KLICKITAT COUNTY COMPREHENSIVE EMERGENCY MANAGEMENT PLAN

APPENDIX 7

HAZARD IDENTIFICATION & VULNERABILITY ANALYSIS

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1. INTRODUCTION

RCW 38.52.070 Emergency Management establishes that preparedness of Klickitat County shall be adequate to deal with disasters.

The purpose of this hazard identification & analysis ("HIVA") study is to identify and describe those potential large-scale hazards within Klickitat County and to serve as a basis for county level emergency preparedness planning. The information contained in this document was gathered from various reports, newspaper articles, and Emergency Management records and reports. It is intended to present a general overview of the disaster and hazard potential in Klickitat County.

The first draft of this document was finalized in November 2002, revised in November 2003 and reviewed by the State of Washington in October 2004. This draft is presented with updated information and edits as provided by contract with Klickitat County.

2. GEOGRAPHIC CHARACTERISTICS

Climate:

Temperatures

	Jan	Apr	Jul	Oct
Max (F)	37	62	84	64
Min (F)	22	34	50	36
Mean (F)	30	48	67	50

Avg Annual Max (F): 61
Avg Annual Min (F): 36
Avg Annual Mean (F): 48
Avg Annual Rain (in): 17.4

Klickitat County is 16th in size among the counties of the State of Washington. Klickitat County encompasses 1,880 square miles. Klickitat County has a population of 19,300 residents as of 2001 (Office of Financial Management).

Klickitat County is situated east of the Cascade Range at the farthest extension of what is generally recognized as south central Washington. The region is bounded by Yakima County to the north, Skamania County to the west, Benton County to the east and the Columbia River (and state of Oregon) to the south.

This section of the State has a very dry climate with rather mild winters and warm sunny summers. Annual precipitation is 10-60 inches. Most of the precipitation is received during the six-month period of November through April. The winter snowfall seldom remains on the ground longer than two to four weeks or reaches a depth in excess of four to six inches. Summers are dry and hot, in the 90's, with a few days at higher temperatures. The growing season is about 150 days extending from mid-April to mid-October.

Klickitat County has two main highway systems: US 97 (north-south) and Highway 14 (east-west). It is also served by the Burlington Northern Santa Fe Railroad. In addition, The Dalles Dam and John Day Dam were constructed on the Klickitat-Oregon section of the Columbia River and there is significant barge travel to upriver and downriver ports, primarily to move agricultural products.

CHIEF PRODUCTS

Agriculture/Dairy/Ranching: Approximately 70% of the farmland in Klickitat County is classified as pasture land or rangeland for livestock. Crops are harvested on approximately 15% of the farm acreage. Major products include tree fruits (apples, pears and cherries), cattle and calves, wheat, hay, dairy products and a variety of vegetables.

Manufacturing and Processing: Machine trades, packaging and materials handling, benchwork, motor freight and transportation, processing.

3. DEMOGRAPHIC ASPECTS

Population:

Bingen:	655
Goldendale:	3,650
White Salmon:	2,220
County:	12,775

The 2003 Washington State Office of Financial Management figures show the population of Klickitat County to be approximately 19,300. Since 1990, population growth has averaged 1.5% per year. Two-thirds of the population lives in unincorporated areas and one-third in incorporated areas as shown below:

Demographic breakdowns of the county's population are shown below:

Density of population:	10.3 persons per square mile
Male population:	9,639 (median age of 40.1)
Female population:	9,661 (median age of 40.5)
White, non-Hispanic population:	16,197
Black, non-Hispanic population:	24
Native American population:	664
Asian & Pacific Island population:	198
Other, non-Hispanic population:	496
Hispanic:	1,721
Assessed Value (2002):	$1,417,103,998

HIVA Score:

Assignment of a relative *Community Risk Assessment tool* score to a given hazard is based upon vulnerability, impacts and probability of occurrence. The "base" score is tempered by in-place service factors that are likely to mitigate severity of impacts. Of a total score of 100 points, the higher the score the higher the vulnerability.

In Klickitat County, the low density of population is reflected in the highest relative community vulnerability of less than 50 points ("moderate").

HIVA ZONES

For the purpose of this study, Klickitat County was divided into three zones. Zone 1, in the western portion of the county, is characterized by forested and mountainous grade landscape and low density population; Zone 2, in the southern & central areas of the county, is characterized by a predominantly sub-urban transportation corridor (highway, rail & water-borne) featuring steep grades & minimal vegetation; and Zone 3, in the eastern portion of the county, is characterized by rolling hills featuring minimal vegetation and low density of population.

