

# PRIORITY 1

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102-03085-ECS/AKK/RJH  
August 9, 1994

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CORRECTED COPY

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)  
Units 1, 2, and 3  
Docket Nos. STN 50-528/529/530  
Revision 14 to the Emergency Plan  
File: 94-002-493; 94-056-026

Arizona Public Service Company (APS) has revised the Emergency Plan in accordance with 10 CFR 50.54(q) and 10 CFR 50.4. APS has determined that this revision does not decrease the effectiveness of the Emergency Plan. In accordance with 10 CFR 50.4(b)(5), two copies will be submitted to the Regional Administrator, Region IV, and one copy will be submitted to the PVNGS Senior NRC Resident Inspector. Enclosure 1 provides a summary of changes to Revision 12 of the Emergency Plan. The revised pages are provided in Enclosure 2.

Should you have any questions, please contact Burton A. Grabo at (602) 393-6492.

Sincerely,

*Carl E. Simpson*  
EC Simpson

ECS/AKK/RJH/rv

Enclosures:

1. Summary of Changes to Revision 12 of the Emergency Plan
2. Revised Pages to Revision 12 of the Emergency Plan

cc: L. J. Callan  
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1.0

DEFINITIONS AND ABBREVIATIONS

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

1.1

Area Radiation Monitoring System (ARMS)

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

1.2

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.

1.3

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.

1.4

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 (or his designee). It is referred to in the Fixed Nuclear Facility Off-Site Emergency Response Plan as the Radiological Technical Directorate.

1.5

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.

1.6

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.

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8/5/94

Superseded pages for  
errors per  
Rev. 14  
50-526/225/030

1.7 Control Room (CR)

A CR, operating under the direction of a Shift Supervisor, 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.

1.8 Control Room Personnel

Shift Supervisor, Assistant Shift Supervisor and Nuclear Operators as defined in the PVNGS Technical Specifications.

1.9 Corporate Emergency Center (CEC)

The CEC is located on the 20th floor of the APS Corporate Headquarters at 400 North Fifth Street, Phoenix, Arizona. The CEC shall be staffed by executive personnel with the authority to commit corporate resources to support emergency and plant recovery operations.

1.10 Corrective Actions

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

1.11 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 (or his designee) exercises coordination over county emergency response actions.

1.12 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.

1.13 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).

1.14 Effective Dose Equivalent (EDE)

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

1.15 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.

1.16 Emergency Coordinator (EC)

The individual with the responsibility and authority to immediately and unilaterally initiate emergency actions, including providing notification and Protective Action recommendations

to governmental authorities responsible for implementing offsite emergency measures.

1.17 Emergency Operations Director (EOD)

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

1.18 Emergency Operations Facility (EOF)

The EOF is the focal point for overall APS 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.

1.19 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.

1.20 Forward News Center (FNC)

Located in the Energy Information Center adjacent to the Palo Verde Nuclear Generating Station. FNC personnel process and release information regarding an emergency to the news media during a Notification of Unusual Event.

1.21 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 are planned.

1.22 Inplant

The area inside the PVNGS Protected Area perimeter fence.

1.23 Joint Emergency News Center (JENC)

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

1.24 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.

1.25 Offsite

The area outside the PVNGS owner-controlled boundary fence.

1.26 Onsite

The area outside the PVNGS Protected Area but inside the PVNGS owner-controlled

boundary fence.

1.27 Operations Support Center (OSC)

A room 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.

1.28 Plant Manager

Is responsible for the operations and maintenance of each unit in compliance with the design and licensing documents using the most efficient and safe means available.

1.29 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.

1.30 Population-at-Risk

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

1.31 Process Radiation Monitoring System (PRMS)

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

1.32 Protective Actions

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

1.33 Protective Action Guides (PAGs)

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

1.34 Recovery Actions

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

1.35 State Emergency Operations Center (State EOC)

The State EOC is located at the Arizona Division of Emergency Management Headquarters, and is the primary point through which the Governor (or his designee) exercises overall control and coordination of governmental offsite emergency response operations.

1.36 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.

1.37 Technical Support Center (TSC)

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

1.38 Total Effective Dose Equivalent (TEDE)

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

1.39 Abbreviations

A-E	-	Architect-Engineer
ADEM	-	Arizona Division of Emergency Management
ADV	-	Atmospheric Dump Valve
APS	-	Arizona Public Service Company
ARMS	-	Area Radiation Monitoring System
ARRA	-	Arizona Radiation Regulatory Agency
ASU	-	Arizona State University
ATWS	-	Anticipated Transient Without Scram
CAS/SAS	-	Central Alarm Station/Secondary Alarm Station
CDE	-	Committed Dose Equivalent
CEC	-	Corporate Emergency Center
CEOG	-	Combustion Engineering (Inc.) Owners Group
CET	-	Core Exit Thermocouple
CFR	-	Code of Federal Regulations
CLAS	-	Containment Isolation Actuation Signal
CR	-	Control Room
CRT	-	Cathode Ray Tube
CS	-	Containment Spray
CSAS	-	Containment Spray Actuation Signal
DDE	-	Deep Dose Equivalent
DE	-	Dose Equivalent
DOE	-	Department of Energy
DPM	-	Disintegrations Per Minute
DPS	-	Arizona Department of Public Safety
EAL	-	Emergency Action Level
EC	-	Emergency Coordinator
ECCS	-	Emergency Core Cooling System
EDE	-	Effective Dose Equivalent
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
EPRI	-	Electric Power Research Institute
EPZ	-	Emergency Planning Zone
ERDS	-	Emergency Response Data System
ERFDADS	-	Emergency Response Facility Data Acquisition & Display System
ESFAS	-	Engineered Safety Features Actuation System



