RISK OVERVIEW

Hazard Identification

This section begins the risk assessment, which also includes hazard profiles and vulnerability assessments found in Sections 5 – 14 and Appendix A. The purpose of this section is to provide background information for the hazard identification process, as well as descriptions for the natural and technological hazards identified.

Upon a review of the full range of natural hazards suggested under FEMA planning guidance, the CVCOG and participating jurisdictions identified 12 hazards that are to be addressed in the Plan Update. These hazards were identified through an extensive process utilizing input from planning team members, preliminary hazard profiling based on the review of the 2005 Plan and a review of the current State of Texas Hazard Mitigation Plan ("State Plan"). Readily available online information from reputable sources such as federal and state agencies was also evaluated to supplement information as needed. Based on this review, nine natural hazards and three technological hazards were identified as significant as shown in Table 4-1.

Atmospheric hazards are events or incidents associated with weather generated phenomenon. Atmospheric hazards identified as significant from Table 4-1 include: thunderstorm, hail, tornado, winter storm, hurricane, and extreme heat.

Hydrologic hazards are events or incidents associated with water related damage and account for over 75 percent of Federal disaster declarations in the United States. Hydrologic hazards identified as significant includes flood and drought. For the purposes of the risk assessment, the hazard wildfire is considered "other" since it is neither atmospheric nor hydrologic.

The terms construction and maintenance of dams; the use of gas and oil pipelines; and the manufacture, transportation, storage, and use of hazardous materials are considered technological hazards. Incidents are distinct from natural hazards primarily in that they originate from human activity. While the risks presented by natural hazards may be increased or decreased as a result of human activity, they are not inherently human-induced; therefore dam failure, pipeline failure, and hazardous material release are

classified as technological hazards. Pipeline failure and hazardous material incident were assessed and summarized in Appendix A.

Table 4-1. Hazard Descriptions

HAZARD	DESCRIPTION
ATMOSPHERIC	
Extreme Heat	Extreme heat is the condition whereby temperatures hover ten degrees or more above the average high temperature in a region for an extended period.
Hailstorm	Any storm that produces hailstones that fall to the ground; usually used when the amount or size of the hail is considered significant.
Hurricane	According to the National Oceanic and Atmospheric Administration (NOAA), a hurricane is an intense tropical weather system of strong thunderstorms with well-defined surface circulation and maximum sustained winds of 74 mph or higher.
Thunderstorm	A thunderstorm occurs when an observer hears thunder. Radar observers use the intensity of the radar echo to distinguish between rain showers and thunderstorms. Lightning detection networks routinely track cloud-to-ground flashes, and therefore thunderstorms.
Tornado	A tornado is a violently rotating column of air that has contact with the ground and is often visible as a funnel cloud. Its vortex rotates cyclonically with wind speeds ranging from as low as 40 mph to as high as 300 mph. The destruction caused by tornadoes ranges from light to catastrophic depending on the intensity, size and duration of the storm.
Winter Storm	Severe winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. Blizzards, the most dangerous of all winter storms, combine low temperatures, heavy snowfall, and winds of at least 35 miles per hour, reducing visibility to only a few yards. Ice storms occur when moisture falls and freezes immediately upon impact on trees, power lines, communication towers, structures, roads and other hard surfaces. Winter storms and ice storms can down trees, cause widespread power outages, damage property, and cause fatalities and injuries to human life.
HYDROLOGIC	

HAZARD	DESCRIPTION
Drought	A prolonged period of less than normal precipitation such that the lack of water causes a serious hydrologic imbalance. Common effects of drought include crop failure, water supply shortages, and fish and wildlife mortality.
Flood	The accumulation of water within a body of water, which results in the overflow of excess water onto adjacent lands, usually floodplains. The floodplain is the land adjoining the channel of a river, stream, ocean, lake or other watercourse or water body that is susceptible to flooding. Most floods fall into the following three categories: riverine flooding, coastal flooding, or shallow flooding.
OTHER	
Wildfire	An uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase the risk for people and property located within wildfire hazard areas or along the urban/wildland interface. Wildfires are part of the natural management of forest ecosystems, but most are caused by human factors.
TECHNOLOGICAL	
Dam Failure	Dam failure is the collapse, breach, or other failure of a dam structure resulting in downstream flooding. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and severe property damage if development exists downstream of the dam.
Hazardous Material Release	Hazardous materials are substances which if released or misused can cause death, serious injury, long-lasting health effects, and damage to structure and other properties, as well as to the environment. Many products containing hazardous chemicals are used and stored in homes routinely.
Pipeline Failure	Fuel pipeline breach or pipeline failure addresses the rare, but serious hazard of an oil or natural gas pipeline. Pipeline failure is a rare occurrence, but has the potential to cause extensive property damage and loss of life.

Overview of Hazard Analysis

This risk assessment was conducted using two distinct methodologies: HAZUS-MH (FEMA's loss estimation software) and a statistical approach. Each approach provides estimates of potential impact by using a common, systematic framework for evaluation.

The HAZUS-MH risk assessment methodology is parametric, in that distinct hazard and inventory parameters (e.g., wind speed and building types) were modeled using the HAZUS-MH software to determine the impact (e.g., damages and losses) on the built environment. The HAZUS-MH software was used to estimate losses from the flood hazard.

