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Generating Station

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**10 CFR 50.54(q)**

ATTN: Document Control Desk  
U. S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)  
Units: 1, 2, and 3  
Dockets: 50-528, 50-529, 50-530  
Licenses: NPF-41, NPF-51, NPF-74  
PVNGS Emergency Plan Revision 29**

Enclosed please find the latest revision to the PVNGS Emergency Plan submitted pursuant to 10 CFR 50.54(q).

APS has evaluated the changes incorporated into Revision 29 of the Emergency Plan and has determined the changes do not decrease the effectiveness of the Emergency Plan and the plan, as changed, continues to comply with the standards of 10 CFR 50.47(b) and the requirements of Appendix E to 10 CFR 50.

In accordance with 10 CFR 50.4(b) and NRC Regulatory Issue Summary 01-005, copies of this report are being forwarded to the NRC Region IV Administrator and the resident inspector. It is Arizona Public Service Company's position that the attached submittal, while not safeguards information, should be considered Sensitive Homeland Security Information and public release should be limited pursuant to 10 CFR §§ 9.17(a)(4) and 2.390(d)(1).

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PVNGS Emergency Plan, Revision 29  
Page 2

No commitments are being made to the NRC by this letter. Should you have questions regarding this submittal, please contact Thomas N. Weber at (623) 393-5764.

Sincerely,

*Michael J. Wueris for CDM*

CDM/SAB/DJS/kg

Enclosures:

1. Summary of Changes - PVNGS Emergency
2. Revision 29 of the PVNGS Emergency Plan

cc: B. S. Mallett (two copies / CD-ROM)  
M. B. Fields (CD-ROM)  
N. L. Salgado (CD-ROM)

**ENCLOSURE 1**  
**SUMMARY OF CHANGES**  
**PVNGS EMERGENCY PLAN**

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PVNGS – Emergency Plan, Rev. 29  
SUMMARY OF CHANGES

Page No.	Section	Description of Change
15	4.2.1.8	Revised description of the duties of the two (2) Satellite TSC Communicators as approved by NRC letter dated 03/19/04.
16	4.2.1.12	Revised description of the duties of the two (2) Shift Technical Advisors (STAs) as approved by NRC letter dated 03/19/04.
26	Table 1	Removed footnote 1 which read "One STSC Communicator position may be provided by one Shift Technical Advisor". Reduced the minimum number of STAs from three (3) to two (2) as approved by NRC letter dated 03/19/04.

**ENCLOSURE 2**  
**PVNGS EMERGENCY PLAN**  
**REVISION 29**

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# PVNGS EMERGENCY PLAN

REVISION 29

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## Introduction

PVNGS is a jointly-owned three-unit Pressurized Water Reactor (PWR) power station operated by APS. The station is located in Maricopa County, south of Wintersburg, Arizona.

The PVNGS Emergency Plan:

- Describes the organization formed and facilities available to manage emergency situations;
- Classifies emergencies according to severity of consequences;
- Defines and assigns responsibilities for emergency response actions;
- Outlines courses of action and protective measures to mitigate the consequences of an accident and to safeguard station personnel and the public;
- Presents a general post-emergency plan and organization to restore the plant to a normal operating status;
- Defines methods and processes to inform the public.

### 1.0 Definitions and Abbreviations

#### 1.1 Definitions

The following are definitions of terms commonly used in this Emergency Plan.

##### Area Radiation Monitoring System (ARMS)

An instrumentation system designed to detect abnormal area radiation levels and activate corresponding station alarms.

##### Arizona Division of Emergency Management (ADEM)

That division of the Arizona Department of Emergency and Military Affairs assigned to coordinate the cooperative effort of all nontechnical governmental agencies, including the federal government, Arizona State government and its political subdivisions, and provide the necessary direction and control of state personnel and equipment for offsite response actions during radiological emergencies. It is referred to in the Fixed Nuclear Facility Off-Site Emergency Response Plan as the Operations Directorate. ADEM is located on the Papago Military Reservation at 5636 East McDowell Road, Phoenix, Arizona.

### ADEM Communication Terminology

- Notification - the initial notice given by Palo Verde Nuclear Generating Station (PVNGS) personnel to designated governmental agencies that an emergency or newsworthy event has developed.
- Alert - the actions taken by governmental agencies receiving notification from PVNGS to place other governmental agencies in a condition of readiness to respond to an emergency condition.
- Warning - the information given to the population-at-risk concerning an actual or pending emergency at PVNGS, including appropriate protective actions to be taken by the public.

### Arizona Radiation Regulatory Agency (ARRA)

The state agency with primary offsite responsibility for carrying out radiological emergency assessment actions, coordinating the technical offsite agency response and providing protective action recommendations to the Governor/designee. It is referred to in the Fixed Nuclear Facility Off-Site Emergency Response Plan as the Technical Operations Center, the Radiological Emergency Assistance Team Center, and the Radiological Emergency Assistance Team Lab.

### Assessment Actions

Actions taken during or after an incident to obtain and process information necessary to determine the character and magnitude of the incident and to implement specific emergency measures.

### Committed Dose Equivalent (CDE)

The dose equivalent to organs or tissues of reference that will be received from an intake of radioactive material by an individual during the 50-year period following the intake.

### Committed Effective Dose Equivalent (CEDE)

The sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the Committed Dose Equivalent to these organs or tissues.

### Control Room (CR)

A CR, operating under the direction of a Shift Manager, is located in the Control Building at the 140 foot level of each PVNGS unit. The CR is the primary point at which unit conditions are monitored and controlled, and from which corrective actions are taken to mitigate an abnormal occurrence. The CR is the location where assessment and classification of an incident are initiated, and has shielding and ventilation to ensure habitability during Design Basis Accidents.

### Control Room Personnel

Shift Manager, Control Room Supervisor, Nuclear Operators and Shift Technical Advisors as defined in the PVNGS Technical Specifications.

### Corrective Actions

Measures taken to terminate an emergency situation at, or near, the source of the problem.

**County Emergency Operations Center (County EOC)**

The County EOC is located at the Maricopa County Department of Emergency Management (MCDEM) Headquarters at 2035 North 52nd Street, Phoenix, Arizona, and is the primary point through which the Chairman, Maricopa County Board of Supervisors/designee exercises coordination over county emergency response actions.

**Deep-Dose Equivalent (DDE)**

The dose equivalent at a tissue depth of 1 cm (1000 mg/cm<sup>2</sup>), which applies to external whole-body exposure.

**Dose Equivalent (DE)**

The product of the absorbed dose in tissue, quality factor, and all other necessary modifying factors at the location of interest. The units of dose equivalent are the rem and sievert (Sv).

**Effective Dose Equivalent (EDE)**

The sum of the products of the dose equivalent to each organ or tissue and a weighting factor applicable to each of the body organs or tissues that are irradiated.

**Emergency Action Levels (EALs)**

Parameters used to designate a particular classification of emergency. These parameters may include radiological dose rates, levels of airborne or waterborne activity, or instrument indications/plant parameter values.

**Emergency Coordinator (EC)**

The individual with the responsibility and authority to immediately and unilaterally initiate emergency actions, including providing notifications and Protective Action recommendations to governmental agencies responsible for implementing offsite emergency measures.

**Emergency Operations Director (EOD)**

The individual who, when the Offsite Emergency Organization is activated, is in command of Emergency Operations and has overall coordination responsibility for the onsite and offsite emergency operations. The EOD has responsibility for interfacing with governmental emergency response agencies.

**Emergency Operations Facility (EOF)**

The EOF is the focal point for overall management of an emergency at PVNGS and for coordination of onsite and offsite radiological emergency operations. It is located below grade in Building E and has shielding and ventilation to ensure habitability following Design Basis Accidents.

**Fixed Nuclear Facility Off-Site Emergency Response Plan**

The State of Arizona/County of Maricopa Plan for governmental response to emergencies at PVNGS. The Plan sets forth specific responsibilities and procedures for state, local and volunteer agencies responsible for offsite emergency operations and protection of the affected population.

**Independent Spent Fuel Storage Installation (ISFSI)**

A complex designed and constructed for the interim storage of spent nuclear fuel and other radioactive materials associated with spent fuel storage. The PVNGS Independent Spent Fuel Storage Installation (ISFSI) is located approximately 605 feet northeast of the PVNGS Power Plant Protected Area.

**Ingestion Exposure Pathway Emergency Planning Zone (EPZ)**

The Ingestion Exposure Pathway EPZ is the fifty-mile radius area centered on the vertical axis of the Unit 2 Containment Building for which protective actions for the general population, farmers, dairy farmers, ranchers, food processors and distributors are planned.

**Inplant**

The area inside the PVNGS Power Plant Protected Area perimeter fence.

**Joint Emergency News Center (JENC)**

Combined PVNGS/state/county function; located on state property adjoining the State Emergency Operations Center. The JENC is responsible for issuing news information during an Alert or higher level emergency classification.

**Nuclear Administrative And Technical Manual (NATM)**

The collection of onsite programs and procedures which prescribes how PVNGS is controlled, operated, maintained, and tested to meet the requirements of applicable licenses, standards, codes, and guides. It establishes effective management practices.

**Offsite**

The area outside the PVNGS owner-controlled boundary fence.

**Onsite**

The area outside the PVNGS Protected Area(s) but inside the PVNGS owner-controlled boundary fence.

**Operations Support Center (OSC)**

An OSC is located on the 140' level of the Auxiliary Building of each PVNGS unit. These centers serve as staging areas and support bases for emergency personnel who may relieve, and/or assist station operators during an emergency.

**Palo Verde Strategic Communications Department personnel:** At Palo Verde Nuclear Generating Station process and release information regarding an emergency to the news media during a Notification of Unusual Event and may provide a forward media location during non-radiological Alert and Site Area Emergency classifications.

Pinnacle West Energy, Generation Communications Department personnel: At Pinnacle West Corporate Headquarters, 400 N. 5th Street, Phoenix, AZ., process and release information regarding an emergency to the news media during a Notification of Unusual Event and may provide a forward media location during non-radiological Alert and Site Area Emergency classifications.

Plume Exposure Pathway Emergency Planning Zone (EPZ)

The Plume Exposure Pathway EPZ is the ten-mile radius area, centered on the vertical axis of the Unit 2 Containment Building, for which protective actions are planned.

Population-at-Risk

Persons for whom protective actions are being, or would be, implemented.

Process Radiation Monitoring System (PRMS)

An instrumentation system designed to detect abnormal radiation levels in process and effluent pathways, and to activate appropriate alarms.

Protected Area(s) (PA)

An area, located within the PVNGS exclusion area boundary, encompassed by physical barriers and to which access is controlled. The PVNGS Power Plant Protected Area and the ISFSI Protected Area are located within the PVNGS Owner Controlled Area.

Protective Actions

Emergency measures taken to avoid or reduce radiation dose. These commonly include sheltering, evacuation, and prophylaxis.

Protective Action Guides (PAGs)

The projected dose to individuals that would warrant consideration of protective action against an accidental release of radioactive material.

Recovery Actions

Post-emergency actions to restore the station to a normal operating condition.

State Emergency Operations Center (State EOC)

The State EOC is located at the ADEM Headquarters, and is the primary point through which the Governor/designee exercises overall control and coordination of governmental offsite emergency response operations.

Technical Operations Center (TOC)

The TOC is co-located with the State EOC. The TOC is the offsite location that provides for overall control of radiological technical operations.

**Technical Support Center (TSC)**

The TSC is located below grade, immediately southwest of PVNGS Building D, inside the Power Plant Protected Area. It has shielding and ventilation to ensure habitability following Design Basis Accidents.

**Total Effective Dose Equivalent (TEDE)**

The sum of the Deep-Dose Equivalent (for external exposures) and the Committed Effective Dose Equivalent (for internal exposures).

**1.2 Abbreviations**

The following are abbreviations of terms commonly used at PVNGS.

ADEM	-	Arizona Division of Emergency Management
ADV	-	Atmospheric Dump Valve
APS	-	Arizona Public Service Company
ARRA	-	Arizona Radiation Regulatory Agency
ASU	-	Arizona State University
BOP	-	Balance of Plant
BPD	-	Buckeye Police Department
CDE	-	Committed Dose Equivalent
CEDE	-	Committed Effective Dose Equivalent
CEDMCS	-	Control Element Drive Mechanism Control System
CEO	-	Chief Executive Officer
CET	-	Core Exit Thermocouple
CFR	-	Code of Federal Regulations
CR	-	Control Room
CTMT	-	Containment
DDE	-	Deep Dose Equivalent
DE	-	Dose Equivalent
DOE	-	Department of Energy
DPS	-	(Arizona) Department of Public Safety
EAL	-	Emergency Action Level
EC	-	Emergency Coordinator
EDE	-	Effective Dose Equivalent
EDG	-	Emergency Diesel Generator
EMT	-	Emergency Medical Technician
ENS	-	Emergency Notification System
EOC	-	Emergency Operations Center
EOD	-	Emergency Operations Director
EOF	-	Emergency Operations Facility
EOP	-	Emergency Operating Procedure
EPA	-	Environmental Protection Agency
EPIP	-	Emergency Plan Implementing Procedure
EPZ	-	Emergency Planning Zone

ERDS	-	Emergency Response Data System
ERFDADS	-	Emergency Response Facility Data Acquisition & Display System
ERO	-	Emergency Response Organization
ESF	-	Engineered Safety Features
FEMA	-	Federal Emergency Management Agency
FPS	-	Fire Protection System
FSS	-	Fire Suppression System
FTS	-	Federal Telecommunications System
FWLB	-	Feedwater Line Break
GPM	-	Gallons Per Minute
HP	-	Health Physics
HPN	-	Health Physics Network
HPSI	-	High Pressure Safety Injection
I & C	-	Instrumentation and Control
INPO	-	Institute of Nuclear Power Operations
ISFSI	-	Independent Spent Fuel Storage Installation
JENC	-	Joint Emergency News Center
JPIP	-	Joint Public Information Procedures
KI	-	Potassium Iodide
LAN	-	Local Area Network
LCO	-	Limiting Condition for Operation
LOAF	-	Loss of all Feed
LOCA	-	Loss of Coolant Accident
LWR	-	Light Water Reactor
MCDEM	-	Maricopa County Department of Emergency Management
MCL	-	Management Counterpart Link
MCSO	-	Maricopa County Sheriff's Office
MSLB	-	Main Steam Line Break
NAN	-	Notification Alert Network
NATM	-	Nuclear Administrative and Technical Manual
NOAA	-	National Oceanic and Atmospheric Administration
NSSS	-	Nuclear Steam Supply System
NUMARC	-	Nuclear Management and Resources Council
NWS	-	National Weather Service
OBE	-	Operating Basis Earthquake
ODCM	-	Offsite Dose Calculation Manual
OSC	-	Operations Support Center
PAG	-	Protective Action Guide
PASP	-	Preplanned Alternate Sampling Program
PBX	-	Private Branch Exchange
PIO	-	Public Information Officer
PMCL	-	Protective Measures Counterpart Link
PSIG	-	Pounds Per Square Inch Gauge
PVNGS	-	Palo Verde Nuclear Generating Station
PWR	-	Pressurized Water Reactor

QSPDS	-	Qualified Safety Parameter Display System
RAC	-	Radiological Assessment Coordinator
RCS	-	Reactor Coolant System
REAT	-	Radiological Emergency Assistance Team
RFAT	-	Radiological Field Assessment Team
RMS	-	Radiation Monitoring System
RP	-	Radiation Protection
RPC	-	Radiological Protection Coordinator
RPM	-	Radiation Protection Monitor
RPS	-	Reactor Protection System
RSCL	-	Reactor Safety Counterpart Link
RSP	-	Remote Shutdown Panel
RVLMS	-	Reactor Vessel Level Monitoring System
SGTR	-	Steam Generator Tube Rupture
SIM	-	(Control Room) Simulator
SPDS	-	Safety Parameter Display System
SM	-	Shift Manager
STA	-	Shift Technical Advisor
STSC	-	Satellite Technical Support Center
TEDE	-	Total Effective Dose Equivalent
TLD	-	Thermoluminescent Dosimeter
TOC	-	Technical Operations Center
TSC	-	Technical Support Center
UFSAR	-	Updated Final Safety Analysis Report
USNRC	-	United States Nuclear Regulatory Commission

## **2.0 Scope and Applicability**

This Emergency Plan is applicable to the Palo Verde Nuclear Generating Station (PVNGS). Specific procedures to implement the Emergency Plan are contained in PVNGS Nuclear Administrative and Technical Manual Procedures (NATM), Joint Public Information Procedures (JPIPs), and Emergency Plan Implementing Procedures (EPIPs).

The emergency response actions contained in the PVNGS Emergency Plan and those set forth in the Fixed Nuclear Facility Off-Site Emergency Response Plan are compatible and complement one another. When combined, they constitute a single and integrated program for response to emergencies at PVNGS.



### 3.0 Summary of the PVNGS Emergency Plan

The Emergency Plan is designed to adhere to U.S. Nuclear Regulatory Commission (USNRC) emergency planning regulations and guidelines applicable to Light Water Reactor (LWR) nuclear power stations. The Emergency Plan is based upon USNRC and Federal Emergency Management Agency (FEMA) guidance as contained in NUREG-0654 (FEMA-REP-1), "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants", Revision 1, and EPA guidance as contained in EPA 400-R-92-001, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents" October, 1991.

Radiological emergency planning for the Palo Verde Nuclear Generating Station has been coordinated with state and local emergency response agencies. The State of Arizona and local government agencies who may be involved in emergency response operations are aware of the emergency response measures described in the Emergency Plan and are advised of changes or modifications to these measures resulting from plan reviews, audits, drills and/or exercises.

Both the Fixed Nuclear Facility Off-Site Emergency Response Plan and PVNGS Emergency Plan contain clear-cut definitions of areas of authority and responsibility. The ADEM, acting under the direction and authority of the Governor, is responsible for overall coordination of offsite governmental emergency operations. The PVNGS Emergency Organization is responsible for onsite emergency operations and for maintaining a continuous flow of accurate plant status information to offsite emergency authorities. The Arizona Radiation Regulatory Agency (ARRA) has been assigned technical (radiological) responsibility for governmental response. Emergency operations within the Plume Exposure Pathway Emergency Planning Zone are the responsibility of Maricopa County.

Sections of the Emergency Plan in the balance of this document detail the PVNGS emergency preparedness program. The contents of those sections are summarized below:

- **Section 4.0 - Organizational Control of Emergencies** - describes the PVNGS Emergency Organization, together with details of the function and responsibilities assigned to each segment of the organization. Interface and coordinative roles with offsite emergency operations are defined. Provision is made for emergency response facilities. This section also notes local and contract support service arrangements. Table 1 provides minimum staffing requirements.
- **Section 5.0 - Emergency Conditions** - describes emergency classifications, basis for classification criteria, and corresponding utility and state/local actions in response to each emergency classification.
- **Section 6.0 - Emergency Measures** - describes the activation of the emergency organization, actions to assess emergency conditions, initiation of actions to correct emergency conditions, recommendations and institution of appropriate protective actions, and measures to aid injured and/or contaminated personnel.

- Section 7.0 - Emergency Facilities and Equipment - describes facilities and equipment (onsite and offsite) available to assess emergency conditions, to support emergency operations, to protect and treat injured/contaminated personnel, and to control incident related damage. This section also outlines communication links between onsite and offsite emergency centers and station emergency teams.
- Section 8.0 - Maintaining Emergency Preparedness - summarizes the emergency training program, describes emergency drills and exercises, outlines the organization for maintaining emergency preparedness, provides for the review and update of the Emergency Plan, and describes procedures used to maintain an adequate inventory of emergency equipment and supplies. This section also outlines methods used to provide pre-emergency protective action information to the public.
- Section 9.0 - Recovery - defines, in general terms, post-emergency re-entry and recovery plans and organizations. Recovery operations are the long term post-emergency efforts undertaken to return the station to a normal operating status.
- Sections 10.0 through 18.0 - contains reference material relevant to this Emergency Plan.

#### **4.0 Organizational Control of Emergencies**

In the event of an emergency, the PVNGS normal station operational organization is supplemented with an organization specifically designed to control emergency situations. Depending on the severity of the emergency, the PVNGS Emergency Organization may consist of an onshift emergency response organization, or of an augmented emergency organization comprised of station, corporate and contract personnel. This section describes the PVNGS Onshift, Onsite and Offsite Emergency Organizations.

##### **4.1 Normal PVNGS Organization**

The normal PVNGS organization is detailed in the PVNGS Updated Final Safety Analysis Report (UFSAR).

##### **4.2 The Licensee Emergency Organization**

The PVNGS Emergency Organization is divided into three distinct, yet coordinated, organizations: Onshift, Onsite, and Offsite Emergency Organizations.

The Palo Verde Nuclear Generating Station Onsite Emergency Organization is supported by offsite emergency centers, including the Emergency Operations Facility (EOF), the Joint Emergency News Center (JENC) and Palo Verde Strategic Communications. The Onsite and Offsite PVNGS Emergency Organizations are staffed and operational after declaration of an Alert or higher level emergency.

In the event a member of the Emergency Response Organization (ERO) minimum staff becomes incapacitated or is otherwise unavailable, they shall be replaced as soon as is reasonably possible. Unit staff who are ERO members are governed by PVNGS Technical Specification 5.2 and its exceptions.

For a Notification of Unusual Event the event is directed from the affected unit Control Room/ STSC and command of the situation remains there with the onshift Emergency Coordinator until either de-escalation/close-out or reclassification to a higher level emergency occurs. Palo Verde Strategic Communications is activated for a Notification of Unusual Event.

In the event of an Alert or higher level classification, the TSC, EOF, JENC, and OSC are fully activated and Palo Verde Strategic Communications is deactivated. The Onsite Emergency Organization is directed by the Emergency Coordinator located at the TSC. The Emergency Operations Director, located at the EOF, provides overall coordination of the Onsite and direction of the Offsite PVNGS Emergency Organizations.

#### **4.2.1 The Onshift Emergency Organization**

The Onshift Emergency Response Organization is coordinated through the Onsite Emergency Organization at an Alert or higher classification. The Onshift Emergency Organization consists of the following positions:

##### **4.2.1.1 Control Room Supervisor**

The Control Room Supervisor located in the unit control rooms, reports to the Shift Manager. The Control Room Supervisor performs initial assessment and evaluation of any abnormal or emergency conditions. After the Shift Manager declares an emergency, the Control Room Supervisor maintains the normal duties of directing the Nuclear Operators and assisting the Shift Manager.

##### **4.2.1.2 Emergency Coordinator**

The affected unit Shift Manager or designee initially assumes the responsibilities of the Emergency Coordinator. Until such time that off duty personnel can respond to staff the emergency organization, members of the normal shift organization assume emergency positions to carry out actions as described below.

For Notification of Unusual Events, the affected unit Shift Manager may choose to be relieved as Emergency Coordinator by another individual qualified as an Emergency Coordinator.

At an Alert or higher level emergency classification, the Emergency Coordinator directs the Security Director to initiate callouts to the emergency organization in accordance with the associated implementing procedure. Upon arrival of the designated Onsite Emergency Coordinator, the Onshift Emergency Coordinator conducts a briefing and is relieved as Emergency Coordinator.

At the onset of an incident, the Emergency Coordinator has the following non-delegable responsibilities:

- Notification of offsite emergency response agencies and offsite emergency organizations
- Provision of protective action recommendations as necessary to offsite emergency management agencies
- Subsequent reclassification of emergency events
- Determination of the necessity for site evacuation
- Authorization for emergency workers to exceed 10CFR20 exposure limits
- Initiate activation of onsite and offsite emergency response organizations for an Alert or higher level emergency classification

Prior to activation of the Onsite Emergency Organization, the functions of the Emergency Coordinator are performed at the Satellite TSC (STSC) in the affected unit.

#### **4.2.1.3 Emergency Repair Team**

The Emergency Repair Team reports to the Emergency Coordinator and is formed if emergency repair operations are necessary. The team consists of Maintenance Technicians and if necessary, a Radiation Protection Technician may also be assigned to the team.

#### **4.2.1.4 Fire Team**

The Fire Team reports to the Emergency Coordinator and is maintained onsite at all times. The Leader, Fire Protection Operations is responsible for ensuring sufficient members of the Fire Team are Emergency Medical Technician (EMT) qualified and available at all times.

#### **4.2.1.5 Operations Shift Personnel**

The unit Operations Shift Personnel (Nuclear Operators) report to the Control Room Supervisor and conduct the safe and proper operation of the unit at all times, and respond to emergency conditions, as necessary.

#### **4.2.1.6 Radiation Monitoring Technician**

The Radiation Monitoring Technician responds to the OSC and reports to the Emergency Coordinator. The Radiation Monitoring Technician establishes a responsible area in the Radiation Monitoring office, and conducts inplant area surveys as necessary.

**4.2.1.7 Radiation Protection Monitor**

The Radiation Protection Monitor (RPM), an ANSI 3.1 Senior Radiation Protection Technician, responds to the STSC and reports to the Emergency Coordinator. The RPM conducts offsite dose calculations until relieved by the Dose Assessment Health Physicist of the Offsite Emergency Organization. The RPM also authorizes exposures up to 10CFR20 Limits, recommends potassium iodide administration to the Emergency Coordinator, and directs inplant, onsite and offsite Survey Teams. The RPM is relieved of these responsibilities by the Radiological Protection Coordinator and Radiological Assessment Coordinator when activated.

