

# NENA Hazard and Vulnerability Analysis Operations Information Document (OID)



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## **1 Executive Overview**

This document is provided to assist Public Safety Answering Points (PSAPs) with the development of Hazard and Vulnerability Analyses. These analyses are essentially audits that provide planning tools to prevent, prepare for, respond to and recover from incidents that have the potential to adversely affect the PSAPs ability to perform its critical functions. Every PSAP is unique and this document should be used as a starting point in disaster planning.

## **2 Introduction**

### **2.1 Purpose and Scope of Document**

This document is intended as a guide for PSAP staff to review the hazards and their individual vulnerability to hazards, which may adversely impact the PSAPs ability to serve their communities. This document is not intended as a template, but as a guide to the process of hazard and vulnerability analysis.

### **2.2 Reason to Implement**

PSAPs are critical for the safety and security of the public. The potential for manmade and/or natural occurrences to prevent a PSAP from receiving, processing, dispatching and monitoring incidents places the public and first responders in danger. It is therefore incumbent on PSAP administrators to prepare for such occurrences.

### **2.3 Reason for Reissue**

NENA reserves the right to modify this document. Whenever it is reissued, the reason(s) will be provided in this paragraph.

### **2.4 Recommendation for Standards Development Work**

This document is intended to be used as a guide to assist with disaster planning. Current and future Standards regarding equipment, infrastructure and capability should be used to assist with disaster planning. In particular, the National Fire Protection Association (NFPA) Standard 1221 and the NENA Communications Center/PSAP Disaster and Contingency Plans Model Recommendations should be utilized.

### **2.5 Cost Factors**

PSAPs that require or desire to adequately prepare for disaster will incur expenses. These expenses will be unique to each PSAP based on their current resources and planning goals. Administrators are urged to look beyond the cost of planning and prevention to the potential cost of system failure.

## 2.6 Acronyms/Abbreviations

Some acronyms/abbreviations used in this document have not yet been included in the master glossary. After initial approval of this document, they will be included. Link to the master glossary is located at <http://www.nena.org/?page=Glossary>.

<b>The following Acronyms are used in this document:</b>	
NFPA	National Fire Protection Association
ANI	Automatic Number Identification
ATIS	Alliance for Telecommunications Industry Solutions
PSAP	Public Safety Answering Point
ACD	Automatic Call Distribution
UPS	Uninterruptible Power Supply
CAD	Computer Aided Dispatch
AVL	Automatic Vehicle Location
ALI	Automatic Location Identification
<b>The following <i>new terms</i> are included in this document:</b>	
Automatic Vehicle Location (AVL)	A means for determining the geographic location of a vehicle and transmitting this information to a point where it can be used.

## 3 Components of an Hazard and Vulnerability Analysis

### 3.1 Phone Network

#### 3.1.1 Customer isolation from Central Office or 9-1-1 tandems

Customer is not able to complete a phone call to 9-1-1 due to a failure of the path from the customer to the PSAP.

#### 3.1.2 Central Office Failure

Call cannot be completed due to failure of the central Office to pass call to another central office or PSAP.

#### 3.1.3 Enhanced 9-1-1 Central Office

Call cannot be completed because of a failure of the 9-1-1 tandem, selective router or other 9-1-1 specific equipment.

#### 3.1.4 ANI/ALI Failure

Call made through dialing 9-1-1 is completed, but without ANI and/or ALI.

#### 3.1.5 Contingency 10-Digit phone failure

Calls cannot be completed through 10-digit phone numbers.

### 3.1.6 Wireless 9-1-1 failures

Calls to 9-1-1 from wireless customers cannot be completed due to failure of wireless system.

## 3.2 PSAP Answering/Telephony Equipment

### 3.2.1 Selective Router

### 3.2.2 Automatic Call Distributor (ACD)

ACD does not direct calls or directs calls to unanswerable queue.

### 3.2.3 Answering Point Failure

Calls cannot be answered due to failure of answering equipment.

## 3.3 Physical Plant

### 3.3.1 External Power Supply

Feed from outside to the PSAP.

### 3.3.2 Back-up Power Supply

UPS/Generator Systems.

### 3.3.3 Heating, Ventilation and Air Conditioning

Both staff comfort and as a means of entry into PSAP.

### 3.3.4 Water Supply

Water supply integrity into PSAP, water leakage in critical areas (9-1-1 center, phone room and transmitter room). Flooding.

### 3.3.5 Environmental

#### 3.3.5.1 Daily Operations

Air filtration systems, UPS Battery of Gassing, outside factors.

#### 3.3.5.2 Emergency Operations

Generator impact, Air Filtration on back-up power.

### 3.3.6 Smoke/Fire detection and response

What level of smoke/fire detection is available? Does detection equipment meet NFPA 72-44 Chapter 6 Protected Premises Fire Alarm Systems?

### 3.3.7 Facility Security

Security into facility and security if facility is entered.

### 3.3.8 Grounding

Is the communications system properly grounded? Include, telephone equipment, Towers.

### 3.3.9 Facility Integrity

Is facility able to remain operational during disaster situation? Are plans in place for times when building integrity is in question?

