TILLAMOOK COUNTY

HAZARD ANALYSIS

January 25, 2009

Developed and Completed
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OEM-FEMA HAZARD ANALYSIS METHODOLOGY

Conducting the hazard analysis described in this guidance is a useful first step in planning for mitigation, response, and recovery. The method that follows provides the jurisdiction with a sense of hazard priorities, or relative risk. It doesn't predict the occurrence of a particular hazard, but it does "quantify" the risk of one hazard compared with another. By doing this analysis, planning can first be focused where the risk is greatest.

CATEGORIES USED IN CONDUCTING THIS HAZARD ANALYSIS:

HISTORY (weight factor = 2)

The record of previous occurrences; examples of events to include in assessing history of a hazard in your jurisdiction are events for which the following types of activities were required:

- The EOC or alternate EOC was activated;
- Three or more EOP functions were implemented, such as alert and warning, evacuation, shelter, etc.;
- Multi-jurisdictional response was required; and/or
- A "Local Emergency" was declared.

These criteria are not exclusive. Include any events you think are significant.

VULNERABILITY (weight factor = 5)

The percentage of population and property likely to be affected

MAXIMUM THREAT (weight factor = 10)

The maximum percentage of population and property that could be impacted under a worst-case scenario

PROBABILITY (weight factor = 7)

The likelihood of future occurrence within a specified period of time

By multiplying the "severity rating" of the rating system shown on page 3 by the weight factors associated with the categories above, we can arrive at a subscore for history, vulnerability, maximum threat, and probability for each hazard. Adding the subscores will produce a total score for that hazard.

For example, look at "landslide" on the Sample Hazard Analysis Matrix shown on page 3. The history of landslides is high in the sample jurisdiction. History has a weight factor of two (2), and in this case, high is scored with ten (10) points for the severity rating. 2 X 10 = subscore of 20. The vulnerability of the sample jurisdiction is medium, however: a landslide normally would not affect much more than 1% of the people and property in the jurisdiction. Vulnerability has a factor weight of five (5) and this team has decided on four (4) points for the severity rating. 5 X 4 = subscore of 20. After figuring maximum threat and probability, the total score for landslides is 133.

The total score isn't as important as how it compares with the total scores for other hazards the jurisdiction faces. By comparing scores, the jurisdiction can determine priorities: Which hazards should the jurisdiction be most concerned about? Which ones less so?

Also, provide a narrative or write-up on those hazards receiving the highest total scores in your jurisdiction, e.g., you may include history, areas of vulnerability, areas of planned or current mitigation measures, maps and displays, or any other facts or data that may be relevant.

POSSIBLE HAZARDS TO CONSIDER:

NATURAL HAZARDS

Most jurisdictions should examine (score) droughts, earthquakes, fires (especially wildland-urban interface or "WUI" fires), floods, landslides and debris flows, windstorms, and winter storms (snow and ice).

Where it applies, jurisdictions should develop scores for coastal erosion, tsunamis, possibly tornadoes, and volcanic hazards (score direct hazards such as blast and lahars separately from secondary hazards such as ash).

Please do not create a "catchall" category for "severe weather," but rather score floods, windstorms, and snow/ice separately. Even the term "winter storm," though used frequently around the state, means different things in different places. For example, a winter storm on the South Coast is typically very different from a winter storm in the Columbia River Gorge.

TECHNOLOGICAL/PERSON-CAUSED HAZARDS

Jurisdictions should develop scores for the dam failure hazard and hazardous materials. You may score fixed site and transportation hazards separately; some jurisdictions score radiological hazards separately.

Though not required as part of this analysis, at your option, you may want to score riots and acts terrorism.