FEMA	-	Federal Emergency Management Agency
FNC	-	Forward News Center
FNF	-	Fixed Nuclear Facility
FSAR	-	Final Safety Analysis Report
FW	-	Feedwater
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
JENC	-	Joint Emergency News Center
KI	-	Potassium Iodide
LCO	-	Limiting Condition for Operation
LOCA	-	Loss of Coolant Accident
LSSS	-	Limiting Safety System Setting
LWR	-	Light Water Reactor
MCDEM	-	Maricopa County Department of Emergency Management
MSIS	-	Main Steam Isolation Signal
MSLB	-	Main Steam Line Break
MSSS	-	Main Steam Support Structure
NAN	-	Notification Alert Network
NRC	-	Nuclear Regulatory Commission
NSSS	-	Nuclear Steam Supply System
NWS	-	National Weather Service
OBE	-	Operating Basis Earthquake
ODCM	-	Offsite Dose Calculation Manual
OSC	-	Operations Support Center
PAG	-	Protective Action Guide
PASS	-	Post Accident Sampling System
PBX	-	Private Branch Exchange
PCB	-	Primary Coolant Boundary
PRMS	-	Process Radiation Monitoring System
PSIA	-	Pounds Per Square Inch Absolute
PSID	-	Pounds Per Square Inch Differential
PSIG	-	Pounds Per Square Inch Gauge
PVNGS	-	Palo Verde Nuclear Generating Station
PWR	-	Pressurized Water Reactor
QSPDS	-	Qualified Safety Parameter Display System
RCS	-	Reactor Coolant System
REAT	-	Radiological Emergency Assistance Team
RMS	-	Radiation Monitoring System
RO	-	Recovery Operations
RP	-	Radiation Protection
RPS	-	Reactor Protection System
RSP	-	Remote Shutdown Panel
RTD	-	Radiological Technical Directorate

### 3.0 SUMMARY OF THE PVNGS EMERGENCY PLAN

The Emergency Plan is designed to adhere to Nuclear Regulatory Commission (NRC) emergency planning regulations and guidelines applicable to Light Water Reactor (LWR) nuclear power stations. The plan delineates the organization for emergencies, provides for classification of emergencies according to severity, defines and assigns responsibilities and authorities, outlines measures to mitigate the consequences of an accident and minimize effects on the health and safety of the public and station personnel and presents a general approach and organization for station recovery.

The Emergency Plan has been based upon NRC 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 Arizona Division of Emergency Management (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.
- ° 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 off-site) 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 employed 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.
- Appendices - contains reference material relevant to this Emergency Plan.

and with American Nuclear Insurers. He reports to the Corporate Emergency Director.

#### 4.2.3.6 Corporate Legal Coordinator

Responsible for all legal concerns. He reports to the Corporate Emergency Director.

#### 4.2.3.7 Corporate Public Affairs Coordinator

Responsible for coordinating all federal, state and local government interfaces. He reports to the Corporate Emergency Director.

#### 4.2.3.8 Corporate Resources Coordinator

Responsible for providing additional manpower, logistical or facility/equipment support. Coordinates all off-site security and assures the physical set-up and notification required to activate the CEC. He reports to the Corporate Emergency Director.

#### 4.2.3.9 Corporate Technical Coordinator

Responsible for obtaining additional engineering support, technical experts, consultants, and technical assistance as needed and providing and interpreting technical information and emergency status to the CEC staff. He reports to the Corporate Emergency Director.

#### 4.2.3.10 Design Engineering

Design Engineering performs engineering analyses as required. He is located in the EOF and reports to the Technical Analysis Supervisor.

#### 4.2.3.11 Dose Assessment Health Physicist

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

#### 4.2.3.12 Dosimetry Clerk

The Dosimetry Clerk provides necessary dosimetry and TLDs to EOF personnel, support personnel reporting for site assignment and site personnel. He reports to the Radiological Assessment Coordinator.

#### 4.2.3.13 Emergency Operations Director

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

- a. Overall coordination of APS onsite and offsite emergency functions

- b. Interface between APS and federal/state/county emergency response agencies
- c. Communication of plant status updates and radiological release data to NRC, state/county EOCs, TOC, CEC, and JENC personnel
- d. Notification of state and county agencies concerning recommended protective actions
- e. Provision of administrative, technical, and logistical support to station emergency operations
- f. Ensuring continuity of emergency organization resources.

Once the Emergency Operations Director assumes his position, he assumes the responsibility from the Emergency Coordinator for the following non-delegable responsibilities:

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

#### 4.2.3.14 Engineering Support

At an Alert or higher level emergency classification, the Nuclear Engineering organization (at the PVNGS Administration Building) may be activated to provide I & C, Electrical, Mechanical, Chemical, Civil, Safety Analysis and Nuclear Engineering support services during both emergency and recovery operations. This organization supports the Emergency Coordinator/Emergency Operations Director and can coordinate, acquire, or provide any other engineering support, technical experts, or assistance requested.

#### 4.2.3.15 EOF Contact

The EOF Contact, located in the EOF, gathers necessary information for subsequent release to the media from the JENC. He communicates with the JENC Technical Advisor and reports to the Emergency Operations Director.

#### 4.2.3.16 Government Liaison Engineer

The Government Liaison Engineer makes the initial and subsequent notifications once the EOF is activated. He relieves the Satellite TSC Communicator of this responsibility. He is located in the EOF and reports to the Technical Analysis Supervisor.

#### 4.2.3.17 Joint Emergency News Center Spokesperson:APS

The Joint Emergency News Center Spokesperson:APS is the APS representative within the JENC organization authorized to speak for APS about actual emergency conditions.

#### 4.2.3.18 JENC Technical Advisor

The JENC Technical Advisor provides any necessary technical explanations to the JENC Facility

