

# Hazard Vulnerability Assessment or HVA

It's All About Relationships!

Oregon HPP Region 2  
September 2009



## DEFINITION OF HAZARD & VULNERABILITY<sup>1</sup>

### HAZARD

- a source of danger
- a chance or chance event
- a risk
- an accident

### VULNERABILITY

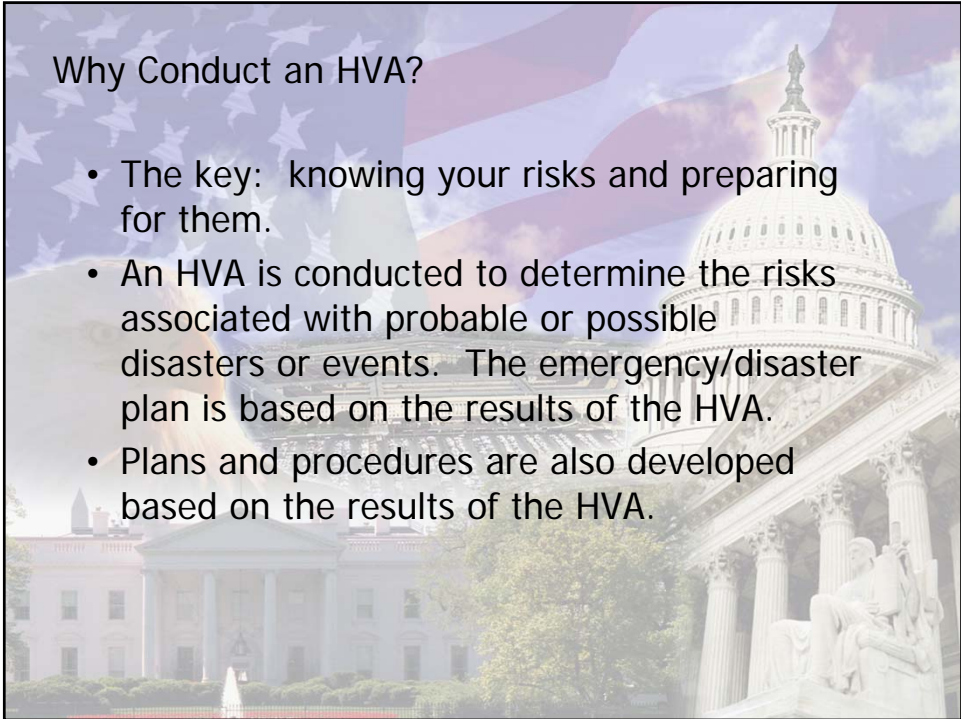
- capable of being physically or emotionally wounded
- open to attack or damage

1. Merriam-Webster Dictionary [http://www.merriam-webster.com/dictionary/hazard/](http://www.merriam-webster.com/dictionary/hazard)



## GOALS

1. Identify disaster-related hazards and associated vulnerabilities in your community.
2. Determine the risks should such disaster occur.
3. Provide leadership with objective information to guide in mitigating against hazards or responding to them.



## Why Conduct an HVA?

- The key: knowing your risks and preparing for them.
- An HVA is conducted to determine the risks associated with probable or possible disasters or events. The emergency/disaster plan is based on the results of the HVA.
- Plans and procedures are also developed based on the results of the HVA.

## Why Conduct an HVA? (cont)

- An HVA identifies the events most likely to affect your organization and the probable impact if they do occur
- Based on identified hazards, the facility should assess how prepared they are to handle them
- Depending on the evaluated level of preparedness, the facility must take necessary steps to ensure they are prepared to meet the challenges presented by the hazards

## RATIONALE FOR ASSESSING RISK

- Disaster prevention measures can be implemented following the analysis of hazards, vulnerability, and risk:
  - Prevention or removal of hazard.
  - Moving those at risk away from the hazard.
  - Providing information and education to the public to protect themselves.
  - Establishing an early warning system.
  - Reducing the impact of the disaster.
  - Increasing capacity to respond.