HAZARD ANALYSIS MATRIX
WORKSHEET

JURISDICTION: Tillamook County, Oregon

Hazards	Severity Rating	History WF = 2	Vulnerability WF = 5	Maximum Threat WF = 10	Probability WF = 7	Total Score
Flood	WF X SR Subscore	2 X 10 = 20	5 X 10 = 50	10 X 10 = 100	7 X 10 = 70	240
Winter Storm	WF X SR Subscore	2 X 10 = 20	5 X 10 = 50	10 X 10 = 100	7 X 10 = 70	240
Wind Storm	WF X SR Subscore	2 X 10 = 20	5 X 10 = 50	10 X 10 = 100	7 X 10 = 70	240
Land Slide	WF X SR Subscore	2 X 10 = 20	5 X 10 = 50	10 X 10 = 100	7 X 10 = 70	240
Earthquake	WF X SR Subscore	2 X 3 = 6	5 X 10 = 50	10 X 10 = 100	7 X 8 = 56	212
Hazardous Material	WF X SR Subscore	2 X 5 = 10	5 X 10 = 50	10 X 10 = 100	7 X 8 = 56	216
Tsunami	WF X SR Subscore	2 X 10 = 20	5 X 10 = 50	10 X 10 = 100	7 X 7 = 49	209
Fire (WUI)	WF X SR Subscore	2 X 7 = 14	5 X 8 = 40	10 X 10 = 100	7 X 7 = 49	203
Dam Failure	WF X SR Subscore	2 X 6 = 12	5 X 10 = 50	10 X 10 = 100	7 X 5 = 35	197
Utility Failure	WF X SR Subscore	2 X 9 = 18	5 X 10 = 50	10 X 8 = 80	7 X 8 = 56	181

DATE: January 2009

WF = weight factor

SR = severity rating

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AGENCY: Tillamook County Department of Emergency Management

HAZARD ANALYSIS MATRIX
WORKSHEET

JURISDICTION: Tillamook County, Oregon

Hazards	Severity Rating	History WF = 2	Vulnerability WF = 5	Maximum Threat WF = 10	Probability WF = 7	Total Score
El Nino / La Nina	WF X SR Subscore	2 X 8 = 16	5 X 8 = 40	10 X 8 = 80	7 X 6 = 42	178
Resource Shortage	WF X SR Subscore	2 X 5 = 10	5 X 8 = 40	10 X 8 = 80	7 X 6 = 42	172
Bio Hazard	WF X SR Subscore	2 X 4 = 8	5 X 8 = 8	10 X 6 = 60	7 X 8 = 40	164
Volcanic	WF X SR Subscore	2 X 2 = 4	5 X 7 = 35	10 X 3 = 30	7 X 7 = 49	118
Pest Infestation	WF X SR Subscore	2 X 5 = 10	5 X 2 = 10	10 X 4 = 40	7 X 7 = 49	109
Dust/Sand Storm	WF X SR Subscore	2 X 5 = 10	5 X 2 = 10	10 X 3 = 30	7 X 5 = 35	85
Civil Disobedience	WF X SR Subscore	2 X 4 = 8	5 X 7 = 35	10 X 3 = 30	7 X 4 = 28	81
Terrorism / War	WF X SR Subscore	2 X 2 = 4	5 X 5 = 25	10 X 3 = 30	7 X 3 = 21	65
Drought	WF X SR Subscore	2 X 2 = 4	5 X 2 = 10	10 X 2 = 20	7 X 3 = 21	55
Other Hazards	WF X SR Subscore	2 X 4 = 8	5 X 2 = 10	10 X 2 = 20	7 X 2 = 14	0-54

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TILLAMOOK COUNTY NATURAL HAZARDS

HAZARDS ANALYSIS:

Based on the hazards analysis criteria shown above, the following hazards are considered to be of greatest risk to Tillamook County:

1. FLOOD / HEAVY RAIN — 240 Points

Floods represent the most common and best known of the hazards within Tillamook County. Flooding generally occurs quickly due to heavy concentrated rainfall. It can be confined to one river system or affect all 7 river systems within the County. Tidal changes coupled with high winds and/or snow accumulation at higher elevations has influence on the severity as well. Flood season is in effect from November 1 through March 31.