# OFFSITE EMERGENCY ORGANIZATION

Figure 4.2-3

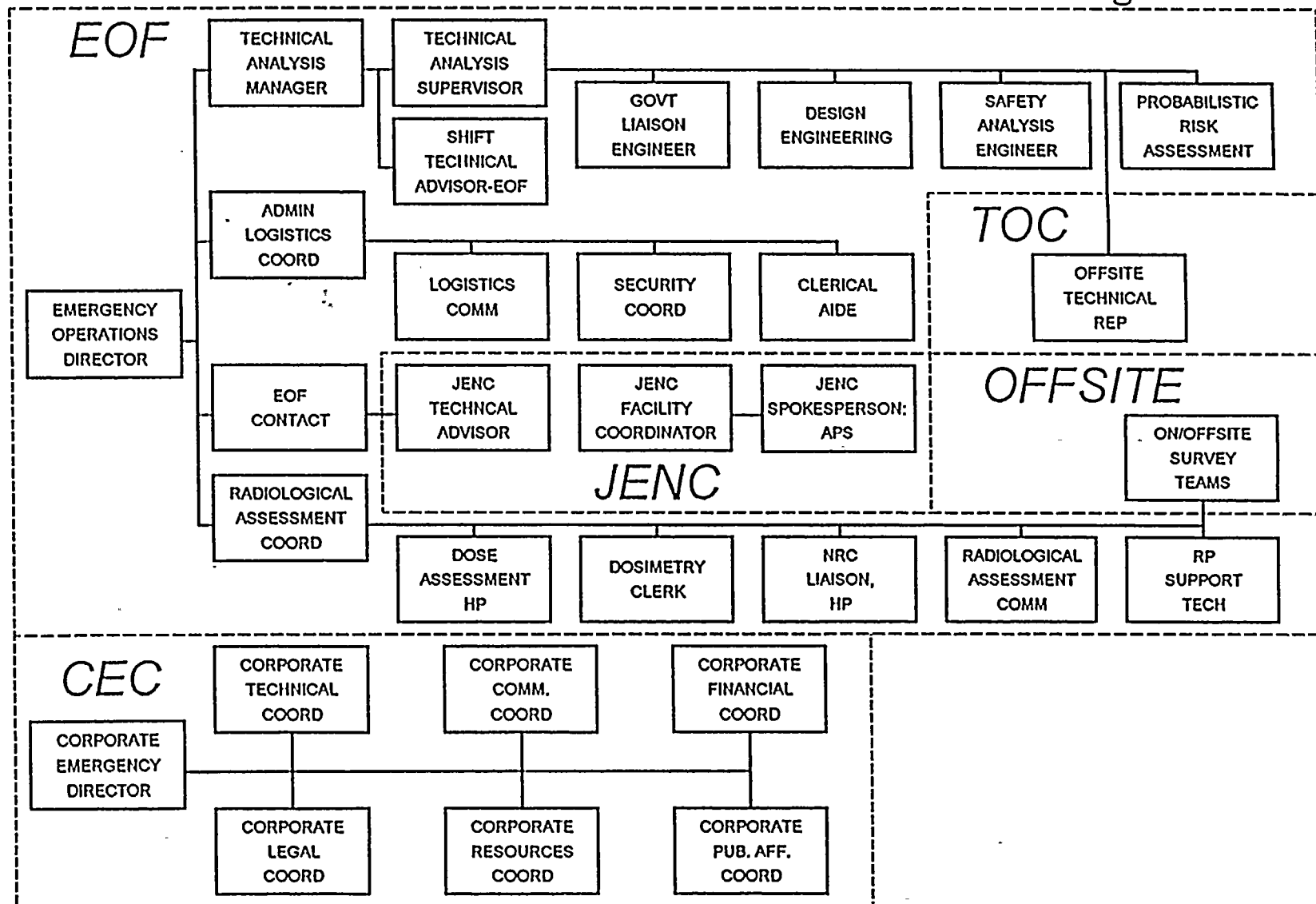
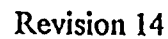


Figure 4.2-4



**Table 5.1-1 Example Emergency Action Levels (EALs)**

Recovery Procedure Implemented	Classification	Classification Criteria
Any event-oriented Recovery Operating Procedure or Functional Recovery Procedure	General Emergency	All 3 barriers either lost or challenged
	Site Area Emergency	2 of 3 barriers either lost or challenged
	Alert	1 of 3 barriers either lost or challenged
	Not Applicable	No barriers lost or challenged
<b>Indication of Barrier Challenge/Failure</b>		
<u><b>RCS</b></u>		
(1) RCS leakage > 44 gpm or SGTR > 44 gpm		
(2) RCS leakage > available makeup capacity as indicated by a loss of subcooled margin		
(3) RVLMS indicates voiding in outlet plenum		
(4) RCS pressure > 2750 psia		
<u><b>CLAD</b></u>		
(1) CET > 700° F		
(2) Failure of the reactor protection system to automatically initiate and reduce reactor power to less than 10 <sup>-4</sup> % <u>OR</u> Excessive RCS activity (> 300 µCi/gm dose equivalent I-131) <u>OR</u> RU-148 > 3.1 E+03 R/hr <u>AND</u> RU-149 > 4.4 E+03 R/hr		
(3) Failure of CEAs to reduce reactor power to less than 10 <sup>-4</sup> % (normal power decay time ramp excluded), requiring the boration of the RCS		
<u><b>CONTAINMENT</b></u>		
(1) H2 concentration > 3.5% by volume		
(2) Containment pressure approaching or exceeding 50 psig		
(3) Physical breach of containment (excluding SG tube leaks) <u>OR</u> CIAS required due to high containment pressure, but not completed, e.g., both automatic valves in a penetration fail to close		
<u><b>VITAL AUXILIARIES/RADIATION RELEASE</b></u>		
(1) Total loss of offsite and onsite AC power (Blackout)		
(2) Total loss of offsite and onsite AC power (Blackout) for longer than 15 minutes		
(3) Loss of all Class 1E DC power		
(4) Loss of all Class 1E DC power for longer than 15 minutes		
(5) Failure of ESF safety systems (both trains) to actuate when required resulting in inability to maintain subcooling		
(6) > 10 gpm primary/secondary leakage concurrent with release of steam to the atmosphere		



**Table 5.1-1 Example Emergency Action Levels (EALs)**

**Unmonitored release, increase in radiation levels or radioactive effluent release rate, contaminated injury, and offsite dose projection**

**Notification of Unusual Event - (EPIP-03)**

- RCS sample activity requires shutdown per Technical Specification 3.4.7.
- Radiation Protection and/or Radiation Monitoring System (RMS) confirms radioactive effluent releases exceed:  
 Plant Vent Monitor RU-143 channel 1  $> 6.35 \text{ E-04 } \mu\text{Ci/cc}$  or valid dose assessment indicates  $> 500 \text{ mRem/yr}$  total body dose at site boundary.  
 Fuel Building Exhaust Monitor RU-145 channel 1  $> 1.56 \text{ E-03 } \mu\text{Ci/cc}$  or valid dose assessment indicates  $> 500 \text{ mRem/yr}$  total body dose at site boundary.  
 Exceed Tech Spec 3/4.11 or ODCM Section 3.0, 4.0, or 5.0 limits at site boundary measured with portable instruments or calculated.
- Transportation of internally or externally contaminated injured person to offsite hospital, i.e., contaminated  $>$  release limits.