**4.2.1.8 Satellite TSC Communicator (2)**

The Satellite TSC (STSC) Communicator is initially assumed by a Nuclear Operator or an Operations Technician and reports to the Emergency Coordinator. Upon direction from the Emergency Coordinator, the Satellite TSC Communicator makes the initial notifications to licensee ERO and state and local agencies. When relieved of this responsibility by the Government Liaison of the offsite organization, the position may serve as the communicator and logkeeper in the STSC. A second STSC Communicator is filled by an individual knowledgeable of the plant (e.g., RO, SRO, STA, previously licensed individual, etc). The communicator maintains an open line of communications with the NRC, as requested. This communicator should not have any other E-Plan [PVNGS EP] collateral duties (or other duties that interfere with the communicator function).

**4.2.1.9 Security Director**

The Security Director responds to the TSC and reports to the Emergency Coordinator. The Security Director (assumed by the onshift Security Section Leader) provides for continued personnel accountability, site access control and performs the call-out of the emergency organization, upon direction from the Emergency Coordinator.

**4.2.1.10 Security Force**

The Security Force reports to locations as directed by the Security Director and assists in performing assigned duties.

**4.2.1.11 Shift Manager**

The Shift Manager of the affected unit, reports to the Emergency Coordinator. The Shift Manager performs initial classification and declaration of an emergency, maintains control of unit operations, and mitigates accident conditions.

**4.2.1.12 Shift Technical Advisors - STSC (2)**

The Shift Technical Advisors (STA) respond to the Control Room or STSC of the affected unit and reports to the Shift Manager. The affected STA advises the Shift Manager on activities that impact the safe and proper operation of the unit and independently verifies emergency classifications. For events classified as an Alert or higher, the affected unit STA activates ERDS.

The unaffected unit STA monitors various data displays throughout the course of the emergency and provides assistance to Control Room personnel. This support includes performing Core Damage Assessments and ongoing assessments of plant systems and core thermohydraulic parameters until relieved by the Reactor Analyst in the TSC.

The unaffected unit STA provides electrical and mechanical technical support until relieved by the Onsite Emergency Organization.

**4.2.1.13 Survey Team**

A Survey Team is formed and responds to the OSC, upon request from the Radiation Protection Monitor. The team performs radiological monitoring activities and at least one member of the team is a Radiation Protection Technician.

**4.2.1.14 Technicians**

Technicians report to the Emergency Coordinator and, if necessary, may be assigned to Emergency Repair or Survey Teams.

A Radiation Protection Technician reports to the STSC and assumes the responsibilities of the Radiation Protection Monitor.

The Chemistry Technicians, Maintenance Technicians (Mechanical, Electrical, Instrumentation and Control) report to the OSC for assignment.

**4.2.2 The Onsite Emergency Organization**

The Emergency Coordinator of the Onshift Emergency Organization orders the activation of the Onsite Emergency Organization at an Alert or higher level emergency classification. The designated Onsite Emergency Coordinator is briefed by the Onshift Emergency Coordinator on plant conditions and the status of the emergency prior to assuming the duties of Emergency Coordinator.

**4.2.2.1 Administrative Support**

Administrative Support personnel report to the Security Director in the TSC and the Administrative and Logistics Coordinator in the EOF and assists the Onsite Emergency Organization in all matters requiring clerical support.

**4.2.2.2 Chemistry Coordinator**

The Chemistry Coordinator responds to the TSC and reports to the Technical Engineering Manager. The Chemistry Coordinator provides analysis and evaluation of coolant samples and air samples to aid in determination of reactor core conditions and release potentials, and provides chemical analyses for evaluation of plant systems. The Chemistry Coordinator has no counterpart in the Onshift Emergency Organization

**4.2.2.3 Electrical Engineer**

The Electrical Engineer responds to the TSC and reports to the Technical Engineering Manager. The Electrical Engineer provides electrical engineering analyses and assumes the duties of Technical Support - Electrical from the STA in the STSC. The Electrical Engineer has no counterpart in the Onshift Emergency Organization.

**4.2.2.4 Emergency Coordinator**

The Emergency Coordinator responds to the TSC and is in charge of onsite emergency operations and is responsible for direction and coordination of the Onsite Emergency Organization.

**4.2.2.5 Emergency Coordinator Technical Assistant**

The Emergency Coordinator Technical Assistant responds to the TSC and reports to the Emergency Coordinator. The Emergency Coordinator Technical Assistant follows procedures that the Control Room is using, and keeps the Emergency Coordinator informed of the operational impact of events in progress. The Emergency Coordinator Technical Assistant has no counterpart in the Onshift Emergency Organization.

**4.2.2.6 Emergency Maintenance Coordinator**

The Emergency Maintenance Coordinator responds to the TSC and reports to the Emergency Coordinator. The Emergency Maintenance Coordinator, coordinates the repair and damage control for all plant systems and directs the emergency response activities of the Emergency Repair Teams. The Emergency Maintenance Coordinator directs the OSC Coordinator to form and dispatch any team that is required and maintains communication with the OSC concerning repair team efforts.

**4.2.2.7 Emergency Repair Team**

The Emergency Repair Team is formed and functions as described in Section 4.2.1, except that the team reports to the Emergency Maintenance Coordinator.

**4.2.2.8 Facility Advisor (optional)**

The Facility Advisor (if assigned) responds to the TSC and reports to the Emergency Coordinator. The Facility Advisor provides procedural assistance to ERO personnel.

**4.2.2.9 Mechanical Engineer**

The Mechanical Engineer responds to the TSC and reports to the Technical Engineering Manager. The Mechanical Engineer assumes the duties of Technical Support - Mechanical from the STA in the STSC and provides mechanical engineering analyses. The Mechanical Engineer has no counterpart in the Onshift Emergency Organization.

**4.2.2.10 Operations Advisor**

The Operations Advisor responds to the Control Room or the Satellite TSC and reports to the Emergency Coordinator. The Operations Advisor provides technical and operational advice to the Shift Manager and the Operations Coordinator and maintains the flow of information between the TSC and Control Room. The Operations Advisor has no counterpart in the Onshift Emergency Organization.

**4.2.2.11 Operations Coordinator**

The Operations Coordinator responds to the TSC and reports to the Emergency Coordinator. The Operations Coordinator receives technical and operational input from the Operations Advisor and maintains the flow of information between the TSC and Control Room.

**4.2.2.12 Operations Support Center Coordinator**

The Operations Support Center (OSC) Coordinator responds to the OSC and reports to the Emergency Coordinator. The Operations Support Center Coordinator coordinates available manpower resources and upon direction from the Emergency Maintenance Coordinator assembles and dispatches emergency teams. The OSC Coordinator has no counterpart in the Onshift Emergency Organization.

**4.2.2.13 Plant Status Technician (optional)**

The Plant Status Technician (if assigned) responds to the TSC and reports to the Technical Engineering Manager. The Plant Status Technician is responsible for maintaining the Plant Status boards.

**4.2.2.14 Radiation Protection Monitor**

The Radiation Protection Monitor (RPM) responds to the STSC and reports to the Operations Advisor. The RPM maintains communication with the Radiological Protection Coordinator and keeps the Operations Advisor informed of the onsite and offsite radiological conditions.



**4.2.2.15 Radiological Protection Coordinator**

The Radiological Protection Coordinator responds to the TSC and reports to the Emergency Coordinator. The Radiological Protection Coordinator provides overall control and direction of inplant monitoring teams and radiological controls. The Radiological Protection Coordinator relieves the RPM of these responsibilities. The Radiological Protection Coordinator maintains communications with the Radiation Protection Technicians in the OSC, the RPM in the STSC, and the Radiological Assessment Coordinator in the EOF.

**4.2.2.16 Reactor Analyst**

The Reactor Analyst responds to the TSC and reports to the Technical Engineering Manager. The Reactor Analyst assumes responsibilities from the STA - STSC. The Reactor Analyst performs detailed analyses of core physics and heat transfer parameters to assess reactor core status and to evaluate the integrity of fuel cladding.

**4.2.2.17 Repairs Coordinator**

The Repairs Coordinator responds to the OSC and reports to the Emergency Maintenance Coordinator. The Repairs Coordinator upon direction from the Emergency Maintenance Coordinator dispatches Emergency Repair Teams. The Repairs Coordinator has no counterpart in the Onshift Emergency Organization.

**4.2.2.18 RP Support Technician**

The RP Support Technician responds to the TSC and reports to the Radiological Protection Coordinator. The RP Support Technician performs habitability surveys of the TSC and provides radio and/or telephone communications with inplant Survey Teams.

**4.2.2.19 Safety Analysis Engineer**

The Safety Analysis Engineer responds to the TSC and reports to the Technical Engineering Manager. The Safety Analysis Engineer performs calculations to reduce or minimize offsite releases.

**4.2.2.20 Satellite TSC Communicator**

Described in Section 4.2.1, except that the Satellite TSC Communicator reports to the Operations Advisor.

**4.2.2.21 Security Director**

The Security Director responds to the TSC and reports to the Emergency Coordinator. The onshift Security Section Leader assumes the duties and responsibilities as the Security Director. The Security Director performs emergency call-out upon direction of the Emergency Coordinator and directs the onsite security force in the areas of personnel accountability, access control, site security, evacuation, medical transportation, and personnel and equipment security control.

**4.2.2.22 Shift Technical Advisor - TSC**

The STA responds to the TSC and reports to the Technical Engineering Manager. STA - TSC monitors plant system data via ERFDADS, maintains liaison with the NSSS vendor, architect-engineer concerning technical status and proposed recommendations. An additional STA (optional) may be stationed to assist the Emergency Coordinator with monitoring ERFDADS.

**4.2.2.23 Survey Team**

The Survey Team functions as described in Section 4.2.1, except that it is formed at the request of the Emergency Maintenance Coordinator. The inplant Teams report results to the Radiological Protection Coordinator while onsite/offsite Teams report to the Radiological Assessment Coordinator in the EOF.

**4.2.2.24 Technical Engineering Manager**

The Technical Engineering Manager responds to the TSC and reports to the Emergency Coordinator. The Technical Engineering Manager directs systems analysis, engineering and any procedure development as required by the emergency and maintains liaison with the Technical Analysis Manager in the Offsite Emergency Organization.

**4.2.2.25 USNRC Liaison Operations**

The USNRC Liaison Operations responds to the TSC and reports to the Operations Coordinator. The USNRC Liaison maintains continuous phone communications with the USNRC concerning operational events and reactor plant status. The USNRC Liaison Operations may be relieved of this duty by a member of the USNRC Site Team upon their arrival at PVNGS.

**4.2.3 Offsite Emergency Organization**

The Emergency Coordinator of the Onshift Emergency Organization orders the activation of the Onsite & Offsite Emergency Organization at an Alert or higher level emergency classification. The Emergency Operations Director is briefed by the Onshift/Onsite Emergency Coordinator on plant conditions and the status of the emergency prior to assuming the duties of the Emergency Operations Director.

When the EOF is activated, communications between the members of the Onsite and Offsite Emergency Organizations are established.

#### **4.2.3.1 Emergency Operations Director**

The Emergency Operations Director is in command of PVNGS emergency operations and is responsible for:

- Overall coordination of onsite and offsite emergency functions
- Interfacing with federal/state/county emergency response agencies
- Communication of plant status updates and radiological release data to USNRC, state/county EOCs, TOC, and JENC personnel
- Notification of state and county agencies concerning recommended protective actions
- Directs administrative, technical, and logistical support to station emergency operations
- Ensuring continuity of emergency organization resources.

Upon the assumption of this position the Emergency Operations Director accepts the responsibility from the Emergency Coordinator for the following non-delegable responsibilities:

- Notification of offsite emergency management agencies
- Making protective action recommendations as necessary to offsite emergency management agencies.

#### **4.2.3.2 Assistant Emergency Operations Director (optional)**

The Assistant Emergency Operations Director (if assigned) responds to the EOF and reports to the Emergency Operations Director to assist with duties and responsibilities.

#### **4.2.3.3 Administrative and Logistics Coordinator**

The Administrative and Logistics Coordinator responds to the EOF and reports to the Emergency Operations Director. The Administrative and Logistics Coordinator mobilizes offsite resources and obtains logistical support for the Emergency Organization.

#### **4.2.3.4 Administrative Support**

Described in Section 4.2.2.

#### **4.2.3.5 Dose Assessment Health Physicist**

The Dose Assessment Health Physicist responds to the EOF and reports to the Radiological Assessment Coordinator to perform radiological dose projections and other calculations or evaluations as directed.

**4.2.3.6 Facility Advisor (optional)**

The Facility Advisor (if assigned) responds to the EOF and reports to the Emergency Operations Director to provide facility and procedural assistance for the Emergency Organization.

**4.2.3.7 Government Liaison**

The Government Liaison responds to the EOF and reports to the Technical Analysis Manager. The Government Liaison makes offsite notifications once the EOF is activated, relieves the Satellite TSC Communicator of this responsibility and gathers necessary information for subsequent release to the media from the JENC.

**4.2.3.8 Plant Status Technician (optional)**

The Plant Status Technician (if assigned) responds to the EOF and reports to the Technical Analysis Manager. The Plant Status Technician is responsible for maintaining the Plant Status boards.

**4.2.3.9 Information Coordinator**

The Information Coordinator responds to the EOF and reports to the Emergency Operations Director. The Information Coordinator gathers information and prepares plant-related press materials for Emergency Operations Director approval.

**4.2.3.10 Radiological Assessment Communicator**

The Radiological Assessment Communicator responds to the EOF and reports to the Radiological Assessment Coordinator. The Radiological Assessment Communicator communicates with radiological assessment personnel at the TSC and directs the activities of the onsite/offsite Survey Teams.

**4.2.3.11 Radiological Assessment Coordinator**

The Radiological Assessment Coordinator responds to the EOF and reports to the Emergency Operations Director. The Radiological Assessment Coordinator is the principal liaison of the PVNGS emergency response organization with the ARRA. The Radiological Assessment Coordinator receives and evaluates dose projection information from the EOF Staff and provides protective action recommendations to the Emergency Operations Director.

**4.2.3.12 RP Support Technician**

The RP Support Technician responds to the EOF and reports to the Radiological Assessment Coordinator to perform habitability surveys in the EOF.

**4.2.3.13 Security Coordinator**

The Security Coordinator responds to the EOF and reports to the Administrative and Logistics Coordinator. The Security Coordinator coordinates site support to facilitate arrivals of offsite personnel.

**4.2.3.14 Shift Technical Advisor - EOF**

The STA responds to the EOF and reports to the Technical Analysis Manager. The STA - EOF provides engineering expertise, monitors plant system data via ERFDADS and maintains liaison with the STA located in the TSC.

**4.2.3.15 Survey Team**

The Survey Team functions as described in Section 4.2.1, except that it is formed at the request of the Emergency Maintenance Coordinator. The inplant Teams report results to the Radiological Protection Coordinator in the TSC while onsite/offsite Teams report to the Radiological Assessment Coordinator in the EOF.

**4.2.3.16 Systems Engineering**

Systems Engineering responds to the EOF and reports to the Technical Analysis Manager. The Systems Engineering performs engineering analyses as required.

**4.2.3.17 Technical Analysis Manager**

The Technical Analysis Manager responds to the EOF and reports to the Emergency Operations Director. The Technical Analysis Manager assesses plant conditions and provides evaluation of projected occurrences and corrective actions.

**4.2.3.18 USNRC Liaison Health Physics**

The USNRC Liaison Health Physics responds to the EOF and reports to the Radiological Assessment Coordinator. The USNRC Liaison is available at all times upon activation of the EOF, if requested by the USNRC, in order that continuous phone communications with the USNRC are maintained concerning the radiological aspects of the event. The USNRC Liaison, may be relieved of this duty by a member of the USNRC Site Team upon their arrival at PVNGS.

**4.2.3.19 Joint Emergency News Center Facility Coordinator**

The Joint Emergency News Center (JENC) Facility Coordinator is the PVNGS representative that coordinates all public information activities at the JENC including preparation of news releases, media briefings, and the flow of information to the Rumor Control Group.

**4.2.3.20 JENC Information Coordinator**

The JENC Information Coordinator is the PVNGS representative stationed in the JENC and reports to the JENC Facility Coordinator to assist and advise the JENC Spokesperson in the preparation of news releases and materials for media briefings.

**4.2.3.21 JENC Spokesperson**

The JENC Spokesperson is the PVNGS representative within the JENC organization authorized to speak about actual emergency conditions.

**4.2.3.22 JENC Technical Advisor**

The JENC Technical Advisor is the PVNGS representative that provides any necessary technical explanations to the JENC Facility Coordinator and JENC Spokesperson. The JENC Technical Advisor interfaces with the Government Liaison and reviews the technical content of all news releases.

**4.2.3.23 Offsite Technical Representative**

The Offsite Technical Representative interfaces with state response agency personnel at the State EOC/TOC, provides up-to-date information on plant status, and clarifies how plant systems operate, via briefings and face-to-face contact with EOC staff, the TOC Shift Supervisor, and the TOC Technical Director. The Offsite Technical Representative is located at the TOC in Phoenix and is assigned to the JENC staff.

**4.2.4 Non-Licensee Support**

Support from outside PVNGS consists of local service companies, institutions, agencies, INPO, and contractor support.

**4.2.4.1 Local Services Support**

In emergency situations, PVNGS may need supplementary assistance from outside companies and service agencies. Such assistance may include transportation of injured and/or contaminated personnel, medical treatment and hospital facilities for station personnel, and fire suppression assistance.

**4.2.4.2 Contract Support**

Contract support may include the Nuclear Steam Supply System (NSSS) supplier, the Architect Engineer, dosimetry and laboratory contractors, and decontamination and radwaste disposal firms. PVNGS has arranged for selected contract support firms to provide this assistance upon request.

### **4.3 Coordination with Participating Government Agencies**

For a complete discussion of authority, assigned responsibilities, capabilities, and activation and communication arrangements refer to the Fixed Nuclear Facility Off-Site Emergency Response Plan. PVNGS personnel coordinate emergency operations with state/county government Emergency Operations Centers.

#### **4.3.1 State of Arizona**

The State of Arizona, through the ADEM, coordinates offsite actions during a radiological emergency. The concept of operations for this responsibility, together with a discussion of action responsibilities assigned to various state/county governmental agencies, is contained in the Fixed Nuclear Facility Off-Site Emergency Response Plan. Arizona statutes require that the Emergency Response Plan be binding on other governmental agencies and therefore, Section 10.0 does not list separate letters of agreement with all agencies.

#### **4.3.2 Maricopa County**

Maricopa County is the only county within the 10-mile Plume Exposure Pathway Emergency Planning Zone. Portions of four other counties (La Paz, Pinal, Yuma, and Yavapai) are included in the 50-mile Ingestion Exposure Pathway EPZ.

#### **4.3.3 Federal Government**

The State of Arizona may require assistance from federal agencies in the areas of communications, radiological monitoring and laboratory analysis, transportation, weather forecasts, and disaster relief.

In general, requests for federal assistance are channeled through the ADEM and the ARRA for technical assistance. The exception is direct contact between the PVNGS and the USNRC or National Weather Service (NWS).

USNRC Region IV, FEMA and DOE have stated that they expect to have representatives at PVNGS within eight hours after receiving notification. EPA has stated that they have the same expectation if their assistance is needed.

For further discussion of federal emergency responsibilities, including resources available to support the federal response and specific federal resources expected, refer to the Fixed Nuclear Facility Off-Site Emergency Response Plan.

<b>Notification of Unusual Event</b>			
<b>Supported Facility</b>	<b>Personnel</b>	<b>Number</b>	<b>Time Required</b>
Control Room / Satellite Technical Support Center <sup>①</sup>	Shift Manager / Emergency Coordinator	1	Immediately
	Control Room Supervisor	1	
	Control Room Operator	2	
	Auxiliary Operator	2	
	Shift Technical Advisor	2	
	Radiation Protection Monitor	1	
STSC Communicator	2		
Operations Support Center	NA		NA
Technical Support Center	Security Section Leader	1 <sup>②</sup>	Immediately
Emergency Operations Facility	NA		NA
<b>Alert (or higher)</b>			
<b>Supported Facility</b>	<b>Personnel</b>	<b>Number</b>	<b>Time Required</b>
Control Room / Satellite Technical Support Center <sup>①</sup>	Shift Manager / Emergency Coordinator	1	Immediately
	Control Room Supervisor	1	
	Control Room Operator	2	
	Auxiliary / Radwaste Operator	3	
	Shift Technical Advisor	2	
	Radiation Protection Monitor	1	
STSC Communicator	2		
Operations Support Center	Chemistry Technician	2	Immediately
	Electrical Technician	3 <sup>②</sup>	
	I&C Technician	1 <sup>②</sup>	
	Mechanical Technician	2 <sup>②</sup>	
	Radiation Protection Technician	3	
	Radiological Monitoring Technician	1	
	RM or RP Technician	1	
	Survey Qualified Position	1	
	Emergency Medical Technician	2 <sup>②</sup>	
	E-Plan Driver	1	
	Fire Protection Team	all <sup>③</sup>	
	Security Team	all <sup>③</sup>	
	-----	-----	
Offsite Fire Department	all	45 minutes <sup>④</sup>	
Offsite Ambulance	all	-----	
-----	-----	-----	
Radiation Protection Technician	6	Immed. - normal hours 2 hours - off-hours	
Technical Support Center	Security Director	1	Immediately
	-----	-----	-----
	Emergency Coordinator	1	1 hour - normal hours
	Reactor Analyst	1	2 hours - off-hours
	Technical Support Electrical	1	
Technical Support Mechanical	1		
Emergency Operations Facility	Emergency Operations Director	1	1 hour - normal hours
	Government Liaison	1	2 hours - off-hours
	Technical Analysis Manager	1	
<b>FOOTNOTES:</b>			
① - Not used			
② - One Technician position may be provided by shift personnel assigned other functions			
③ - Shift personnel maintain normal duties in normal locations			
④ - From time of request			
⑤ - Unit staffing shall meet the requirements of approved Technical Specifications			

