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CALIFORNIA POLYTECHNIC STATE UNIVERSITY

HAZARD PROFILE OVERVIEW

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PURPOSE

This document provides a detailed overview of the potential hazards that may pose a threat to the University and surrounding areas. This Hazard Profile Overview provides information regarding probability of hazards, impacts associated with them, and past incidents that have occurred in the area.

SCOPE

This document outlines hazards associated specifically with the Cal Poly campus as well as the San Luis Obispo County Area. This document is for situational awareness purposes only and is not intended to be a response plan. For details regarding campus emergency roles, responsibilities or strategies please reference the Campus Emergency Operations Plan (EOP).

SITUATION OVERVIEW

Although many hazards may impact our area, this document provides details for those hazards that have been deemed to be substantial in our Campus Hazard Vulnerability Assessment (HVA), which takes into account hazard frequency, probably, and severity of the associated impacts. The hazards identified in this document are:

- Earthquake
- Fire
- Extreme Weather Events
- Hazardous Materials
- Terrorism/Civil Disturbance
- Transportation Accidents/Multi-Casualty
- Nuclear Power Plant

EARTHQUAKE

An earthquake is the result of a sudden release of energy in the earth's crust that creates seismic waves. Earthquakes manifest themselves by shaking oftentimes displacing the ground. If the earthquake's epicenter is located offshore, the seabed may become displaced engendering a tsunami. Earthquakes have been known to trigger landslides and in rare instances volcanic activity.

Historic Earthquakes

Where earthquakes have struck before, they will strike again. The central California coast has a history of damaging earthquakes, primarily associated with the San Andreas Fault. However, there have been a number of magnitude 5.0 to 6.5 earthquakes on other faults which have affected large portions of the Central Coast. Recent events include the December 2003 - 6.5 magnitude San Simeon Earthquake and the September 2004 - 6.0 magnitude Parkfield Earthquake.

Hazard Potential

The intensity of ground shaking at a particular site or structure is a function of many factors including: 1) earthquake magnitude, 2) distance from the epicenter, 3) duration of strong ground motion, 4) local geologic conditions (soil type and topography), and 5) the fundamental period of the structure.

A brief description of those factors is presented below:

Earthquake Magnitude: Earthquake magnitude, as generally measured by either the Richter or Moment Magnitude scale, is a measurement of energy released by the movement of a fault. As the amount of energy released by an earthquake increases, the potential for ground shaking impacts also increases.

Distance from Epicenter: Earthquake energy generally dissipates (or attenuates) with distance from a fault. Over long distances, this loss of energy can be significant, resulting in a significant decrease in ground shaking with increased distance from the epicenter.

Duration of Strong Shaking: The duration of the strong ground shaking constitutes a major role in determining the amount of structural damage and the potential for ground failure that can result from an earthquake. Larger magnitude earthquakes have longer durations than smaller earthquakes.

Local Geologic Conditions: The geologic and soil conditions at a particular site have the potential to substantially increase the effects of ground shaking. The thickness, density, and consistency of the soil, as well as shallow ground water levels, have the potential to amplify the effects of ground shaking depending on the characteristics of the earthquake. In general, the presence of unconsolidated soils above the bedrock surface can amplify the ground shaking caused by an earthquake.

Fundamental Periods: Every structure has its own fundamental period or natural vibration. If the vibration of ground shaking coincides with the natural vibration period of a structure, damage to the structure can be greatly increased. The extent of damage suffered during an earthquake can also depend on non-geologic factors. The type of building and its structural integrity will influence the severity of the damage suffered. Generally, small, well-constructed, one- and two-story wood and steel frame buildings have performed well in earthquakes because of their light weight and flexibility. Reinforced concrete structures will also usually perform well. Buildings constructed from non-flexible materials, such as unreinforced brick and concrete, hollow concrete block, clay tile, or adobe, are more vulnerable to earthquake damage.

Effects of Ground shaking

The primary effect of ground shaking is the damage or destruction of buildings, infrastructure, and possible injury or loss of life. Building damage can range from minor cracking of plaster to total collapse. Disruption of infrastructure facilities can include damage to utilities, pipelines, roads, and bridges. Ruptured gas and water lines can result in fire and scour/inundation damage, respectively, to structures. Secondary effects can include geologic impacts such as co-seismic fault movement along nearby faults, seismically induced slope instability, liquefaction, lateral spreading, and other forms of ground failure and seismic response.