Using the *Community Risk Assessment* tool, the HIVA score is reported in the summary charts on both a zone and county-wide basis.

The purpose of the scoring matrix is to attempt to display the relative risk among various types of hazards in the community. This tool will assist in focusing planning efforts and maximizing the limited resources available to prepare for, respond to and mitigate hazardous conditions. *It should also be remembered that one hazard may cause or exacerbate another type of hazard.*

4. NATURAL HAZARDS

A. DROUGHT

Definition:

A drought is the prolonged period of significantly less than normal precipitation, causing a critical drop in available sources of drinking and agricultural water supplies and producing measurable agricultural damages and losses. The severity of drought is measured by the Palmer Index (*Attachment 1 to Appendix 7*).

HISTORY

There has been one major drought declaration between 1956 and 2001. It occurred in March 1977. A Presidential Emergency Declaration was made for 20 counties in Eastern Washington. This drought had an economic impact on Klickitat County. The primary effects have been felt by the agricultural industry, however, the general population has been affected to a lesser degree due to water curtailments, etc.

VULNERABILITY

Klickitat County's primary industry is agriculture and livestock and it could be damaged or destroyed by a major drought occurrence. The probability of a drought occurrence and its impacts is increasing as water usage agreements are being revised in light of environmental issues, such as salmon run restoration.

EFFECTS

The major effect of drought conditions would be economic to the agricultural industry (farm owners, tenants, and laborers). The condition affects crop yields and feed for animals especially in the non-irrigated fields.

A secondary effect would be the increased danger of wildland fires due to reduced moisture in fire fuels. Scoring for this hazard is included under the classification of "Wildfire".

CONCLUSION

New developments in the agricultural industry have lessened the impact of droughts. Widespread irrigation minimizes the impact of a short-term drought by using the water resources available in the Columbia River. Federal and state governments have also assumed an active role in developing water and soil conservation programs which could help to combat a long-term drought. The end of a drought is usually based on a determination made by individuals in the affected area that precipitation has approached accepted normal levels and existing water sources have been adequately replenished.

B. EARTHQUAKE

HISTORY

Earthquakes rank as one of nature's most violent events. They are measured using sensitive monitoring equipment called seismographs. Using several seismograph locations, seismologists can pinpoint the location and depth of an earthquake. They can usually locate an earthquake within one tenth of a degree latitude or longitude. In addition to determining location, the seismologists can also determine the strength of the earthquake. Two main scales are used to show the strength: the Richter Scale (Attachment 2) and the Modified Mercalli Intensity Scale (Attachment 3).

Definition:

An earthquake is the shaking or trembling of the crust of the earth, caused by underground volcanic forces or by breaking and shifting of rock beneath the surface producing casualties and considerable property damage.

The Richter Scale is probably the most well known by the public and is usually given in news reports. This scale is a logarithmic scale which shows the magnitude of an earthquake. This is determined from seismograph readings rather than from actual reports of shaking. Contrary to popular belief, the Richter Scale goes on indefinitely with each increase of one indicating 10 times the strength of the previous number. For example; a 3 on the Richter Scale would be 10 times stronger than a 2, and 100 times stronger than a 1.

The Modified Mercalli Intensity Scale was developed to show the intensity of an earthquake without using measuring devices. This scale ranges from 1 to 12 and is used to describe the effects on people and property. This scale works well for earthquakes that occurred before seismographs were developed.

Eastern Washington has historically had deep, infrequent, small earthquakes. Typically, they have caused no damage. However, when Mount St. Helen's erupted on May 18, 1980 it caused an earthquake measuring 5.1 on the Richter Scale. It sent 520 tons of ash eastward across the state and created complete darkness as far as 250 miles away. Ash covered 22,000 square miles. There has been activity since 1980, but the mountain has returned to a period of quiet. However, it continues to be monitored.

VULNERABILITY

Klickitat County is located in Seismic Zone II according to the Uniform Building Code Seismic Risk Map. In this zone, earthquakes up to 5.5 - 6.1 on the Richter Scale can be expected to occur. Earthquakes that have occurred in California and that are anticipated for Western Washington could not occur here because geological differences are too great.

An earthquake in Klickitat County can expect a quake in the range of 4 to 4.5 on the Richter Scale every 50 years.

EFFECTS

The effects of an earthquake episode would certainly depend on the location and the intensity of the earthquake. Some effects could include negligible damage in buildings of good design, slight to moderate damage in well build ordinary structures and more excessive damage in poorly built or badly designed structures. Klickitat County utilizes the Uniform Building Code. According to this code, new buildings must meet standards identified for Seismic Zone II. An earthquake could cause other secondary disasters such as conflagration, flooding, land movement, and mass casualty incidents.