**Table1 Minimum Staffing Requirements for PVNGS for Nuclear Power Plant Emergencies**



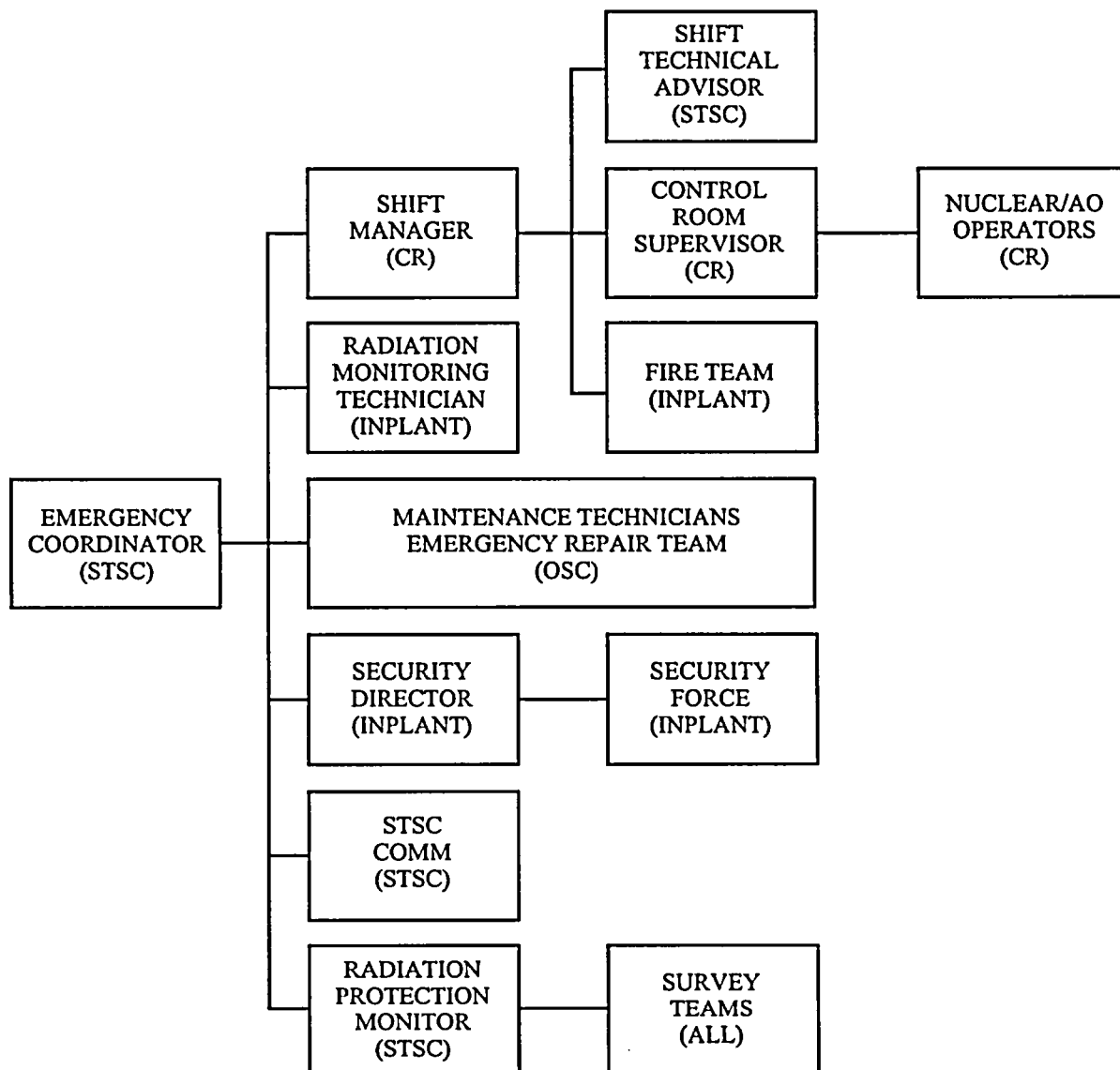
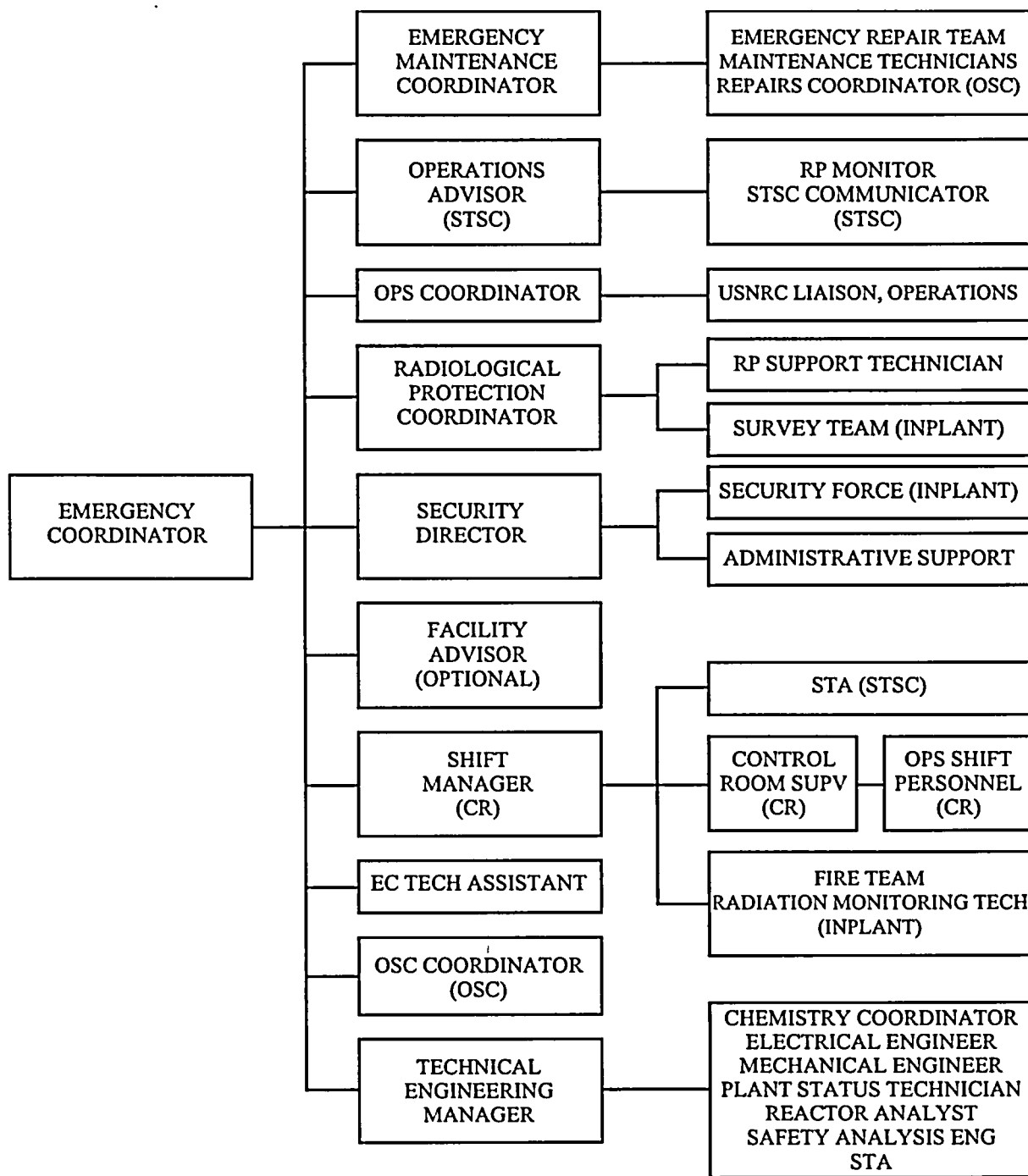
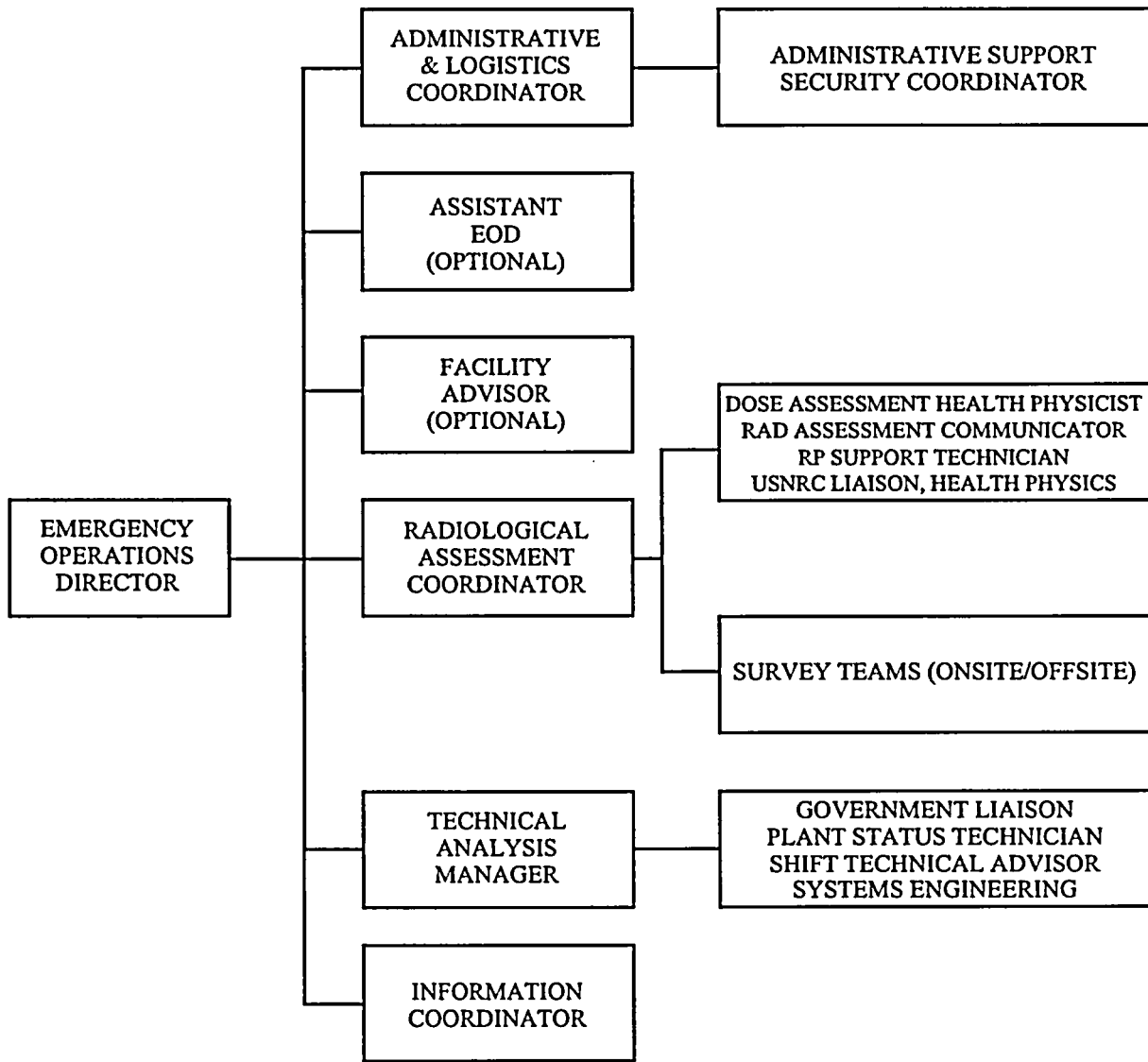


Figure 1 Onshift Emergency Organization



All positions are in TSC unless otherwise indicated.

**Figure 2 TSC Emergency Organization**



All positions are in EOF unless otherwise indicated.

**Figure 3 EOF Emergency Organization**

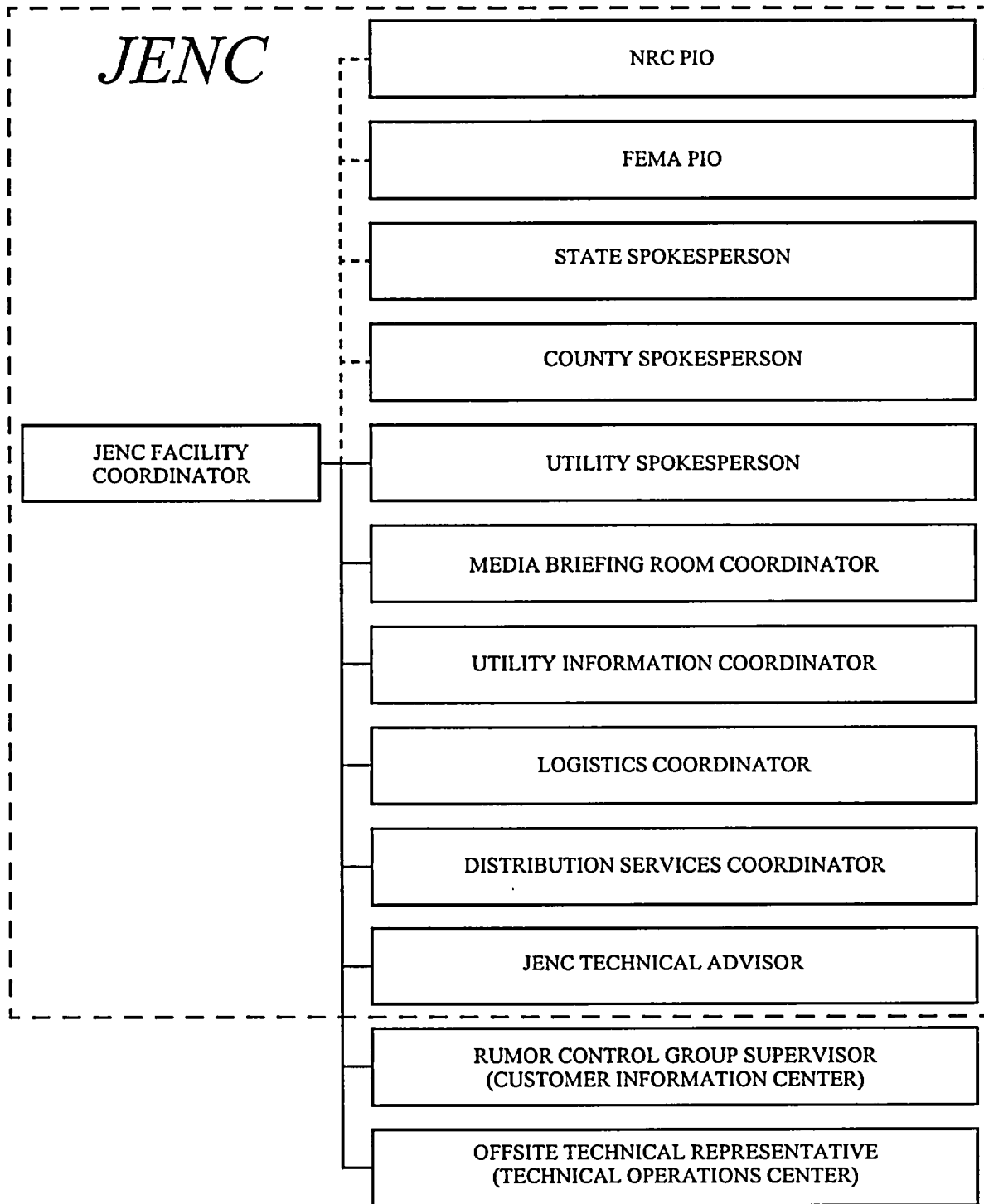


Figure 4 JENC Emergency Organization

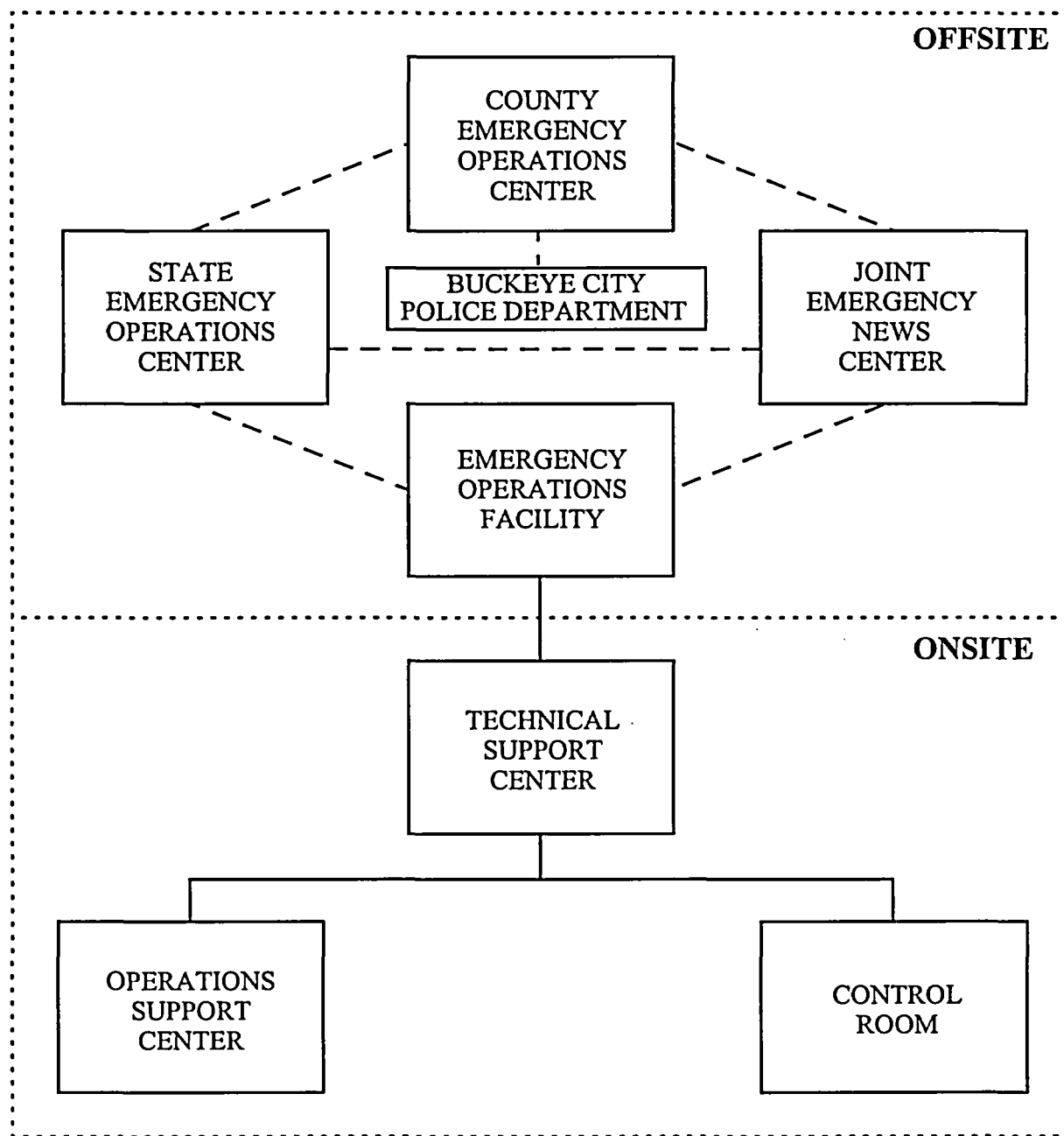
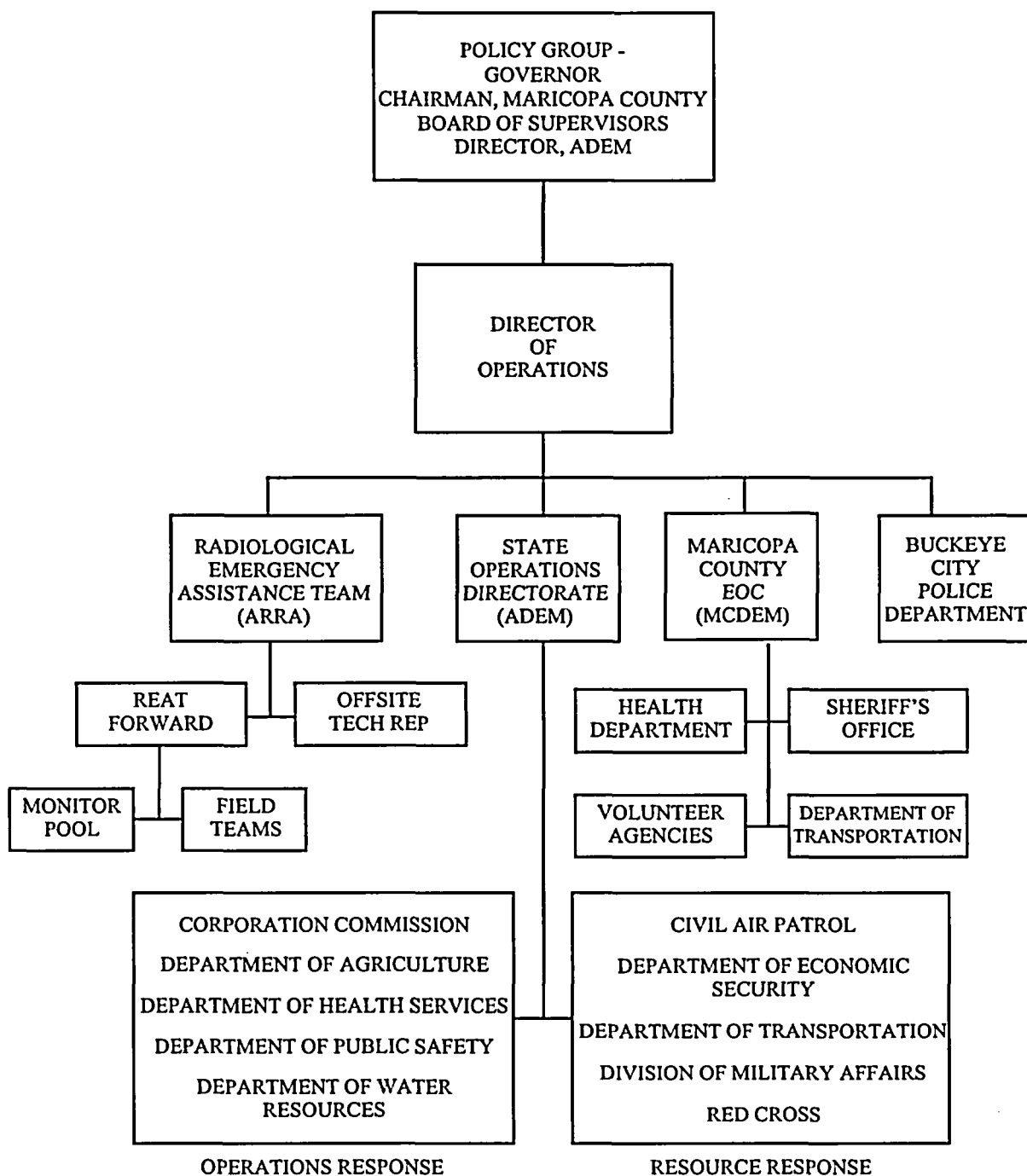


Figure 5 Onsite-Offsite Emergency Organization Interface



**Figure 6 State, County and City Emergency Operations Center Organization**

## **5.0 Emergency Conditions and Classifications**

### **5.1 Emergency Conditions**

The first step in any occurrence is emergency classification. Emergency classification is divided into four categories. Emergency Action Levels (EALs), based on indications available in the control room and correlated to the emergency classifications, are provided to the operator. Some EALs are keyed to the safety functions used in Emergency Operating Procedures (EOP).

The four emergency classifications including appropriate licensee and state/county governmental agency emergency response actions are described in the following sections:

#### **5.1.1 Notification of Unusual Event**

This classification applies to unusual events that are in progress or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occur.

In these situations, time is available to take precautionary and constructive steps to prevent a more serious event and/or to mitigate any consequences that may occur. This event status places the plant in a readiness position for augmentation of onshift resources and/or possible cessation of routine activities. Appropriate notifications to USNRC, state and county authorities are made.

#### **5.1.2 Alert**

This classification consists of events that are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of the Environmental Protection Agency (EPA) Protective Action Guideline (PAG) exposure levels. Declaration of an Alert triggers prompt initial and followup notification to offsite authorities. Onsite and offsite emergency centers are activated.

#### **5.1.3 Site Area Emergency**

A Site Area Emergency consists of events that are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Any releases are not expected to exceed EPA PAG exposure levels except near the site boundary. Offsite authorities are promptly notified. Consideration of appropriate protective actions, based on actual or projected data, is warranted. Assembly and accountability of personnel on site is mandatory for a Site Area Emergency. Site evacuation is initiated if indicated to be necessary by actual or projected doses.

#### **5.1.4 General Emergency**

A General Emergency consists of events that are in progress or have occurred which involve actual or imminent substantial core degradation or melting, with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA PAG exposure levels offsite for more than the immediate site area. Evacuation of Non-essential personnel from the site is mandatory along with prompt notification of USNRC and appropriate state and county authorities of the General Emergency status.

#### **5.2 Basis for Palo Verde Nuclear Generating Station (PVNGS) Emergency Classification Criteria**

Classification for a Notification of Unusual Event through a General Emergency is based on the status of the three main barriers: fuel cladding, primary coolant system boundary, and containment. Consideration is also given to radiation doses resulting from any offsite releases. Determining the emergency classification becomes a function of a system based on the failure of, or challenge to, the fission-product barriers. Defining the status of these barriers defines the criteria for classification.

For non-reactor trip events, the initial classification is based on such circumstances as (1) non-compliance with a Technical Specification such that the requirement of the Limiting Condition for Operation (LCO) and associated action requirements are not met within the specified time intervals to shut down the plant, or (2) external physical conditions which have the potential to damage or disable systems or structures required to maintain the three fission product barriers. These situations may be upgraded based on the safety systems impacted and the severity of impact or at the Emergency Coordinator's discretion.

##### **5.2.1 Loss**

"Loss" of barriers is defined in terms consistent with NUREG-0654, Appendix 1, "Example Initiating Conditions," and NUMARC/NESP-007. Some examples of boundary loss are as follows: primary coolant leak in excess of available makeup capacity constitutes failure or loss of the primary coolant boundary; 300  $\mu\text{Ci/cc}$  dose equivalent I-131 constitutes failure or loss of the clad (based on release of 1% equilibrium gas gap equivalent I-131); loss of containment integrity.

##### **5.2.2 Potential Loss**

Challenge or potential loss to a barrier is defined as one of the following conditions:

- Loss of a critical safety function which protects that barrier;
- An existing situation which will cause a barrier failure unless successful corrective actions are implemented; or
- An initiating event which in all probability has damaged a fission-product barrier but has yet to be verified.



**5.2.3 Classification by Barriers**

The fission product barrier status correlated to event classification criteria in increasing order of severity provides the bases for implementing guidance provided to the operators. This correlation is as follows:

Emergency Classification	Fission Product Barrier Status
Notification of Unusual Event	1. Any loss of containment. 2. Any potential loss of containment.
Alert	1. Any loss of either Fuel Clad or RCS or 2. Any potential loss of either Fuel Clad or RCS.
Site Area Emergency	1. Loss of both Fuel Clad and RCS or 2. Potential loss of both Fuel Clad and RCS or 3. Potential loss of either Fuel Clad or RCS and loss of any additional barrier
General Emergency	1. Loss of any two barriers and potential loss of a third barrier

**5.2.4 Boundary Status**

The integrity of the fission product barriers directly relates to maintaining the following corresponding safety functions within Technical Specification limits:

FISSION PRODUCT BARRIER	RELATED SAFETY FUNCTIONS
Fuel Cladding	Reactivity Control RCS Heat Removal
Primary Coolant Boundary	RCS Inventory and Pressure Control
Containment	Containment Integrity

Using clearly defined boundary status applied to classification criteria allows the development of EALs which are independent of event sequences and can be directly correlated with PVNGS symptom/function based EOP. Using this method to classify events provides a direct means to quickly and accurately assess the event and take the appropriate actions to protect the health and safety of the public.

**5.2.5 Upgrading of Events**

Events are upgraded based on boundary status - i.e., the number of boundaries failed or challenged and/or projected offsite dose rates.

### **5.2.6 Downgrading of Events**

Downgrading of events is based on plant status with all safety functions satisfied and verification of boundary status.

### **5.2.7 Initiation of Recovery**

The following plant status conditions serve as general guidelines for decisions on the initiation of post-emergency recovery efforts:

- Radiation levels are stable or decreasing with time
- Releases of radioactive materials to the environment have ceased or are controlled within permissible license limits
- Fire or similar emergency conditions no longer constitute a hazard to the plant or station personnel
- Measures have been successfully instituted to correct or compensate for malfunctioning equipment.