**Alert (EPIP-04)**

- RCS sample activity  $> 300 \mu\text{Ci/gm}$  dose equivalent I-131.
- Direct radiation readings within Unit increase by a factor of 1000.
- Radiation Protection and/or RMS confirms radioactive effluent releases exceed:  
 Plant Vent Monitor RU-143 channel 1  $> 6.35 \text{ E-03 } \mu\text{Ci/cc}$  or valid dose assessment indicates  $> 5000 \text{ mRem/yr}$  total body dose at site boundary.  
 Fuel Building Exhaust Monitor RU-146 channel 1  $> 5.66 \text{ E-02 } \mu\text{Ci/cc}$  or valid dose assessment indicates  $> 5000 \text{ mRem/yr}$  total body dose at site boundary.  
 Effluent release rate 10X Tech Spec 3/4.11 or ODCM limits or  $> 1 \text{ mRem DDE}$  for a 2 hour release measured at the site boundary with portable instruments or calculated.
- Primary/secondary leakage  $> 10 \text{ gpm}$  and  $< 44 \text{ gpm}$  concurrent with release of steam to the atmosphere.
- Fuel damage accident with release of radioactivity to containment or fuel handling building resulting in valid High Radiation Alarms on any of the following: RU-16, -17, -31, -33, -143, or -145.

**Site Area Emergency (EPIP-04)**

- Major damage to spent fuel with release of radioactivity to containment or fuel handling building resulting in valid radiation reading  $> 10$  times the High Radiation Alarms on any of the following, RU-16, -17, -31, -33, -143, or -145.
- Radiation Protection and/or RMS confirms radioactive effluent releases exceed:  
 Plant Vent Monitor RU-144 channel 1 30 min. @  $> 1.10 \text{ E-01 } \mu\text{Ci/cc}$ , RU-144 channel 1 2 min. @  $> 1.10 \text{ E+00 } \mu\text{Ci/cc}$  or valid dose assessment indicates  $> 50 \text{ mRem/hr}$  external EDE at site boundary.  
 Fuel Building Exhaust Monitor RU-146 channel 1 30 min. @  $> 9.80 \text{ E-01 } \mu\text{Ci/cc}$ , RU-146 channel 2 2 min. @  $> 9.80 \text{ E+00 } \mu\text{Ci/cc}$  or valid dose assessment indicates  $> 50 \text{ mRem/hr}$  external EDE at site boundary.
- $> 50 \text{ mRem/hr}$  Deep Dose Equivalent measured at site boundary with portable instruments or calculated, or valid dose assessment indicates  $> 50 \text{ mRem/hr TEDE}$  or  $> 250 \text{ mRem/hr}$  thyroid CDE.
- $> 44 \text{ gpm}$  primary/secondary leakage and indication of fuel damage, i.e.,  $> 300 \mu\text{Ci/gm}$  dose equivalent I-131.

**General Emergency (EPIP-04)**

- Radiation Protection and/or RMS confirms radioactive effluent releases exceed:  
 Plant Vent Monitor RU-144 channel 1  $> 2.20 \text{ E+00 } \mu\text{Ci/cc}$  or valid dose assessment indicates  $> 1000 \text{ mRem/hr}$  external EDE at site boundary.  
 Fuel Building Exhaust Monitor RU-146 channel 2  $> 1.96 \text{ E+01 } \mu\text{Ci/cc}$  or valid dose assessment indicates  $> 1000 \text{ mRem/hr}$  external EDE at site boundary.
- $> 1000 \text{ mRem/hr}$  Deep Dose Equivalent measured at site boundary with portable instruments or calculated, or valid dose assessment indicates  $> 1000 \text{ mRem/hr TEDE}$  or  $> 5000 \text{ mRem/hr}$  thyroid CDE.

**Table 5.1-1 Example Emergency Action Levels (EALs)**

**Fire and/or Security compromise**

**Notification of Unusual Event (EPIP-03)**

- Fire within the Protected Area boundary lasting longer than 10 minutes, or any fire onsite in which offsite Fire Department assistance is requested
- Complete loss of all means of communications capability with the State, County, or NRC from the Control Room/STSC (this includes normal PBX, dedicated lines, ringdown lines, ENS, NAN primary and NAN radio)
- Declared Security Emergency

**Alert (EPIP-04)**

- Evacuation of Control Room with control of shutdown systems established at the Remote Shutdown Panel
- SS/EC determines that the level of plant safety is reduced due to fire or ongoing security compromise, e.g., deliberate acts directed against plant equipment (40AC-00P07).

**Site Area Emergency (EPIP-04)**

- Imminent loss of physical control of the Unit, e.g., hostile force entered into Protected Area
- Control Room evacuated and local control of shutdown systems not established within 15 minutes at the Remote Shutdown Panel
- Fire causing loss of functions\* in both trains of a safety system

**General Emergency (EPIP-04)**

- Loss of physical control of the Unit, e.g., hostile forces enter Control Room envelope or Remote Shutdown Panel room or other vital plant area
- Any major internal or external events which could cause massive damage to plant systems, potentially leading to releases of large amounts of radioactivity

\* Loss of function, as used here, means loss of safety function, i.e., heat removal, inventory, etc.