## WHERE DO YOU FIND THE DATA?

- Local government/emergency planner
- Local fire department
- Local hospitals
- American Red Cross (local chapter): <http://www.redcross.org>
- Salvation Army <http://www1.salvationarmy.org/>
- FEMA: <http://www.fema.gov/>
- Environmental Protection Agency: <http://www.epa.gov/>
- U.S. Department of Agriculture: <http://www.usda.gov/wps/portal/usdahome>
- U.S. Geological Survey: <http://www.usgs.gov/>
- Communities with a flood hazard (National Flood Insurance Program Coordinator): <http://www.fema.gov/nfip/>

## VARIABLE BASED ON FACTORS

- Hazard effects are variable and severity can be affected by such factors as location, occurrence time, population, impact area, intensity, duration, response capacities and capabilities and mitigation efforts taken before the occurrence.

## FEMA INFORMATION

- The Federal Emergency Management Administration (FEMA) classifies the causes of hazards as **natural**, **technological** (human caused) and **national security** events (terrorist acts, warfare, or civil disturbance).

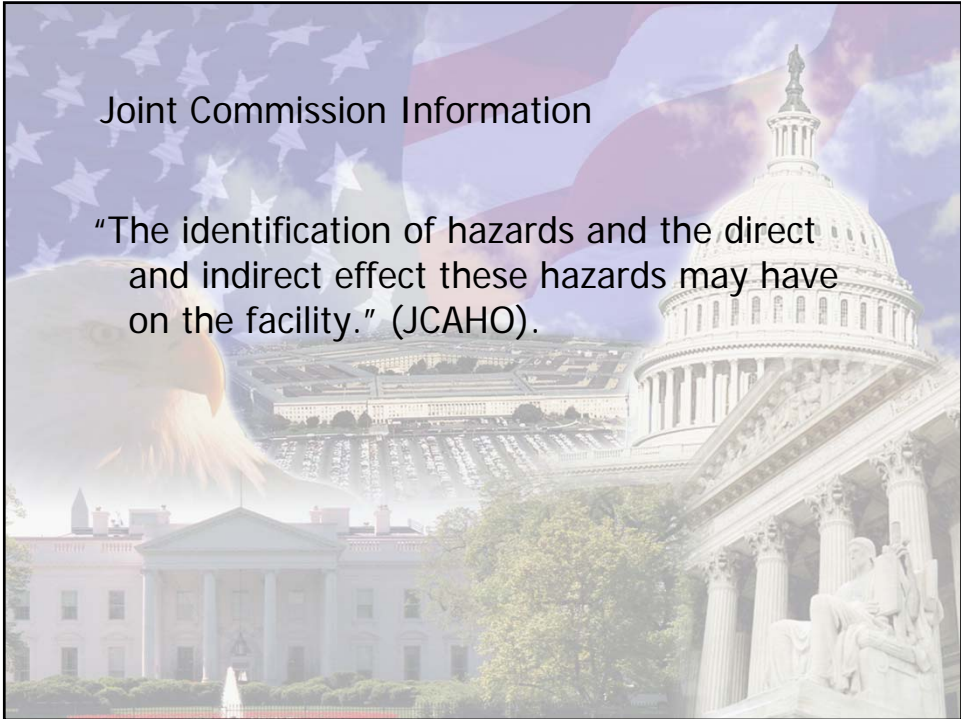
## FEMA INFORMATION (cont)

- **Natural** hazards can include, earthquakes, floods, severe weather, fires, and others.
- **Technological** hazards include unplanned hazardous materials releases, large scale transportation accidents, utility failures, and others.
- **National Security** hazards include armed attack on the country by armed military forces, terrorist attacks, sabotage and civil insurrection.