## 3.4 Other Issues

### 3.4.1 Radio System

#### 3.4.1.1 Network Failure

What degradation will occur with radio system failure? How is the radio network protected?

#### 3.4.1.2 Wire line Failure

Does the radio system rely on wire line and what are the impacts of wire line failure?

#### 3.4.1.3 Tower Failure

Will a failure at a tower cause system-wide failure? If towers are connected via microwave is the system reversible? How is tower failure identified? Do towers meet the same level of site security as the PSAP?

#### 3.4.1.4 Interference

Are plans in place to quickly identify and correct interference issues?

#### 3.4.1.5 Radio Console

What impact is expected if radio consoles are lost? Plans should include information regarding console receive and transmit failures.

### 3.4.2 CAD/Mapping

Is CAD/Mapping secure from planned and inadvertent tampering? Does CAD/Mapping connect with the Internet in any way?

### 3.4.3 Interface Features (AVL, ALI)

### 3.4.4 Staffing

Analysis should be performed regarding reasons for staffing issues and the expected impact on service.



## 4 References

National Fire Alarm Code, 72-44, Chapter 6, Protected Premises Fire alarm Systems

National Fire Protection Association, Standard 1221, Installation, Maintenance, and Use of  
Emergency Services Communications Systems.

Alexander, David, Principles of Emergency Planning and Management, Oxford University  
Press 2002

## 5 Exhibits

### 5.1 Hazard Checklist

#### Hazard Checklist

**Hazard:**

**Brief description of scenario:**

**Location:**

**Characterization**

natural    technological    human    secondary    complex

**Probability of occurrence**

calculable    hypothesized    unknown    independent of past events    dependent of past events

**Frequency**

regular (e.g. seasonal)    some regularity    random

**Pattern of impact**

sudden catastrophe    rapid build-up (<24h)    slow build-up

**Duration**

seconds    minutes    hours    days    weeks    months    years

**Area of Impact**

widespread    local    site specific

**Short-term predictability (forecast capability)**

**Location**    predictable    variable but generally known    unpredictable

**Timing**    highly predictable    very predictable    somewhat predictable    highly unpredictable

**Warning capability**

very high    high    moderate    low    very low

**Controllability (can physical process be stopped?)**

definitely    probably    possibly    no

**General assessments**

**Vulnerability**                     very high    high    moderate    low    very low

**Risk levels**                     very high    high    moderate    low    very low

**Preparedness levels**

very effective    effective    unknown    ineffective    lacking

**Structural and semi-structural preparedness**

very effective    effective    unknown    ineffective    lacking

**Infrastructure preparedness**

very effective    effective    unknown    ineffective    lacking

**Probable future impact levels**

very effective    effective    unknown    ineffective    lacking

**Staff awareness of hazard**

very effective    effective    unknown    ineffective    lacking

**Support for mitigation and preparedness measures**

very effective    effective    unknown    ineffective    lacking

**General assessment of mitigation situation for this hazard**

very effective    effective    unknown    ineffective    lacking

## 5.2 Hazard Profile Worksheet

<b><i>HAZARD PROFILE WORKSHEET</i></b>	
<b><i>HAZARD:</i></b>	
<b><i>POTENTIAL MAGNITUDE (Percentage of the facility that may be affected):</i></b>	
<ul style="list-style-type: none"> <li>○ <b>Catastrophic:</b> More than 50 %</li> <li>○ <b>Critical:</b> 25 to 50%</li> <li>○ <b>Limited:</b> 10 to 25%</li> <li>○ <b>Negligible:</b> Less than 10%</li> </ul>	
<b><i>FREQUENCY OF OCCURRENCE:</i></b> <ul style="list-style-type: none"> <li>○ <b>Highly likely:</b> Near 100% probability in next year.</li> <li>○ <b>Likely:</b> Between 10 and 100% probability in next year, or at least one chance in next 10 years.</li> <li>○ <b>Possible:</b> Between 1 and 10% probability in next year, or at least one chance in next 100 years.</li> <li>○ <b>Unlikely:</b> Less than 1% probability in next 100 years.</li> </ul>	<b><i>PATTERN:</i></b>
<b><i>AREAS LIKELY TO BE AFFECTED:</i></b>	
<b><i>PROBABLE DURATION:</i></b>	
<b><i>POTENTIAL SPEED OF ONSET (Probable amount of warning time):</i></b>	
<ul style="list-style-type: none"> <li>○ Minimal (or no) warning</li> <li>○ 6 to 12 hours warning</li> <li>○ 12 to 24 hours warning</li> <li>○ More than 24 hours warning</li> </ul>	
<b><i>EXISTING WARNING MECHANISMS:</i></b>	
<b><i>COMPLETE VULNERABILITY ANALYSIS:</i></b>	
<ul style="list-style-type: none"> <li>○ Yes</li> <li>○ No</li> </ul>	