CONCLUSION

An earthquake could occur in any season. The occurrence of an earthquake is of rapid onset, which does not permit citizens in area of impact to initiate preparedness actions. The duration of an earthquake is generally less than one minute.

C. FLOOD

Definition:
Flooding is the temporary overflow of water onto lands not normally covered by water and that are used or usable by people producing measurable property damage or destruction and forcing evacuation of people and vital resources.

HISTORY
Flooding in Klickitat County has occurred and been declared a Presidential Major Disaster Declaration five times between 1956 and 2001. Flooding has been caused by heavy rains, severe storms, snowmelt, mudslides, winter storms, and ice/snow falls. These flooding events have resulted in extensive property damage. Both private citizens and government agencies made application to the federal government for recovery assistance.

VULNERABILITY
Klickitat County continues to be vulnerable to floods as noted above.

EFFECTS
Flooding effects can include minimal to maximum property damage, loss of life, economic damage to farming lands, loss of crops and farm animals, prolonged evacuation of residents, contamination of wells, disruption of transportation routes (rail, highways), prolonged disruption of utilities, and contamination of domestic water supplies. Secondary effects can include disruption of emergency response routes.

CONCLUSIONS
Flooding will generally occur in late winter and early spring. The average flooding event requires 24 to 72 hours to reach its maximum peak flow through runoff. Flood crest, (highest level of water), lasts several hours then quickly dissipates over the next 24 to 48 hours.

The U.S. Army Corps of Engineers under Public Law 84-99 has the authority to assist public entities in flood fighting and rescue operations and to protect, repair and restore federally constructed flood control works threatened, damaged or destroyed by a flood.

The National Weather Service provides weather information to local governments and the public through radio, teletype, and telephone. The National Weather Service also has an extensive river and weather monitoring system and usually will provide adequate and timely flood warnings.

D. LANDSLIDE & EROSION

Definition:
Landslide refers to the *catastrophic* down-slope movement of masses of rock and soil. Erosion refers to the *gradual* down-slope movement of masses of rock and soil.

HISTORY
The most recent slide in Klickitat County was a mudslide in December 1977, which caused flooding and resulted in a Presidential Major Disaster Declaration. The largest and most critical mudslide occurred as a result of severe storms, and ended in flooding.

VULNERABILITY
Klickitat County continues to be at risk for mudslides, depending on weather conditions. New areas of instability may present themselves due to man's activities, such as excavation, development, road cuts, irrigation, etc.

EFFECTS
Mudslides may cause damage or destruction to transportation networks, public and private buildings, utilities, irrigation systems, and industry.

CONCLUSION
Mudslides generally occur in the winter during severe storms. Development proposals in the previously listed areas will be carefully scrutinized and site specific studies and thorough investigation for hazards will be required of prospective developers.

E. SEVERE STORMS

Definition:

High winds: sustained wind speeds in excess of 40 mph with gusts exceeding 60 mph;

Thunderstorm: a violent weather phenomenon producing high winds, heavy rain, lightning and hail that can cause injuries, damages or destroys property, crops & livestock;

Ice storm: rain that freezes on impact, coating at least ¼-inch thickness and is heavy enough to damage trees and overhead power lines;

Snow storm: a snowfall of 6 or more inches within 12 to 24 hours;

Blizzard: falling or blowing snow combined with winds of at least 35 mpg for several hours.

HISTORY
In the period of 1956 to 2001, Klickitat County has experienced severe rain storms, heavy snow storms, and ice storms. There have been four Presidential Major Disaster Declarations made. These storms have resulted in considerable damage, road closures, school and business closures, resulting in significant economic impact.

VULNERABILITY
Severe weather has the potential for extensive property damage, but is generally localized in a single occurrence. Injury to people is also possible, but less likely than economic impacts.

EFFECTS
The effects of severe local storms can vary with the intensity of the storm and the level of preparation of local government and residents. The major effect from severe storms is the immobility. Transportation accidents are more likely to occur, motorists become stranded, transportation networks can be closed or impassable causing delays. Property damage can be extensive. Failure of utilities can cause business and public building closures resulting in economic losses.

CONCLUSION
Severe local storms can occur in any season with varying intensity. Public education and preparedness should lessen the impact of severe local storms on people, but damage to agriculture and other industries may be unavoidable. Procedures for requesting state and federal assistance may help with economic impacts.

