFPA 1201	Standard for Developing Fire Protection Services for the Public 2000 Edition
NFPA 1250	Recommended Practice in Emergency Service Organization Risk Management 2000 Edition
NFPA 1402	Guide to Building Fire Service Training Centers 2002 Edition
NFPA 1403	Standard on Live Fire Training Evolutions 2002 Edition
NFPA 1404	Standard for Fire Service Respiratory Protection Training 2002 Edition
NFPA 1410	Standard on Training for Initial Emergency Scene Operations 2000 Edition
NFPA 1451	Standard for a Fire Service Vehicle Operations Training Program 2002 Edition
NFPA 1500	Standard on Fire Department Occupational Safety and Health Program 2002 Edition
NFPA 1521	Standard for Fire Department Safety Officer 2002 Edition
NFPA 1561	Standard on Emergency Services Incident Management System 2002 Edition
NFPA 1581	Standard on Fire Department Infection Control Program 2000 Edition
NFPA 1582	Standard on Medical Requirements for Fire Fighters and Information for Fire Department Physicians 2000 Edition
NFPA 1583	Standard on Health-Related Fitness Programs for Fire Fighters 2000 Edition
NFPA 1584	Recommended Practice on the Rehabilitation of Members Operating at Incident Scene Operations and Training Exercises 2003 Edition
NFPA 1670	Standard on Operations and Training for Technical Rescue Incidents 1999 Edition
NFPA 1710	Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments 2001 Edition
NFPA 1720	Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments 2001 Edition
NFPA 1851	Standard on Selection, Care, and Maintenance of Structural Fire Fighting Protective Ensembles 2001 Edition

NFPA 1852	Standard on Selection, Care, and Maintenance of Open-Circuit Self-Contained Breathing Apparatus (SCBA) 2002 Edition
NFPA 1901	Standard for Automotive Fire Apparatus 1999 Edition
NFPA 1906	Standard for Wildland Fire Apparatus 2001 Edition
NFPA 1911	Standard for Service Tests of Fire Pump Systems on Fire Apparatus 2002 Edition
NFPA 1912	Standard for Fire Apparatus Refurbishing 2001 Edition
NFPA 1914	Standard for Testing Fire Department Aerial Devices 2002 Edition
NFPA 1915	Standard for Fire Apparatus Preventive Maintenance Program 2000 Edition
NFPA 1931	Standard on Design of and Design Verification Tests for Fire Department Ground Ladders 1999 Edition
NFPA 1932	Standard on Use, Maintenance, and Service Testing of Fire Department Ground Ladders 1999 Edition
NFPA 1936	Standard on Powered Rescue Tool Systems 1999 Edition
NFPA 1961	Standard on Fire Hose 2002 Edition
NFPA 1962	Standard for the Inspection, Care, and Use of Fire Hose, Couplings, and Nozzles and the Service Testing of Fire Hose 2003 Edition
NFPA 1963	Standard for Fire Hose Connections 1998 Edition
NFPA 1964	Standard for Spray Nozzles 2003 Edition
NFPA 1971	Standard on Protective Ensemble for Structural Fire Fighting 2000 Edition
NFPA 1975	Standard on Station/Work Uniforms for Fire and Emergency Services 1999 Edition
NFPA 1977	Standard on Protective Clothing and Equipment for Wildland Fire Fighting
NFPA 1981	Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services 2002 Edition
NFPA 1982	Standard on Personal Alert Safety Systems (PASS) 1998 Edition
NFPA 1983	Standard on Fire Service Life Safety Rope and System Components 2001 Edition
NFPA 1989	Standard on Breathing Air Quality for Fire and Emergency Services Respiratory Protection 2003 Edition
NFPA 1991	Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies 2000 Edition
NFPA 1992	Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies 2000 Edition
NFPA 1994	Standard on Protective Ensembles for Chemical/Biological Terrorism Incidents 2001 Edition
NFPA 1999	Standard on Protective Clothing for Emergency Medical Operations 2003 Edition

Appendix 5

Principles of a Legally Defensible Impact Fee System (adapted from A Practitioner's Guide to Development Impact Fees, American Planning Association, 1991)

1. The purpose of an impact fee system is to ensure that growth pays its own way. Development fees are calculated to reflect actual growth-related costs so that when a new development occurs, its demand for public infrastructure will not subsidize or be subsidized by existing residents.
2. There must be a reasonable connection between the need for additional facilities and the growth resulting from new development.
3. The fees charged must not exceed a proportionate share of the cost incurred or to be incurred in accommodating the development paying the fee.
4. There must be a reasonable connection between the expenditure of the fees collected and the benefits received by the development paying the fees.
5. Impact fee revenues must be earmarked and spent only for the purpose for which they were collected.
6. A properly created impact fee system begins with a good comprehensive plan backed up with a good capital improvements plan (CIP).