Major faults in San Luis Obispo County

The California Geological Survey (CGS) records and maps faults throughout California. The Alquist-Priolo Earthquake Fault Zoning (AP) Act was passed into law following the destructive February 9, 1971 Mw 6.6 San Fernando earthquake. The AP Act provides a mechanism for reducing losses from surface fault rupture on a statewide basis. The intent of the AP Act is to insure public safety by prohibiting the sitting of most structures for human occupancy across traces of active faults that constitute a potential hazard to structures from surface faulting or fault creep. Fault zoning is continually updated and reviewed by CSG and it is likely that other faults in addition to those currently listed by CSG will be added to the list in the future.

The primary active faults identified by the AP Act include the San Andreas, San Simeon-Hosgri, and Los Osos faults. Two recent studies by CSG have estimated potential ground acceleration that could be experienced in California. Studies have estimated the maximum credible ground acceleration that could be generated by active and potentially active faults. Deterministic peak horizontal ground accelerations from these studies range from a low of 0.4 g in the central portion of the County to a high of about 0.7 g along the San Andreas, Rinconada, Oceanic-West Huasna, and coastal fault zones.

The western portion of San Luis Obispo County has a high probability of experiencing ground accelerations in the range of 0.3 g to 0.4 g in the next 50 years. The eastern portion of the County adjacent to the San Andreas Fault has a high percent probability of experiencing a peak ground acceleration of 0.5 g to 0.7 g in the next 50 years. The statistical variance in estimated ground acceleration could easily be plus or minus 50 percent of the estimated ground motion.

In 2008, the Shoreline Fault was discovered off the coast in the area of the Diablo Canyon Power Plant which is owned and operated by Pacific Gas and Electric Company (PG&E). The initial study of the fault, using conservative assumptions about the total length of the fault zone, indicates that a potential magnitude 6.5 strike-slip earthquake is possible. Follow up investigations were performed by PG&E in 2009 and 2010 and more detailed studies are planned to more accurately refine the size and potential of the fault. (Report on the Analysis of the Shoreline Fault Zone, Central Coastal California, Report to the U.S. Nuclear Regulatory Commission, January 2011, PG&E)

Other faults that are near the borders of San Luis Obispo are the West Huasna, Oceanic, and Edna faults. These faults are considered to be potentially active and present a moderate fault rupture hazard to developments in their vicinity.

Problems that may occur as a result of light-to-heavy damaging earthquakes include:

- Building Collapse-particularly unreinforced masonry structures causing mass injuries and need for rescue and evacuation
- Liquefaction-the process by which saturated, unconsolidated soil or sand is converted into a quicksand like suspension during an earthquake.
- Landslides-the down-slope movement of soil and rock
- Major Fires
- Hazardous Materials Releases
- Utility Disruptions
- Communication Disruptions leading to command and coordination problems.
- Roadway and Transportation System Interruptions
- Overloaded Medical Services (Hospital and EMS)

Tsunamis are not a concern because of Cal Poly's significant distance to the Pacific Ocean.

Both direct and indirect consequences of a major earthquake will severely stress the resources of the University and will require a high level of self-help, coordination and cooperation. Outside assistance from other local, regional, state, federal and private agencies may be delayed by more than 72 hours, depending upon the regional severity of the earthquake.

Assessment Conclusion

The University is located in a geologically complex and seismically active region. There are numerous active and potentially active faults in the County. The County has a history of damaging earthquakes, including those associated with the San Andreas Fault, but there have also been a number of magnitude 5.0 to 6.5 earthquakes which have affected large portions of the County. While it is impossible to accurately predict the next earthquake event, the probability for future damaging earthquakes in San Luis Obispo County impacting the University is high.

FIRE

1. Wildland Fires

Wildfire is an uncontrolled fire spreading through vegetative fuels, posing danger and destruction to property. Wildfires can occur in undeveloped areas and spread to urban areas where structures and other human development are more concentrated.

While some wildfires start by natural causes, humans are responsible for four out of every five which are usually the result of debris burns, arson or carelessness. As a natural hazard, a wildfire is often the direct result of a lightning strike that may destroy personal property and public land areas, especially on state and national forest lands. The predominant dangers from wildfires are:

- The destruction of vegetation, property, wildlife, and
- Injury or loss of life to people living in the affected area or using the area for recreational facilities.