2. WINTER STORM / FREEZING RAIN / ICE AND SNOW — 240 Points

This hazard is limited mostly to the mountain passes in Tillamook County rather than the populated area in most cases. The hazard does result in travel hazards out of the County and both localized and large-scale power outages, which are more serious with the low temperatures.

3. WINTER STORM / HIGH WIND — 240 Points

This hazard is common in Tillamook County and usually results in localized power outages or large scale power outages, which can affect all of Tillamook County. Windstorms can reach hurricane strength in the exposed areas and damage to homes and property is not unusual during the winter months.

4. LANDSLIDE OR SUBSIDENCE — 240 Points

This hazard is the down slope movement of rock, soil, or other debris or the opening of sink holes. These hazards are often associated with other incidents such as heavy rainfall, snow melt run-off, floods or earthquakes. Our past history has been that we have frequent landslides during the rainy months on our mountain roads, highways, and city streets.

We have seen new landslide hazard within Tillamook County with the sloughing of ocean beaches, particularly in The Capes area of Netarts-Oceanside. Beach landslides in addition to regular landslides we have experienced have increased this hazard in its severity level for the County.

5. EARTHQUAKE 212 Points

This hazard is created by tectonic movement within the earth's crust. This movement is manifested as localized ground shaking and/or soil liquefaction. After the initial seismic event, tremors or aftershocks can occur for an extended period of time resulting in additional structural damage to buildings and public facilities. In addition to fault lines throughout the Willamette Valley which could result in damage to us, we have the additional Cascadia Subduction Zone approximately 65 miles off the Oregon coastline. The movement of the Pacific Plate and Juan de Fuca Plate with the North American Plate would create a much more serious situation due not only to the magnitude of the earthquake itself, but also the tsunami which would immediately be generated.

6. HAZARDOUS MATERIAL RELEASE 216 Points

Tillamook County has several businesses and industries that use hazardous materials on a daily basis and are regulated by the US Environmental Protection Agency. Under SARA title III, these facilities are identified with the amount of product stored at fixed facilities. Hazardous materials are a threat to us because of the ever-increasing use of materials which pose a serious threat to life, property and the environment. These products, which are used in agricultural, and industrial technologies, as well as home use, are becoming increasingly complex with many new products developed and introduced annually. Incidents involving the release of hazardous materials may occur during handling at industrial facilities using such materials or during the transportation of such materials. A release of these chemicals could have a significant risk to our population and would require an immediate response to protect our communities.

7. TSUNAMI 209 Points

This is a series of traveling ocean waves of extremely long length and period, generated by disturbances associated with earthquakes. As it enters the shoaling water of coastlines in its path, the velocity of its waves diminishes and wave height increases. In shallow waters they can crest to heights of more than 100 feet and become a threat to life and property. Our coastline is particularly vulnerable with many homes and small communities in need of early warning.

8. FOREST FIRE 203 Points

A major threat in the County is forest fire in the large amount of public and private forest lands. Approximately 70% of the County is forested, with most used by the public for recreation and the forestry industry. There is a high forest fire hazard particularly during the dry months of August, September and October.

9. UTILITY FAILURE 181 Points

Utility failures are a common occurrence in Tillamook County. Many of our small communities are without power and other essential services when these incidents occur. They are most common during wind storms since most of our utilities are above ground and susceptible to falling trees, landslides, ice and wind. Failures can provide a high hazard for our, at-risk population.

10. El NINÕ / LA NINÃ 178 Points

Water temperatures in the Pacific Ocean play an important factor in determining the severity of localized weather patterns. Some of our worst flood events coincide with a La Nina where water temperatures are below average along the equator. Likewise, the El Nino sets up most of the weather pattern south of us, which can lead to dry or drought conditions. On the one hand we are at higher risk for flood and severe weather patterns, and the other condition leads us to a higher wild land fire hazard or drought.