F. VOLCANIC ACTIVITY

HISTORY
Scientists use the term "active" to refer to any volcano that has erupted in historic time. By this definition, Mt. Rainier, Mt. Baker, Mt. Hood, and Mt. St. Helens are active volcanoes. Glacier Peak has

erupted within the last 1000 years and may have erupted as recently as the 17th century. Mt. Adams is also capable of renewed activity.

Definition:

A volcano is created when *magma* (liquid molten rock deep within the earth) erupts onto the surface of the earth, of the general types based on chemical composition & conditions of eruption:

Basalts: Hawaiian type magma hot & fluid;
Rhyolites: stiff magma with explosive eruptions & form steep domes;
Andesites: thick & slow flowing magma with moderate explosive history, most common in the Pacific Northwest.

The most current volcanic activity that affected Klickitat County occurred during the May 1980 eruption of Mt. St. Helens. The most recent eruptions of other volcanoes affecting Washington State are as follows:

Mount Adams	~1500 B.C.
Glacier Peak	~1800
Mount Hood	1800 - 1804
Mount Rainier	1820 - 1894
Mount Baker	1975
Mount St. Helens	1980

VULNERABILITY

There are two active volcanoes that could directly affect Klickitat County: Mt. St. Helens, and Mt. Hood (in Oregon). Due to the county's distance from the volcanoes, the only effect that can be expected is ash fall, most likely from Mt. St. Helens or Mt. Hood because of prevailing easterly winds.

EFFECTS

The major effect of volcanic eruption to Klickitat County would be ashfall. A one-inch deep layer of ash weighs an average of ten pounds per square foot. Heavy ashfall may clog water courses and machinery, it causes electrical short circuits, drifts in roadways, railways, and runways. Its weight may cause structural collapse. Because it is easily carried by air currents, it remains a hazard for months after the eruption. In addition, ash could greatly impact Klickitat County's agriculture and livestock industries.

When ash clouds combine with rain, sulphur dioxide combines with water to form diluted sulfuric acid that may cause minor, but painful burns to the skin, eyes, and mucous membranes, nose, throat, etc. Hydrochloric acid rains have also been reported. Acid rains may affect water supplies, strip and burn foliage, strip paint, corrode machinery, and dissolve fabric.

Volcanic earthquakes, often centered within or beneath the volcano, are usually one of three kinds:

Pre-eruption - caused by explosions of steam or underground magma movements
Eruption - caused by explosions and collapse of walls inside the volcano
Post-eruption - caused by magma retreat and interior structural collapse

CONCLUSION

Due to extensive monitoring of Cascade Range volcanoes, warning of increased volcanic activity prior to an eruption is expected. Response to a volcanic eruption could be long-term if heavy ashfall were to occur in Klickitat County. State and local planning should address the special problems associated with ash fall, such as damage to emergency vehicles and respiratory problems of emergency workers.

5. TECHNOLOGICAL HAZARDS

G. DAM FAILURE

Definition:

A dam failure is the spontaneous release of water from a barrier built to hold back the flow of water. The loss of structural integrity causes rapid flooding, loss of life, damage or destruction of property and forces evacuation of people and vital resources. Dam failures can be caused by many circumstances:

Water exceeding spillway capacity: 35%

Failure of foundation structure: 25%

Improper operation, design, construction & materials: 40%.

HISTORY

Public Law 92-367, the National Dam Inspection Act, resulted in the inventorying of all dams in the United States. As of September 1980, 63,418 dams had been inventoried, and 8639 non-federal dams had been inspected nationally. Klickitat County has never experienced a dam failure; however, other areas in Washington State have been affected by dam failure.

VULNERABILITY

Many of the dams in Washington State are more than 50 years old. The dams that would affect Klickitat County have been inspected under a U.S. Army Corps of Engineers inspection program. Those inspected dams with notable problems have been turned over to the Washington State Department of Ecology, Dam Safety Office for resolution of the noted problems. Expected loss of life and property damage from a dam with a higher probability of failure is low. Expected loss of life and property damage from a dam with a lower probability of failure is high.

EFFECTS

The arrival time of flood waters from a major dam failure on the Columbia River could be as little as two hours or as much as forty-eight hours. The necessary evacuation along with the suspected widespread damage would be extensive in most scenarios and the resulting overall effect would be catastrophic. Damage to structures, roads, utilities, and crops would be extensive. Contamination of sanitary water supplies, damage to public buildings such as schools and city government buildings can be expected. The pumping stations that furnish water for firefighting would be lost.

CONCLUSION

A dam breach event could occur at any time. A higher probability exists during periods of high flood potential, especially during the spring. Ice jams pose a very serious threat to dams. As measures to revitalize salmon runs on the Columbia River are implemented, the integrity of dams may be diminished.