**Table 5.1-1 Example Emergency Action Levels (EALs)**

**Natural disaster/physical hazard to facility**

**Notification of Unusual Event (EPIP-03)**

- Natural phenomenon beyond usual level experienced or projected
  - Earthquake  $\geq 0.02g$ , as determined by 79IS-9SM01
  - Sustained winds  $> 73$  mph and  $< 85$  mph
  - Flood, tornado onsite.
- Other hazards experienced or projected
  - Aircraft crash onsite or unusual aircraft activity over facility
  - Train derailment onsite which could hamper personnel in performance of duties to protect the health and safety of the public or threaten the environment
  - Explosion near or onsite which could hamper personnel in performance of duties to protect the health and safety of the public or threaten the environment
  - Toxic or flammable gas release near or onsite which could hamper personnel in performance of duties to protect the health and safety of the public or threaten the environment
  - Main turbine rotating component failure resulting in reactor shutdown

**Alert (EPIP-04)**

- Severe natural phenomena experienced or projected
  - Earthquake greater than OBE, as determined by 79IS-9SM01
  - Tornado striking Unit, or sustained winds  $> 85$  mph and  $< 105$  mph
  - Severe flooding
- Other hazards experienced or projected
  - Aircraft crash on Unit
  - Missile impacts on Unit
  - Explosion damage to Unit affecting plant operation
  - Toxic or flammable gas restricts entry to Unit environs
  - Main turbine failure causing casing penetration

**Site Area Emergency (EPIP-04)**

- Severe natural phenomena experienced or projected with Unit in Modes 1-4
  - Earthquake greater than SSE as determined by 79IS-9SM01
  - Flood with failure of protection of vital equipment
  - Sustained winds in excess of design levels ( $\geq 105$  mph)
- Other hazards experienced or projected with Unit in Modes 1-4
  - Aircraft crash affecting vital structures by impact
  - Severe damage to safe shutdown equipment by missile or explosion
  - Lack of entry into vital areas due to uncontrolled toxic or flammable gas

**General Emergency (EPIP-04)**

- Any major internal or external events which could cause massive damage to plant systems potentially leading to release of large amounts of radioactivity

## 6.0 EMERGENCY MEASURES

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

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

1. Recognition and Evaluation
2. Classification and Declaration
3. Notification and Mobilization
4. Assessment Actions
5. Protective Actions
6. 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 Assistant Shift Supervisor should provide initial evaluation of the indicators and notify the Shift Supervisor. The Shift Supervisor evaluates the conditions against the established Emergency Action Levels (EALs) to determine if an EAL has been reached or exceeded.

### 6.2 Classification and Declaration

If the Shift Supervisor finds that a specific Emergency Action Level has been reached or exceeded, he classifies and declares the emergency.

When the Shift Supervisor declares an emergency, he announces this to Control Room personnel, has an announcement made over the unit public address system, and has the other Control Rooms and Security notified.

For those abnormal situations potentially involving more than one unit, the Unit 1 Shift Supervisor 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 NRC 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 dedicated telephone circuit (NAN). The NRC 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 Emergency Operations Facility (EOF). At that time, all subsequent notifications are made from the EOF by the Government Liaison Engineer. Initial notifications and followup messages contain specific information about the type and classification of the emergency and whether emergency actions are needed.

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 PVNGS emergency response organization is activated at the direction of the Emergency Coordinator. Personnel of the emergency response organization may be notified via an automated notification system and/or a 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. Survey Teams 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 indicates and records wind speed and direction and temperature differentials continuously.

#### 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:

- a. Maintaining strict access control into affected plant areas
- b. Availability and use of augmented dosimetry
- c. Additional use of portable radiation monitoring devices, particularly high range monitoring devices, for monitoring contamination and area radiation levels
- d. Increased availability and use of protective clothing and respiratory devices
- e. Increased air sampling for the purpose of limiting the number of persons subject to exposure
- f. 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 Search and Rescue, 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 Shift Technical Advisor. 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 Supervisor. Information is obtained from the SPDS and critical parameter values from the Emergency Response Facility Data Acquisition and Display System.

#### 6.5 Corrective Actions

Station 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. Flashing blue lights are provided in high noise areas:

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 APS 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 is issued to emergency personnel by Radiation Protection.

### 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 Offsite 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 APS 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 Emergency Coordinator authorizes exposures above 10CFR20 Limits.

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 Samaritan Hospital or Good Samaritan Hospital. 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.

#### 6.7.3 Medical Transportation

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

#### 6.7.4 Medical Treatment

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

#### 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 the Forward News Center (FNC). At the Alert or higher classification of an

### 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:

1. Manage onsite emergency response
2. Direct inplant radiological protection activities
3. Direct emergency mechanical maintenance
4. Direct emergency electrical maintenance
5. Direct personnel accountability and site security
6. Direct safety and hazards control
7. Perform engineering and technical analyses for control room support
8. Perform reactor analyses for control room support
9. Provide I & C technical support
10. Provide computer technical support
11. Provide chemistry technical support

The TSC has an SPDS readout for each of the three units, as well as the ability to call up the plant parameter readout for any of the units on the CRT displays.

The TSC has computer terminals on the Emergency Response Facility Data Acquisition and Display System (ERFDADS), which displays Control Room parameters for each unit, the Radiation Monitoring System (RMS), the station meteorological system, and other parameters. Capability exists in the TSC to access the records management system to rapidly retrieve plant documents, drawings, procedures and plans contained in the TSC Library. The TSC (when activated) is the central location for the receipt and analysis of inplant radiological monitoring data.

The TSC has a communications area with the following communications links available:

- Technical Line
- Radiological Line
- Environmental Assessment Line
- EC/EOD Line
- Maintenance Control Line
- Ringdown Telephone Circuits #1, #2, #3 and #4
- Base Station Radio
- PBX

- ENS
- HPN
- NAN
- Facsimile Machines (High Resolution PBX Circuit & Ringdown Circuits #1 and #2)
- Separate Dedicated CR, EOF, OSC & STSC Phones
- Cellular telephone
- Federal Telecommunications System (FTS) phones: Emergency Notification System (ENS), Health Physics Network (HPN), Reactor Safety Counterpart Link (RSCL), Protective Measures Counterpart Link (PMCL), Management Counterpart Link (MCL), and Local Area Network (LAN) access.

The TSC contains a dining facility, conference room, records library, an emergency supply storage area, and an area reserved for NRC personnel. The TSC contains equipment required for emergency response. The TSC is also equipped with an alarmed 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 NRC, FEMA and state/county emergency personnel. The EOF has the following Communications links:

- EOD/CEC Ringdown Circuit
- Technical Line
- Environmental Assessment Line
- EC/EOD Line
- Dedicated TSC Line
- Dedicated CR Line
- Dedicated STSC Line
- NAN
- Ringdown Telephone Circuits #1, #2, #3 and #4
- ENS
- HPN
- Base Station Radio Console
- Facsimile Machines (High Resolution PBX Circuit & Ringdown Facsimile Machine Circuits #1 and #2)
- Dedicated OSC Line
- Cellular telephone
- Public Information Ringdown Circuit #1 to JENC and CEC
- REAT Radio and Data Terminal
- FTS phones: ENS, HPN, RSCL, PMCL, MCL, and LAN access.