## **5.3 Emergency Operating Procedure**

The EOP, designed to mitigate the consequences of a design basis event, has been developed by PVNGS based on CEN-152, CE Emergency Procedure Guidelines. Conformance to or variation from CEN-152 is described under the Emergency Procedure Technical Guidelines in the NATM. The objective of the EOPs is to maintain safety functions while taking the specific actions required to mitigate the consequences of the initiating event.

PVNGS EOP and the correlation to CEN-152 is addressed in the Plant Specific Emergency Procedure Technical Guidelines.

### **5.3.1 Safety Functions**

Safety Functions and their bases are outlined in CEN-152. The PVNGS approach to safety functions is consistent with CEN-152 with the exception that certain safety functions have been combined to enhance operator response. The procedure that addresses safety functions on an individual basis is the Functional Recovery Procedure.

## **5.4 Offsite Accident Assessment**

PVNGS has the responsibility to perform a preliminary assessment of the offsite consequences of an incident. Based upon the results of these assessments, notification to state/county authorities of the appropriate emergency classification and any recommended protective actions are made.

PVNGS deploys Survey Teams offsite at least until ARRA has mobilized its Radiological Emergency Assistance Team (REAT). Approximately three (3) hours is estimated for REAT deployment. Long-term offsite assessments (ingestion pathway EPZ) are the responsibility of ARRA.

#### **5.5 Program for Developing and Maintaining High Quality Emergency Planning Implementing Procedures**

The accidents which might occur at the PVNGS are analyzed in Chapter 15 of the PVNGS FSAR in terms of severity of consequence. The Independent Spent Fuel Storage Installation (ISFSI), which is stationary and centrally located within the PVNGS exclusion area boundary, is analyzed in the Cask FSAR and satisfies the requirements for off-normal radiological dose. The PVNGS FSAR analyzed accidents reflect the design characteristics of a Pressurized Water Reactor (PWR) and are addressed by PVNGS EOPs and EIPs. Postulated events concerning the ISFSI are encompassed by the scheme of EALs designated for PVNGS.

Efforts to ensure the adequacy of the EIPs and proper interface with the EOPs is a function of coordinated activities among Emergency Planning, Operations, and Operations Support personnel. This serves to ensure prompt and accurate classification.

Periodic exercises are conducted to evaluate major portions of emergency response capabilities. Periodic drills are conducted to develop and maintain key skills. Deficiencies identified as a result of exercises or drills are corrected.

**Fission Product Barriers**

**Notification of Unusual Event**

Any loss OR any potential loss of Containment

**Alert**

Any loss OR any potential loss of either Fuel Clad or RCS

**Site Area Emergency**

Loss of both Fuel Clad and RCS OR Potential loss of both Fuel Clad and RCS OR Potential loss of either Fuel Clad or RCS AND loss of any additional barrier

**General Emergency**

Loss of any two barriers AND Potential loss of a third barrier

**Fuel Clad Barrier**

**Potential Loss**

- Highest valid CET temperature > 50°F superheated
- Valid RVLMS level currently or previously < 21% plenum

**Loss**

- Highest valid CET temperature > 1200°F
- RCS activity > 300 μCi/gm Dose Equivalent I-131
- CTMT radiation monitor: RU-148 > 1.2E+06 mrem/hr or RU-149 > 1.8E+06 mrem/hr

Any condition that, in the opinion of the SM/EC, indicates loss or potential loss of Fuel Clad Barrier

**RCS Barrier**

**Potential Loss**

- RCS leak > 44 gpm
- SGTR > 44 gpm
- LOAF such that minimum acceptable feedwater flow cannot be maintained

**Loss**

- RCS leak rate > available makeup capacity as indicated by a loss of RCS subcooling (i.e., RCS at saturation conditions)
- SGTR > 132 gpm with a prolonged \* release of contaminated secondary coolant occurring from the ruptured S/G to the environment

Any condition that, in the opinion of the SM/EC, indicates loss or potential loss of RCS Barrier

\* Encompasses MSLB, FWLB, stuck open S/G safety/ADV(s), plant cooldown steaming affected S/G to atmosphere

**Containment Barrier**

**Potential Loss**

- CTMT pressure 50 psig and increasing
- CTMT pressure > 8.5 psig with both CTMT Spray Systems not operating
- CTMT radiation monitor: RU-148 > 6.2E+09 mrem/hr or RU-149 > 8.7E+09 mrem/hr
- H<sub>2</sub> concentration > 3.5% by volume
- CET > 1200°F and not restored within 15 min. or CET > 700°F with RVLMS < 21% plenum and not restored within 15 min.

**Loss**

- Rapid unexplained CTMT pressure decrease following initial increase
- CTMT pressure or sump level response not consistent with LOCA conditions
- Failure of both CTMT isolation valves in any one line to close and pathway to the environment exists
- Release of contaminated secondary side to atmosphere, i.e., S/G safety or ADV with S/G primary-to-secondary leakage > Tech Spec allowable leakage

Any condition that, in the opinion of the SM/EC, indicates loss or potential loss of CTMT Barrier

**Security**

**Notification of Unusual Event**

Declared Security Color Code RED - Condition SECURITY EMERGENCY as reported by Security Shift Supervision or Notification of a credible security threat against PVNGS.

**Alert**

Security event within the Power Plant Protected Area

**Site Area Emergency**

Security event within any vital area

**General Emergency**

Security event resulting in the loss of ability to reach and maintain Cold Shutdown from the Control Room or Remote Shutdown Panel

**Table 2 Example Emergency Action Levels (EALs)**

**Electrical**

**Notification of Unusual Event**

- Loss of offsite power (ESF XFMRs) to both 4.16 KV Class 1E buses PBA-S03 and PBB-S04 for > 15 minutes and both Emergency Diesel Generators (EDGs) are supplying power to their respective 4.16 KV Class 1E buses
- Unplanned loss of required 125 V Class 1E DC power (voltage < 112 as indicated on PKA-EI-M41, PKB-EI-M42, PKC-EI-M43, and/or PKD-EI-M44) for > 15 minutes in Modes 5-6 and Defueled

**Alert**

- Either PBA-EI-S03 or PBB-EI-S04 indicates no voltage in Modes 1-4 under the following condition:  
Loss of offsite power (ESF XFMRs) to both 4.16 KV Class 1E buses PBA-S03 and PBB-S04 for > 15 minutes and one 4.16 KV Class 1E bus is powered from a single onsite power source (EDG) OR Loss of onsite power (EDGs) to both 4.16 KV Class 1E buses PBA-S03 and PBB-S04 for > 15 minutes and one 4.16 KV Class 1E bus is powered from a single offsite power source (ESF XFMR)
- Loss of offsite power (ESF XFMRs) and loss of onsite AC power (EDGs) to both 4.16 KV Class 1E buses PBA-S03 and PBB-S04 for > 15 minutes in Modes 5-6 and Defueled

**Site Area Emergency**

- Loss of offsite power (ESF XFMRs) and loss of onsite AC power (EDGs) to both 4.16 KV Class 1E buses PBA-S03 and PBB-S04 for > 15 minutes in Modes 1-4
- Loss of all required 125 V Class 1E DC power (voltage < 112 as indicated on PKA-EI-M41, PKB-EI-M42, PKC-EI-M43, and/or PKD-EI-M44) for > 15 minutes in Modes 1-4

**General Emergency**

- Loss of offsite power (ESF XFMRs) and loss of onsite AC power (EDGs) to both 4.16 KV Class 1E buses PBA-S03 and PBB-S04 in Modes 1-4 AND Power restoration to at least one 4.16 KV Class 1E bus within 4.5 hours is not likely or degradation of core cooling based on Fission Product Barrier monitoring is indicated

**Hazards**

**Notification of Unusual Event**

- Fire affecting major structures or areas within the Protected Area(s) not extinguished within 15 minutes of Control Room notification or Control Room alarm verification.
- Explosion affecting the Protected Area(s) resulting in visible damage, i.e., deformation, scorching, to permanent structures or equipment
- Vehicle/aircraft crash or missile impact into plant structures or systems within the Protected Area(s)
- Release of toxic or flammable gases that could enter the Site Boundary and deemed detrimental to safe operation of the plant
- Main turbine failure causing casing penetration or damage to turbine oil seals or generator seals
- Valid "Event Trigger" indicated on Seismic Warning Panel per 79IS-9SM01
- Natural or destructive phenomena (i.e., seismic, tornado, tornado driven missiles, flooding, lightning strikes) or accident condition (i.e., mispositioned cask, missile, fire, explosion) OR any condition that, in the opinion of the SM/EC, indicates loss of a loaded spent fuel storage cask Confinement Boundary.

**Alert**

- Fire or explosion affecting safety systems required for the current operating Mode as indicated by degraded performance or as indicated by plant personnel reporting visible damage, i.e., deformation, scorching, to permanent structures or equipment
- Entry into 40AO-9ZZ18, Shutdown Outside the Control Room, or 40AO-9ZZ19, Control Room Fire, for Control Room evacuation
- Vehicle/aircraft crash or missile impact affecting plant vital areas
- Visible structural damage to any building containing safe shutdown equipment
- Toxic or flammable gas within a facility structure affecting operation of safety systems required for the current operating Mode or is life threatening to personnel within those structures per site Fire Department analyses
- Main turbine failure generating missiles which result in visible damage to structures containing safety related equipment
- Confirmed earthquake > OBE levels per 79IS-9SM01 such that preliminary analysis indicates OBE validity
- Sustained winds > 105 mph (design levels) or tornado with average winds > 300 mph (design basis) per 4xAO-xZZ58
- Flooding potentially affecting safety systems required for the current operating Mode

**Site Area Emergency**

- Evacuation of Control Room and control not established locally at the Remote Shutdown Panel within 15 minutes

**General Emergency - None**

**Table 2 Example Emergency Action Levels (EALs)**

**Radiological**

**Notification of Unusual Event**

- Confirmed Plant Vent sample analysis or valid reading on Plant Vent RU-143 CH-1 indicating > 1.22E-03  $\mu\text{Ci/cc}$  sustained for 60 minutes or longer OR Valid dose assessment indicates > 1000 mrem/year Total Body Dose at the Site Boundary
- Confirmed Fuel Bldg. sample analysis or valid reading on Fuel Bldg. RU-145 CH-1 indicating > 3.12E-03  $\mu\text{Ci/cc}$  sustained for 60 minutes or longer OR Valid dose assessment indicates > 1000 mrem/year Total Body Dose at the Site Boundary
- Unplanned radioactivity release which results in Site Boundary dose rates > 2 x ODCM Section 3.0, 4.0, and 5.0 limits as measured with portable instrumentation
- Site Boundary dose rate > 0.1 mrem/hr Deep Dose Equivalent as measured with portable instrumentation
- Unexpected increase by a factor of 1000 over normal levels in valid direct area radiation monitor readings within the unit
- Uncontrolled water level decrease (as indicated by associated level alarms, sumps, or by visual indication) in the reactor refueling cavity, spent fuel pool, and/or fuel transfer canal with all irradiated fuel assemblies remaining covered by water
- RCS specific activity > Technical Specification allowable limits

**Alert**

- Confirmed Plant Vent sample analysis or valid reading on Plant Vent RU-143 CH-1 indicating > 1.22E-02  $\mu\text{Ci/cc}$  sustained for 15 minutes or longer OR Valid dose assessment indicates > 10000 mrem/year Total Body Dose at the Site Boundary
- Confirmed Fuel Bldg. sample analysis or valid reading on Fuel Bldg. RU-146 CH-1 indicating > 1.13E-01  $\mu\text{Ci/cc}$  sustained for 15 minutes or longer OR Valid dose assessment indicates > 10000 mrem/year Total Body Dose at the Site Boundary
- Unplanned radioactivity release which results in Site Boundary dose rates > 20 x ODCM Section 3.0, 4.0, and 5.0 limits as measured with portable instrumentation
- Site Boundary dose rate > 1.0 mrem/hr Deep Dose Equivalent as measured with portable instrumentation
- Valid readings on the associated radiation monitor in any of the following areas required to maintain plant safety functions which are: (1) > 15 mR/hr on RU-18 (Control Room or Secondary Alarm Station) OR (2) > 5000 mR/hr on RU-18 (Remote Shutdown Panels), RU-155 (Main Steam Support Structure), RU-153c (Aux Bldg, 100' East), RU-23 (Chemistry Hot Laboratory), or RU-19 (Fuel Building)
- Major damage to irradiated fuel or indication of loss of water level in the reactor refueling cavity, spent fuel pool, and/or fuel transfer canal (i.e., level < 132.5 ft. elevation as indicated by associated level alarms, sumps, or by visual indication) such that the uncovering of irradiated fuel (outside the reactor vessel) has or will occur AND Valid high radiation alarm on the associated radiation monitor exists: RU-16, RU-31, RU-33, RU-143, or RU-145

**Site Area Emergency**

- Confirmed Plant Vent sample analysis or valid reading on Plant Vent RU-144 CH-1 indicating > 2.20E-01  $\mu\text{Ci/cc}$  sustained for 15 minutes or longer OR Valid dose assessment indicates > 100 mrem/hr external EDE at the Site Boundary OR Valid dose assessment indicates > 1.00E+06 mrem/year Total Body Dose at the Site Boundary
- Confirmed Fuel Bldg. sample analysis or valid reading on Fuel Bldg. RU-146 CH-1 indicating > 1.96E+00  $\mu\text{Ci/cc}$  sustained for 15 minutes or longer OR Valid dose assessment indicates > 100 mrem/hr external EDE at the Site Boundary OR Valid dose assessment indicates > 1.00E+06 mrem/year Total Body Dose at the Site Boundary
- Site Boundary dose rate > 100 mrem/hr Deep Dose Equivalent as measured with portable instrumentation OR Valid dose assessment indicates > 100 mrem/hr TEDE or > 500 mrem/hr thyroid CDE at the Site Boundary

**General Emergency**

- Confirmed Plant Vent sample analysis or valid reading on Plant Vent RU-144 CH-1 indicating > 2.20E+00  $\mu\text{Ci/cc}$  sustained for 15 minutes or longer OR Valid dose assessment indicates > 1000 mrem/hr external EDE at the Site Boundary OR Valid dose assessment indicates > 1.00E+07 mrem/year Total Body Dose at the Site Boundary
- Confirmed Fuel Bldg. sample analysis or valid reading on Fuel Bldg. RU-146 CH-2 indicating > 1.96E+01  $\mu\text{Ci/cc}$  sustained for 15 minutes or longer OR Valid dose assessment indicates > 1000 mrem/hr external EDE at the Site Boundary OR Valid dose assessment indicates > 1.00E+07 mrem/year Total Body Dose at the Site Boundary
- Site Boundary dose rate > 1000 mrem/hr Deep Dose Equivalent as measured with portable instrumentation OR Valid dose assessment indicates > 1000 mrem/hr TEDE or > 5000 mrem/hr thyroid CDE at the Site Boundary

**Table 2 Example Emergency Action Levels (EALs)**

<b>Leakage</b>
<p><b>Notification of Unusual Event</b></p> <ul style="list-style-type: none"> <li>• Unidentified or pressure boundary leakage &gt; 10 gpm in Modes 1-4</li> <li>• Identified leakage &gt; 25 gpm in Modes 1-4</li> </ul> <p><b>Alert</b> - None</p> <p><b>Site Area Emergency</b> - None</p> <p><b>General Emergency</b> - None</p>
<b>Miscellaneous</b>
<p><b>Notification of Unusual Event</b></p> <ul style="list-style-type: none"> <li>• Control Room assessment that an event has occurred affecting the Power Plant Protected Area</li> <li>• Other conditions exist which, in the judgment of the SM/EC, indicate a potential degradation of the level of safety of the plant</li> </ul> <p><b>Alert</b></p> <ul style="list-style-type: none"> <li>• Control Room assessment that an event has occurred affecting the plant vital areas</li> <li>• Other conditions exist which, in the judgment of the SM/EC, indicate that plant safety systems may be degraded and that increased monitoring of plant functions is warranted</li> </ul> <p><b>Site Area Emergency</b></p> <ul style="list-style-type: none"> <li>• Other conditions exist which, in the judgment of the SM/EC, indicate actual or likely major failure of plant functions needed for protection of the public</li> </ul> <p><b>General Emergency</b></p> <ul style="list-style-type: none"> <li>• Other conditions exist which, in the judgment of the SM/EC, indicate: (1) actual or imminent substantial core degradation with potential for loss of CTMT, or (2) potential for uncontrolled radionuclide releases that can reasonably be expected to exceed EPA PAG plume exposure levels outside the Site Boundary</li> </ul>
<b>Malfunctions</b>
<p><b>Notification of Unusual Event</b></p> <ul style="list-style-type: none"> <li>• Unplanned loss of most or all safety system annunciation for &gt; 15 minutes requiring increased monitoring while in Modes 1-4 and compensatory indications are available</li> <li>• Inability to reach required shutdown conditions within the Tech Spec LCO allowable Action Statement time limits while in Modes 1-4</li> <li>• Loss of all offsite communications capability from the Control Room/STSC. This includes normal PBX, dedicated lines, ringdown lines, ENS, NAN primary, and NAN radio</li> <li>• Loss of all onsite communications capability affecting the ability to perform routine operations. This includes normal PBX, plant page system, two-way radio, and sound powered phone system</li> </ul> <p><b>Alert</b></p> <ul style="list-style-type: none"> <li>• Failure of RPS to initiate or complete an automatic reactor shutdown (i.e., subcritical) once an RPS setpoint has been met or exceeded and manual shutdown was successful when in Modes 1-2 (manual shutdown includes reactor trip pushbuttons and/or removal of power to CEDMCS Bus from the Control Room)</li> <li>• Loss of any function or system which precludes the ability to maintain Cold Shutdown and a temperature increase has occurred that either exceeds 210°F or results in an uncontrolled temperature rise approaching 210°F when in Modes 5-6</li> <li>• Unplanned loss of most or all safety system annunciation for &gt; 15 minutes requiring increased monitoring while in Modes 1-4 and either compensatory indications are unavailable or a significant transient is in progress</li> </ul> <p><b>Site Area Emergency</b></p> <ul style="list-style-type: none"> <li>• Failure of RPS to initiate or complete an automatic reactor shutdown (i.e., subcritical) once an RPS setpoint has been met or exceeded and manual shutdown was not successful when in Modes 1-2</li> <li>• Loss of reactor vessel water level that has or will uncover fuel in the reactor vessel when in Modes 5-6 (RE: 4xAO-xZZ22 and Safety Analysis Operational Data)</li> <li>• Loss of any function (i.e., heat removal, reactivity control) or system which precludes the ability to achieve or maintain Hot Shutdown when in Modes 1-4</li> <li>• Loss of most or all safety system annunciation with a significant transient in progress while in Modes 1-4. Compensatory indications and indications needed to monitor safety functions are both not available</li> </ul> <p><b>General Emergency</b></p> <ul style="list-style-type: none"> <li>• Failure of RPS to complete an automatic reactor shutdown (i.e., subcritical) and manual shutdown was not successful when in Modes 1-2 AND CET &gt; 1200°F, or RVLMS &lt; 21% plenum, or minimum acceptable feedwater flow cannot be maintained</li> </ul>

**Table 2 Example Emergency Action Levels (EALs)**

## **6.0 Emergency Measures**

This section establishes the methodology of emergency response and is the basis for the EPIPs which define the emergency actions to be taken during an emergency.

Emergency measures follow a sequential process which contain the following definable elements:

- Recognition and Evaluation
- Classification and Declaration
- Notification and Mobilization
- Assessment Actions
- Protective Actions
- Corrective Actions

### **6.1 Recognition and Evaluation**

Initial recognition of emergency conditions should normally occur in the Control Room. Emergency conditions may be indicated by alarms, instrument readings or reports to the Control Room. The Control Room Supervisor should provide initial evaluation of the indicators and notify the Shift Manager. The Shift Manager evaluates the conditions against the established EALs to determine if an EAL has been reached or exceeded.

### **6.2 Classification and Declaration**

An emergency shall be classified and declared if the Shift Manager finds that a specific EAL has been reached or exceeded.

When the Shift Manager declares an emergency to the Control Room personnel, an announcement shall be made over the unit public address system, and the other Control Rooms and Security shall be notified.

For those abnormal situations potentially involving more than one unit, the Unit 1 Shift Manager is responsible for initially classifying and declaring the emergency and assuming the position of Onshift Emergency Coordinator.

The level of emergency classification is upgraded or downgraded according to specified ranges within the EALs.



### **6.3 Notification and Mobilization**

The Emergency Coordinator ensures that initial notifications are made to state and county warning points and the USNRC in accordance with established procedures. The procedures include a means of message verification. The initial notifications to state and county warning points are initiated within 15 minutes of the declaration of the emergency and occur over the Notification Alert Network (NAN) dedicated telephone circuit. The USNRC is notified immediately after State and County notification and within one hour. This notification occurs via the ENS line. The Satellite TSC Communicator makes initial notifications until activation of the EOF. At that time, all subsequent notifications are made from the EOF by the Government Liaison. Initial notifications and followup messages contain specific information about the type and classification of the emergency and whether emergency actions are needed.

When the Onshift Emergency Organization is activated, the RPM advises the Emergency Coordinator regarding PARs for a radiological event, the Emergency Coordinator determines the PARs and directs the STSC Communicator to make the offsite notifications via the NAN. When the Onsite and Offsite Emergency Organizations are activated, the Radiological Assessment Coordinator advises the Emergency Operations Director regarding PARs for a radiological event, and the Emergency Operations Director determines the PARs and directs the Government Liaison to make the offsite notifications via the NAN.

The emergency organization for Notification of Unusual Event consists of normal shift personnel. Augmentation of this organization may occur at the discretion of the Emergency Coordinator. At an Alert or higher level emergency classification, the Onsite and Offsite PVNGS emergency response organization is activated at the direction of the Emergency Coordinator. Personnel of the emergency response organizations may be notified via an automated notification system, and/or Group Paging System.

### **6.4 Assessment Actions**

Initial assessments and emergency classification may often be the result of exceeding pre-specified levels.

Assessment actions will continue throughout the emergency. Continued assessment may result in reclassification of the emergency and alteration of emergency response actions.

Priority will be given to continuing assessment actions that result in, (1) maintaining control of the plant, (2) resolving an emergency situation, (3) protective action recommendations for the health and safety of the general public, (4) protective actions for onsite personnel, and (5) corrective actions to reduce the consequences of an emergency.

#### **6.4.1 Assessment Action for Control of Plant Operations**

The existence of any emergency condition causes increased monitoring of Control Room instrumentation to monitor trends of appropriate parameters, particularly the indicated values that triggered the emergency and those that may be related. Additional monitoring equipment may be used to assess the nature of the emergency condition. A Safety Parameter Display System (SPDS) display console is in the Control Room and is accessible to Control Room personnel.

#### **6.4.2 Environmental Assessment for Protection of the Health and Safety of the Public**

Within 30 minutes of the declaration of an emergency, a monitoring program assesses potential releases or the extent of an actual release, and provides guidance for appropriate protective measures. A Survey Team will be deployed after declaration of an Alert or higher level emergency with an effluent monitor indication of a higher than normal release of radioactive materials.

The principal early concerns are Committed Dose Equivalent plus external Effective Dose Equivalent to thyroid, and Total Effective Dose Equivalent. Criteria for taking protective actions such as sheltering and evacuation are expressed in terms of these two variables. Following this, efforts will normally be directed toward the evaluation of possible long-term exposures from ground deposition and various food chain pathways. Monitoring continues throughout the duration of the emergency (as required) so that the need for protective measures can be quickly assessed.

Survey Teams measure dose rate readings and noble gas and iodine concentrations. PVNGS maintains fully equipped and dedicated vehicles to support field teams. Air monitoring equipment has the capability to detect, under field conditions, radioiodine concentrations in air as low as  $1\text{E-}7$  microcuries per cubic centimeter. The Radiological Assessment Coordinator provides direct input to the Emergency Operations Director concerning the need to make protective action recommendations to offsite agencies. If field monitoring data are consistently higher or lower than dose rate calculations the Radiological Assessment Coordinator may modify the release rates being used in the calculations.

The site has a permanent meteorological installation which continuously indicates and records wind speed, direction and temperature differentials.

#### **6.4.3 Inplant Radiological Controls**

During the course of an emergency, elevated radiation or contamination levels may be experienced. It may then be necessary to impose additional radiological controls beyond the controls established by the normal inplant radiological controls program.

Inplant radiological controls in an emergency situation may differ from normal radiological control activities in the following aspects:

- Maintaining strict access control into affected plant areas
- Availability and use of augmented dosimetry
- Additional use of portable radiation monitoring devices, particularly high range monitoring devices, for monitoring contamination and area radiation levels
- Increased availability and use of protective clothing and respiratory devices
- Increased air sampling for the purpose of limiting the number of persons subject to exposure
- Increased whole body counting and other bio-assays.

Initial assessment of the need for inplant radiological controls may be based on plant readings, RMS readings, inplant TLD readings and system status reports. Additional information concerning inplant radiological conditions may be gained during the debriefing of personnel deployed with Emergency Repair and Survey Teams.