There are three state statutes that deal with safety of dams and other hydraulic structures: The Revised Code of Washington (RCW) 43.21, 86.16, and 90.03. These laws provide authority to approve plans for dams, control construction of dams and inspect hydraulic works.

Evacuation planning should consider the effects of a large-scale evacuation which could result from a dam failure. Klickitat County emergency response resources participate in emergency planning and exercises based on dam failure conducted by the dam operators.

H. ENERGY EMERGENCIES

Definition:

Power failure: interruption of electrical service for 24 hours or more, forcing shutdown of business, industry and possible evacuation of certain populations.

Energy shortage: includes fast-developing petroleum shortage (caused by supply or demand factors), hydro-electrical shortages (caused by low water levels). Shortage in one area (e.g. hydro-carbon fuels) may effect another energy source (coal fired electrical generation).

HISTORY

Power outages may occur due to natural or technological circumstances. Long-term power outages have followed severe local storms in Klickitat County and in surrounding areas. However, most occurrences are less than 24 hours.

Petroleum shortages were demonstrated during the 1973-1974 Arab Oil Embargo and the Iran cutoff of 1979. During those periods, "state set-aside" program allowed state governments to allocate portions of the fuel in the state to areas of greatest need. This program was abolished under deregulation rules early in 1981. Electrical shortages occurred in 1973-1974 and 1977-1978, from drought conditions and resulted in insufficient amounts of water to operate the hydroelectric plants. A heating fuel shortage occurred in 1996 when the lower Columbia River dams were closed and barge traffic could not reach Klickitat County.

VULNERABILITY

Both power outages and energy shortages can be the result from numerous different circumstances, but are not expected to cause significant harm to people or property. Economic impacts could be great, however, depending on the severity and duration of the emergency.

Petroleum shortages can occur depending on the political climate of an unstable Middle East Region. Although imports have decreased substantially due in part to greater conservation measures and increased domestic production and awareness, the United States remains dependent upon imports for a majority of its petroleum needs. The National Strategic Petroleum Reserve has gradually increased since 1973, providing a limited protection against the impact of petroleum shortages.

Hydroelectric dams produce the majority of the electricity in the State of Washington. Low precipitation years may result in insufficient energy production.

EFFECTS

The major effects of energy emergencies would include economic loss for businesses and agricultural industries.

CONCLUSION

Power outages will occur. Public education and preparedness should lessen the impact of short-term power outages on people, but long-term outages will require additional support including congregate care facilities.

Future energy shortages are likely to occur due to numerous uncontrollable factors. The Washington State Energy Office has developed a Petroleum Products Contingency Plan and Electrical

Contingency Plan for dealing with various energy shortage scenarios.

I. WILDFIRE

Definition:
Wildland fire is destruction through burning of farmland or undeveloped countryside covering and extensive tract of land. Major causes of wildland fires include lightning, motor vehicles and arson. Fires adjacent to railroads are commonly touched off by sparks from trains.

NOTE: *urban type conflagrations are not considered in this HIVA due to extremely low risk factors (low population density, small & isolated number of large structures).*

HISTORY
Klickitat County and southeastern Washington are especially prone to this type of emergency. The climate of the area coupled with the chief industry of agriculture and livestock, make range fires within this area a yearly occurrence.

VULNERABILITY
Over half of Klickitat County is wildland or non-irrigated grazing land. The climate of southeastern Washington is ideal for fire proliferation. Economic impacts of a wildland fire could be high. An uncontrolled fire may also cause homes and/or businesses to be destroyed, with a potential loss of life.

EFFECTS
The effects of range fires often vary with the intensity of the fire, the area affected and the time of year that the fire occurs. The greatest short-term loss is the destruction of valuable natural resources, such as wildlife habitats, scenic vistas and watersheds. Range fires also have the potential to destroy structures, and create economic loss by destroying crops and farming machinery and animals.

CONCLUSION
The fire season usually runs from mid-May through October. However, any prolonged period of drought conditions or decreased precipitation presents a potentially dangerous situation. The probability of a fire in any specific locality on a particular day depends on fuel conditions (moisture levels, types, loading), topography, past and present weather conditions.

Mutual aid agreements have been established for the fire departments and fire protection districts in Klickitat County. Mutual Aid is along county borders, as well as with the bordering state of Oregon.

A large-scale wildland fire would be managed according to the Washington State Fire Mobilization Plan, which can bring in resources from all of Washington. These mutual aid agreements, as well as a special wildland fire strike force agreement, help to counteract the effects of reduced manpower and specialized equipment.