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

The EOF also has computer terminals on the Emergency Response Facility Data Acquisition and Display System (ERFDADS). Terminals from the records management system enable timely retrieval of station technical drawings, procedures, documents, and plans stored in the EOF library. The EOF is also equipped with a radiation monitor with an alarm.

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.

A backup 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 Corporate Emergency Center (CEC)

Corporate support for PVNGS emergency operations is directed from the Corporate Emergency Center (CEC). The CEC is located on the 20th floor of the APS Headquarters offices at 400 North 5th Street, Phoenix. The CEC is manned by executive personnel with the authority to commit corporate resources (manpower, facilities, equipment, funds) to cope with an emergency situation.

The principal functions of the CEC include:

- Providing support and assistance to PVNGS emergency personnel upon request from the Emergency Operations Director
- Approval of APS policy statements relating to emergency and recovery operations
- Coordination of all legal and financial matters related to the emergency

The CEC is operational following declaration of an Alert or higher classification. The CEC contains copies of the PVNGS Emergency Plan, the PVNGS Emergency Plan Implementing Procedures and the Fixed Nuclear Facility Off-Site Emergency Response Plan. Other equipment, facilities and services that will be located within, or near, the CEC include: communication links with the TSC, EOF, JENC, State EOC, and ARRA, reproduction equipment, facsimile machines, and stenographic assistance.

#### 7.1.8 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.

Additional communications equipment available at the JENC includes:

- a. Public Information Ringdown Circuit #1 to CEC and EOF
- b. Public Information Ringdown Circuit #2
- c. Facsimile Machine (Conventional telephone line and Ringdown Facsimile Machine Circuits #1 and #2) to EOF

#### 7.1.9 Forward News Center (FNC)

The Forward News Center, located at the PVNGS Energy Information Center, is responsible (during normal working hours only) for developing press releases to the media until the Joint Emergency News Center is activated. The FNC is activated at the Notification of Unusual Event classification.

The FNC is supplied with PBX telephones and a facsimile machine for onsite and offsite communications.

#### 7.1.10 The State Emergency Operations Center (State EOC)

The State Emergency Operations Center is the primary point from which the Governor (or his designee) exercises overall coordination of offsite emergency response operations through the Arizona Division of Emergency Management (ADEM). The State EOC is located at ADEM Headquarters in Phoenix at 5636 East McDowell Road. The state's Technical Operations Center (TOC) is located with the state EOC.

Staffing of the State EOC consists of authorized representatives of:

1. Office of the Governor
2. Arizona Division of Emergency Management (ADEM)
3. Arizona Radiation Regulatory Agency (ARRA)
4. Arizona Department of Public Safety (DPS)
5. Arizona Department of Transportation
6. Arizona Department of Economic Security
7. Maricopa County Department of Emergency Management (MCDEM)
8. Arizona Public Service - APS (Offsite Technical Representative)
9. Others (as notified/required).

#### 7.1.11 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:

- a. the TSC
- b. the Satellite TSC
- c. the EOF
- d. the Control Room

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

- a. the RP Office
- b. the TSC
- c. the Satellite TSC
- d. the OSC

This line is used in matters concerning inplant radiological controls. Direction concerning the

forming of Search and Rescue, Emergency Repair, and Survey Teams is transmitted on this line. The telephones are administratively controlled. The backup communication 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:

- a. the TSC
- b. the EOF
- c. the Satellite TSC

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 communication 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:

- a. the EOF
- b. the TSC
- c. the Satellite TSC

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:

- a. TSC
- b. OSC
- c. CR

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

with special tools to reduce operator dose. The grab samples are analyzed in the radiochemistry laboratory on a gamma energy analytical system with a detector as specified in UFSAR Section 12.5.

Backup post accident samples can be obtained through the Preplanned Alternate Sampling Program (PASP). In the PASP, reactor coolant grab samples are taken via the Nuclear Sampling System. Containment air samples are taken via Containment Air Monitor JSQBRU1. These samples can then be analyzed as in the paragraph above.

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
- 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 the following locations:

- (1) Control Room of each unit
- (2) Satellite TSC of each unit
- (3) TSC
- (4) EOF
- (5) PVNGS Administration Building
- (6) Nuclear Administration
- (7) Simulator



#### 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 NRC Operations Center. The system is intended to provide to the NRC, 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.

#### 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 the Arizona Radiation Regulatory Agency.

#### 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.

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.



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.

An independent review/audit of the various aspects of the emergency preparedness program is conducted at least every 12 months. The independent audit includes, but is not limited to, the Emergency Plan, implementing procedures, training, readiness testing, equipment, and interfaces with state and county organizations. The results are considered by APS management in modifying aspects of the Plan. The results of the audit, along with recommendations for improvements, are routed to appropriate APS corporate and plant management and are made available to involved FEMA, State, and County organizations. Audit documentation is maintained for at least five years.

The Manager, Emergency Planning, is responsible for ensuring that Emergency Plan Implementing Procedures are updated and revised as necessary.

Emergency Plan revisions and changes are conducted in accordance with APS Administrative policies and procedures.

The revised and/or updated Emergency Plan and procedures are handled in accordance with document control procedures, as delineated by the Drawing and Document Control Department.

### 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.

APPENDIX A  
AGREEMENT LETTERS

This appendix contains 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. The agreements are listed below.

- Memo from Executive Vice President, Nuclear concerning Quality and Administrative Controls during emergencies.
- Signature page from Fixed Nuclear Facility Off-Site Emergency Response Plan, including cover memo.
- Letter of agreement from National Weather Service.
- Letter of agreement from Institute of Nuclear Power Operations.
- Contract change order for Bechtel emergency assistance, expires 12-31-99.
- Combustion Engineering contract change order, expires 12-31-94.
- Letter of agreement from Good Samaritan Medical Center, expires 12-31-95.
- Letter of agreement from Maryvale Samaritan Hospital, expires 12-31-95.
- Letter of agreement from City of Phoenix Fire Department.
- Letter of agreement from APS Buckeye Office.