PREREQUISITE to Establishing Fire Impact Fees:
Interested fire districts should prepare and adopt a 5-10 year CIP.

See Madison County Capital Improvements Plan, 2001-2006 for guide.
Elements of a fire district's CIP should include:

1. Number of residences and businesses currently served. Land area encompassed by district (ag land, vacant undeveloped, developed, public).
2. Projections of future growth.[3]
3. Current capital assets (buildings and grounds, vehicles and equipment). Current capital needs (and estimated costs) to serve existing population and land area. Identifying needs should be based on what the district (or County) has chosen to be its service standards, such as an ISO rating goal to achieve or maintain.[4]
4. Projected future capital needs and estimated costs
    a. Those needed to serve existing population
    b. Those needed to serve future additional population (to provide new population with the same level of service as existing population)
5. Current revenues and revenue sources to cover capital needs

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[3]The Madison County Planning Office can assist in determining Items #1 and #2.

[4]Typically, the current standard of service is used as the basis for impact fees.

6. Projected future revenues and revenue sources -- If they are not enough to cover Item #4, then fire impact fees can be used to address at least a portion of the shortfall pertinent to Item #4b.

CALCULATING FIRE IMPACT FEES

Factors to consider in establishing a proportionate share of capital costs to be borne by new development:

1. What is the replacement cost of existing capital facilities?

2. By what methods were the existing capital improvements financed?

3. To what extent have new developments already contributed to the cost of existing capital improvements (e.g., property taxes paid by vacant land)?

4. To what extent will new development pay for existing capital improvements in the future (e.g., debt service payments)?

5. To what extent has new development been required by the County to construct fire-related capital improvements?

6. Are there any extraordinary costs associated with serving the new development?

7. Consider the time-price differentials associated with payments made at different times.

APPENDIX 6

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: **South Boulder, Mammoth** **Date:** **11/12/02** **Surveyor:** **J.P. King**

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	4
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	9
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	6
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	2
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	6
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	9
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	6
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	9
Roads/ Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	9
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	6
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	9
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	2
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	9
Scoring	< 50	50 - 79	≥ 80	**Total** **86**

***See Field Notes (on back)**

FIELD NOTES

South Boulder, Mammoth

- 4 Bridges on Road #107
  1 - 6 Ton Limit
  1 – 11 Ton Limit

- Winter maintenance of road unknown.

- Mail delivery limited to lower portion of Road.

- 30 some cabins at Mammoth. Most are older than 20 years.

- Travel time from Mammoth to Harrison, Pony, Norris, Summit Valley Fire Station in Harrison at 44 minutes, 22.6 miles.

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: ___Pony__ **Date:** _11/12/02_____ **Surveyor:** _____J.P. King_____

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	4
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	3
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	3
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	4
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	3
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	3
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	6
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	9
Roads/ Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	6
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	3
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	9
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	3
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	6
Scoring	< 50	50 - 79	≥ 80	**Total** **62**

***See Field Notes (on back)**

FIELD NOTES

Pony

- Harrison to Pony 6.1 miles.
- Approximately 120 mail boxes in Pony Post Office
- Most homes are older and do not have fire protected exteriors.
- No rural addressing

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: ____**Potosi, Hot Springs**_____ **Date:** ___**11/12/02**____ **Surveyor:** _____**J.P. King**_____

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	4
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	*9
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	6
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	2
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	6
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	9
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	9
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	9
Roads/ Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	9
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	3
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	9
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	1
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	6
Scoring	< 50	50 - 79	≥ 80	**Total** **82**

***See Field Notes (on back)**

FIELD NOTES

Potosi, Hot Springs

- 8.7 Miles from Pony
- Approximately 6-8 Homes in Potosi,
- 2 small bridges on S. Willow Creek Road of unknown weight capacity.
- Electrical service to area is buried cable.