Weather Influences

The climate in San Luis Obispo County is generally referred to as "Mediterranean" with warm dry summers and relatively cool, moderately wet winters. Rainfall throughout the County occurs primarily between November and April, and ranges between 20-25 inches per year in the coastal areas, to less than 10 inches per year in inland areas. Climatic conditions throughout the County range from the cool, damp coastal areas, to hot and dry inland areas. Because summers are generally warm and dry, the risk of wildfires is highest in late summer and early fall. Fog and cool weather that are common in the coastal regions help to maintain moisture levels in vegetation along the coast, which helps to minimize fire risk. The hot and dry conditions of the Santa Lucia Mountains, directly above the campus core and surrounding the outlying campus areas, can quickly dry out the vegetation resulting in an increased fire risk.

Other weather-related elements can have complex and important effects on wildfire intensity and behavior. Wind is of prime importance because as wind velocity increases, the rate of fire spread also increases. Gusty and erratic wind conditions are the norm in the Chorro Valley and the along the base of the hills and canyons directly behind the campus core. These winds can cause a fire to spread irregularly, making it difficult to predict its path and effectively deploy fire suppression forces. Relative humidity is also an important fire-related weather factor. As humidity levels drop, the dry air causes vegetation moisture levels to decrease, thereby increasing the likelihood that plant material will ignite and burn.

Fuels and Topography

A large portion of the campus is surrounded by natural vegetation. This vegetation can be grouped into approximately 14 regimes, each of which contributes varying degrees to fire hazard severity. The table outlined below depicts general vegetation communities that are found throughout the County, and those specific to the campus, and their likely relative fire hazard severity rated by fuel conditions only. The likely fire hazard severity depicted in the table can be influenced by many factors, including the age of vegetation, accumulation of dead plant material, vegetation management programs that may have been implemented, period of time since a stand of vegetation was last burned, historic climate, and topography of the region. Chaparral plant communities, found to the north of the campus core present the most significant fire hazard severity, as this type of vegetation burns with intense heat. The amount of fuel available to burn can be very high if the area is not properly managed or has not been recently burned. Controlled burning is one method that can greatly reduce the fire hazard severity for a given area. A significant increase in dead material as the result of insect or disease infestations can lead to a much higher fire hazard. The pitch canker infestation in Cambria is an example of this problem.

Fuel loading in developed areas susceptible to wildfire becomes even more complex. The introduction of some ornamental plantings as landscaping and groundcover can dramatically increase the fire loading of a neighborhood. Gazebos, fencing, patios, decks and even the structures themselves add even more fuel. Once structures become involved in fire, the problem compounds as embers cast out thousands of feet onto combustible roofs well removed from the wildland area.

Steep terrain also plays a key role in the rate at which wildfires spread, as fires will normally burn much faster uphill. Generally, when the gradient of a slope doubles, the rate of spread of a fire will also double. Steep topography also channels air flow, thereby creating erratic wind patterns. Fire suppression in steep areas is also complicated by limited accessibility, and the effectiveness of firefighters and equipment are hampered by lack of access roads.

Likely Fire Hazard Severity Rated by Fuel Conditions Only

Very High	High	Moderate
*Chaparral	*North Coast Scrub	*Riparian Woodland
	*Foothill Woodland	*North Coast Grassland

	*Juniper Oak Woodland	Evergreen Forest
		Interior Herbaceous
		Desert Scrub
		Beach Dune
		Coastal Sand Plains
		Saline Plains
		Coastal Salt Marsh
		Freshwater Marsh
***Denotes fuels found adjoining the campus**		

Historic Wildfires

San Luis Obispo County has one of the worst fire environments in the State of California for large damaging wildfires. The Las Pilitas, Chispa, Highway 41, Highway 58 and the Logan, were all large damaging fires that combined, consumed approximately 300,000 acres, scores of homes and cost millions of dollars to suppress. The Logan fire that occurred in 1997 burned 50,000 acres and cost $6 million to extinguish. No structures were lost in the Logan fire.

The Highway 41 and Highway 58 fires that occurred in 1994 and 1996 directly impacted both the main campus and outlying University properties causing widespread and substantial damage. The Highway 41 fire resulted in the destruction of 42 homes, 61 other structures, and 91 vehicles. It also cause massive power outages, shut down two major highways for over 24 hours and destroyed public radio and television transmissions. A total of 48,531 acres were burned and an estimated $10,000,000 in property loss damages occurred. The Highway 58 fire burned 106,668 acres and resulted in the loss of homes and 14 other structures.