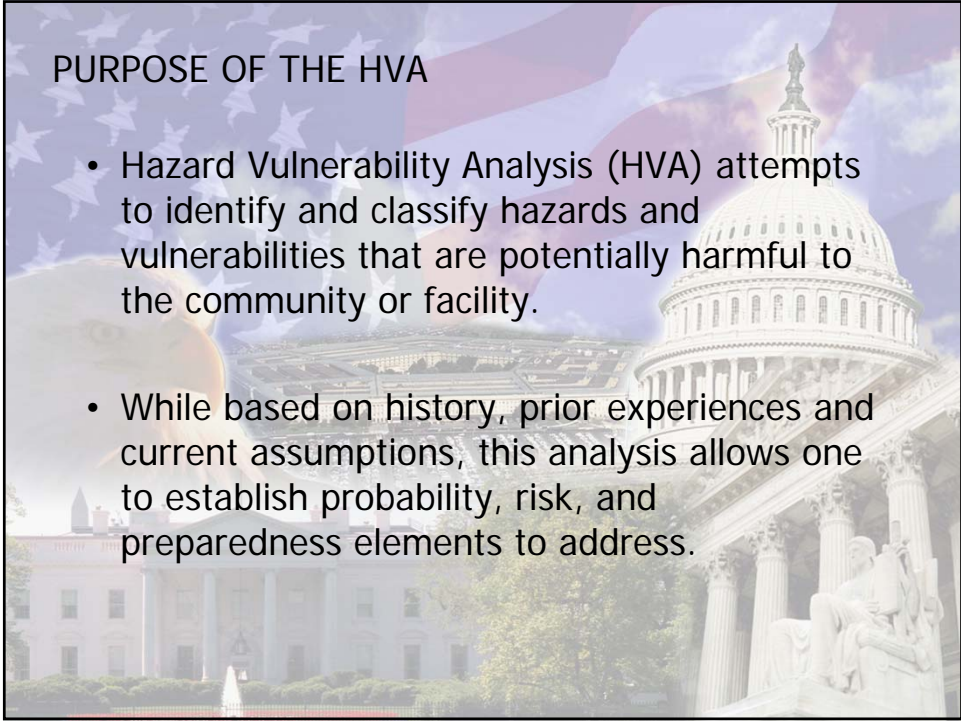
## FEMA INFORMATION (cont)

- Some hazards can either originate naturally or be human-made by design or error.
- Examples of these are fires started by man or lightning, catastrophic dam failures caused by terrorist action or by an earthquake as well as acts of bio-terrorism or naturally occurring events such as epidemics and pandemics.



## Joint Commission Information

“The identification of hazards and the direct and indirect effect these hazards may have on the facility.” (JCAHO).



## PURPOSE OF THE HVA

- Hazard Vulnerability Analysis (HVA) attempts to identify and classify hazards and vulnerabilities that are potentially harmful to the community or facility.
- While based on history, prior experiences and current assumptions, this analysis allows one to establish probability, risk, and preparedness elements to address.



## POTENTIAL HAZARDS IN A COMMUNITY

- Laboratories located in academic or other research institutions
- Agricultural facilities
- Chemical manufacturing and storage
- Dams, levies, and other flood control mechanisms
- Facilities for storage of infectious waste
- Firework factories
- Plants for food production or storage



## POTENTIAL HAZARDS IN A COMMUNITY

- Military installations
- Munitions factories or depots
- Pesticide manufacturers or storage
- Petrochemical refineries or storage facilities
- Pharmaceutical companies
- Nuclear power plants or fuel processing facilities
- Water treatment and distribution centers
- Possible terrorist targets (state/federal buildings, historical landmarks, casinos )



## HVA TOOL

- Identify hazardous events
- Estimate their probability
- Determine the effect and impact on staff and operations
- Estimate current capacities and capabilities of managing event
- Rank hazardous events to guide evolution of emergency management plan
- Assure emergency plans are responsive to hazards representing greatest threat to employees and operations



## CATEGORIES

- Probability
  - Known risk
  - Historical data
  - Manufacturer/vendor statistics
- Response
  - Time to marshal an on-scene response
  - Scope of response
  - Historical evaluation of response success



## CATEGORIES (cont)

- Preparedness
  - Status of current plans
  - Frequency of drills
  - Insurance
  - Availability of alternate sources for critical supplies/services



### CATEGORIES (cont)

- Business Impact
  - Business interruption
  - Employees unable to report to work
  - Patients unable to reach facility
  - Company in violation of contractual agreements
  - Imposition of fines and penalties or legal costs
  - Interruption of critical supplies
  - Interruption of product distribution
  - Reputation and public image
  - Financial impact/burden



### CATEGORIES (cont)

- Internal Resources
  - Types of supplies on hand/will they meet the need?
  - Volume of supplies on hand/will they meet the need?
  - Staff availability
  - Availability of back-up systems
  - Internal resources ability to withstand disaster/survivability



## CATEGORIES (cont)

- External Resources
  - Types of agreements with community agencies/drills?
  - Coordination with local and state agencies
  - Coordination with nearby/local partners
  - Coordination with regional, state, or interstate partners
  - Community resources