#### **6.4.4 Reactor Core Damage Assessment**

Initial assessment of the status of the reactor core is performed by the STA. Initial assessment of core conditions is based on readings of Control Room instrumentation and assessment of SPDS data.

Prior to TSC activation, the STA in the STSC provides additional capability for assessment of reactor core damage.

When the TSC is activated, the Reactor Analyst assesses core conditions under the direction of the Technical Engineering Manager. Information is obtained from the SPDS and critical parameter values from ERFDADS.

#### **6.5 Corrective Actions**

PVNGS procedures contain steps for preventive and/or corrective actions to avoid or mitigate serious consequences of an incident.

#### **6.6 Protective Actions**

Protective actions are emergency measures taken during and after an emergency so that onsite personnel and the general public are alerted and actions are initiated for the protection of their health and safety. Protective actions are initiated if radiation or airborne radioactivity levels exceed predetermined values or when situations threaten the health and safety of onsite personnel or the general public.

Protective actions for onsite personnel and visitors are the responsibility of the Emergency Coordinator. Measures for the protection of the general public are detailed in the Fixed Nuclear Facility Off-Site Emergency Response Plan. The Emergency Operations Director (or Emergency Coordinator as appropriate) will make protective action recommendations for the general public to offsite emergency management agencies.

### **6.6.1 Protective Action for Onsite Personnel**

Protective actions for onsite personnel may include alerting, personnel assembly, accountability, and evacuation as well as security procedures, access control, monitoring and decontamination. Protective actions may also be taken for onsite personnel for emergencies such as fires or natural disasters where personnel safety is threatened.

#### **6.6.1.1 Alerting**

Unit personnel are alerted by an audible signal and an announcement over the unit public address system. Site personnel are alerted by activation of an audible signal followed by public address system announcements. Evacuation/accountability is assured in high noise work areas by the use of audible alarms, flashing lights, and/or administrative measures.

The PVNGS Site Warning Siren/Public Address System consists of electronic sirens with four distinct sounds: (1) assembly signal, (2) evacuation signal, (3) fire signal, and (4) all-clear signal. These signals are introduced in Site Access Training and are available on a phone recording. The emergency signal can be activated from the Control Room, the TSC, or Simulator "A".

#### **6.6.1.2 Assembly and Accountability**

Personnel assembly and accountability is mandatory at the Site Area Emergency or higher level classification. Accountability of personnel within the Protected Areas is accomplished within 30 minutes, and continuously thereafter, using Protected Area(s) boundary access control as described in the PVNGS Security Plan. If there are station personnel who are unaccounted for, the Unit Evacuation System and site-wide page are used to locate them, or, in extreme cases (fire, toxic gas release, explosions, structural damage, etc.), trained search and rescue personnel are deployed to search for and assist the missing personnel.

Accountability of site personnel outside the Protected Areas is accomplished by all personnel reporting to assembly areas.

#### **6.6.1.3 Security and Access Control**

PVNGS Security personnel at Security Access Control Points are instructed to admit only emergency personnel and designated State and USNRC personnel. Special onsite security measures have been developed to facilitate rapid access by emergency response personnel. In case of a Security contingency event such as a direct armed attack, Security's response actions may be primarily focused on the Security event and take precedence over emergency response duties.

#### **6.6.1.4 Monitoring and Decontamination**

Personnel are monitored for contamination at the Security Access Points as they depart the Power Plant Protected Area. Personnel located outside the Power Plant Protected Area are monitored as required by radiological conditions. If decontamination of personnel is required, they are decontaminated by trained personnel.

Onsite emergency personnel are monitored for contamination at their respective emergency stations. Decontamination of onsite emergency personnel is conducted at onsite decontamination facilities.

#### **6.6.1.5 Evacuation**

The decision to evacuate non-essential personnel is made by the Emergency Coordinator. Generally, non-essential personnel are evacuated in the event of a Site Area Emergency or General Emergency. However, in certain situations it is desirable to evacuate earlier.

### **6.6.2 Offsite Alerting and Protective Actions**

Protective Action Recommendations include sheltering or evacuation based on consideration of the relative benefits of each action. The action which affords the higher level of dose avoidance, when offsite doses are expected to exceed Protective Action Guides, is preferred. However, other factors such as release duration, mobilization time or adverse weather are important considerations affecting offsite protective action recommendations.

#### **6.6.2.1 Alerting of the General Public**

The Maricopa County EOC prepares the protective action warning message and activates the public warning system (sirens), and, if necessary, initiates personal notification by the Maricopa County Sheriff's Office. In case of siren failure, MCSO vehicles with loud speakers are dispatched to alert persons within the affected area(s). The Maricopa County EOC sends the warning message over the Emergency Alert System stations. The content of warning messages to be broadcast is contained in the Fixed Nuclear Facility Off-Site Emergency Response Plan. The warning messages give instructions about specific protective actions to be taken by occupants of affected areas.

#### **6.6.2.2 Protective Actions for the General Public**

Protective action recommendations for the general public consider the time required for notification of offsite authorities, for public alerting and for implementation of protective actions. At the Site Area Emergency level of classification, sheltering for the public within a two-mile radius around the plant site is considered based on plant/containment conditions. In the case of a core melt situation, evacuation of at least a two-mile radius around the plant site and at least five miles downwind for affected sectors is recommended.

When evacuation is ordered, the Fixed Nuclear Facility Off-Site Emergency Response Plan provides, as a minimum, for evacuation by 22.5 degree sectors considering first the sector in which the central axis of the plume is located and then the adjacent sector on each side. Implementation of protective actions for the general public is described in the Fixed Nuclear Facility Off-Site Emergency Response Plan. Time estimates for evacuation within the Plume Exposure Pathway Emergency Planning Zone are maintained in the files of Emergency Planning Department.

Offsite authorities receive notification for each change in emergency classification, from either the STSC Communicator (if the onshift ERO is on duty) or the Government Liaison. Each notification of a change in emergency classification also includes a Protective Action Recommendation.

### **6.6.3 Use of Onsite Protective Equipment and Supplies**

A variety of protective equipment is available onsite to minimize radiological exposures, contamination problems and fire fighting hazards.

#### **6.6.3.1 Respiratory Protection Equipment**

Respiratory protection equipment includes full face canister respirators, self contained breathing apparatus and air-fed respirators. Radiation Protection personnel determine when the use of respiratory protection equipment is appropriate and select the correct type of equipment for conditions expected to be encountered.

#### **6.6.3.2 Protective Clothing**

Protective clothing is maintained onsite for routine use and is available for use during emergencies.

#### **6.6.3.3 Thyroid Blocking Agent**

The Emergency Coordinator is the only person who may authorize the voluntary use of potassium iodide (KI) for PVNGS emergency personnel. The Emergency Coordinator authorizes the use of KI with the advice of the Radiological Protection Coordinator. The use of KI is based on the potential for release, or on the magnitude of an actual release, of iodine. KI is distributed to emergency workers when its use is authorized.

#### **6.6.3.4 Emergency Dosimetry**

Dosimetry is located in close proximity to all emergency centers and available for issue to emergency personnel as necessary by Radiation Protection personnel.

## **6.6.4 Contamination Control Measures**

### **6.6.4.1 Plant Site**

Specific area limits have been established for control of contamination within the PVNGS facility. The basis for these limits is that contamination shall be controlled so that hazards to personnel are minimized and compliance with personnel exposure limits (internal and external) is assured.

As necessary, Contamination Areas are established and posted. Details of contamination control measures for onsite personnel and equipment are contained in the PVNGS Radiation Protection Program.

### **6.6.4.2 Offsite**

Criteria and measures for contamination control in offsite areas are detailed in the Fixed Nuclear Facility Off-Site Emergency Response Plan.

## **6.7 Aid to Affected Personnel**

### **6.7.1 Emergency Personnel Dose Criteria**

Emergency workers carry dosimeters in addition to TLDs. Dosimeters are read at intervals dependent upon radiation levels in accordance with PVNGS Nuclear Administrative and Technical Manual Procedures. Emergency worker dose criteria are based on three categories of actions: sampling under accident conditions, lifesaving actions, and corrective/protective actions.

Emergency dosimetry is provided on a 24-hour basis by PVNGS Radiation Protection personnel. Every effort is made to minimize emergency worker doses through the use of protective equipment and supplies and by minimizing exposure time. Emergency exposures above administrative guidelines are authorized by the Radiological Protection Coordinator or the Emergency Coordinator. The RPM or Radiological Protection Coordinator authorizes exposures up to the 10 CFR 20 limits, and the Emergency Coordinator authorizes exposures above 10 CFR 20 limits, in accordance with PVNGS procedures.

The Emergency Coordinator is notified of accidental or emergency dose in excess of occupational limits. Affected individuals so dosed are not assigned to further emergency team operations with the possibility of exposure. Decisions to accept doses in excess of occupational limits in life-saving situations are on a volunteer basis. In no case, are planned doses permitted to exceed 25 Rem Total Effective Dose Equivalent.

### **6.7.2 Decontamination and First Aid**

Provisions exist to assist personnel who are injured and who have received high radiation doses, or who have been contaminated. Decontamination materials and portable first aid kits are available at strategic locations throughout the station and offsite. There are personnel onshift and in the Onsite and Offsite Emergency Organizations trained in first aid and decontamination procedures. In addition, onsite decontamination areas equipped with decontamination facilities, supplies, and other specialized equipment are located near the access control point on the 140 ft. elevation in the Auxiliary Building of each unit. Personnel found to be externally contaminated are decontaminated. Where contamination of large, open wounds is involved, personnel are transported to Maryvale Hospital Medical Center or Good Samaritan Regional Medical Center. Contaminated PVNGS evacuees are decontaminated at the offsite reassembly area. Waste fluids and wastes from decontamination of personnel or material are collected and handled as radioactive wastes in accordance with the PVNGS Nuclear Administrative and Technical Manual, except at the offsite reassembly area, where radioactive wastes are handled under the guidance of ARRA.

### **6.7.3 Medical Transportation**

Injured/externally contaminated personnel who require medical attention are transported to Maryvale Hospital Medical Center or Good Samaritan Regional Medical Center by an available onsite or offsite ambulance.

### **6.7.4 Medical Treatment**

Arrangements for treating externally contaminated patients exist for Maryvale Hospital Medical Center and Good Samaritan Regional Medical Center.

### **6.8 Media Relations**

Provisions for media relations during the course of an emergency are detailed in the Joint Public Information Procedures. When a Notification of Unusual Event is declared, news media relations are conducted from Palo Verde Strategic Communications. At the Alert or higher classification, the Joint Emergency News Center is activated and fully staffed at the Papago Military Reservation at 5636 E. McDowell Road, Phoenix in accordance with the guidelines of the Joint Public Information Procedures.

The Public Inquiry Center at the State EOC and the Rumor Control Center at PVNGS Customer Information (C&I) respond to public inquiries.



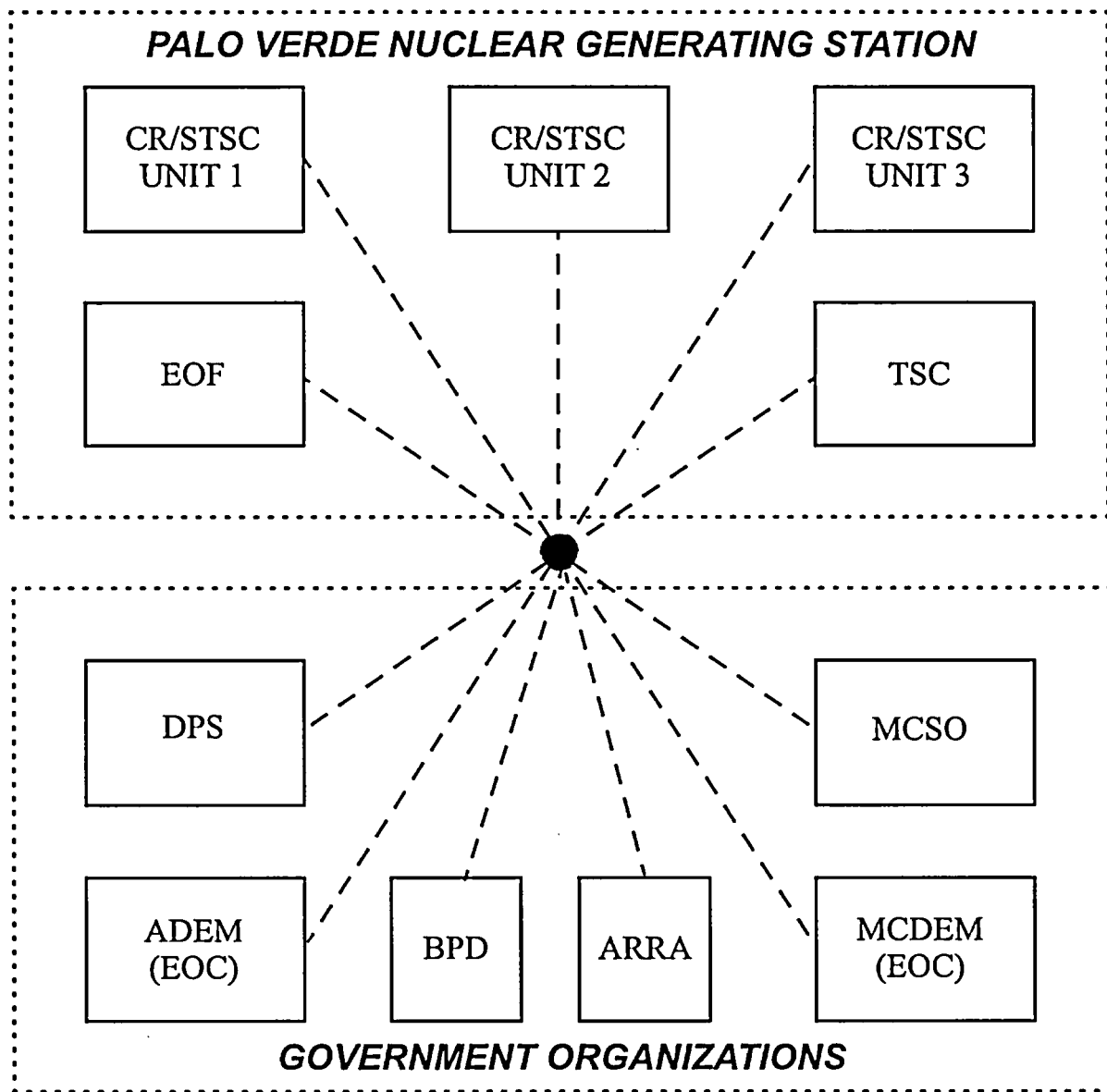
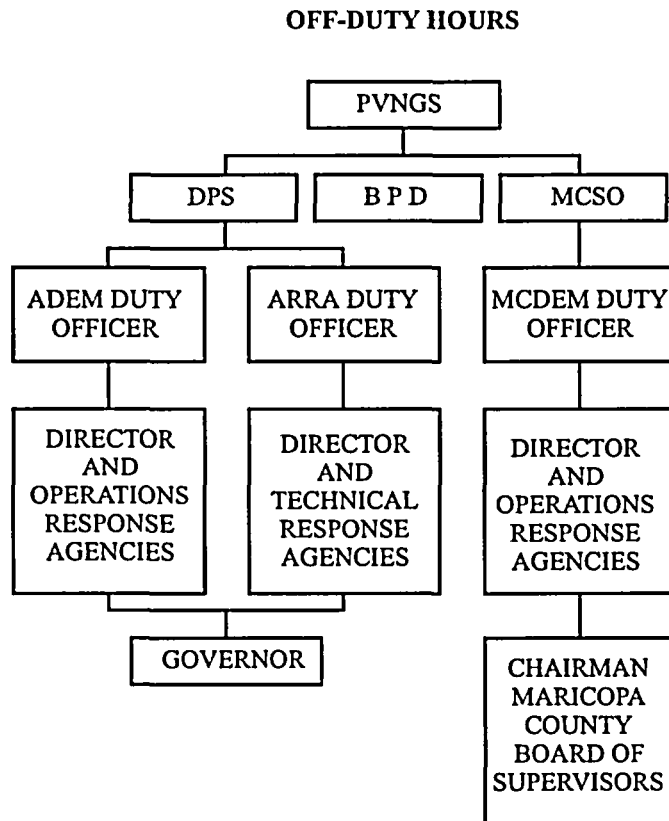
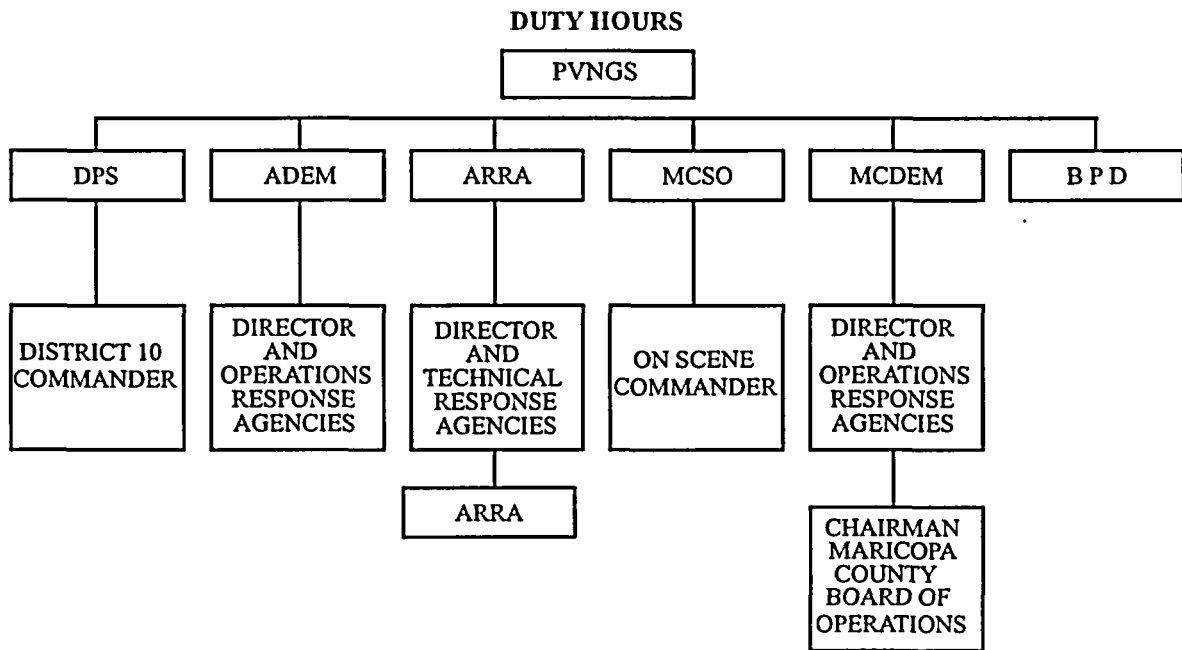


Figure 7 Notification and Alert Network (NAN)



**Figure 8 NAN Notification Flow**

*Onshift  
Organization  
activated*

*Onsite and Offsite  
Organization  
activated*

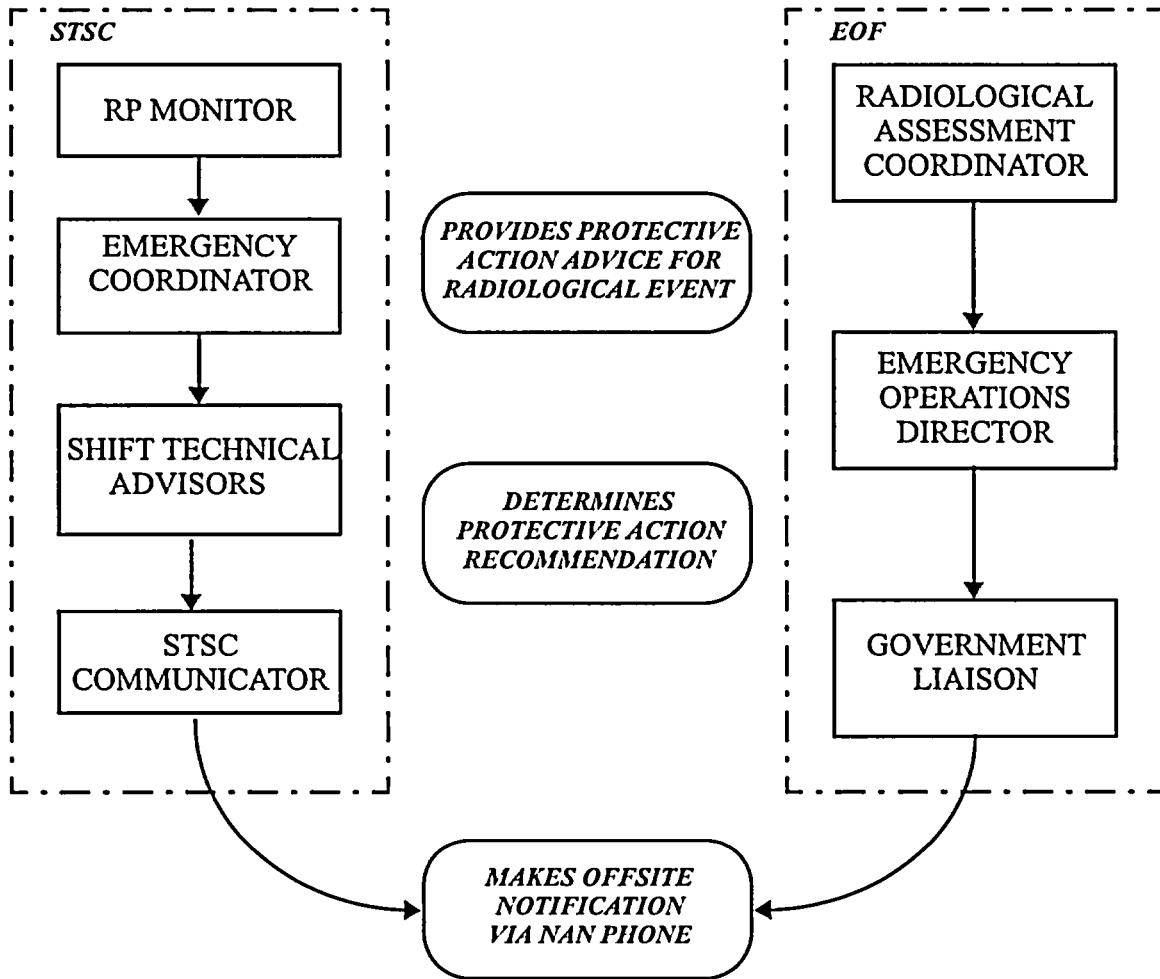


Figure 9 Communications Leading to Protective Action Recommendations

## **7.0 Emergency Facilities and Equipment**

This section describes emergency response facilities, onsite and offsite communications system links, assessment equipment and facilities, first aid and medical facilities, and damage control equipment.

### **7.1 Emergency Centers**

#### **7.1.1 Control Room (CR)**

The CR is in the Control Building on the 140-foot level and is designed to be habitable during Design Basis Accidents. The CR, which includes the Shift Manager's office, contains full plant instrumentation, ERFDADS/SPDS, a Qualified SPDS display, communications links, and technical drawings. Protective breathing apparatus, emergency radiological monitoring equipment, and protective clothing are stored in the emergency kit outside the Control Room.

#### **7.1.2 Remote Shutdown Panel Room (RSP)**

An emergency requiring the evacuation of the CR results in shutdown control from the RSP. The RSP has two redundant and independent sets of plant controls. Each redundant control area has its own Radio Console and emergency phone, as well as PBX telephone and sound-powered phone.

#### **7.1.3 Satellite Technical Support Center (STSC)**

An STSC is located in each unit adjacent to the CR on the 140-foot level of the Control Building.

When the onsite emergency organization is activated, the STSC functions as an extension of the TSC to provide direct technical support to the CR personnel in the areas of:

- Engineering and technical analytical support
- Reactor analytical support
- Radiological analytical support.

An ERFDADS/SPDS display and various communications equipment are available in the STSC.

#### **7.1.4 Operations Support Center (OSC)**

The OSC is the entire 140' level of the Auxiliary Building of each unit. Emergency equipment required is stored in emergency kits in the OSC. The OSC also includes the Radiation Protection area which provides a decontamination facility, a fixed radiological counting facility, and access to the station's radiation protection records and forms. The OSC serves as the point of origin for Survey Teams and Emergency Repair Teams. Various communications links are available in the OSC.

In the event the OSC becomes uninhabitable, an unaffected unit OSC may be used as an alternate OSC.

#### **7.1.5 Technical Support Center (TSC)**

The TSC is the focal point for onsite emergency operations and for directing and assisting the Control Room during unit emergency conditions. Key station management and technical personnel are stationed at the TSC during the emergency to provide the guidance required for accident termination and mitigation.

The TSC is activated and manned during an Alert, Site Area Emergency, or General Emergency.

The TSC is centrally located within ten minutes walking time from the CR of each of the three Palo Verde units. The functions performed in the TSC include:

- Manage onsite emergency response
- Direct inplant radiological protection activities
- Direct emergency mechanical maintenance
- Direct emergency electrical maintenance
- Direct personnel accountability and site security
- Direct safety and hazards control
- Perform engineering and technical analyses for control room support
- Perform reactor analyses for control room support
- Provide I & C technical support
- Provide computer technical support
- Provide chemistry technical support

The TSC has ERFDADS/SPDS computer terminals, which display CR parameters for each unit, the Radiation Monitoring System (RMS), the station meteorological system, and other parameters. Capability exists in the TSC to rapidly retrieve plant documents, drawings, procedures and plans from the TSC Library. The TSC (when activated) is the central location for the receipt and analysis of inplant radiological monitoring data. The TSC has various communications links available.