HAZUS-MH is FEMA's standardized loss estimation software program built upon an integrated geographic information system (GIS) platform. This risk assessment applies HAZUS-MH produce regional profiles and estimate losses for the flood hazard only.

Records retrieved from National Climatic Data Center (NCDC) are reported for the named participating cities. Remaining NCDC records occurring in a named area in a county were considered in the total for county events and maximum recorded magnitude of event.

The risk assessment includes four general parameters that are described for each hazard; frequency of return, approximate annualized losses, a description of general vulnerability, and a statement of the hazard's impact.

Frequency of return was calculated by dividing the number of events in the recorded time period for each hazard by the overall time period that the resource database was recording events.

Each of the hazard profiles includes a description of a general vulnerability assessment. Vulnerability is the total of assets that are subject to damages from a hazard (based on historic recorded damages). Assets in the region were inventoried and defined in hazard zones where appropriate. The total amount of damages (including property and crop damages) for each hazard is divided by the total number of assets (building value totals) in that community in order to find out the percentage of damage that each hazard can cause to the community.

Once loss estimates and vulnerability were known, an impact statement was applied to relate the potential impact of the hazard on the assets within the area of impact.

Building Values

Table 4-2 presents the asset distribution for the CVCOG Region. Data was gathered from the 2010 U.S. Census Bureau for population and housing units. Housing units are defined as structures in which people "live" (not work, or otherwise), therefore commercial and

industrial buildings were not counted for this assessment. Building values were collected from HAZUS and include valuations from all building occupancies, which includes commercial, industrial, residential, etc. Building values are reported by millions or billions of dollars as indicated by an "M" or "B" in Table 4-2.

Table 4-2. Asset Distribution[1]

JURISDICTION	2010 POPULATION		2010 HOUSING UNITS		BUILDING VALUES	
Coke County	**3,320**		**2,667**		**$291.4 M**	
Bronte		999		473		$54.9 M
Robert Lee		1,049		636		$70.8 M
Concho County	**4,087**		**1,637**		**$187.2 M**	
Eden		2,766		581		$92.5 M
Paint Rock		273		128		$11.3 M
Crockett County	**3,719**		**1,866**		**$263.7 M**	
(No Incorporated Cities)						
Irion County	**1,599**		**856**		**$112.3 M**	
Mertzon		781		358		$38.6 M
Kimble County	**4,607**		**3,371**		**$345.1 M**	
Junction		2,574		1,270		$152.9 M
McCulloch County	**8,283**		**4,302**		**$459.6 M**	
Melvin		178		113		$8.9 M
Menard County	**2,242**		**1,702**		**$148.4 M**	
Menard		1,471		828		$69.4 M
Reagan County	**3,367**		**1,372**		**$178.8 M**	
Big Lake		2,936		1,089		N/A
Schleicher County	**3,461**		**1,489**		**$163.7 M**	
Eldorado		1,951		838		$95.8 M
Sterling County	**1,143**		**615**		**$89.1 M**	
Sterling City		888		419		$65.8 M
Sutton County	**4,128**		**2,031**		**$259.0 M**	
Sonora		3,027		1,323		$157.0 M
Tom Green County	**110,224**		**46,571**		**$6.423 B**	
San Angelo		93,200		39,548		$5.6 B

[1] Source: U.S. Census Bureau (2010), [Housing Units]: 2010 U.S. Census Bureau, [Building Values]: using RS Means construction valuations from 2006 to estimate the Building Values by Census geography.

JURISDICTION	2010 POPULATION	2010 HOUSING UNITS	BUILDING VALUES
TOTALS	150,180	68,479	$8.9 B

Potential Dollar Losses

Using the statistical risk assessment methodology, loss estimates were obtained by hazard at the city and county level. Methodology of estimations was described and is presented in summary in Table 4-3 below.

Table 4-3. Summary of Annualized Loss (AL) Estimates

COUNTY	DROUGHT[2]	FLOOD	HAIL	HURRICANE	THUNDER-STORM	TORNADO	WINTER STORM
Coke	$833,266	$52,500	Negligible	$21,838	$21,838	$18,881	$44,082
Concho	$833,266	Negligible	Negligible	Negligible	Negligible	$2,374	$26,554
Crockett	$851,786	$57,722	Negligible	Negligible	Negligible	$15,212	$26,260
Irion	$833,266	$35,167	Negligible	$253,255	$253,255	Negligible	$23,046
Kimble	$852,320	$747,778	Negligible	$5,560	$5,560	$16,205	$26,968
McCulloch	$833,266	$28,333	Negligible	$15,597	$15,597	$127,524	$27,478
Menard	$1,379,167	$36,667	Negligible	$9,948	$9,948	Negligible	$26,971
Reagan	$1,771,461	$16,667	Negligible	Negligible	Negligible	$30,144	$22,979
Schleicher	$851,786	$30,556	Negligible	$17,401	$17,401	$131,841	$26,662
Sterling	$833,266	$51,667	Negligible	Negligible	Negligible	Negligible	$23,046
Sutton	$851,786	$448,722	Negligible	Negligible	Negligible	Negligible	$27,881
Tom Green	$833,266	$101,611	$36,624	$1,600,319	$1,600,319	$3,204,683	$26,573

[2] For drought, the numbers presented are based upon the annualized expected agriculture product market value exposure. Exposure was estimated at the county level due to data limitations.
Note: Negligible is less than $5,000