Relationship to Other Hazards – Cascading Effects

Major wildfires can completely destroy ground cover. If heavy rains follow a major fire, flash floods, heavy erosion, landslides and mudflows can occur. After a wildfire passes through an area, the land is laid bare of its protective vegetation cover and is susceptible to excessive run-off and erosion from winter storms. The intense heat from the fire can also cause a chemical reaction in the soil that makes it less porous, and the fire can destroy the root systems of shrubs and grasses that aid in stabilizing slope material.

These cascading effects can have ruinous impacts on people, structures, infrastructure, and agriculture.

- ***Effects on people and housing:*** In addition to damage to natural environments, wildfires result in a high risk for personal injury, loss of life to inhabitants of the fire area and firefighters, and losses of structures and personal property.
- ***Effects on commercial and industrial structures:*** As mentioned in the historic wildfires section above, the effects on commercial and industrial structures can be significant. Many of the fires resulted in damaged or destroyed structures.
- ***Effects on infrastructure:*** Public utilities are often strained by the impacts of wildfire, including depletion of water reserves, downed power lines, disrupted telephone service and blocked roads. Furthermore, flood control facilities may be inadequate to handle an increase in storm runoff, sediment, and debris that is likely to be generated from barren, burned over hillsides.
- ***Effects on agriculture:*** Effects on agriculture can be devastating. In addition to the obvious impacts on crops and animals, wildfire can have deleterious effects on soil and water that will impact agriculture for an extended period of time.

Fire Hazard Reduction Efforts

A number of steps have been taken by the University to reduce the potential for wildfires. Although these measures cannot eliminate the risk of wildfire related damages, they will help to substantially reduce the associated risk. Wildfire hazard reduction measures generally include implementation by the County of the following precautions:

- ***Use fire resistant building materials and construction methods:*** Standards have been adopted to reduce the use of combustible building materials in high fire hazard areas. Standards for fire resistive building materials and construction methods are provided by the California Building Code (Chapter 7A), The California Fire Code (Chapter 47) and the Public Resources Code.
- ***Provide defensible space around structures:*** Providing a defensible space area around a structure serves a dual function of limiting fuel for the fire to approach the structure, as well as providing a position from which fire fighters can combat the blaze. Wildfire risk reduction and management practices enforced in the County include the removal or thinning of highly combustible vegetation, the use and maintenance of fire resistant plantings, providing clearings around structures and other combustible materials, and the implementation of a variety of other fuel reduction and fire prevention/ suppression measures.

- ***Provide adequate water supply:*** Water that is used for fire suppression purposes, and the pressure under which it is delivered, is referred to as "fire flow." The fire flow that would be required for a specific development is dependent upon a variety of factors, including the type of construction, the use or occupancy of the structure, and the location of surrounding structures.
- ***Provide adequate access:*** Adequate access to structures includes providing roadways that are passable by large fire-fighting equipment. This requires roadways to have adequate widths, as well as gradients, bridges, and turn-around areas that accommodate fire trucks.

2. Structure Fire

A *structure fire* is a fire involving the structural components of a building. The University has a wide range of structures from high rise (Type 1) non-combustible to single story wood frame structures (Type 5) The occupancy classifications of these buildings range from large public assemblies (A-3) to small out structures with little if any life threat. Laboratories, dormitories, apartment complexes, large office buildings all combine to produce a considerable fire loss potential in both life and property values. All structures contain fire alarm/detection systems. All residence facilities are, or will be retrofitted, to be protected by automatic fire sprinkler systems.

The National Fire Protection Association (NFPA), rates structures into five construction types for the purposes of firefighting, and are listed from least combustible to most combustible:

Type I: Fire Resistive

The material comprising the structure is either inherently able to withstand significant exposure to fire (concrete), or in which a fire resistive covering is applied to steel structural members.

Type II: Non-Combustible

Typically used in strip shopping center malls. These roofs are constructed out of steel rafters.

Type III: Ordinary Construction

Brick and mortar walls, wood frame floors. This type of construction is often found in city row houses.

Type IV: Heavy Timber

Often used in churches or other community-based buildings

Type V: Wood Frame

Typically used in recent construction of single-family dwellings, townhouses, and garden apartments with four floors.

Existing Fire Protection Services

Fire suppression services to the University are provided by the City of San Luis Obispo for the main campus and the California Department of Forestry and Fire Protection (CAL FIRE) for outlying areas.

Assessment Conclusion

The combination of available fuels, weather, and topography found in a large majority of the areas both surrounding and on the outlying areas of the campus results in the University being confronted with a considerable hazardous wildfire risk. However, the actions taken as outlined above have significantly mitigated this risk to University.