11. DAM/LEVEE FAILURE 197 Points

Tillamook County has two (2) high hazard dams, Barney Reservoir located at the head waters of the North Trask River and the McGuire Dam located at the head waters of the Nestucca River. Historically, a dam failure occurred at the Meadow Lake Dam in 1964, which prompted an evacuation and destruction to homes, roads and bridges along the Nestucca River. In the event of a Cascadia Subduction Earthquake both dams have a very high probability of failure. Additionally, an act of terrorism is also possible. Warning systems have been developed by Tillamook County Emergency Management and Oregon State Dam Safety and is reviewed and updated annually. The Shilo Levee protects the commercial zone located along North US 101 in the City of Tillamook and poses a significant threat if the structure were to fail. Other levees and dams are hazards throughout the County though on a much smaller degree.

12. RESOURSE SHORTAGE 172 Points

Most transportation routes in Tillamook County are susceptible to blockage due to landslides, floods or downed trees. This creates a special problem for re-supplying our stores, gas stations and even medical supplies. Our helicopter landing pad at our hospital is usually under water during high tide and flood conditions which compound the problem. In a mass casualty incident we will need supplies to augment our one mass casualty trailer located in Central County.

TILLAMOOK COUNTY TECHNOLOGICAL HAZARDS

HAZARD ANALYSIS:

13. BIO HAZARDS 164 Points

We are also susceptible to bio hazards which can lead to an epidemic, or overwhelm the limited resources of the County. Influenza can affect our at-risk population and limited health care and EMS system. The Tillamook County Heath Department monitors our vulnerability on a daily basis.

14. VOLCANIC 118 Points

Another hazard experienced in Tillamook County includes volcanic ash fall. The eruption of the Mount St. Helens volcano created 4-6 inches of ash fallout. An epidemiological emergency could occur particularly within the farming community. The volcanic ash was very difficult to remove from our road systems which damaged most of our sweepers and other road maintenance equipment. A snow plow was utilized for the best result during the Mount St. Helens incident.

15. PEST INFESTATION 109 Points

Pest infestation can destroy our timber industry and can have a devastating effect on our community. Pest infestation such as West Nile Virus can have limited impacts on our community and would have a higher risk factor on our senior citizens, children and individuals with chronic illnesses. These and other diseases can have serious health concerns including death for our at-risk population. Other diseases and heath concerns can lead to a localized epidemic if not properly managed.

16. DUST STORM / SAND STORM 85 Points

Dust Storms are rare in Tillamook County; however, our coastal community does suffer from blowing sand or sand storms. Cape Kiwanda has had drifting sand cover several homes to the roof line which creates special problems for digging out and moving these large drifts. This has happened a few times in the last decade. State Parks and local contractors work together in addressing this problem.

17. CIVIL DISOBEDIENCE 81 Points

Civil unrest historically, can be ignited by economic hardship, resource shortages and racial tensions, or frustrations after a disaster, where the victim's may have lost property and loved ones. Most of the time if the community has a good forum to discuss and mitigate outstanding issues can defuse potential disturbances.

18. TERRORISM / WAR 65_Points

Tillamook County may be subject to attack to a Terrorist event. Tillamook has important infrastructure and other targets. Wars have also marked our County during World War II where Tillamook had a Naval Air Base and U.S. Air Force Radar Site. Most coastal communities have some risk of being attacked by sea or air.

19. DROUGHT 55_Points

Historically, Tillamook County has very few drought years. However, when drought conditions prevail, our farmers and livestock can suffer catastrophic losses. Milk production is hindered due to the lack of feed produced and the costs can overwhelm our local farms. Tillamook County has over 40,000 dairy cows located throughout the county and a drought can seriously affect our local and state economy. Additionally, the Tillamook Forest and Federal Forest lands are more susceptible to disease and wild land forest fires during drought.

20. OTHER HAZARDS 1-54 Points

Other hazards, which may pose a risk to citizens of Tillamook County, may include Fog Hazards, High Surf Hazards, Civil Disturbances, acts of Terrorism or act of War, and other Hazards. All could have limited impacts on our community and would have more of an economic impact than life threatening risks.