J. RADIOLOGICAL EMERGENCIES

HISTORY
No emergencies involving the release of radiation have occurred in Klickitat County. Emergencies have occurred at facilities that have radioactive materials in Benton County, but none have resulted in significant radiation releases.

Definition:
The spontaneous release of radioactive material from a fixed facility or transport medium due to a failure of existing safety systems.

VULNERABILITY

A radiological emergency can be generated from a number of facilities in adjacent Benton County, including research laboratories, waste storage, and decommissioned nuclear reactors at the U. S. Department of Energy's Hanford Site; the nuclear power plant Washington Nuclear Project-Plant 2; Siemens' nuclear fuel fabrication facility; and private research and development laboratories near the Hanford Site. In addition, radiological materials are transported by rail, road and barge in and around Klickitat County.

The Tri-Cities in nearby Benton and Franklin Counties have a much greater likelihood of experiencing a radiological emergency than most parts of the country, due to the combined potential from a nuclear reactor, a federal nuclear waste site, and various industries supporting both of those facilities. However, the probability compared to other types of emergencies remains low. Expected property damage from a major release would be high, both in actual damage to industry and from the economic impact of the suspicion of contamination. Impacts to life and health are also likely from a major release.

EFFECTS

The effects from a radiological emergency could range from no impact to the public to widespread contamination, evacuation, and/or permanent relocation. Radioactivity from a release may enter the human food chain via crops or dairy products, causing further contamination and severe economic impacts. The effects of a release are determined by the type of radioactive material involved, the quantity released, and the meteorological conditions. Utilities, roads and structures would be largely unaffected, except in the case of severe gross contamination which may be unable to be remediated.

CONCLUSION

A radiological emergency could occur at any time. The emergency will be a sudden onset, and could last hours, days or even weeks. Benton and Franklin County Emergency Management and other emergency response agencies spend a significant amount of time planning and preparing for such an emergency, including training emergency workers and participating in emergency exercises. Industries, which use or transport radiological materials, are governed by various state and federal agencies and regulations mandating their safe use and transportation.

K. HAZARDOUS MATERIALS

Definition:

A hazardous materials ("haz-mat") incident is the loss of containment of a material in a quantity or form that will cause severe injury and/or loss of life, significant property damage or forcing the evacuation of people from an impact area.

It can originate from a fixed facility or from any transportation medium. The manufacture, use, transportation, storage and disposal of haz-mat products poses potential risk to public health, safety & welfare, private & government properties and the environment.

HISTORY

Klickitat County has suffered both transportation and fixed facility hazardous materials accidents. Most incidents involve petroleum products, or agricultural products such as anhydrous ammonia.

VULNERABILITY

The U.S. Department of Transportation classifies a material as hazardous if it is corrosive, explosive, toxic, flammable, biologically irritating, radioactive, or packaged in a dangerous container.

These materials are regulated while in transit, and when stored on site by a variety of local, state, and federal guidelines. Federal regulations, such as Title III of the Superfund Amendments and Reauthorization Act, have made it easier for local governmental agencies to track the presence of hazardous materials in their jurisdictions.

Incidents involving hazardous materials may occur at any time, but are most likely limited to Highway 97, Highway 14, Interstate 84 (across the Columbia River in Oregon), along the petroleum products distribution pipelines, or along the Burlington Northern Santa Fe (Washington side) or Union Pacific (Oregon side) railroad lines. Some material may be carried from time to time by barge on the Columbia River as well. Bulk storage of liquefied petroleum gasses at Dallesport presents a potential site for produce release. Any uncontrolled release of a hazardous material may involve ground, water, air, or any combination thereof. HAZMAT incidents are not limited to industrial areas, they can occur on rural transportation routes, major highways, residential yards, public buildings, railroads, waterways, or remote fields.

Statistically, the majority of hazardous materials incidents are transportation related. The majority of these incidents involve petroleum products such as motor oil and fuels. Ground water supplies are particularly vulnerable in areas of shallow aquifers and, once contaminated, can be difficult and expensive to clean up. Hazardous materials incidents also may cause injury or loss of life, although these effects will likely be more localized than property damage.

EFFECTS

Hazardous materials incidents occur suddenly and can cause damage to people and property without any warning. The impact of this type of emergency can last from a few minutes to weeks, months and even years before damage to the environment could be repaired.