There is little to no threat of a major conflagration occurring to the structures on the campus. Well-constructed, properly maintained, abundant fire detection and automatic fire suppression systems, a good water supply and adequate access and egress all combine to reduce the threat to a very minimal level.

EXTREME WEATHER/EVENTS

The University is located in an area that has a generally mild climate and a very limited history of extreme weather. Types of extreme weather events include: extreme cold/freezing, large winter storms, wind storms, drought, and thunder storms. These events can have significant impacts on the health and safety of the population and cause major property and infrastructure damage. The duration of these events, with the exception of drought, is typically short-term. Listed below are the primary dangers associated with these events:

- Flooding
- Dam/Reservoir Failures
- Threat to life and danger to public health
- Damage/loss of personal property or crops/livestock
- Utility failures
- Interruption of the transportation network
- Interruption of communication systems

1. Historic Extreme Weather Events

January-February, 1969: In January of 1969, a series of storms delivered rainfall totals that ranged from approximately 12 inches in various parts of SLO County over an eight-day period. In February, another series of storms delivered another 5 to 10 inches. The Army Corp of Engineers reported that: "…severe damages were sustained by streets, highways, and utilities throughout the County. The sewage-treatment plants at Morro Bay, Avila Beach, and Pismo Beach were inundated by both floods. The destruction and damage of sewer lines and sewage-treatment plants at many locations posed a threat to the lives and health of many residents. Debris and raw sewage piled up on the beaches and carried in the streams posed serious threats to health until emergency cleanup operations were completed."

January, 1973: Much like the floods of 1969, the 1973 storm produced a ten-hour period of unusually heavy rainfall. Many creeks and streams throughout the County overtopped their banks and inundated a number of areas.

January and March, 1995: A series of powerful and slow-moving storms brought heavy rain and strong winds to all of Central California. Serious flooding occurred in all coastal and many inland streams. San Luis Obispo Creek caused damage in the City of San Luis Obispo, and especially near the ocean, where the San Luis Bay Golf Course and other properties received extensive damage. Cambria was completely inundated, with water as deep as six feet on Main Street. In Morro Bay 12 inches of rain fell in a 24 hour period. The community was isolated as Highway 41 was closed due to rockslides and Highway 1 was impassable due to flooding at San Bernardo Creek to the south and at Morro Creek within the City.

March, 2001: Central and Southern California were significantly impacted by a powerful storm that delivered up to six inches of rain in some of the coastal areas of San Luis Obispo County. The mountain areas of the County received even more, with reports of up to 13 inches. The heavy rain produced numerous flooding incidents.

December, 2004: A quick moving and powerful storm brought flash flooding and heavy rain to the Central Coast of California. Rainfall amounts ranged from one to three inches on the coastal plains to three to six inches in the more mountainous regions of the county. Flooding problems were reported throughout the county.

2. Flood/Dam Failure

Rainfall and inclement weather are primarily seasonal phenomena in the area which boasts a mild Mediterranean climate. Generally the rainy season is from November through March. Typical rainfall amounts range from 20 to 25 inches over most of the campus area, however higher amounts can be expected in the foothills to the north of the main campus. Flooding generally occurs in response to heavy rainfall events when streams, rivers, and drainage channels overflow their banks. Even during moderately sized storms, flooding can also occur in low-lying areas that have poor drainage.

Many factors can increase the severity of floods including; fires in watershed areas, the placement of structures or fill material in flood-prone areas, and tidal influence in low lying coastal areas. Additionally, the construction of impervious surfaces such as roadways and rooftops will result in increased runoff.

The 100-year flood, which is the standard used by most federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. Commonly misperceived, the following describes the Federal Emergency Management Agency‘s (FEMA) definition of “100-year flood”: The term "100-year flood" is misleading. It is not a flood that will occur once every 100 years. Rather, it is the flood elevation that has a one percent chance of being equaled or exceeded each year. Thus, a 100-year flood could occur more than once in a relatively short period of time.

Flood Recurrence Intervals	Percent Chance of Occurrence Annually
10 years	10.0%
50 years	2.0%
100 years	1.0%
500 years	0.2%

Source: FEMA, August 2001.

Future Probability

Flooding has not been problematic on the campus. The campus core is essentially located on a hillside. The Stenner and Brizzolara creek drainage systems, as seen in the 1995 Floods, can present varying hazards and may temporarily block access to and egress from the remote portions of the campus.