**5.3 Risk Assessment Worksheet**

<b>RISK ASSESSMENT WORKSHEET</b>	
<i>Area</i>	<i>Essential Facilities at Risk</i>
	<b>% of Property</b>
<input type="radio"/> Severe	
<input type="radio"/> Substantial	
<input type="radio"/> Minor	
<input type="radio"/> None	

5.4 Risk Index Worksheet

<b><i>RISK INDEX WORKSHEET</i></b>						
<b><i>Hazard</i></b>	<b><i>Frequency</i></b>	<b><i>Magnitude</i></b>	<b><i>Warning Time</i></b>	<b><i>Severity</i></b>	<b><i>Special Characteristics and Planning Considerations</i></b>	<b><i>Risk Priority*</i></b>
	<input type="checkbox"/> Highly likely <input type="checkbox"/> Likely <input type="checkbox"/> Possible <input type="checkbox"/> Unlikely	<input type="checkbox"/> Catastrophic <input type="checkbox"/> Critical <input type="checkbox"/> Limited <input type="checkbox"/> Negligible	<input type="checkbox"/> Minimal <input type="checkbox"/> 6-12 hours <input type="checkbox"/> 12-24 hours <input type="checkbox"/> 24+ hours	<input type="checkbox"/> Catastrophic <input type="checkbox"/> Critical <input type="checkbox"/> Limited <input type="checkbox"/> Negligible		
	<input type="checkbox"/> Highly likely <input type="checkbox"/> Likely <input type="checkbox"/> Possible <input type="checkbox"/> Unlikely	<input type="checkbox"/> Catastrophic <input type="checkbox"/> Critical <input type="checkbox"/> Limited <input type="checkbox"/> Negligible	<input type="checkbox"/> Minimal <input type="checkbox"/> 6-12 hours <input type="checkbox"/> 12-24 hours <input type="checkbox"/> 24+ hours	<input type="checkbox"/> Catastrophic <input type="checkbox"/> Critical <input type="checkbox"/> Limited <input type="checkbox"/> Negligible		
	<input type="checkbox"/> Highly likely <input type="checkbox"/> Likely <input type="checkbox"/> Possible <input type="checkbox"/> Unlikely	<input type="checkbox"/> Catastrophic <input type="checkbox"/> Critical <input type="checkbox"/> Limited <input type="checkbox"/> Negligible	<input type="checkbox"/> Minimal <input type="checkbox"/> 6-12 hours <input type="checkbox"/> 12-24 hours <input type="checkbox"/> 24+ hours	<input type="checkbox"/> Catastrophic <input type="checkbox"/> Critical <input type="checkbox"/> Limited <input type="checkbox"/> Negligible		
	<input type="checkbox"/> Highly likely <input type="checkbox"/> Likely <input type="checkbox"/> Possible <input type="checkbox"/> Unlikely	<input type="checkbox"/> Catastrophic <input type="checkbox"/> Critical <input type="checkbox"/> Limited <input type="checkbox"/> Negligible	<input type="checkbox"/> Minimal <input type="checkbox"/> 6-12 hours <input type="checkbox"/> 12-24 hours <input type="checkbox"/> 24+ hours	<input type="checkbox"/> Catastrophic <input type="checkbox"/> Critical <input type="checkbox"/> Limited <input type="checkbox"/> Negligible		
	<input type="checkbox"/> Highly likely <input type="checkbox"/> Likely <input type="checkbox"/> Possible <input type="checkbox"/> Unlikely	<input type="checkbox"/> Catastrophic <input type="checkbox"/> Critical <input type="checkbox"/> Limited <input type="checkbox"/> Negligible	<input type="checkbox"/> Minimal <input type="checkbox"/> 6-12 hours <input type="checkbox"/> 12-24 hours <input type="checkbox"/> 24+ hours	<input type="checkbox"/> Catastrophic <input type="checkbox"/> Critical <input type="checkbox"/> Limited <input type="checkbox"/> Negligible		
	<input type="checkbox"/> Highly likely <input type="checkbox"/> Likely <input type="checkbox"/> Possible <input type="checkbox"/> Unlikely	<input type="checkbox"/> Catastrophic <input type="checkbox"/> Critical <input type="checkbox"/> Limited <input type="checkbox"/> Negligible	<input type="checkbox"/> Minimal <input type="checkbox"/> 6-12 hours <input type="checkbox"/> 12-24 hours <input type="checkbox"/> 24+ hours	<input type="checkbox"/> Catastrophic <input type="checkbox"/> Critical <input type="checkbox"/> Limited <input type="checkbox"/> Negligible		
	<input type="checkbox"/> Highly likely <input type="checkbox"/> Likely <input type="checkbox"/> Possible <input type="checkbox"/> Unlikely	<input type="checkbox"/> Catastrophic <input type="checkbox"/> Critical <input type="checkbox"/> Limited <input type="checkbox"/> Negligible	<input type="checkbox"/> Minimal <input type="checkbox"/> 6-12 hours <input type="checkbox"/> 12-24 hours <input type="checkbox"/> 24+ hours	<input type="checkbox"/> Catastrophic <input type="checkbox"/> Critical <input type="checkbox"/> Limited <input type="checkbox"/> Negligible		

\* High, Medium, Low