



Federal Emergency Management Agency

Region IX
Building 105
Presidio of San Francisco
San Francisco, California 94129

DEC 14 1999

Mr. Ellis Merschoff
Regional Administrator
U.S. Nuclear Regulatory Commission Region IV
611 Ryan Plaza, Suite 400
Arlington, Texas 76011-8064

Dear Mr. Merschoff:

We are enclosing the Final Evaluation Report for the March 9, 1999, Off-site Biennial Exercise for the Palo Verde Nuclear Generating Station (PVNGS). The report addresses the evaluation of the plans and preparedness for the public in the Emergency Planning Zone. We identified 16 issues during this exercise, and 10 issues from previous exercises remain uncorrected. We will provide a copy of the report to the State of Arizona and monitor the correction of the identified issues.

The level of preparedness and the adequacy of the off-site radiological emergency response plans for the State of California and the jurisdictions site-specific to PVNGS, together with the ability to implement these plans, were demonstrated in the referenced drill. Based on the results of this drill, we have determined that there is reasonable assurance that appropriate measures can be taken off-site to protect the health and safety of the public in the event of a radiological emergency at PVNGS. Therefore, the Title 44 CFR, Part 350 approval of the off-site radiological emergency response plans and preparedness for the State of Arizona site-specific to PVNGS will remain in effect.

Please contact me directly at (415) 923-7100, or your staff may contact Mr. Tom Ridgeway, Regional Assistance Committee Chair, at (415) 923-7277, if you have any questions or need additional information.

Sincerely,

Martha Whetstone
Martha Whetstone
Regional Director

Enclosure

cc: Ms. Vanessa Quinn, FEMA HQ
Mr. Charles L. Miller, NRC HQ



Final Exercise Report

PALO VERDE NUCLEAR GENERATING STATION

Licensee: Arizona Public Service Company

Exercise Date: March 9, 1999

Report Date: December 7, 1999

**FEDERAL EMERGENCY MANAGEMENT AGENCY
REGION IX
Building 105
Post Office Box 29998
Presidio of San Francisco, California 94129**

2. **Recommendation:** Provide training to ensure the timely updating of all status boards and posted information.

45-99-2-A-2. Internal Communication Equipment did not operate properly

NUREG - 0654 Reference: F.1.2.

Objective #2

Demonstration Criterion #1

1. **Description:** Incoming calls from the NAN are typically broadcast throughout the SEOC through an intercom system. The equipment used for this function was not operational resulting in reliance on message runners to deliver hand-written messages to the message center for copying and then to distribute to proper staff. This malfunction therefore delayed delivery of critical information, such as recommendations to evacuate the public, from getting to the Operations Officer. Neither the first shift ADEM Acting Director nor the ADEM Director seemed to be aware of these information flow problems.
2. **Recommendation:** Repair equipment and provide training on troubleshooting and repair of the system.

I. EXECUTIVE SUMMARY

On March 9, 1999, the Federal Emergency Management Agency (FEMA), Region IX evaluated a biennial exercise for the emergency planning zone (EPZ) around the Palo Verde Nuclear Generating Station (PVNGS). The purpose of the exercise was to assess the level of State and local preparedness in responding to a radiological emergency. This exercise was held in accordance with FEMA's policies and guidance concerning the exercising of State and local radiological emergency response plans (RERP) and procedures.

The most recent, prior biennial exercise at this site was conducted on May 21, 1997. The qualifying emergency preparedness exercise was conducted on April 1, 1981.

FEMA wishes to acknowledge the efforts of the many individuals who participated in this exercise.

Protecting the public health and safety is the full-time job of some of the exercise participants and an additionally assigned responsibility for others. Still others have willingly sought this responsibility by volunteering to provide vital emergency services to their communities. Cooperation and teamwork of all the participants were evident during this drill.

The local organizations, except where noted in this report, demonstrated knowledge of their emergency response plans and procedures and adequately implemented them. There were 16 Areas Requiring Corrective Action (ARCA) identified as a result of this exercise; 13 ARCAs from the May 21, 1997 exercise and one ARCA from the April 12, 1995 exercise were corrected, and 10 ARCAs remain uncorrected from the May 21, 1997 exercise.

REPORT CREDITS

Document Preparation

Elena Joyner
FEMA Region IX

Document Research and Editing

Richard Echavarria
FEMA Region IX

Chief Editor

Thomas Ridgeway
Chair, Regional Assistance Committee Region IX

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II. INTRODUCTION

On December 7, 1979, the President directed FEMA to assume the lead responsibility for all off-site nuclear planning and response. FEMA's activities are conducted pursuant to 44 Code of Federal Regulations (CFR) Parts 350, 351 and 352. These regulations are a key element in the Radiological Emergency Preparedness (REP) Program that was established following the Three Mile Island Nuclear Station accident in March 1979.

FEMA Rule 44 CFR 350 establishes the policies and procedures for FEMA's initial and continued approval of State and local governments' radiological emergency planning and preparedness for commercial nuclear power plants. This approval is contingent, in part, on State and local government participation in joint exercises with licensees.

FEMA's responsibilities in radiological emergency planning for fixed nuclear facilities include the following:

- Taking the lead in off-site emergency planning and in the review and evaluation of RERPs and procedures developed by State and local governments;
- Determining whether such plans and procedures can be implemented on the basis of observation and evaluation of exercises of the plans and procedures conducted by State and local governments;
- Responding to requests by the U.S. Nuclear Regulatory Commission (NRC) pursuant to the Memorandum of Understanding between the NRC and FEMA dated June 17, 1993 (Federal Register, Vol. 58, No. 176, September 14, 1993); and
- Coordinating the activities of Federal agencies with responsibilities in the radiological emergency planning process:
 - U.S. Department of Commerce,
 - U.S. Nuclear Regulatory Commission,
 - U.S. Environmental Protection Agency,
 - U.S. Department of Energy,
 - U.S. Department of Health and Human Services,
 - U.S. Department of Transportation,
 - U.S. Department of Agriculture,
 - U.S. Department of the Interior, and
 - U.S. Food and Drug Administration.