Dams and Reservoirs

There are no dams located in an area outside the campus that would cause inundation into the campus due to dam failure or overflow. However, the campus is very dependent on water supplies from both Whale Rock Reservoir and Salinas Reservoir. If either of these dams fail, the campus could face an extreme hardship and potential threat to public health and safety due to limited water supplies for an unknown length of time.

There are eight reservoirs on campus, as follows:

Name of Reservoir	Area (in acres)	Capacity (in acre feet)
Drumm	1.54	12.00
Shephers	4.8	33.95
Smith	.75	6.00
Indonesion	2.57	20.56
Middlecamp	1.37	10.96
Cheda	4.20	33.60
Chorro Creek#1	6.10	49.00
Chorro Creek #2	4.00	50.00

Drumm Reservoir **-** A complete failure would flood the Brizzolara Creek that could flood Parking Lot H-16, Farm Shop, close Via Carta and Highland Drive under the railroad bridge. Other than debris it would be open in less than an hour.

Shephard Reservoir - A complete failure would flood the new sports complex fields to the Brizzolara Creek. Highland Drive at the railroad overpass would be flooded. Opening of Highland Drive would take from two to eight hours depending on the amount of debris found under the overpass and how quickly the drains could be cleared.

Smith Reservoir - A complete failure would flood the sports complex to Brizzolara Creek. Highland Drive under the railroad overpass would flood for less than an hour depending on the debris under the overpass.

Indonesion Reservoir **-** A complete failure would flood Shephard Reservoir which in turn would fail, flooding the sports complex to Brizzolara Creek. Highland Drive underpass would flood. Total failure of both Indonesion and Shepard reservoirs would take 8 to 12 hours to restore if crew were available. Note- if all four reservoirs above failed, the resulting flood could take 24 to 48 hours to restore the underpass on Highland Drive if crews were available.

Middlecamp Reservoir **-** A complete failure of this reservoir would cause minimal damage to the campus; the resulting flood would go into Stenner Creek possibly flooding various agricultural fields along the creek. This reservoir was designed in 1995 and designed for earthquakes.

***Cheda Reservoir* -** A complete failure would cause water to flow into Stenner Creek possibly flooding various fields adjacent to the creek.

***Chorro Reservoirs* -** Both of these low at-surface reservoirs are designed to over flow into Chorro Creek.

3. Related Hazards – Cascading Effects of Storms

In addition to the threat of standing and running water, storms may pose other, more serious threats to the University. Because of the largely unconsolidated nature of the sedimentary soils found in the area, washout of the materials on which bridges and roads are built on may be a major problem. Both Stenner and Brizzolara Creek channel banks currently abut several roads. In addition, slumping of hillsides may result in sections of roads being blocked or carried away. High winds often accompany winter storms and may cause significant damage to the community. Other problems and hazards associated with flooding and inclement weather include; utility disruptions, broken power lines lying on the ground, trees damaged and blown down, and transportation route disruptions.

Utility disruptions can occur when extremely warm weather overloads the power supply grid causing forced roll brownouts or failures of the infrastructure. The cause of the disruption can be far removed geographically from the local area impacted.

A rolling blackout, also referred to as ***rotational load shedding or feeder rotation***, is an intentionally engineered electrical power shutdown where electricity delivery is stopped for non-overlapping periods of time over different parts of the distribution region. Rolling blackouts are a last-resort measure used by an electric utility company to avoid a total blackout of the power system. They are a type of demand response for a situation where the demand for electricity exceeds the power supply capability of the network. Rolling blackouts may be localized to a specific part of the electricity network or may be more widespread and affect entire countries and continents. Rolling blackouts generally result from two causes: insufficient generation capacity or inadequate transmission infrastructure to deliver sufficient power to the area where it is needed.

Rolling blackouts are also used as a response strategy to cope with reduced output beyond reserve capacity from power stations taken offline unexpectedly such as through an extreme weather event.

Assessment Conclusion

While it is impossible to predict future long range weather patterns, it is certain that the location of the campus, in close proximity to the Pacific Ocean and surrounded by mountains to the north, will continue to have a significant exposure to major winter storms. However, the campus facilities are well constructed and the campus core is situated on high ground therefore the threat from flooding events is minimal.

HAZARDOUS MATERIALS

A hazardous material is any substance, natural or man-made, that may be harmful to life or to the environment. Hazardous material incidents may occur at fixed facilities where as required by law, most likely, the occupants have filed site specific emergency response contingency and evacuation plans. Incidents may also occur along land, water or air transportation routes as a result of aircraft or other transportation accidents. Improper use of agricultural chemicals and illegal dumping will also pose a hazardous materials risk.