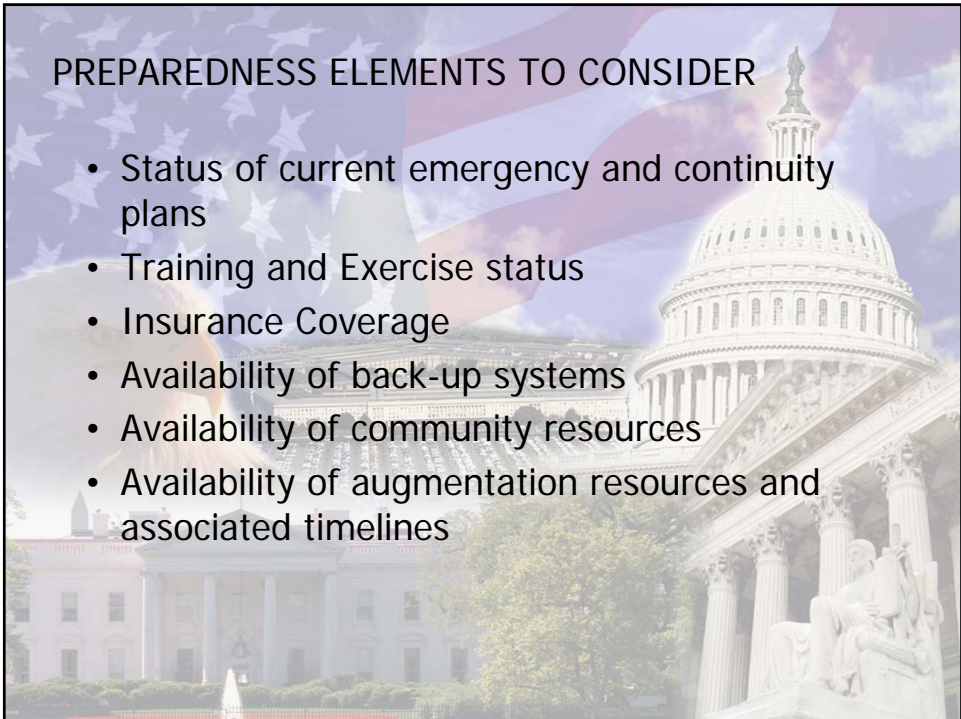
## QUALITATIVE CRITERIA USED FOR RANKING

- **HISTORY** – the number of times the event has occurred in prior years (typically set by a time period, i.e., 20 years, 50 years, 100 years)
- **VULNERABILITY** – the percentage of the population or property likely to be affected
- **MAXIMUM THREAT (SEVERITY)** - the percentage of the population or property that could be impacted
- **PROBABILITY** – the likelihood of an occurrence within a specified period of time



## RISK ELEMENTS TO CONSIDER

- Threat to life and/or health
- Disruption of services
- Damage/failure possibilities (property/utilities)
- Loss of available emergency service response
- Loss of access (transportation)
- Loss of community trust
- Ecological degradation or loss of stability
- Financial impact (economic impact)
- Legal issues



## PREPAREDNESS ELEMENTS TO CONSIDER

- Status of current emergency and continuity plans
- Training and Exercise status
- Insurance Coverage
- Availability of back-up systems
- Availability of community resources
- Availability of augmentation resources and associated timelines