Arizona Public Service Company  
COMPANY CORRESPONDENCE

ID #: 245-00039-WFC/HL

DATE: June 29, 1989

TO: Harry F. Bieling  
Sta. # 6010  
Ext. # 82-6280

FROM: William F. Conway *W.F. Conway*  
Sta. # 9012  
Ext. # 81-3900

FILE: 89-002-493

SUBJECT: PVNGS EMERGENCY PLAN:  
QUALITY AND ADMINISTRATIVE CONTROLS

In the event of an emergency at Palo Verde, which requires prompt action on the part of the people managing the emergency, it is appropriate to modify our normal operating procedures. I am hereby delegating the following authority to the Emergency Operations Director at the EOF.

In the event of a radiological emergency at Palo Verde, which is classified as either an Alert, Site Area Emergency or General Emergency, the Emergency Operations Director will have the authority to make exceptions to any PVNGS Nuclear Administrative or Technical Procedure or QA/QC Procedure. Such exceptions shall be noted at the time they are made by the EOD, so that during recovery from the emergency, appropriate follow-up action can be taken to document the exception and properly rectify or document it for the records.

I would further suggest that the Emergency Operations Director may want to delegate to the Emergency Coordinator, the authority for taking exceptions to Procedures in the event of an Alert or higher level emergency.

Please include these provisions in the PVNGS Emergency Plan.

WFC/HL

cc: R. J. Adney  
J. M. Allen  
O. M. DeMichele  
J. G. Haynes  
D. R. Heinicke  
W. E. Ide  
D. B. Karner  
J. E. Kirby  
L. G. Papworth  
J. T. Reilly  
W. C. Marsh

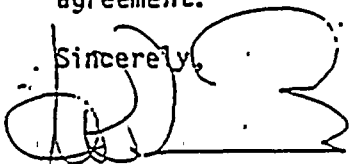
Bill Durham  
February 28, 1989  
Page 2

3. Additional personnel and equipment will be dispatched if necessary to the extent available without compromising protection to the City of Phoenix.
4. In the event of extended duration operation, Arizona Public Service will provide transportation to shuttle relief crews back and forth to the scene.
5. PVNGS agrees to reimburse the City of Phoenix for any overtime personnel costs resulting from response covered by this agreement and for the costs of any equipment damaged or consumable supplies used in such an incident.
6. All operations conducted under the terms of this agreement shall be governed by a standard incident command and management system and shall comply with NFPA 1500, Standard for a Fire Department Health and Safety Program.
7. The PVNGS Fire Department and the Phoenix Fire Department agree to participate in joint training and familiarization activities to meet the objectives of the agreement.
8. In no event, while performing its obligations under this Agreement, shall the City or its representative be authorized to act as an agent of PVNGS, but on the contrary, shall be deemed for all purposes to be an independent governmental agency providing emergency assistance to PVNGS.

These details should be sufficient to clarify the terms of our agreement to provide emergency back-up assistance. It is understood that the Phoenix Fire Department can only provide assistance to the extent that would maintain standard protection for the citizens of Phoenix at all times.

Please feel free to contact me if you have any questions regarding this agreement.

Sincerely,



Alan V. Brunacini  
Fire Chief  
Phoenix Fire Department

AVB:cc/9491f

c: George Britton  
Senior Staff

# APS

## Arizona Public Service Company COMPANY CORRESPONDENCE

ID #:

DATE:

April 25, 1994 (DTF)

TO:

Harry F. Bieling

Sta. #

6050

Ext.

82-6280

FROM:

Daniel Froetscher DTF 04/25/94

Sta. #

4614

Ext.

875-675

*Daniel T. Froetscher*

FILE:

94-002-493

SUBJECT:

PVNGS EMERGENCY PLAN:

ALTERNATE EMERGENCY OPERATIONS FACILITY AGREEMENT

This memo provides the agreement for use of the APS Customer Service Business Office located at 615 North 4th Street, Buckeye, Arizona, in support of the Palo Verde Nuclear Generating Station Emergency Plan.

In the event of an emergency at Palo Verde, which is classified as either an ALERT, SITE AREA EMERGENCY, or GENERAL EMERGENCY, and the onsite Emergency Operations Facility (EOF) becomes uninhabitable, the Emergency Operations Director (EOD) may relocate emergency response personnel to the Alternate EOF (APS Buckeye Office).

Personnel to be relocated and functions to be carried out are specified in Emergency Plan Implementing Procedure (EPIP) 13, "Emergency Operations Facility Activation".

PVNGS use of the Alternate EOF for non-emergency purposes is expected to consist of annual familiarization tours for emergency staff (no office disruption) and an evaluated exercise and full scale drill approximately every five (5) years. Emergency Planning staff shall coordinate with APS Buckeye Office staff to ensure minimal disruption of operations.

Additionally, any facility modifications shall be coordinated between APS Buckeye Office staff and PVNGS Emergency Planning staff to ensure accurate information is maintained in EPIP-13.