Hazardous material incidents differ from other emergency response situations because of the wide diversity of causative factors and the pervasiveness of the potential threat. Circumstances such as the prevailing wind and geographic features in the vicinity of emergency incidents are relevant factors that may greatly increase the danger.

The threat of a major hazardous material incident in the planning area would likely be derived from one of the following sources:

- Industrial/Agriculture
- Transportation
- Utilities-natural gas and propane
- Clandestine dumping

Industrial/Agriculture

The University currently has approximately 30 locations where hazardous materials are stored in quantities exceeding the reporting thresholds of Chapter 4, Division 2, Title 19, California Code of Regulations (Hazardous Materials Business Plan Regulations).

Transportation Related Hazardous Materials:

Transportation-Highway

Highways 1 and 101 are the major transportation routes through or near the University. Given that these State Routes are not Interstates, significant quantities of hazardous materials are not typically transported through the local area.

Transportation- Railroad

The main Union Pacific coast rail line crosses through a large portion of the University. The campus core is situated to the immediate north alongside the rail line as it transitions through the City onto the campus and then into the outlying campus areas where it crosses the large Stenner Creek trestle. It then climbs steeply through a series of switchbacks and tunnels through the mountains on its way to Santa Margarita. There is a significant potential for a hazardous materials release originating from a rail car accident.

Utilities-Natural Gas

Natural gas is a hydrocarbon gas mixture consisting primarily of methane, but commonly includes varying amounts of other higher alkanes and even a lesser percentage of carbon dioxide, nitrogen, and hydrogen sulfide. Natural gas is an energy source often used for heating, cooking, and electricity generation. It is also used as fuel for vehicles and as a chemical feedstock in the manufacture of plastics and other commercially important organic chemicals.

Natural gas service to the campus core is in place therefore the use of propane tanks and bottles are not common in this area. However propane is found in outlying areas of the campus.

Utilities-Propane

Propane is a colorless compressed gas with a faint odor at high concentrations. Fuel grades contain mercaptans which have a disagreeable odor. Propane is extremely flammable. The gas is heavier than air and may spread long distances. As a result, distant ignition and flashback are possible. It is also a simple asphyxiant which means the gas may reduce oxygen available for breathing. When there is rapid evaporation of liquid from cylinder, frostbite may occur.

Clandestine Dumping

Illegal dumping of hazardous waste (for example, clandestine methamphetamine lab solvents) can occur on both public and private property. Historically, this has not been a significant problem for the University. As the costs and restrictions increase for legitimate hazardous waste disposal sites, it can be anticipated that illegal dumping of hazardous materials will increase proportionately. Of special concern is the impact of illegal dumping into the municipal sewer systems and the associated impacts on the waste water treatment plants.

Assessment Conclusion

A hazardous spill or release could present a significant threat to both the environment and the public health of students, faculty, staff and visitors. The most serious threat, one involving a railroad incident, is difficult to mitigate. There is a very limited history of these types of events on the campus and current practices and handling procedures appear adequate.

TERRORISM/CIVIL DISTURBANCE

For planning purposes, these two types of emergencies have been combined. Since these events are crime scenes, they are initially the primary responsibility of local law enforcement until it can be determined if federal laws have been violated. When the latter occurs, the Federal Bureau of Investigation (FBI) assumes responsibility. Given the variety of events that could unfold, it is difficult to predict the extent of the emergency and the impact on the local community.

Civil Disturbance

The spontaneous disruption of normal, orderly conduct and activities in urban areas, or an outbreak of rioting or violence that is of a large nature is referred to as civil disturbance or disorder. Civil disorder is a demonstration of popular unrest that may manifest itself in acts of violence and destruction against property and human life. Civil disorder can be spurred by specific events, such as large sporting events or criminal trials, or can be the result of long-term disfavor with authority. The threat to law enforcement and safety personnel can be severe and bold in nature. Securing of essential facilities and services is necessary. Looting and fires can take place as a result of perceived or actual non-intervention by University authorities.

Terrorism

Terrorism involves a struggle between competing principles and ideologies below the level of conventional war. Principal targets include military personnel and facilities, commercial establishments, university campuses, government buildings and property, and/or any location large numbers of people congregate.

The effects of terrorist activities can vary significantly, depending upon the type, severity, scope, and duration of the activity. Terrorist activities may result in disruption of utility services, property damage, injuries and the loss of lives.