The TSC contains a breakroom with a microwave and refrigerator, conference room, records library, an emergency supply storage area, and an area reserved for USNRC personnel. The TSC contains equipment required for emergency response. The TSC is also equipped with an airborne radiation monitor.

#### **7.1.6 Emergency Operations Facility (EOF)**

The EOF is the focal point for coordination of onsite and offsite emergency response activities. Management and technical personnel assigned to the EOF are responsible for protective action recommendations, liaison with offsite governmental organizations and response facilities, and overall coordination of the PVNGS Emergency Organization.

The EOF has space allocated for housing emergency personnel and space for USNRC, FEMA and state/county emergency personnel. The EOF has various communications links available.

The EOF is activated and manned for an Alert or higher level emergency classification.

The EOF also has ERFDADS/SPDS computer terminals. Capability exists in the EOF to rapidly retrieve plant documents, drawings, procedures and plans from the EOF Library. The EOF is equipped with an airborne radiation monitor. The EOF contains a supply of equipment for emergency response. In addition, the EOF is equipped with a sleeping area, lounge, food preparation facilities, and emergency food and water.

An alternate EOF is located approximately 18 miles east of PVNGS at the APS Buckeye Office in Buckeye, Arizona, for use when the EOF is inaccessible. It has commercial telephones and phone circuits on the APS telephone system.

#### **7.1.7 Joint Emergency News Center (JENC)**

The JENC, located at 5636 East McDowell Road in Phoenix, serves as the primary point for dissemination of information to the news media representatives for an Alert or higher level emergency classification.

Provision is made at the JENC for telephones to allow media personnel to communicate with their base facilities. State, county and federal agency officials share office space with the staff at the JENC.

Various communications links are available at the JENC.

#### **7.1.8 Palo Verde Strategic Communications Department**

Palo Verde Strategic Communications, located in Building "A" at PVNGS, is responsible for developing press releases and coordinating media briefings during Notification of Unusual Event classifications. At Alert and higher classification, the JENC assumes the responsibility for this function. At Alert or Site Area Emergency classifications involving non-radiological events, Palo Verde Strategic Communications will work with the JENC to coordinate plant visits and briefings. Palo Verde Strategic Communications is equipped with PBX telephones and fax machines for onsite and offsite communications.

#### **7.1.9 The State Emergency Operations Center (State EOC)**

The State EOC is the primary point from which the Governor/designee exercises overall coordination of offsite emergency response operations through the ADEM. The State EOC is located at ADEM Headquarters in Phoenix at 5636 East McDowell Road. The state's TOC is located with the state EOC.

Staffing of the State EOC consists of authorized representatives of:

- Office of the Governor
- Arizona Division of Emergency Management (ADEM)
- Arizona Radiation Regulatory Agency (ARRA)
- Arizona Department of Public Safety (DPS)
- Arizona Department of Transportation
- Arizona Department of Economic Security
- Maricopa County Department of Emergency Management (MCDEM)
- PVNGS (Offsite Technical Representative)
- Others (as notified/required).

#### **7.1.10 The Maricopa County Emergency Operations Center (EOC)**

The Maricopa County EOC is the focal point of the local government emergency response activity. It is located at 2035 North 52nd Street, Phoenix. Emergency response actions of the Maricopa County Sheriff's Office, Health Department and Department of Transportation, together with emergency response actions of volunteer agencies, are coordinated by the MCDEM at the County EOC.

### **7.2 Communications Systems**

The PVNGS communications system is designed to ensure the reliable, timely flow of information and action directives between all parties designated and empowered to mitigate emergencies. To ensure the reliability of the communications systems, the following provisions have been designed into these systems:

- Redundancy
- Alternative radio communications
- Telephone ringdown circuits (voice and data) to offsite emergency organizations, to preclude delays due to system overload
- Routine use of many of the systems, which lowers the probability of undetected system failures

The following subsections provide a description of each of the communications systems available for mitigation of emergency conditions.

#### **7.2.1 Technical Line (Multi-Line Phone)**

The Technical Line has separate, dedicated primary and backup lines providing communications links with conference capability between the TSC, the Unit and Simulator A Satellite TSCs, the EOF, and the Control Room.

This line is used for transmitting technical, operational, and assessment data. The telephones are administratively controlled.

The backup communications line is provided by use of multiple onsite PBX switches.

#### **7.2.2 Radiological Line (Multi-Line Phone)**

The Radiological Line has separate dedicated primary and backup lines providing communications links with conference capability between the RP Office, TSC, the Unit and Simulator A STSCs, and the OSC.

This line is used in matters concerning inplant radiological controls. Direction concerning the forming of Emergency Repair and Survey Teams is transmitted on this line. The telephones are administratively controlled. The backup communications line is provided by use of multiple onsite PBX switches.

#### **7.2.3 Environmental Assessment Line (Multi-Line Phone)**

The Environmental Assessment Line has separate dedicated primary and backup lines providing communications links with conference capability between the TSC, EOF, the Unit and Simulator A STSCs.

This line is used to transmit information concerning offsite dose projections, onsite radiological conditions and offsite radiological conditions.

The telephones are administratively controlled. The backup communications line is provided by use of multiple onsite PBX switches.

#### **7.2.4 Emergency Coordinator/Emergency Operations Director (EC/EOD) Line (Multi-Line Phone)**

The EC/EOD line has separate dedicated primary and backup communications lines with conference capability among the EOF, TSC, and the Unit and Simulator A STSCs.

This line provides a direct communications link between the Emergency Coordinator and Emergency Operations Director. It also permits three-way conversations between the Emergency Coordinator, Emergency Operations Director and the Operations Advisor. The backup communications line is provided by use of multiple onsite PBX switches.

#### **7.2.5 Maintenance Control Line (Multi-Line Phone)**

The Maintenance Control Line has separate dedicated primary and backup lines providing a communications link with conference capability between the TSC, OSC, and the Unit and Simulator A Control Room.

This line is used to transmit information and to provide direction concerning maintenance and emergency repair operations necessary to mitigate the consequences of an emergency. The telephones are administratively controlled.



The backup communication line is provided by use of multiple onsite PBX switches.

#### **7.2.6 Remote Shutdown Panel (RSP) Line**

The RSP Line has separate dedicated primary and backup lines with conference capability to all the PVNGS telephones.

#### **7.2.7 Telephone Ringdown Circuits**

These voice circuits serve as a primary communications link for providing technical information to offsite agencies, public information communications, and the communication of protective action recommendations to offsite authorities.

#### **7.2.8 Multiple onsite PBX switches**

Onsite emergency telephone lines are divided among three independent onsite PBX switches. Each PBX switch is provided with a backup battery for reliability.

#### **7.2.9 PVNGS Radio System**

PVNGS operates a trunked radio system, with separate talk groups available for departments such as Operations, Security, Fire Protection, Radiation Protection, Emergency Planning, the Water Reclamation Facility, etc. This system includes base station consoles at various locations and emergency facilities throughout the site. Some of the radios used during emergencies are portable radios at various site locations, mobile radios in the RFAT vehicles, and base station consoles at the TSC, EOF, Unit and Simulator A STSCs, and Unit and Simulator A Control Rooms. PVNGS Fire Protection also maintains radios that are used to contact the air ambulance service to provide landing instructions.

#### **7.2.10 Radio Pagers**

Radio pagers are provided to key members of the emergency response organization. This provides a reliable means of contact with key members 24 hours a day, 7 days a week.

#### **7.2.11 Area Paging System**

The area paging system provides a reliable means of notifying and providing instructions to personnel. Access to this system is through the PBX system telephones by use of dedicated numbers.

#### **7.2.12 Alarms**

Audible alarms are a quick and effective means of communicating emergency warnings. The alarm systems are described in the following sections.

**7.2.12.1 Site Warning Siren/Public Address System**

The Site Warning Siren/Public Address System consists of electronic sirens to sound over the entire PVNGS site. The sirens are initiated from a push-button in the Control Room, Simulator, and TSC, and have distinctive signals for assembly, evacuation, fire and all-clear. The Public Address System also has voice capability using the microphone of the control unit, and is cross-connected to the Area Paging System to permit site-wide announcements.

**7.2.12.2 Unit Area Alarm System**

The Unit Area Alarm System consists of electronic sirens located throughout each unit area to alert all personnel within a unit area. The electronic sirens are activated from the Control Room. The Unit Area Alarm System also has voice capability using the microphone of the control unit to provide backup to the Area Paging System, and is cross-connected to the Area Paging System to permit site-wide announcements. The sirens have distinctive signals for assembly, evacuation, fire and all-clear.

**7.2.13 Autodialer**

The Autodialer is used to call out PVNGS emergency response personnel. The system can be activated locally at the Server or remotely from any LAN connected PC with the Client software installed and configured on the workstation. The system can also be activated remotely utilizing a touch-tone telephone. The Server is located in the TSC and can place multiple calls simultaneously. Telephone numbers to be contacted and notification messages are pre-programmed on the system. If proper acknowledgment does not occur, the system periodically redials the number.

**7.2.14 Private Branch Exchange (PBX)**

PVNGS uses a PBX telephone system. This system will function during emergencies as it does during normal operations. PVNGS telephones have the capability of trunk access (via local provider) and APS-owned microwave access which provides direct dial capabilities to the entire APS system via the company owned microwave transmission system. The "switches" through which all telephone calls pass, are supplied with redundant power supplies to ensure the reliability of this system. The PVNGS PBXs are the primary links for PVNGS phones. There are also administratively dedicated lines for the CR, STSC, TSC, EOF, and OSC.

**7.2.15 USNRC Emergency Notification System (ENS)**

The USNRC ENS is a Federal Telecommunications System (FTS) telephone that connects PVNGS with the USNRC Headquarters Operations Center. USNRC Headquarters has the capability to patch in the Region IV office on this line. It is to be used for reporting emergencies. Commercial telephone lines are available as backup communications. Transmittal of operations related data should be on this system. The purpose of this line is to provide reliable communications with the USNRC. The ENS phones are located at each Unit, Simulator A STSC, the TSC, and the EOF.

**7.2.16 USNRC Health Physics Network (HPN)**

The USNRC HPN is a Federal Telecommunications System (FTS) telephone that connects PVNGS with the USNRC Headquarters Operations Center. The HPN is designed to provide health physics and environmental information to the USNRC in the event of an emergency. Other commercial telephone lines are available as backup communications. The HPN phones are located in both the TSC and EOF.

**7.2.17 Notification Alert Network (NAN)**

NAN is a dedicated telephone/radio system that provides a communications link among the Unit STSCs, Simulator A, TSC, EOF, ADEM, ARRA, MCDEM, MCSO, DPS, and Buckeye Police Dept.

NAN's primary function is to provide a communications link for notifications to offsite agencies. In the event of NAN failure, the commercial phone lines or a channel on the PVNGS radio system is used to make initial notifications.

**7.2.18 Radiological Emergency Assistance Team (REAT) Radio System**

The PVNGS 800 MHZ Radio system provides a communications link between the State and State deployed field monitoring teams. Field monitoring information will be transmitted over the radio system. The State's EOF representative has access to the 800 MHZ radio system from the EOF. Hard copy of data is transmitted via FAX from the EOF to REAT Forward.

**7.2.19 Facsimile Transmission**

Facsimile transmission provides "hard copy" communications to:

- TSC (through PVNGS PBX) (high resolution machine)
- EOF (through PVNGS PBX) (high resolution machine)
- Ringdown Facsimile Machine Circuits #1 (Microwave) and #2 (Hardwire) link the EOF, TSC, STSC, JENC, ADEM, ARRA and APS Corporate Offices.

**7.2.20 National Oceanic and Atmospheric Administration (NOAA) Weather Broadcasts**

Weather broadcasts can be monitored for "weather alert" information at CR, TSC and EOF.

**7.2.21 Additional Offsite Communication Links**

Communication links in addition to those described above include:

- Public Information Ringdown Circuit #1 - a microwave link from the EOF to the JENC
- Public Information Ringdown Circuit #2 - a hardwire telephone circuit between the EOF and the JENC
- Public Information Unlisted Dedicated Dial-up Telephone Circuit - ADEM to JENC
- Information Word Processor - JENC
- Public Information Unlisted Dedicated Dial-up Facsimile Machine Circuit #2 - ADEM to JENC
- PVNGS Emergency Alert System (EAS) Ringdown Telephone Circuit - hardwire from MCDEM and MCSO to AM broadcast station KTAR and to FM broadcast station KKL T
- Public Information Unlisted Dedicated Dial-up Telephones - JENC (5 general circuits)
- Public Information Unlisted, Receive-only Telephone Circuits - JENC (6 circuits)
- Public Information Media Dial-up Telephone Circuits - JENC (30 circuits)
- Unlisted Dedicated Dial-up Facsimile Circuit #3 - ADEM (EOC) to MCDEM
- Public Information Unlisted Dedicated Dial-up Telephone Circuit - JENC to MCDEM
- ADEM Business Dial-up Telephone - ADEM general use (24 circuits), ADEM Public Inquiry (3 circuits)
- Public Information Unlisted Dedicated Dial-Up Facsimile Machine Circuit - MCDEM to JENC

Communications Links		Facilities												
		ADEM	ARRA	CR	DPS	EOF	JENC	MCDEM	MCSO	OSC	STSC	SIM A	TSC	BPD
Dedicated Lines	Control Room Line					●				●	●	●	●	
	Environmental Line					●					●	●	●	
	EC/EOD Line					●					●	●	●	
	EOF Line			●						●	●	●	●	
	Maintenance Line			●						●		●	●	
	OSC Line			●		●					●	●	●	
	Radiological Line									●	●	●	●	
	STSC Line			●		●				●			●	
	Technical Line			●		●					●	●	●	
	TSC Line			●		●				●	●	●		
FTS Lines	ENS			●		●						●	●	●
	HPN					●							●	
	LAN					●							●	
	MCL					●							●	
	PMCL					●							●	
	RSCL					●							●	
Ringdown Lines	EOD/CEO					●	●							
	NAN	●	●		●	●		●	●		●	●	●	●
	Ops #1 (hardwired)	●	●			●					●		●	
	Ops #2 (hardwired)	●				●						●	●	
	Ops #3 (microwave)	●				●					●		●	
	Ops #4 (microwave)	●	●			●						●	●	
	PI #1 (microwave)					●	●							
	PI #2 (hardwired)					●	●							
Other	Cellular phone			●		●							●	
	ERFDADS			●		●					●	●	●	
	Fax	●	●	●		●	●				●	●	●	
	Radio base station			●		●					●	●	●	

**Table 3 Emergency Response Facility Communications Links**

**7.3 Assessment Equipment**

This section describes onsite and offsite facilities and monitoring equipment used for initial and continuing assessment.

### 7.3.1 Onsite Systems and Equipment

Onsite equipment is described below.

#### 7.3.1.1 Geophysical Data

##### (1) Meteorology Program

The PVNGS meteorology atmospheric transport and diffusion assessment program has been established using the guidance of NUREG-0654 and Regulatory Guide 1.23. The PVNGS meteorological tower has the following instrumentation: temperature, differential temperature (between top and bottom sensors), precipitation, dew point, wind speed, and wind direction. Display of meteorological indications is available in the Control Room on ERFDADS. Additionally, displays are available in the TSC, the Units and Simulator A STSC, and the EOF. In the event the PVNGS meteorological monitoring system is unavailable, the National Weather Service (NWS Phoenix office) has an instrumentation unit which can be brought to the site (if available) to provide backup meteorological information during emergencies.

##### (2) Seismic Instruments

Information is obtained from passive and active instruments giving absolute peak ground acceleration in three mutually orthogonal directions. The system determines whether operating basis or safe shutdown maximum accelerations are exceeded in any of three directions. Recorded information is available in the Unit 1 Control Room.

#### 7.3.1.2 Radiation Monitoring System (RMS)

The Radiation Monitoring System is divided into three basic groups of detector systems.

##### (1) Process Monitoring System

Process monitors provide information to Control Room operators to assure proper functional performance of the monitored system, provide for the early detection of radioactive leakage into non-radioactive systems, provide continuous remote indication and recording of airborne radioactivity levels in areas where personnel have routine access, and provide a means of process sample collection.

**(2) Effluent Monitoring System**

The Effluent Monitoring System provides continuous sampling, recording and indications of gaseous activity levels and, as a minimum, provides continuous representative sampling of particulate and radioiodine activity levels at principal effluent discharge points, provides for monitoring, alarm annunciation, and automatic closure of the gaseous waste discharge valve to maintain releases from the waste gas decay tanks below Technical Specification limits, provides radiation level indication and alarm annunciation to Control Room operators whenever Technical Specification limits are approached or exceeded, and provides a means for collection of samples for laboratory analyses at effluent points.

**(3) Area Monitoring System**

The area monitoring system immediately notifies plant personnel entering or working in non-radiation or low-radiation areas of abnormally high or increasing radiation levels to prevent inadvertent overexposure, and informs Control Room Operators of the occurrence and location of abnormal radiation level increases in non-radiation or low-radiation areas.

**7.3.1.3 System Monitors**

These monitors detect and/or control problems within plant systems and include pressure detectors, heat detectors, heat rise detectors, or similar devices designed to monitor plant parameters. Many of these detectors are capable of initiating control actions to prevent and mitigate damage or release of radioactive material.

**7.3.1.4 Fire Protection System**

The Fire Protection System (FPS) and Fire Suppression System (FSS) detect, contain, and extinguish fires in the unit. The FPS for each unit has monitoring, detection, alarm, suppression, and extinguishing facilities specifically selected to protect the area or equipment from damage by fire. A computer terminal is provided in the Control Room of each unit for incoming FPS/FSS alarms (including identification of affected areas and suppression actions initiated by the FSS system).

**7.3.1.5 Radioactivity Analysis**

Liquid samples are drawn in the individual Units via the Nuclear Sampling System. A built in sample bomb is in each primary sample sink. Containment air samples are taken via Containment Air Monitor JSQBRU1.

Grab samples are drawn and diluted as necessary utilizing procedural direction to minimize operator dose. The grab samples are analyzed in the radiochemistry laboratory via a gamma energy analytical detector system.

In the event the affected unit cannot perform the analysis, backup analysis is done in one of the unaffected units. The Arizona Radiation Regulatory Agency is equipped to do isotopic analysis as an offsite backup to PVNGS capabilities.

#### **7.3.1.6 Portable Survey Instruments**

These instruments provide flexibility and backup capability for radiation measurements in areas not served by installed monitors, or where installed monitors may be inoperative.

#### **7.3.1.7 Emergency Response Facility Data Acquisition and Display System (ERFDADS)**

The ERFDADS provides a centralized location within the CR for display of plant parameters from which the safety status of operations can be assessed. Displays of data, including graphical displays, available on demand include plant temperatures, pressures, and flow rates; equipment and valve status, i.e., on, off, open, closed; process and area RMS readings; meteorology system data; and incore parameters.

In addition to the above parameters, the SPDS portion of ERFDADS contains a graphical display which provides immediate indication of deviation from safe operating values. From this display, additional specific data concerning the system in question is accessed on demand. The ERFDADS is designed to include the data acquisition system requirements of NUREG-0696.

ERFDADS displays are installed at Unit and Simulator A Control Room, Unit and Simulator A STSC, the TSC, and the EOF.

#### **7.3.1.8 Qualified Safety Parameter Display System (QSPDS)**

The QSPDS is designed to provide indications to detect the approach to, the existence of, and the recovery from inadequate core cooling. It also provides a minimum set of seismically qualified parameters from which abnormal plant operating conditions may be quickly assessed.

#### **7.3.1.9 Emergency Response Data System (ERDS)**

The ERDS is a direct electronic transmission system between the ERFDADS and the USNRC Operations Center. The system is intended to provide to the USNRC, on a near real-time basis, selected parameters from plant computer systems whose values indicate the condition of the plant during an emergency condition of Alert or higher. Since the Control Room Simulator is not connected to ERDS, Simulator data is not available on ERDS for drills and exercises.



### **7.3.2 Offsite Systems and Equipment**

The Offsite Dose Calculation Manual (ODCM) refers to the location of the environmental radiological monitoring sampling stations, as well as Thermoluminescent dosimeter (TLD) stations. Environmental samples routinely collected and analyzed include: water, vegetation, food products and milk. Backup and cross-check environmental surveillance are performed by ARRA.

### **7.4 Protective Facilities and Equipment**

Control Room shielding and ventilation allow personnel habitability during Design Basis Accident conditions. The TSC and EOF have shielding and ventilation similar to the CR for habitability during an incident. Portable radiation monitoring instrumentation, communications equipment, respiratory protection equipment and protective clothing are available in, or near the CR, STSC, TSC, EOF, and OSC.

### **7.5 First Aid and Medical Facilities**

A first aid treatment center is maintained onsite. In addition, a first aid room is located in each unit at the 140-foot level of the Auxiliary Building. First aid treatment of injured individuals is administered by trained personnel. Advanced medical care, if required, is obtained by transporting the individuals to an offsite medical facility.

### **7.6 Damage Control Equipment and Supplies**

Fire hose stations, extinguishers and hydrants are strategically located throughout the station for use in fire. PVNGS maintains self-contained breathing apparatus storage areas throughout the station to be used for fire fighting, entry into airborne radioactivity areas, or entry into toxic gas areas.

### **7.7 Prompt Notification Siren System**

The Prompt Notification Siren System is a group of high sound output sirens located throughout the 10-mile Plume Exposure Pathway Emergency Planning Zone. Its operation is at the discretion of the state and county governmental agencies responsible for notification and alerting of the public. This system alerts the people within the 10-mile EPZ to monitor radio or TV emergency broadcasts for specific information regarding the situation at PVNGS and/or protective actions. This system is operated from any of the four control point locations:

- County Emergency Operations Center
- Arizona Department of Public Safety
- Maricopa County Sheriff's Office
- APS Building at 502 South Second Avenue, Phoenix

Normally the sirens are activated from the Maricopa County Emergency Operations Center or from the Maricopa County Sheriff's Office. The system is tested periodically to ensure its readiness.

## **8.0 Maintaining Emergency Preparedness**

### **8.1 Organizational Preparedness**

The Palo Verde Nuclear Generating Station (PVNGS) emergency preparedness program consists of (1) personnel training, (2) drills and exercises, and (3) regular emergency plan review and evaluation by PVNGS personnel and management.

#### **8.1.1 Training**

The PVNGS Emergency Response Training Program ensures that personnel who are active participants in the emergency organization are familiar with the contents and responses in the Emergency Plan and associated implementing procedures. The Program Leader, Emergency Planning, is responsible for ensuring that the PVNGS Emergency Response Training Program meets these objectives. PVNGS Training provides onsite training. All other employees receive general information on the Emergency Plan annually.

The PVNGS Emergency Response Training Program lists specific training and indicates, where applicable, qualification requirements for key members of the PVNGS Emergency Organization. A brief discussion of key features of PVNGS emergency response training follows.

##### **8.1.1.1 Basic Training and Indoctrination**

Personnel requiring unescorted access into the Protected Area(s) receive general instructions on the Emergency Plan annually as part of Site Access Training. Retraining is conducted annually.

##### **8.1.1.2 Specialized Training for Key Emergency Organization Personnel**

Specialized training is provided annually to key personnel involved in emergency response actions. This special training includes instruction and review in the technical and practical aspects of emergency response actions. In addition to training, drills and exercises are conducted to develop and maintain emergency response skills.

Training for the Emergency Planning Staff includes participation in industry sponsored emergency planning symposia and workshops.

##### **8.1.1.3 Training for Participating Agencies**

Training for participating agencies is programmed by the individual agencies. Training personnel are available to describe the special conditions and constraints involved in dealing with PVNGS emergency radiological release situations.

**8.1.1.4 Public Education**

PVNGS, ADEM and MCDEM jointly prepare an educational calendar for distribution to the public within the Plume Exposure Pathway EPZ. The calendar is mailed annually to residents within a 10-mile radius of the station, using postal procedures that ensure maximum distribution. The calendar outlines, in lay language, the station's operational concept, lists the various classifications of emergencies, summarizes the emergency plan developed to safeguard the general public, reviews appropriate protective actions, and indicates public warning signals. The calendar also contains material on radiation, contacts for additional information and means for advising governmental authorities about special needs of EPZ residents.

In addition to this written material, PVNGS periodically conducts public information seminars and meetings as needed or requested with local groups within the 10-mile EPZ. Local groups may be invited to participate in drills and exercises to maintain emergency preparedness and to test specific segments of emergency plans and procedures that are affected by, or may affect, 10-mile EPZ residents.

Methods are also established to provide emergency and protective information to the transient population within the PVNGS 10-mile EPZ. Inserts are placed in telephone books. Information is posted local stores, businesses, schools, churches, post offices, truck stops, and recreational vehicle parks.

Emergency and protective action information is provided to employers for subsequent distribution to their workers.

**8.1.1.5 Media Familiarization**

Annual programs are conducted to acquaint media personnel with the PVNGS Emergency Plan, information concerning basic nuclear plant operation and radiation, and the locations and means employed to disseminate public emergency information.