Any incident in which hazardous materials are involved has the potential for escalation from a relatively minor incident into a full-scale disaster. The hazardous properties of chemicals, motor fuels, radioactive substances and other potentially dangerous materials

range from highly flammable to explosive to poisonous. These chemicals have the ability to contaminate the environment with

amounts harmful to human, animal and plant life. The potential for loss of life, extensive property damage, environmental contamination, and economic loss always remains high when hazardous materials are involved.

The effects of a hazardous materials incident vary depending on such factors as the type and quantity of material(s) involved, the location, time of day, and weather conditions. In the case of airborne contaminants, wind speed and direction are extremely important for response procedures and capabilities. Mass evacuation or widespread shelter-in-place should be considered a high priority when dealing with airborne or potential airborne contamination.

CONCLUSION

Hazardous Materials pose a threat to Klickitat County due to the quantity of materials transported through the county. The paramount requirement is to continue to improve and maintain a hazardous materials management system.

This management system should emphasize to the public and industrial sectors the need to correctly report hazardous materials as outlined by Title III of the Superfund Amendments and Reauthorization Act.

Hazardous materials education is also necessary. Federal regulations outline minimum acceptable standards for response personnel. It is the ultimate responsibility of local government to ensure that its emergency response personnel are adequately trained and prepared for hazardous materials situations.

Responding to hazardous materials emergencies requires special training beyond that required of fire departments. A HAZMAT team is available through mutual aid agreements with Oregon.

L. MASS CASUALTY

Definition:

A Mass Casualty Incident ("MCI") is a medical incident that overwhelms the ability of the emergency responders and/or medical facilities to provide normal levels of care to sick & injured victims.

HISTORY

Mass casualty incidents have occurred in and around Klickitat County. Klickitat County responders have dealt with an average of one mass casualty incident per year. Mass casualty incidents may occur from transportation accidents (air, rail, or highway), major fires, natural disasters, terrorism, etc.

VULNERABILITY

The susceptibility to a mass casualty incident increases with the likelihood of all types of natural and technological disasters, including the growing threat of domestic terrorism. An MCI can occur at any time in any place. Expected property damage from an MCI is low, but injury and loss of life could be potentially very high.

EFFECTS
A mass casualty incident generally occurs without warning. Secondary effects from having emergency response personnel involved in a mass casualty incident could include decreased safety in other areas of fire and law enforcement. Public chaos is a likely possibility, especially before the victims have been identified and family notifications made.

CONCLUSION
The potential for an MCI is not restricted to any one season or set of circumstances. Planning and preparation are the key elements to coping with an MCI. Klickitat County emergency response agencies are participants in the development of a Mass Casualty Incident Plan (Pre-Hospital). This plan is exercised each year.

M. SEARCH & RESCUE

Definition:
Search & rescue ("S&R") activity can be classified into various distinct areas: wildland (or "land-based"), urban, air and underground (mining). The most immediate risk in Klickitat County is related to wildland S&R.

Wildland S&R is defined and detailed in both statute (RCW 38.52) and in the *Federal Response Plan*.

HISTORY
Conducting a wildland search & rescue ("S&R") operation is a relatively common event in Klickitat County. There are approximately five operations per year that last less than one day and are staffed by a limited number of S&R personnel, Sheriff's deputies and neighbors. Once or twice a year, a full activation of county S&R resources is made with searches lasting greater than one day. S&R resources are also used to assist adjacent counties under mutual aid agreements and with authorized mission numbers from State EMD. By statute, the Klickitat County Sheriff is responsible for the S&R operations in the county.

VULNERABILITY
The wide range of and easy access to outdoor recreational activities in the county and the large number of people who participate in those activities results in a significant number of people becoming lost and/or injured every year. Also the wildland-urban interface situation (locating of housing in wildland areas) has increased the risk of people becoming lost in areas that may only be a few minutes away from their home.

EFFECTS
Wildland S&R operations are primarily initiated, coordinated and directed by local jurisdictions in accordance with state and local jurisdictional plans, using local resources. Generally, they are of a relatively focused nature (geographically). If such operations exceed the scope or capability of local resources, requests for additional resources including special skills, expertise or equipment are coordinated through the State Emergency Management Division. This would be most prevalent in air and underground S&R operations.

CONCLUSION

Risk to the community for wildland S&R events is relatively low due to the current capability of local resources, frequent exercising of S&R operations and depth of support if necessary.

N. TERRORISM- CHEMICAL / BIOLOGICAL RADIOLOGICAL/ NUCLEAR

Definition:

Terrorism is the use of force or violence against persons or property violating the criminal laws of the United States for the purposes of intimidation, coercion or ransom.

Terrorists often use threats to create fear among the public; attempt to convince citizens that their government is powerless to prevent terrorism; and to obtain publicity for their causes.