# EMERGENCY MANAGEMENT MODEL EXAMPLE

WEIGHT FACTOR	2 Points	5 Points	10 Points	7 Points	TOTAL
HAZARD	HISTORY	VULNERABILITY	MAXIMUM THREAT (Severity)	PROBABILITY	
Intensity	Events in last 100 years in which citizens affected	Percent of property or population affected	Percent of property or population affected in worse-case event	Likelihood of an occurrence within specified time period	
High	4 or more events (7-10 Points)	More than 10% (7-10 Points)	More than 25% (7-10 Points)	1 incident in the next 10 years (7-10 Points)	
Moderate	2-3 events (4-6 Points)	From 1 to 10% (4-6 Points)	From 5% to 25% (4-6 Points)	1 incident in the next 50 years (7-10 Points)	
Low	1 or no event (1-3 Points)	Less than 1% (1-3 Points)	Less than 5% (1-3 Points)	1 incident in the next 100 years (7-10 Points)	
Pandemic Influenza	6 = 12	10 = 50	10 = 100	10 = 70	232
Weather Emergencies	10 = 20	10 = 50	9 = 90	10 = 70	230
Earthquake	5 = 10	9 = 45	10 = 100	9 = 63	223
Flood	10 = 20	10 = 50	8 = 80	10 = 70	220
Hazardous Materials	10 = 20	10 = 50	7 = 70	10 = 70	210
Power Failure	10 = 20	8 = 40	8 = 80	10 = 70	210
Terror Attack - WMD	2 = 4	10 = 50	10 = 100	8 = 56	210
Wildland Fire	10 = 20	6 = 30	8 = 80	10 = 70	200
Pipe Line Disruption	5 = 10	10 = 50	10 = 100	5 = 35	195
Volcano/Fallout	3 = 6	10 = 50	8 = 80	8 = 56	192
Dam Failure	2 = 4	10 = 50	10 = 100	4 = 28	182
Landslide/Debris Flow	10 = 20	1 = 5	2 = 20	10 = 70	115

# HEALTHCARE MODEL EXAMPLE

Event	Probability	Impact - Pick ONE ONLY					Preparation 2 points for every one that is tick					Relative Risk
		Life-Threatening	Health-Threatening	High Disruption	Medium Disruption	Low Disruption	Clear	Prepared	Prepared	Prepared	Prepared	
<small>Adapted from Kaiser, American Society for Healthcare Engineering and Design 7/06</small> <small>Scoring Criteria (ASHC): When in doubt, grade more severely, lean on healthcare, not emergency management</small>												
Uninterrupted Electrical Failure	2	B	B		2	1			2	2	2	2
Natural Gas Emergency	1					1						2
Water Contamination	2					1						2
Communication Failure (phones)	2				2		2	2	2	2	2	16
Supply Shortage (for whatever reason)	2											2
Device Failure	1	B	B		2	1			2	2	2	6
Fire/High winds	4					1			2	2		12
Power Transformer	4					1			2	2		12
Water Pipes	4	B	B	3				2	2	2		16
Earthquake	3	B	B	3					2	2	2	12
Pipe Work	1	B	B	3					2	2		12
Weather/Emergency	3					1			2	2		6
Flood	4	B	B	3					2	2		12
Wild Fire	2					1			2	2		6
Aviation	2					1			2	2		6
Dam Failure	1				3				2	2		6
Volcano	1					1			2	2		6
Nuclear Leak	5	B	B	3					2	2	2	18
Biological Threat	1					1			2	2	2	6
Mass Casualty Incident (more than 10 critical patients)	5	B	B			1			2	2	2	18
Mass Casualty Incident	5				2				2	2	2	18
Mass Casualty Incident (medical/nursing)	5					1			2	2	2	18
Mass Casualty Incident (medical/nursing)	4	B	B		2				2	2	2	16
Mass Casualty Incident (medical/nursing)	1					1			2	2	2	6
Mass Casualty Incident (medical/nursing)	1					1			2	2	2	6
Mass Casualty Incident (medical/nursing)	2					1			2	2	2	6
Mass Casualty Incident (medical/nursing)	2					1			2	2	2	6
Mass Casualty Incident (medical/nursing)	1					1			2	2	2	6
Mass Casualty Incident (medical/nursing)	1					1			2	2	2	6
Mass Casualty Incident (medical/nursing)	1					1			2	2	2	6

## BENEFITS OF CONDUCTING AN HVA

- Areas of Strength
- Areas of Weakness
- Justification for Funding
- Justification for Training
- Accreditation/Compliance
- Organizational Awareness
- Community Awareness

## Now What?

### Four Phases of Emergency Management



- **Mitigation**  
*Prevention to lessen effects of a potential disaster.*
- **Preparation**  
*Activity before the disaster to support/enhance response.*
- **Response**  
*Activity to address immediate and short term effects.*
- **Recovery**  
*Activity to restore functions and systems.*



## SUMMARY

- Develop and implement an adequate and appropriate all-hazards emergency management plan.
- Train and practice with everyone involved.
- Stock and maintain the resources called for in the plan.



## Contact Information

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