**8.1.1.6 Documentation**

All emergency preparedness training is documented and training records are maintained in accordance with established procedures.

### **8.1.2 Exercises**

Joint emergency exercises simulate events resulting in offsite radiological releases which require response by offsite authorities. Exercises are conducted in accordance with USNRC and FEMA rules. The Program Leader, Emergency Planning and assigned personnel coordinate with federal and state/county emergency personnel in planning joint exercises. During each six-year period, an exercise is scheduled to commence offshift. Exercises are conducted under a variety of weather conditions, and some exercises are unannounced. Scenarios for joint exercises are developed in cooperation with the ADEM, ARRA, and MCDEM. The Program Leader, Emergency Planning, is responsible for overall exercise control, and for the review of scenarios to ensure that essential portions of plans and organizations are tested within a six-year period.

As soon as practicable after the conclusion of joint exercises, USNRC, FEMA, PVNGS, and state/county observers hold critiques. The critiques result in formal evaluations of these exercises which are published by Federal or State authorities and are analyzed by PVNGS management. Areas found to be weak are noted and corrective actions to improve deficiencies are implemented. The Program Leader, Emergency Planning, monitors corrective actions and assures their implementation.

### **8.1.3 Drills**

Instructional emergency drills are conducted as scheduled, with emphasis placed upon orderly implementation of activities prescribed within the Emergency Plan and its implementing procedures.

Drill performance is critiqued by personnel acting as drill controllers who offer on-the-spot corrections to erroneous performance. Each controller is assigned a specific area for evaluation and receives written drill instructions. Written evaluations of drill performance are provided to appropriate management personnel. Follow-up action is then taken by the responsible Department Leaders to upgrade areas where shortcomings are noted; they report their progress to the Program Leader, Emergency Planning.

Following all drills, a drill controller critique is held and all aspects of drill performance are discussed. All significant deficiencies are incorporated into action items and tasked to the affected department.

Drills for the emergency organization are conducted periodically throughout the year to test response timing and familiarity with implementing procedures and methods, to test emergency equipment, and to ensure that members of the emergency organization are familiar with their duties.

Certain drills, i.e., fire, and medical emergency, and tests, i.e., communications and notification, are coordinated with offsite participating agencies. The Program Leader, Emergency Planning, has overall responsibility for meeting all drill requirements. He may delegate specific tasks to operating departments.

Communications links and notification procedures with offsite state and county agencies are tested periodically using a simulated emergency message transmitted offsite for subsequent fan-out alerting by state/county authorities. USNRC communications links are tested in accordance with Appendix E to 10 CFR Part 50. Communication tests also evaluate the understanding of the content of messages.

Fire drills are conducted in accordance with the PVNGS Updated Final Safety Analysis Report (UFSAR).

Health Physics (HP) Drills are conducted semi-annually, generally in connection with joint exercises or Radiological Monitoring Drills. These drills involve response to, and analysis of, simulated elevated radioactivity in airborne samples and direct radiation measurements in the environment.

Medical Emergency Drills with Offsite Medical Facilities involving treatment of a simulated externally contaminated person are conducted annually with provision for participation by an offsite ambulance.

Radiological Monitoring Drills are conducted annually for both onsite and offsite Survey Team personnel. These drills include collection and analysis of appropriate sample media, e.g., vegetation, soil, and air, communications, and record keeping. Since PVNGS is located in a desert area and there are no nearby bodies of water, liquid environmental samples are not collected or analyzed during Radiological Monitoring or Health Physics drills. These drills are coordinated with offsite organizations where appropriate.

#### **8.1.4 Scenarios**

Drill and exercise scenarios are written to allow a certain amount of free play for decision making. Controllers are instructed at pre-drill and pre-exercise briefings as to which portions of the scenario permit free play and which portions require strong controller management. The Program Leader, Emergency Planning, is responsible for overall drill and exercise control.

#### **8.1.5 Organization for Maintaining Emergency Preparedness**

The Senior Vice President, Nuclear, has overall responsibility and authority for all nuclear activities, including emergency response planning. The Program Leader, Emergency Planning, has been assigned the responsibility to develop and maintain a coordinated PVNGS, Federal, State, and local government emergency preparedness program for PVNGS. The Program Leader, Emergency Planning, participates in meetings, seminars, and conferences aimed at maintaining a current and accurate Emergency Plan, and maintains a current knowledge of regulations and guidelines. The Program Leader, Emergency Planning is responsible for the Emergency Plan, and implements Plan revisions and updates.

## **8.2 Review and Updating of the Emergency Plan**

The PVNGS Emergency Plan is reviewed annually and updated as needed. The update takes into account changes identified by drills and exercises. The Program Leader, Emergency Planning, maintains documentation substantiating the annual review. Special attention is devoted to reviewing PVNGS/governmental agency interfaces, updating offsite response agreements, maintaining effective communication channels, and, on a quarterly basis, ensuring up-to-date contact and notification lists. Liaison with state and local agencies ensures uniform updating and Plan improvement.

Independent audits/reviews by individuals who have no direct responsibility for the implementation of the Emergency Preparedness Program are conducted in accordance with the Quality Assurance Program Description in the PVNGS Updated Final Safety Analysis Report (UFSAR).

The Program Leader, Emergency Planning, is responsible for ensuring that EIPs are updated and revised as necessary.

Emergency Plan revisions and changes are conducted in accordance with PVNGS Administrative Policies and Procedures.

The revised and/or updated Emergency Plan and procedures are handled in accordance with document control procedures. Changes to the Emergency Plan and procedures are approved by the Program Leader, Emergency Planning or designated alternate, and transmitted to the Vice President, Nuclear Production, and to the Offsite Safety Review Committee.

## **8.3 Maintenance and Inventory of Emergency Equipment and Supplies**

Quarterly inspections of the operational readiness of emergency equipment and supplies are conducted by the Emergency Planning Department. Deficiencies noted during inspections are corrected. The use of inspection procedures with checklists and follow-up actions ensures that equipment is ready for use. Sufficient reserves of instruments/equipment are maintained to replace those undergoing calibration or repair. Calibration of equipment is conducted at intervals set forth in the UFSAR. In addition, planned use of communications, first aid, fire fighting, and radiation measuring equipment during scheduled drills further ensures the availability and operability of emergency equipment.

## **9.0 Recovery**

Recovery operations include long term post-emergency efforts that follow a major incident. These operations are performed by station and other PVNGS personnel, contract experts and specialists, and qualified engineers under the direction of the PVNGS recovery organization.

Post accident recovery actions are designed to identify the extent of plant damage, prepare specific plans and programs for station repair and restoration, implement recovery plans and programs, and return the plant to a normal operating status.

The following plant status conditions serve as general guidelines for decisions on the initiation of post-emergency recovery efforts:

- Radiation levels are stable or decreasing with time
- Releases of radioactive materials to the environment have ceased or are controlled within permissible license limits
- Fire or similar emergency conditions no longer constitute a hazard to the plant or station personnel
- Measures have been successfully instituted to correct or compensate for malfunctioning equipment.

Based on consideration of these criteria, as well as other pertinent items, the Emergency Operations Director determines when to activate the recovery organization. Manpower and equipment resources supporting the individual functional segments of the recovery organization may vary according to the severity of damage and specific situational needs.

### **9.1 Recovery Organization**

The responsibilities and functions of the Recovery Organization Managers are summarized as follows:

- The Recovery Manager has overall corporate responsibility for restoring the station to a normal operating configuration.
- The Station Operations Manager manages day-to-day inplant operations and, during recovery, is responsible for ensuring that repairs and modifications optimize post-recovery plant operational effectiveness and safety.
- The Nuclear Support Manager focuses necessary engineering, design, and construction resources on those aspects of plant recovery requiring redesign, modification, or new construction; directs and coordinates NSSS and Balance-of-Plant (BOP) engineering and construction/repair work.
- The Radiological Services Manager develops plans and procedures to process and control liquid, gaseous, and solid wastes to minimize adverse effects on the health and safety of the public and station recovery personnel. In addition, the Radiological Services Manager coordinates the activities of staff Radiological Engineers and radiation protection personnel engaged in waste treatment operations.
- The Technical Support Manager provides analyses, plans, schedules, and procedures in direct support of plant operations.
- The Quality Assurance Manager assures that the overall conduct of recovery operations is performed in accordance with corporate policy and rules and regulations governing activities which affect public health and safety.

- The Planning/Scheduling Manager prepares plans and schedules, and tracks/expedites recovery operations.
- The Administrative/Logistics Manager supplies administrative, logistic, communications, and personnel support for the recovery operation.
- PVNGS Strategic Communications coordinates the flow of media information concerning recovery operations.

## **9.2 Recovery Exposure Control**

The Recovery Manager, via the Recovery Organization, is responsible for evaluating the advisability of initiating recovery and reentry. Information on existing conditions, interviews with employees evacuated during the emergency, regulatory exposure guidelines, and counsel from recognized experts are used to formulate decisions on reentry and recovery.

During recovery operations, actions are preplanned to limit exposures. Access to areas is controlled and exposure to personnel documented.

Estimates of total population dose are available if any releases are required or occur during recovery operations.

## **9.3 Re-entry**

If a site evacuation is ordered, re-entry to the site is controlled in accordance with established procedures. Respiratory protection equipment, protective clothing, and thyroid blocking agent are maintained onsite for the use of individuals remaining or arriving onsite before, during, or after the emergency.

## **10.0 Agreement Letters**

This section lists written agreements referring to the concept of operations developed between Federal, State, and local agencies and other support organizations having an emergency response role within the Emergency Planning Zones. Original copies of agreements are maintained in the files of Emergency Planning Department. The agreements are listed below.

- Fixed Nuclear Facility Off-Site Emergency Response Plan.
- Letter of agreement from National Weather Service.
- Letter of agreement from Institute of Nuclear Power Operations.
- Combustion Engineering contract change order. (#PV81-4765)
- Letter of agreement from Good Samaritan Regional Medical Center.
- Letter of agreement from Maryvale Hospital Medical Center.
- Letter of agreement from City of Phoenix Fire Department.
- Letter of agreement from APS Buckeye Office.



**11.0 Referenced Interfacing Emergency Plans****Fixed Nuclear Facility Off-Site Emergency Response Plan**

- State of Arizona - Division of Emergency Management
- Maricopa County - Department of Emergency Management

**Federal Radiological Emergency Response Plan**

- U.S.A. - Federal Emergency Management Agency

**Joint Public Information Procedures**

- APS

**National Plan for Radiological Emergencies at Commercial Nuclear Power Plants, publication FCM-P15-1982**

- U.S. Department of Commerce
- National Oceanic and Atmospheric Administration

12.0 Maps

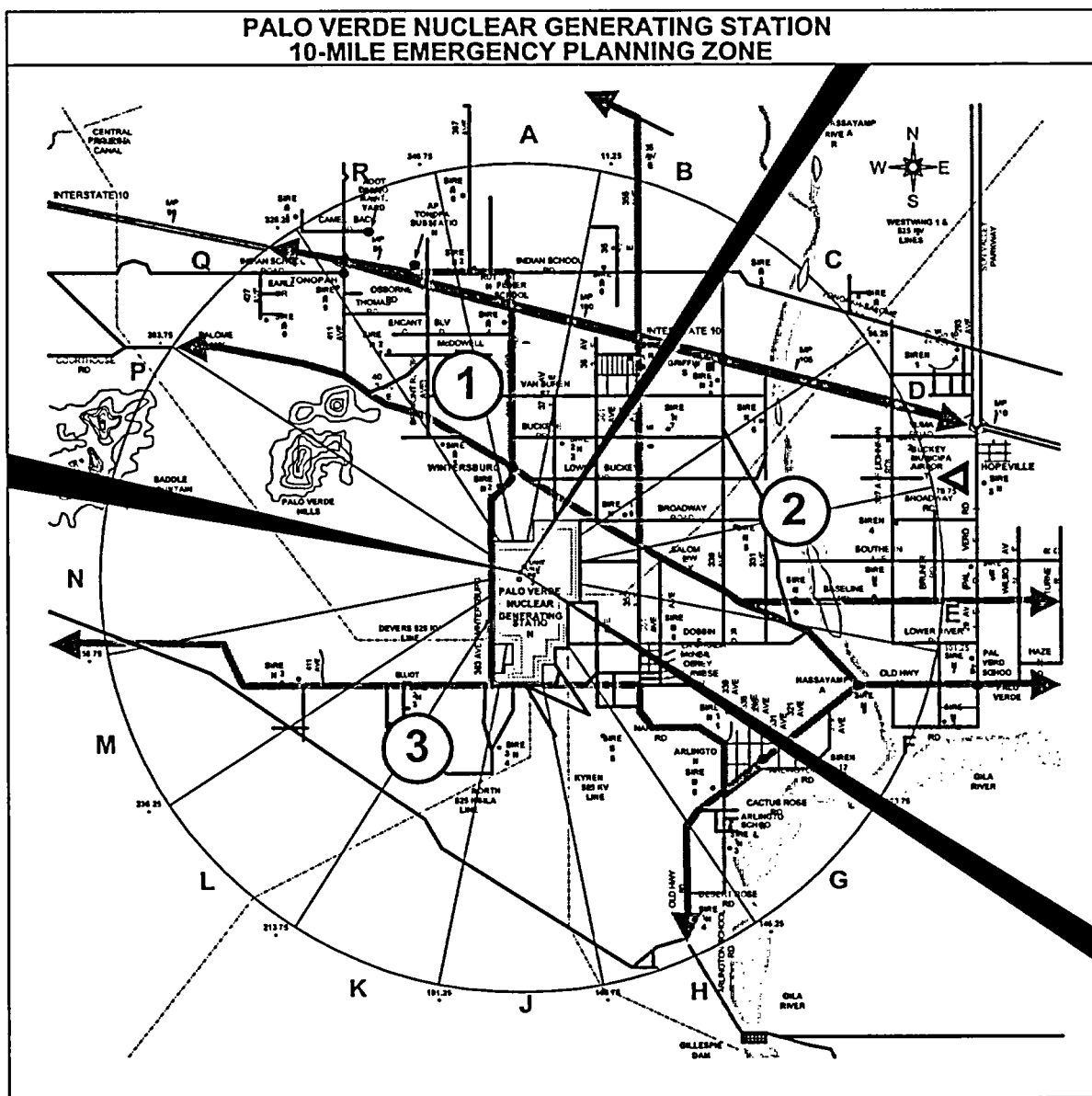


Figure 10 Population Evacuation Route Sections and Evacuation Routing

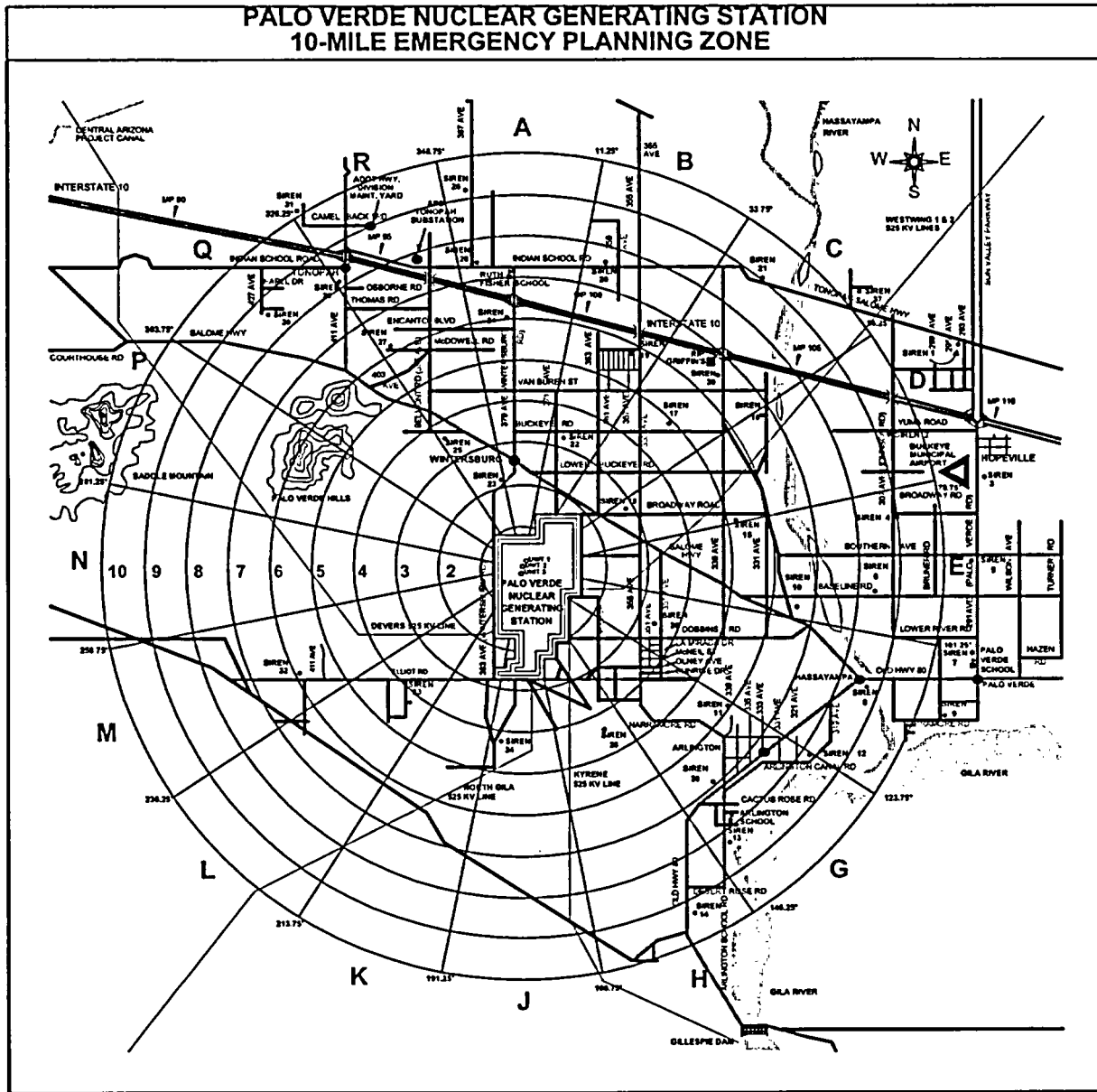


Figure 11 Demography within the Plume Exposure Pathway Emergency Planning Zone

**PALO VERDE POPULATION SURVEY  
November 2002**

Mile Ring												
Sector	1	2	3	4	5	5 Mile Total	6	7	8	9	10	10 Mile Sector Total
A	0	20	106	130	55	311	12	62	74	38	53	550
B	0	3	60	124	61	248	65	21	110	44	2	490
C	0	0	37	23	159	219	177	45	5	33	11	490
D	0	0	5	42	165	212	124	54	0	4	379	773
E	0	0	9	31	33	73	95	6	15	71	66	326
F	0	0	4	73	44	121	13	27	4	40	60	265
G	0	0	0	4	2	6	0	148	91	8	2	255
H	0	0	0	0	0	0	0	0	0	44	16	60
J	0	0	2	0	4	6	0	0	0	0	0	6
K	0	0	5	0	2	7	2	0	0	0	0	9
L	0	2	0	11	6	19	0	2	0	0	0	21
M	0	0	2	0	0	2	4	7	0	22	0	35
N	2	2	2	0	0	6	0	0	0	0	0	6
P	2	0	0	0	0	2	0	0	0	0	0	2
Q	11	0	0	2	27	40	16	2	19	10	57	144
R	2	2	7	63	31	105	4	12	264	22	60	467
Mile Ring Total	17	29	239	503	589	1377	512	386	582	336	706	3,899

PREVIOUS TOTAL = 2,592 (as of June 2000)

Ruth Fisher School	Students	656	Staff	75	Total	731
Arlington School	Students	192	Staff	30	Total	222
Palo Verde School	Students	355	Staff	55	Total	410