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: North Meadow Creek **Date:** 11/12/02 **Surveyor:** J.P. King

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	6
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	9*
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	3
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	2
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	3
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	9
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	9
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	9
Roads/ Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	9*
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	6
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	9
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	1
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	6
Scoring	< 50	50 - 79	≥ 80	**Total** **81**

***See Field Notes (on back)**

FIELD NOTES

North Meadow Creek

- 90% ranch land on lower end
- Good wide road on lower portion
- 6 ton bridges
- 7.1 miles up, new developments of 10 – 20 acre lots
- Open land, steep slopes in developments
- Steep gravel roads
- Utilities under ground
- Housing development are on steep open ground

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: South Meadow Creek **Date:** 11/12/02 **Surveyor:** J.P. King

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	4
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	9*
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	9
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	4
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	6
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	9
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	6
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	9
Roads/ Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	9
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	9
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	9
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	2
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	9
Scoring	< 50	50 - 79	≥ 80	**Total** **94**

***See Field Notes (on back)**

FIELD NOTES

South Meadow Creek

- Half homes in timber/half in open country
- Lots of log homes with metal roofs
- Most homes less than 10 years old.
- Many small bridges on driveways to individual homes.
  (unknown weight capacity)
- Good roads in area
- Approximately 9 miles from Ennis, Madison County Rural Fire Station
  Up to homes in this area.

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: South Ruby **Date:** 11/13/02 **Surveyor:** J.P. King

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	4
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	3
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	3
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	2
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	6
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	6
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	6
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	9*
Roads/ Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	6
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	3
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	9
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	1
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	6
Scoring	< 50	50 - 79	≥ 80	**Total** **64**

***See Field Notes (on back)**

FIELD NOTES

South Ruby

- There are 3 engines stationed in the Upper Ruby. Steve Gilman has information on all. This will factor into response time.

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: Indian Creek **Date:** 11/13/02 **Surveyor:** J.P. King

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	6
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	3
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	3
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	4
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	6
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	6
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	9
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	9
Roads/ Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	9
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	9
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	6
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	1
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	6
Scoring	< 50	50 - 79	≥ 80	**Total** **77**

***See Field Notes (on back)**

FIELD NOTES

Indian Creek

- Appear to be more residences in Wisconsin Creek Drainage than in Indian Creek
- Rough road at upper end
- Steep roads at upper end driveways

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: Melrose Road **Date:** 11/13/02 **Surveyor:** J.P. King

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	4
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	3
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	3
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	4
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	3
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	3
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	6
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	6
Roads/ Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	6
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	3
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	9
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	1
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	6
Scoring	< 50	50 - 79	≥ 80	**Total** **57**

***See Field Notes (on back)**

FIELD NOTES

Melrose Road

- This development is within 5 miles of Twin Bridges
- Homes on flat open ground

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: Silver Star **Date:** 10/21/02 **Surveyor:** B. Waters

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	4
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	3
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	3
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	4
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	6
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	3
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	6
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	9
Roads/ Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	3
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	3
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	6
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	3
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	3
Scoring	< 50	50 – 79	≥ 80	**Total** **56**

***See Field Notes (on back)**

FIELD NOTES

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: **Haypress Lake Area** **Date:** **1/03/03** **Surveyor:** **B. Waters**

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	6
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	3
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	3
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	2
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	3
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	3
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	3
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	9
Roads/ Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	9
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	6
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	9
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	1
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	3
Scoring	< 50	50 – 79	≥ 80	**Total** **60**

***See Field Notes (on back)**

FIELD NOTES

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: Shining Mountain/V.C Ranches **Date:** 01/03/03 **Surveyor:** B. Waters

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	6
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	3
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	9
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	2
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	6
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	6
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	6
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	9
Roads/ Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	9
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	9
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	9
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	2
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	9
Scoring	< 50	50 – 79	≥ 80	**Total** **85**

***See Field Notes (on back)**

FIELD NOTES

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: ___Lower Shining Mountain Ranch___ **Date:** _01/03/03____ **Surveyor:** ____B. Waters_____

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	6
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	3
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	3
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	2
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	6
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	3
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	6
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	9
Roads/Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	9
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	6
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	9
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	1
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	3
Scoring	< 50	50 – 79	≥ 80	**Total** **66**

***See Field Notes (on back)**

FIELD NOTES

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: **Sundowner/Sunriser Area** **Date:** **1/4/03** **Surveyor:** **B. Waters**

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	6
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	3
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	3
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	2
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	6
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	6
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	9
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	9
Roads/Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	9
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	9
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	9
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	1
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	9
Scoring	< 50	50 – 79	≥ 80	**Total** **81**

*See Field Notes (on back)

FIELD NOTES

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: **Sun Ranch West** **Date:** **1/05/03** **Surveyor:** **B. Waters**

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	**6**
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	3
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	9
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	2
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	9
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	9
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	9
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	9
Roads/Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	9
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	9
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	6
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	1
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	9
Scoring	< 50	50 – 79	≥ 80	**Total** **90**

***See Field Notes (on back)**

FIELD NOTES

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: Sundance Bench/Madison River Ranches **Date: 1/05/03** **Surveyor: B. Waters**

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	**6**
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	3
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	9
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	2
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	6
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	6
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	9
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	9
Roads/Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	9
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	6
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	9
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	1
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	9
Scoring	< 50	50 – 79	≥ 80	**Total** **84**