DF/cb

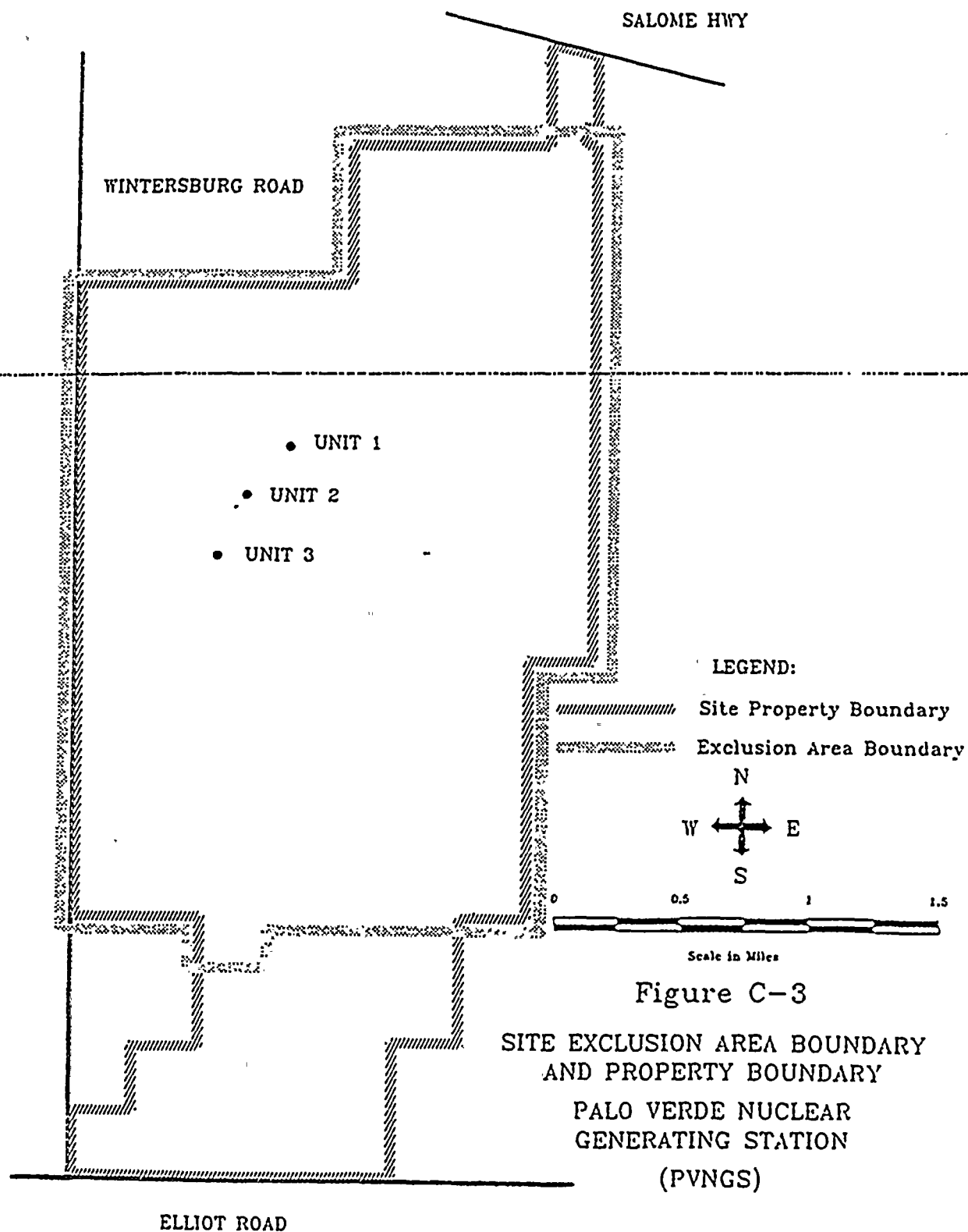
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SECTOR	RADIUS (MILES)										TOTAL
	1	2	3	4	5	6	7	8	9	10	
A	0	19	52	32	9	6	12	17	3	6	156
B	0	2	35	81	22	41	16	93	38	0	328
C	0	0	28	4	51	93	16	2	1	6	201
D	0	0	8	12	74	50	34	0	8	60	246
E	0	0	3	0	10	102	9	16	46	33	219
F	0	0	0	17	32	2	18	0	41	19	129
G	0	0	0	6	5	2	126	105	4	0	248
H	0	0	0	0	3	0	0	0	53	0	56
J	0	0	0	0	12	0	0	0	0	0	12
K	0	0	0	0	0	0	0	0	0	0	0
L	0	0	2	2	3	0	0	0	0	0	7
M	0	4	0	0	0	4	3	0	0	0	11
N	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0
Q	0	0	0	0	23	16	2	21	9	2	73
R	0	0	2	2	4	4	12	77	13	9	123
TOTAL	0	25	130	156	248	320	248	331	216	135	1809

TOTAL = 1809 (as of March 1, 1994)

Figure C-2  
 DEMOGRAPHY WITHIN THE  
 PLUME EXPOSURE PATHWAY EMERGENCY PLANNING ZONE  
 PALO VERDE NUCLEAR GENERATING STATION (PVNGS)  
 Page 2 of 2



APPENDIX D: EMERGENCY PLAN IMPLEMENTING PROCEDURES		
Designator	Title	Plan Section
EPIP-02	Emergency Classification	5 & 6
EPIP-03	Notification of Unusual Event Implementing Actions	4 & 6
EPIP-04	Alert, Site Area and General Emergency Implementing Actions	4 & 6
EPIP-11	Technical Support Center/Satellite TSC Activation	6
EPIP-12	Operations Support Center Activation	6
EPIP-13	Emergency Operations Facility Activation	6
EPIP-14	Dose Assessment	6
EPIP-15	Protective Action Guidelines	6
EPIP-18	Emergency Exposure Guidelines	6
EPIP-19	Onsite Evacuation	6
EPIP-20	Personnel Assembly and Accountability	6
EPIP-24	Security	4 & 6
EPIP-26	Potassium Iodide (KI) Administration	6
EPIP-27	Post Accident Sampling and Analysis	6
EPIP-31	Recovery	9
EPIP-33	Offsite Assistance	4
EPIP-38	Emergency Equipment and Supplies Inventory	7 & App E
EPIP-56	Ultimate Heat Sink Emergency Water Supply	6
EPIP-57	Corporate Emergency Response	4 & App H
EPIP-58	Core Damage Assessment	4 & 6
16AC-0EP01	Emergency Response Organization and Staffing	4
16AC-0EP04	Emergency Plan Implementing Procedures, Review and Approval	8
16AC-0EP05	Emergency Preparedness Drills	8
16AC-0EP06	Emergency Preparedness Exercise	8
16AC-0EP07	Corporate Emergency Procedures (CEPs) Review and Approval	7
16AC-0EP08	Joint Public Information Procedures Review and Approval	7
16AC-0EP09	Offsite Siren System Activation Test	7
15DP-0TR34	Emergency Plan Training	8
16DP-0EP01	Review of Emergency Planning Procedures in Accordance with 10 CFR 50.54 (Q)	8



## APPENDIX F

### 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.

#### 1.0 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.

#### 2.0 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.

#### 3.0 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.

#### 4.0 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.