NOTE

A separate *Terrorism Annex* has been prepared. The most common means of producing a terrorist act include use of explosives or chemical weapons, however, there exists some potential threat in the use of biological weapons, radiological weapons or nuclear weapons.

HISTORY

Recent political actions throughout the world have highlighted terrorist actions, including infamous attacks against the United States on September 11, 2001. Terrorism is the method of choice in many venues for outright warfare. As such, terrorism is now a major focus in community risk planning. There have been no known acts of terrorism in Klickitat County to date.

VULNERABILITY

Klickitat County's relatively low population density would tend to limit the potential threat of terrorist attack; however, there are several key potential targets within and near the county (details included in the *Terrorism Annex*). In addition several factors affect Klickitat County's vulnerability to a terrorist attack. Local response capabilities to manage the threat or use of Weapons of Mass Destruction are extremely limited. Issues that may be commonly encountered include:

- Difficulty in recognizing at attack as such.
- Difficulty in identifying the agent.
- Determining the most appropriate means of protection.
- Decontaminating and treating (victims, incident sites, and the environment).
- Identifying and providing appropriate treatment (initial and definitive).
- Identifying and providing diverse collateral requirements (public safety, mental health, etc.).
- Determining the appropriate disposition of the deceased.

EFFECTS

The effects of terrorism can vary significantly from massive loss of life and property damage, to nuisance service interruptions. Threatened services include electricity, water supply, public transportation, communications and public safety. With the relatively low density of population, terrorist opportunities to inflict mass casualties are very limited.

CONCLUSION

History and community demographics suggest a low probability of terrorist activity in Klickitat County. While the proximity to some key targets and the relatively low capability to handle terrorist actions are significant, the general risk to the community is low.

6. ATTACHMENTS

ATTACHMENT 1

PALMER INDEX

Palmer Index (Wayne C. Palmer, U.S. Weather Bureau, Research Paper No. 45 "Meteorological Drought," February 1965). This index is computed using a complex formula designed to indicate the cumulative effect of prolonged departures from normal moisture. It takes into account the intensity and duration of abnormally wet or dry weather periods using several parameters, including: (1) temperature, (2) precipitation, (3) evaporation and transpiration, (4) runoff, and (5) soil moisture. Current and antecedent moisture data are compared to long-term averages for each climatologically division to derive a single index number which normally falls within a -6 to +6 range.

Above +4	Extremely Wet
+3 to +4	Severely Wet
+2 to +3	Moderately Wet
-2 to +2	Near Normal
-2 to -3	Moderate Drought
-3 to -4	Severe Drought
Below -4	Extreme Drought

ATTACHMENT 2 RICHTER SCALE

Each point on the Richter Scale represents about a tenfold increase in the power of an earthquake.

8.9	Damage nearly total. Lines of sight distorted. Large rock masses displaced; objects thrown in the air.
8.0	Damage severe to wood structures. Few masonry buildings stand. Bridges, underground pipes destroyed.
7.9	Most masonry, wood structures gone; large landslides and serious damage to dams and dikes. Rails bend slightly.
7.0	Conspicuous cracks in ground. Masonry heavily damaged; serious damage to reservoirs and pipes broken.
6.9	Steering of autos affected. Chimneys, stucco and masonry walls collapse. Frame houses move; cracks in wet ground.
6.0	Difficult to stand. Fall of plaster. Hanging objects shake; small slides; noticed by drivers and waves on ponds.
5.0-5.9	Felt by all. People walk unsteadily. Glass breaks. Furniture moves. Objects fall from shelves.
4.0-4.9	Felt outdoors by most people. Sleepers awakened; doors swing closed. Pictures move. Some plaster breaks.
3.0-3.9	Felt indoors. Vibrations feel like passing of light trucks. May not be recognized as an earthquake.

ATTACHMENT 3

MODIFIED MERCALLI INTENSITY SCALE
(ABBREVIATED)

I. Not felt except by a very few under especially favorable circumstances.

II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.

III. Felt quite noticeably indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration similar to the passing of a truck. Duration estimated.

IV. Felt indoors by many, outdoors by few during the day. At night, some awakened, dishes, windows, doors disturbed; walls make creaking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.

V. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.

VI. Felt by all; frightened a run outdoors. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.

VII. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken.

VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse. Damage will be great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.

IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage will be great in substantial buildings with partial collapse. Buildings shifted off foundations.

X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

XI. Few, if any, (masonry) structures remain standing. Bridges destroyed.

XII. Damage total. Lines of sight and level distorted. Objects will be thrown into the air.