***See Field Notes (on back)**

FIELD NOTES

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: **Highway 87 South to Idaho Line** **Date:** **01/05/03** **Surveyor:** **B. Waters**

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	**4**
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	3
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	3
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	2
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	3
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	3
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	9
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	9
Roads/Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	9
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	6
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	9
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	1
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	9
Scoring	< 50	50 – 79	≥ 80	**Total** **70**

***See Field Notes (on back)**

FIELD NOTES

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: Virginia City Area **Date:** 4/02/03 **Surveyor:** Bruce Suenram

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	**4**
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	3
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	3
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	2
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	6
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	6
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	9
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	3
Roads/Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	6
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	6
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	6
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	3
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	6
Scoring	< 50	50 – 79	≥ 80	**Total** **63**

***See Field Notes (on back)**

FIELD NOTES

FORM 1 – HAZARD ASSESSMENT FIELD FORM

Area: Nevada City Area **Date:** 4/02/03 **Surveyor:** Bruce Suenram

Rating Element	Low Hazard	Moderate Hazard	High Hazard	Rating
Aspect	North (N, NW, NE) (2)	East or Level (4)	South and West (SE, S, SW, W) (6)	**6**
Bridges	> 40 tons (3)	20 – 40 tons (6)	< 20 tons (9)	6
Canopy Closure	Spacing between crowns greater than 30 ft. (3)	Spacing between crowns is 20 to 30 ft. (6)	Spacing between crowns is less than 20 ft. (9)	3
Elevation	> 5500 ft (2)	3500-5500 ft (4)	< 3500 ft (6)	2
Fuel Density/ Fuel Bed Depth	Non-Continuous Fuel Bed. Grass and/or Sparse Fuels (< than 30% cover)/Low (Avg. Less Than 1ft) (3)	Broken Moderate Fuels (31 to 60% cover)/ Moderate (avg. 1-3 ft) (6)	Continuous Fuel Bed. Composition conductive to crown fires or high intensity surface fires. (>60% cover) High (avg. greater than 3 ft) (9)	6
Fuel Type	Small, Light Fuels (Grass, Weeds, Shrubs) (3)	Medium Fuels (Brush, Medium Shrubs, Small Trees) (6)	Heavy Fuels (Timber, Woodland, Large Brush, or Heavy Planting of Ornamentals) (9)	6
Predominant Building Materials/ Flammability of Structures	Majority of homes have fire resistant roofs and/or siding. (3)	10-50% of homes have fire resistant roofs and/or siding. (6)	Less than 10% of homes have fire resistant roofs and/or siding. (9)	9
Response Times	Prompt response time to interface areas. (10 min. or less) (3)	Moderate response time to interface areas. (11 – 20 minutes) (6)	Lengthy response to interface areas. 21 or more min.(9)	9
Roads/Access	Wide loop roads that are maintained, paved or solid surface with shoulders. Multiple entrances, exits, and turnarounds that are well equipped for fire trucks. (3)	Roads are maintained. Some narrow two lane roads with no shoulders. Limited access route 2 ways in and 2 ways out. Moderate grades. (6)	Narrow and/or single lane, minimally maintained, no shoulders. Narrow, dead end roads or 1 way in, 1 way out. Steep grades. (9)	9
Slope	Flat to little slope (<10%) (3)	Moderate slopes (10-30%) (6)	Steep slopes (>30%) (9)	6
Street Signs /Rural Addressing	Present (4" in size, reflectorized and non-combustible) (3)	Present & Combustible (6)	Not Present (9)	9
Structure Density	Less than one structure per 10 acres. (1)	One structure per 5-10 acres. (2)	At least one structure per 0-5 acres. (3)	3
Survivable Space Actions on Private Property	Majority of homes have improved survivable space around property. (>50%) (3)	10-50% of homes have improved survivable space around property.(6)	Less than 10% of homes have improved survivable space around property.(9)	9
Scoring	< 50	50 – 79	≥ 80	**Total** **83**

***See Field Notes (on back)**

FIELD NOTES

While Nevada city Area (surrounding the town limits) of Virginia City rates as a high hazard, this area should be noted as not being provided with any structural fire protection.

VIII. Maps (Full Size)

Map 1 – Madison County Ownership and Conservation Easements
Map 2 – Madison County Historical Fire Regime
Map 3 – Madison County Land Cover Fuels Classification
Map 4 – Madison County Fire Regime and Conditions Class
Map 5 – Madison County Fire Districts
Map 6 – Madison County Planning Polygons
Map 7 – Madison County Hazard Ratings