The University, when compared with major metropolitan areas, is a low population area, with moderate population density which subsequently gives the University a lower terrorism risk. Terrorist actions may include biological, chemical, incendiary, explosive, nuclear/radiological, or electronic (such as software system) attacks.

Biological Agents of Terrorism

A bioterrorism attack is the deliberate release of viruses, bacteria, or other microorganisms used to cause illness or death in people, animals, or plants. These agents are typically found in nature, but it is possible that they could be altered in order to increase their ability to cause disease, become more resistant to current medicines, or spread more easily amongst animals or humans. Biological agents can be spread through the air, through water, or in food. Terrorists may use biological agents because they can be extremely difficult to detect and do not cause illness for several hours to several days. Some bioterrorism agents, like the smallpox virus, can be spread from person to person and some, like anthrax, cannot.

Local healthcare providers must be knowledgeable of and prepared to address various biological agents of terrorism, including pathogens that are rarely seen in the United States. High-priority disease/biological agents known as Category A Biological Agents include:

- Anthrax (Bacillus anthracis)
- Botulism (Clostridium botulinum toxin)
- Plague (Yersinia pestis)
- Smallpox (Variola major)
- Tularemia (Francisella tularensis)
- Viral Hemorrhagic Fever (filoviruses and arenaviruses)

These **Category A** microorganisms pose a risk to national security because they:

- Can in most cases be easily disseminated or transmitted from person to person
- Result in high mortality rates and have the potential for major public health impact
- Might cause public panic and social disruption, and
- Require special action for public health preparedness.

The University Police Department assumes the primary role in responding to such events until the event is confirmed to be terrorism related. At that point, the FBI assumes responsibility.

TRANSPORTATION ACCIDENT/MULTI-CASUALTY

A multi-casualty incident (MCI) is one which involves a sufficient number of injured persons that overwhelm the first responding medical resources or an incident involving a significant medical hazard to a large population.

Transportation - Highway

While a very small portion of the campus is transected by Highway 1, responsibility for emergency medical service is covered by either the City or County Fire agencies depending on the exact location.

Transportation - Railroad

The main Union Pacific coast rail line transects through a large portion of the campus. The campus core is situated to the immediate north alongside the rail line as it transitions through the City into the campus and then into the outlying campus areas where it crosses a large trestle at Stenner Creek. It then climbs steeply through a series of switchbacks and tunnels through the mountains on its way to Santa Margarita. AMTRAK passenger trains utilize this line on a daily basis and present the possibility of a large scale MCI should an accident occur.

Transportation - Air Traffic

The University is not in either the takeoff or landing pattern of the SLO County regional airport which is located approximately 12 miles to the south-east.

Structure Failure

The collapse of structure due (i.e. stadium bleacher or viewing stand) to overloading or component failure is a remote possibility. The facilities on the campus are well constructed and properly managed and maintained.

Responsibility

The responsibility for overall management of a transportation event will be contingent upon the type of event that has occurred and the location. The immediate priority for these types of events is for the recovery and the medical care of the injured which will be either a City or County Fire Department and Emergency Medical System responsibility depending on Location.

NUCLEAR POWER PLANT

The **Diablo Canyon Power Plant** is an electricity-generating nuclear power plant near Avila Beach in San Luis Obispo County that resides on approximately 1,000 acres of the Pacific Coastline, approximately 13 air miles from the campus. Following the permanent shutdown of the southern California based, San Onofre Nuclear Generating Station, in 2013 Diablo Canyon is the only nuclear plant operational in the state. It has operated safely since 1985 with its two Westinghouse Pressurized Water Reactor (PWR) units that are licensed until 2024 and 2025 respectively. The two units produce a total of 18,000 gigawatt-hours of clean and reliable electricity annually, which is enough energy to meet the needs of more than three million Northern and Central Californians (nearly 10% of California's energy portfolio and 20% of the power that PG&E provides throughout its service area).

For more than 25 years, Diablo Canyon has continued to safely produce clean and reliable energy without greenhouse gases (GHG), avoiding 6 to 7 million tons per year of GHG's that would be emitted by conventional generation resources. Although the power plant was built directly over a geological fault line and is in close proximity to a second fault, it was constructed using state-of-the-art seismic supports to withstand extreme natural disasters, including earthquakes.

The plant is located in Nuclear Regulatory Commission Region IV. In November 2009, PG&E applied to the Nuclear Regulatory Commission (NRC) for 20-year license renewals for both reactors. The facility is continually inspected and assessed by Nuclear Regulatory Commission inspectors, to ensure that the facility's systems are operating safely and efficiently every day.