**Figure 11 Demography within the Plume Exposure Pathway Emergency Planning Zone**

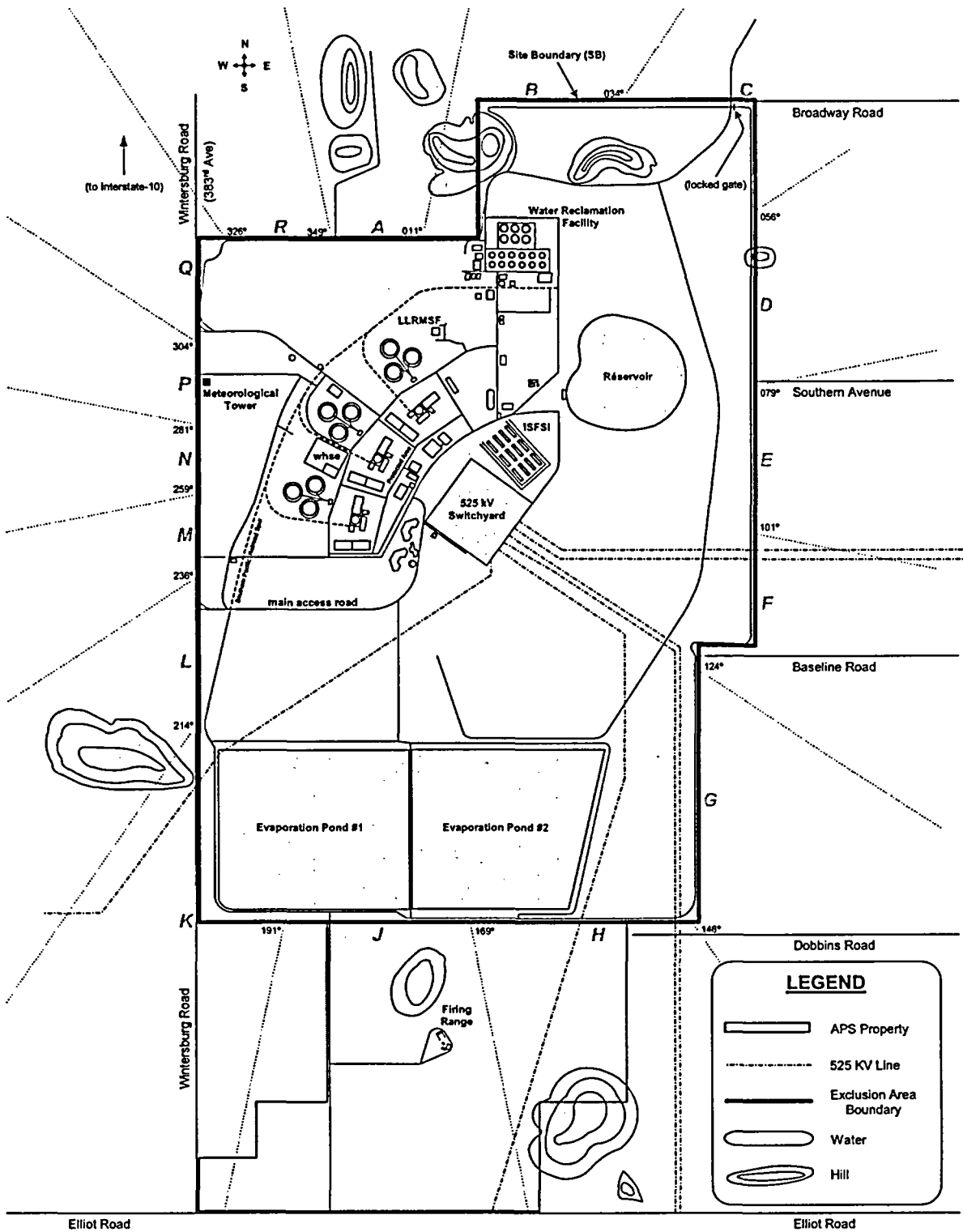


Figure 12 Site Exclusion Area Boundary and Property Boundary

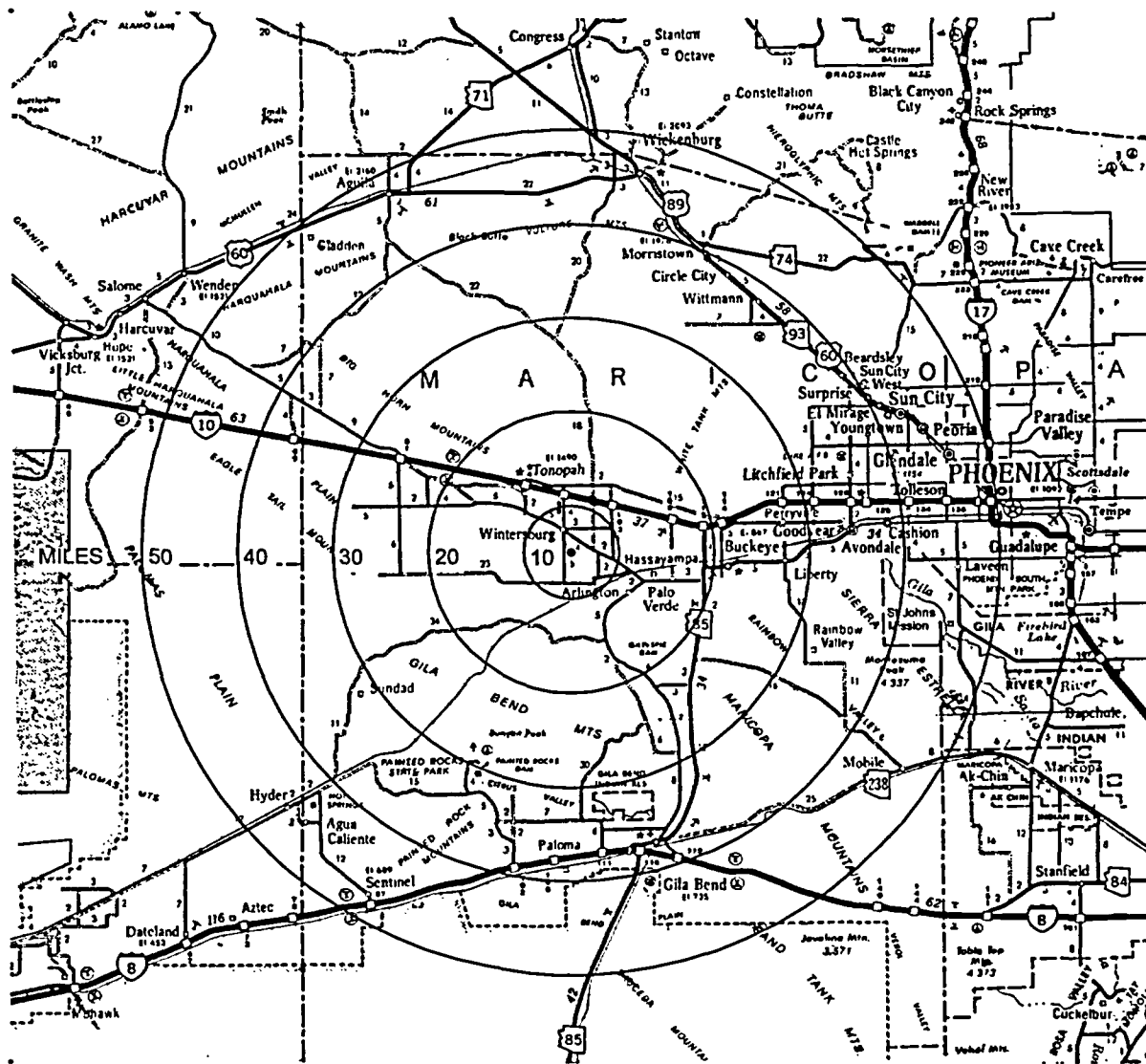
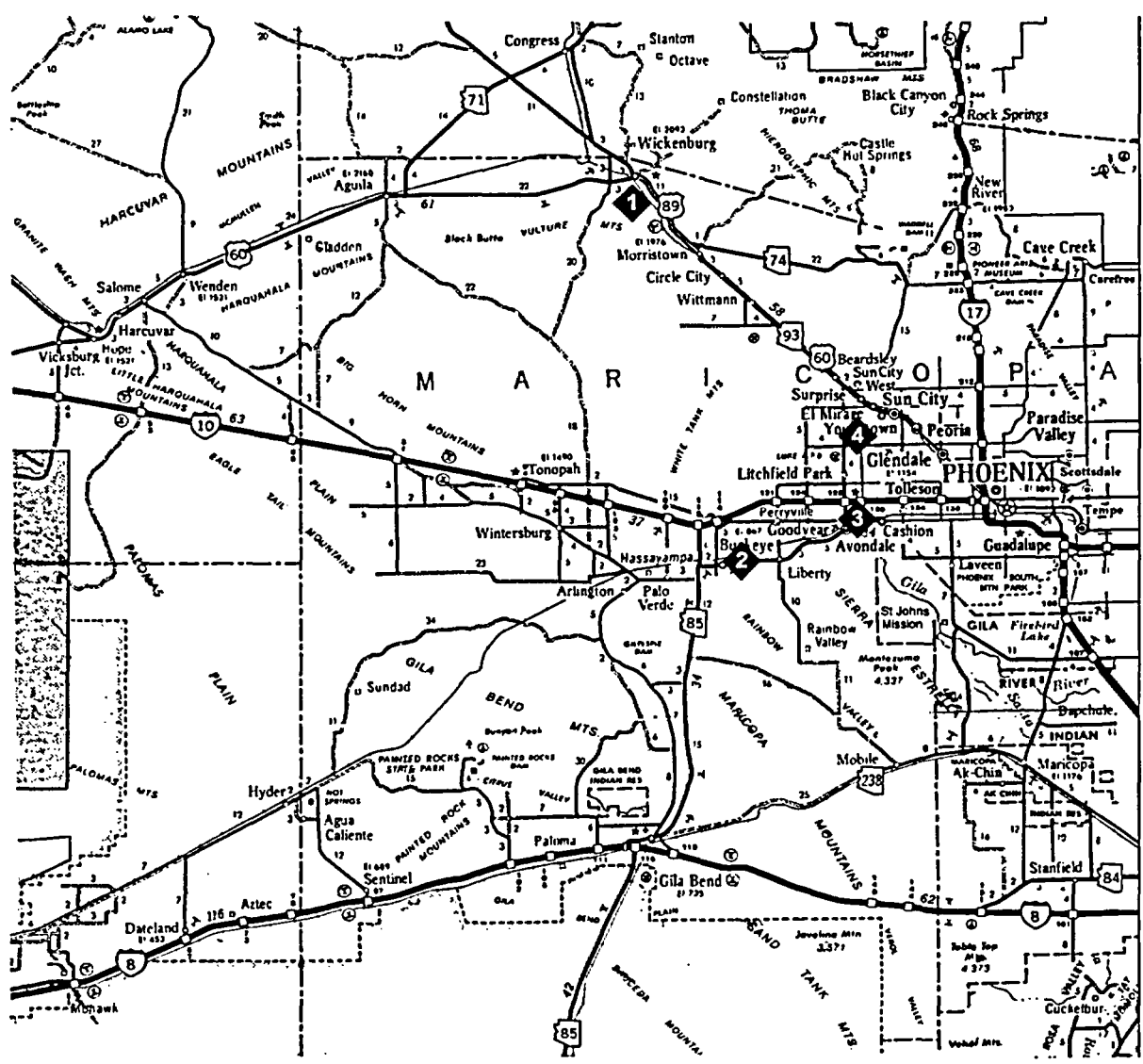
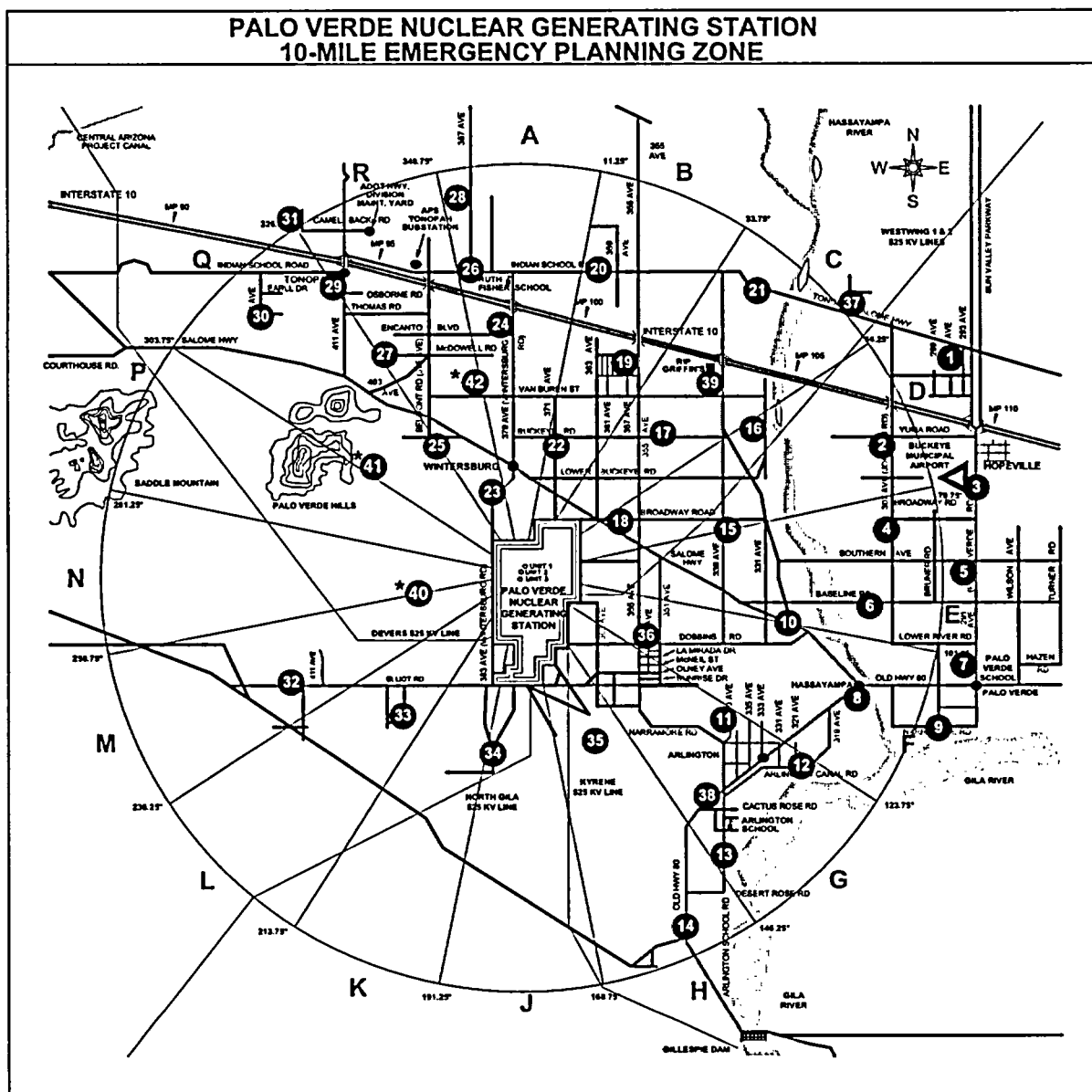


Figure 13 Ingestion Exposure Pathway Emergency Planning Zone



- 1. WICKENBURG HIGH SCHOOL  
1090 S. Vulture Mine Road
- 2. BUCKEYE UNION HIGH SCHOOL  
902 Eason Avenue
- 3. DYSART HIGH SCHOOL  
11405 N. Dysart Road
- 4. TREVOR BROWNE HIGH SCHOOL  
7402 W. Catalina Drive

Figure 14 Reception and Care Centers



\* - Under Construction

Figure 15 Prompt Notification System Siren Locations



**13.0 Emergency Plan Implementing Procedures**

Designator	Title	Plan Section
EPIP-01	Satellite Technical Support Center Actions	6,7
EPIP-02	Operations Support Center Actions	6,7
EPIP-03	Technical Support Center Actions	6,7
EPIP-04	Emergency Operations Facility Actions	6,7
EPIP-05	Backup Emergency Operations Facility Actions	7
EPIP-06	Reassembly Area Actions	7
EPIP-07	Telecommunications	7
EPIP-08	Emergency Planning Administration	7, 8
EPIP-09	E-Plan Implementation for Security Events	6

**14.0 Identification of Emergency Kits by General Category**

Kit Equipment	EOF TSC OSC	STSC	Offsite Survey Teams	Ambulance	Hospitals, Medical Facility, Evacuation Decon.	Backup EOF
Protective Equipment	X	X		X	X	
Communications Equipment	X	X	X	X		
Radiological Monitoring Equipment	X	X	X		X	
Emergency Supplies	X	X	X	X	X	X

**15.0 Accident Dose Projection and Source Term Estimation**

The primary method used for dose projection at PVNGS is the MESOREM, Jr. computer program, which runs on several microcomputers throughout the plant.

### 15.1 System Overview

MESOREM, Jr. is used to calculate off-site radiation doses/dose rates from airborne radionuclides in the event of an accidental release of radioactive material into the atmosphere. This system can also be used to estimate doses for emergency planning exercises or hypothetical situations.

### 15.2 Dose Assessment Model Methodology

The standard MESOREM, Jr. System has two modes of operation, Mode A and Mode B (Class A and Class B model - NUREG-0654, respectively). Each mode of operation is a separate dose assessment system. Data entry and dose projections are performed independently for each mode of operation. Selection of the mode of operation is performed through menu control. Access to either mode A or B is restricted through the system password and user I.D.

The MESOREM, Jr. System Mode A Operation uses a dispersion model in accordance with NUREG-0654, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants and Regulatory Guide 1.145, Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants.

The MESOREM, Jr. System Mode B operation is based upon the third-generation Lagrangian puff transport and diffusion model MESOI, Version 2.0, as developed by the Pacific Northwest Laboratory, and as described in NUREG/CR-3344, PNL-4753, Dec. 1984. The basis for the MESOI model is the MESODIF Model, which was prepared initially by Start and Wendell for the National Reactor Testing Station. The MESOI model was developed for use by the U.S. Nuclear Regulatory Commission, Office of Inspection and Enforcement, in responding to emergencies at nuclear facilities. The MESODIF dispersion model has been verified with tracer material released into the atmosphere at Idaho Falls, Idaho.

### 15.3 Dose Capability at Receptor Locations

The standard MESOREM, Jr. System's Mode A Operation (NUREG-0654 Class A dispersion and dose model) provides the following information for each receptor location:

- Shelter dose estimates for Total Organ Dose Equivalent (TODE) (thyroid) and Total Effective Dose Equivalent (TEDE)
- Evacuation dose estimates for TODE (thyroid) and TEDE (evacuation doses are based upon estimated release duration time, the time the accident has been in progress and the evacuation time estimate)
- Protective Action Recommendations based upon dose savings from shelter and evacuation dose calculations
- Iodine deposition rates
- CHI/Q values
- External Effective Dose Equivalent (EDE) rates

- Adult thyroid inhalation Committed Dose Equivalent (CDE) rates
- TEDE rates

Center line dose rates, iodine deposition rates, and CHI/Q values are also provided at site boundary, 2, 5, and 10 miles.

The Mode A Operation also provides graphic plume displays of the following items:

- External EDE rates
- Adult thyroid inhalation Committed Dose Equivalent (CDE) rates
- TEDE rates
- CHI/Q values
- Iodine deposition rates

Meteorology and effluent release rate data, centerline values, estimate of plume arrival time to 10 mile boundary, and mode of operation are listed on each geographic display.

Total estimated Mode A calculational time required after the data input has been completed to the display of tabular dose values ranges from 0.5 to 3 minutes.

The standard MESOREM, Jr. System Class B dispersion and dose model (NUREG-0654) considers temporal and spatial characteristics in estimating CHI/Q, dose, dose rate and deposition values from an accidental release of radioactive material into the atmosphere.

The MESOREM, Jr. System's Mode B Operation (Class B dispersion and dose model) provides the following information for each receptor location:

- External EDE (integrated and rates)
- Adult thyroid inhalation CDE (integrated and rates)
- TEDE (integrated and rates)
- Integrated depleted CHI/Q values
- Ingestion Reports (GASPAR Reg. Guide 1.109 equations with EPA Report No. 11 Dose Conversion Factors)
- Integrated iodine deposition values

The Mode B Operation also provides graphic displays of the following items:

- External EDE (integrated and rates)
- Adult thyroid inhalation CDE (integrated and rates)
- TEDE (integrated and rates)
- Integrated depleted CHI/Q values
- Integrated iodine deposition

Meteorology and effluent release rate data, maximum values at 2, 5 and 10 miles for the chosen category, and mode of operation are listed on each geographic display.

#### 15.4 Dose Assessment Model Operation

The MESOREM, Jr. system prompts the operator to enter the accident type, and effluent and meteorological data. Alternate monitors are listed in the menus, in case the primary monitor is inoperable. Default values are also available, in case all monitors are inoperable. MESOREM, Jr. can calculate simultaneous releases from up to two different release points and accident types. The system also has the capability in Mode A to (a) back-calculate from radiological field readings, providing comparisons of actual readings with calculated readings, and comparisons of release rates calculated from in-plant monitors with release calculated from field readings, and (b) back-calculate external EDE/TEDE ratio.

#### 16.0 Cross Reference to NUREG-0654

Cross Reference between NUREG-0654 and the Palo Verde Nuclear Generating Station Emergency Plan.

##### **A. Assignment of Responsibility (Organization Control)**

- A.1.a Sections 4.2, 4.3
- A.1.b Section 4
- A.1.c Figures 1 through 6
- A.1.d Sections 4.2.1, 4.2.2, and 4.2.3
- A.1.e Section 4.2.1
- A.2.a NA
- A.2.b NA
- A.3 Section 10
- A.4 Section 4.2.3

##### **B. Onsite Emergency Organization**

- B.1 Sections 4.1, 4.2
- B.2 Section 4.2.1
- B.3 Sections 4.2.1, 4.2.2, 4.2.3
- B.4 Sections 4.2.1, 4.2.2, 4.2.3
- B.5 Section 4.2, Figures 1 through 6, Table 1
- B.6 Sections 4.2, 4.3, Figures 1 through 6
- B.7 Section 4.2
- B.7.a Section 4.2.3
- B.7.b Section 9
- B.7.c Section 4.2.3
- B.7.d Sections 4.2.3, 18
- B.8 Section 4.2.4
- B.9 Sections 4.2.4, 10

##### **C. Emergency Response Support and Resources**

- C.1.a Section 4.2.3
- C.1.b Section 4.3.3
- C.1.c Sections 4.3.3, 7.1.5, 7.1.6, Table 3
- C.2.a NA
- C.2.b Section 4.2.3
- C.3 Section 7.3.1.5
- C.4 Sections 4.2.4, 10

**D. Emergency Classification System**

- D.1 Table 2
- D.2 Section 5.2, Table 2
- D.3 NA
- D.4 NA

**E. Notification Methods and Procedures**

- E.1 Section 6.3
- E.2 Section 6.3
- E.3 Section 6.3
- E.4.a Section 6.3
- E.4.b Section 6.3
- E.4.c Section 6.3
- E.4.d Section 6.3
- E.4.e Section 6.3
- E.4.f Section 6.3
- E.4.g Section 6.3
- E.4.h Section 6.3
- E.4.i Section 6.3
- E.4.j Section 6.3
- E.4.k Section 6.3
- E.4.l Section 6.3
- E.4.m Section 6.3
- E.4.n Section 6.3
- E.5 NA
- E.6 Sections 6.3, 6.6.2, 7.7, Figure 15
- E.7 Sections 6.3, 6.6.2

**F. Emergency Communications**

- F.1.a Sections 6.3, 7.2.17, Figures 7 & 8
- F.1.b Sections 6.3, 7.2.17, Figures 7 & 8
- F.1.c Sections 4.2.3, 4.3, 6.3, 7.2.15
- F.1.d Section 7.2, Table 3
- F.1.e Section 6.3
- F.1.f Sections 7.2
- F.2 Section 7.2
- F.3 Section 8.1.3, 8.3

**G. Public Education and Information**

- G.1 Section 8.1.1.4
- G.2 Section 8.1.1.4
- G.3.a Section 7.1.7
- G.3.b Section 7.1.7
- G.4.a Sections 4.2.3, 18
- G.4.b Section 17
- G.4.c Section 6.8
- G.5 Section 8.1.1.5

**H. Emergency Facilities and Equipment**

- H.1 Sections 7.1.3, 7.1.4, 7.1.5
- H.2 Section 7.1.6
- H.3 NA

- H.4 Section 6.3
- H.5.a Section 7.3.1.1
- H.5.b Sections 7.3.1.2, 7.3.1.6
- H.5.c Section 7.3.1.3
- H.5.d Section 7.3.1.4
- H.6.a Section 7.3.1.1
- H.6.b Section 7.3.2
- H.6.c Section 7.3.1.5
- H.7 Section 7.3.2
- H.8 Sections 6.4.2, 7.3.1.1
- H.9 Section 7.1.4
- H.10 Section 8.3
- H.11 Section 14
- H.12 Section 7.1.6

**I. Accident Assessment**

- I.1 Table 2
- I.2 Sections 7.3.1.2, 7.3.1.5
- I.3.a Section 15.0
- I.3.b Section 15.0
- I.4 Section 15.0
- I.5 Sections 6.4.2, 7.1.3, 7.1.5, 7.1.6, 7.3.1.1, 7.3.1.9
- I.6 Section 15.0
- I.7 Section 6.4.2
- I.8 Sections 6.4.2

Note: PVNGS is a dry site and has no monitored liquid release pathways.

- I.9 Section 6.4.2
- I.10 Sections 6.4.2, 15
- I.11 NA

**J. Protective Response**

- J.1.a Section 6.6.1.1
- J.1.b Section 6.6.1.1
- J.1.c Section 6.6.1.1
- J.1.d Section 6.6.1.1
- J.2 Section 6.6.1.5
- J.3 Section 6.7.2
- J.4 Sections 6.6.1.5, 6.7.2
- J.5 Section 6.6.1.2
- J.6.a Sections 6.6.3.1, 9.3
- J.6.b Sections 6.6.3.2, 9.3
- J.6.c Sections 6.6.3.3, 9.3
- J.7 Section 6.6.2.2, Figure 9
- J.8 Section 6.6.2.2
- J.9 NA
- J.10.a Figures 10, 14
- J.10.b Figure 11
- J.10.c Sections 6.6.2.1, 7.7, Figure 15
- J.10.d NA

- J.10.e NA
- J.10.f NA
- J.10.g NA
- J.10.h NA
- J.10.i NA
- J.10.j NA
- J.10.k NA
- J.10.l NA
- J.10.m Section 6.6.2, 6.6.2.2
- J.11 NA
- J.12 NA

**K. Radiological Exposure Control**

- K.1.a Sections 6.7.1, 6.7.2, 6.7.3
- K.1.b Sections 6.7.1, 6.7.2, 6.7.3
- K.1.c Sections 6.7.1, 6.7.2, 6.7.4
- K.1.d Sections 6.7.1, 6.7.2, 7.5
- K.1.e Section 6.7.1
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- K.1.g Sections 6.7.4, 7.5
- K.2 Section 6.7.1
- K.3.a Sections 6.6.3.4, 6.7.1
- K.3.b Sections 6.6.3.4, 6.7.1
- K.4 NA
- K.5.a Section 6.7.2
- K.5.b Section 6.7.2
- K.6.a Section 6.6.4
- K.6.b Sections 6.6.4, 7.1.6
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- K.7 Sections 6.7.2, 6.7.4

**L. Medical and Public Health Support**

- L.1 Sections 6.7.2, 6.7.3, 6.7.4
- L.2 Sections 6.7.2, 7.5
- L.3 NA
- L.4 Section 4.2.4, 6.7.3

**M. Recovery and Reentry Planning and Post Accident Operations**

- M.1 Sections 9.0 through 9.3
- M.2 Section 9.1
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- M.4 Section 9.2

**N. Exercises and Drills**

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- N.1.b Section 8.1.2
- N.2.a Section 8.1.3
- N.2.b Section 8.1.3
- N.2.c Section 8.1.3
- N.2.d Section 8.1.3
- N.2.e.1 Section 8.1.3
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- N.3.a Sections 8.1.2, 8.1.3
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- N.3.e Sections 8.1.2, 8.1.3
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- N.4 Sections 8.1.2, 8.1.3
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**O. Radiological Emergency Response Training**

- O.1 Section 8.1.1
- O.1.a Sections 8.1.1, 10.0
- O.1.b NA
- O.2 Sections 8.1.1.2, 8.1.3
- O.3 Section 4.2.1.4, 6.7.2
- O.4.a Section 8.1.1
- O.4.b Section 8.1.1
- O.4.c Section 8.1.1
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- O.4.g Section 8.1.1.3
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- O.4.i Section 8.1.1
- O.4.j Section 8.1.1
- O.5 Section 8.1.1.2

**P. Responsibility for the Planning Effort: Development, Periodic Review and Distribution of Emergency Plans**

- P.1 Section 8.1.1.2
- P.2 Section 8.1.5
- P.3 Section 8.1.5
- P.4 Section 8.2
- P.5 Section 8.2
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## **17.0 Corporate Emergency Support**

Recognizing the need to provide effective management for radiological emergencies at PVNGS, the Emergency Operations Director in the EOF will request and coordinate required support.

## **18.0 Public Information**

### **18.1 Introduction**

The purpose of this Appendix is to briefly summarize the responsibilities, operation and staffing of the Palo Verde Strategic Communications, Pinnacle West Energy, Generation Communications Department's and the Joint Emergency News Center (JENC). Detailed procedures are contained in the Joint Public Information Procedures.

### **18.2 Activation and Operation**

The purpose of the Palo Verde Strategic Communications, Pinnacle West Energy, Generation Communications Department and the JENC is to release information about an emergency at PVNGS to the news media and the general public.

The Palo Verde Strategic Communications, Pinnacle West Energy, Generation Communications Department is activated at a Notification of Unusual Event (during normal working hours only). At an Alert or higher, the JENC is activated and assumes responsibility for the public information function.

### **18.3 Staffing and Location**

Palo Verde Strategic Communications Department personnel are located at the Palo Verde Nuclear Generating Station and the Pinnacle West Energy, Generation Communications Department personnel are located at the Pinnacle West/APS Corporate Headquarters, 400 N. 5th Street, Phoenix, AZ.

The JENC is located at the Papago Park Military Reservation at 5636 E. McDowell Road in Phoenix. The JENC staff consists of Pinnacle West Energy/PVNGS and government public information and support personnel. PVNGS coordinates and releases information with government authorities. Each principal organization represented at the JENC has a designated spokesperson who has access to all necessary information. JENC procedures are designed to allow the timely exchange of information among spokespersons.