Representatives of these agencies serve on the FEMA Region IX Regional Assistance Committee (RAC) which is chaired by FEMA.

Formal submission of the RERPs for the Palo Verde Nuclear Generating Station to FEMA Region IX by the State of Arizona and the involved local jurisdictions occurred on May 31, 1988.

State and local Radiological Emergency Preparedness plans are required, in NUREG-0654/FEMA REP 1, Rev. 1 (November 1980), to designate primary and back-up medical facilities capable of providing appropriate care to injured/contaminated individuals originating from the off-site effects of an incident at a nuclear power plant. One or more of these facilities are usually exercised as part of the biennial State/Local REP exercise. Others may be exercised during the off-year period. At least one evaluated medical drill must be held each year at each nuclear facility, according to NUREG-0654 Planning Standard N.2.c.

FEMA Region IX evaluated a biennial REP exercise on March 9, 1999, to assess the capabilities of local emergency preparedness organizations in implementing their RERPs and procedures to protect the public health and safety during a radiological emergency involving the PVNGS. The purpose of this report is to present the results and findings on the performance of the off-site response organizations (ORO) during a simulated radiological emergency.

The findings presented in this report are based on the evaluations of the Federal evaluator team, with final determinations made by the FEMA Region IX RAC Chairperson, and approved by the Regional Director.

The criteria utilized in the FEMA evaluation process are contained in:

- NUREG-0654/FEMA-REP-1, Rev. 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," November 1980;
- FEMA-REP-14, "Radiological Emergency Preparedness Exercise Manual," September 1991; and
- FEMA-REP-15, "Radiological Emergency Preparedness Exercise Evaluation Methodology," September 1991.
- FEMA Guidance Memoranda MS-1, "Medical Services," November, 1986.

Section III of this report, entitled "Overview," presents basic information and data relevant to the drill. This section of the report contains a description of the plume pathway EPZ, a listing of all participating jurisdictions and functional entities which were evaluated.

Section IV of this report, entitled "Evaluation and Results," presents detailed information on the demonstration of applicable objectives at each jurisdiction or functional entity evaluated in a jurisdiction-based format. This section also contains descriptions of all ARCAs assessed during this drill.

III. OVERVIEW

Contained in this section are data and basic information relevant to the March 9, 1999 Biennial Exercise to test a portion of the off-site emergency response capabilities for the area surrounding the Palo Verde Nuclear Generating Station. This section of the report includes a description of the plume pathway EPZ, and a listing of all participating jurisdictions and functional entities which were evaluated.

A. Plume Emergency Planning Zone Description

The State of Arizona has designated a Emergency Planning Zone (EPZ) which extends out from a 10-mile circle around the plant. The EPZ includes the unincorporated areas of Maricopa County.

B. Exercise Participants

The following agencies, organizations, and units of government participated in the Palo Verde Nuclear Generating Station off-site biennial exercise on March 9, 1999.

STATE OF ARIZONA

- Arizona Department of Agriculture
- Arizona Department of Health
- Arizona Department of Public Safety
- Arizona Department of Transportation
- Arizona Division of Emergency Management
- Arizona National Guard
- Arizona Radiation Regulatory Agency

RISK JURISDICTION

- Maricopa County
 - Department of Emergency Management
 - Department of Public Health
 - Department of Transportation
 - Sheriff's Office

SUPPORT JURISDICTIONS

- Buckeye Union High School
- Buckeye Police Department

PRIVATE/VOLUNTEER ORGANIZATIONS

American Red Cross
Arizona Humane Society
Buckeye Union High School Honor Society
Civil Air Patrol
Outdoor and Emergency Education Bureau
Radio Amateur Civil Emergency Services
Radio Station KTAR

FEDERAL AGENCIES

National Weather Service

C. Exercise Timeline

Table 1, on the following page, presents the time at which key events and activities occurred during the Palo Verde Nuclear Generating Station off-site biennial exercise on March 9, 1999. Also included are notification times that were made to the participating jurisdictions/functional entities.

Table 1. Exercise Timeline

DATE AND SITE: Palo Verde Nuclear Generating Station-3/9/99

Emergency Classification Level or Event	Time Utility Declared	Time That Notification Was Received or Action Was Taken									
		SEOC (D)	JENC	TOC	MCEOC	MCSO WC	MCOSCP/ EVAC	REAT-FORWARD	FMTs	KTAR	BUCKEYE R&C
Unusual Event	0225	N/A	N/A	N/A	N/A	0232	N/A	N/A	N/A	N/A	N/A
Alert	0242	N/A	N/A	N/A	N/A	0245	N/A	N/A	N/A	N/A	N/A
Site Area Emergency	0748	0757	0758	0757	0751		0758	0748	0801	N/A	N/A
General Emergency	0923	0927	0934	0927	0931		0934	0930	0930	N/A	N/A
Simulated Rad. Release Started	1010	1037	1021	1010	1018		1034	1010		N/A	N/A
Simulated Rad. Release Terminated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Facility Declared Operational		0431	0433	0357	0448	N/A	0520	0540	0610	N/A	0945
Shift Change		0849	0655 (C) 0852(S)	0800	0700		0745	0740	0834 / 0850	N/A	N/A
Declaration of State of Emergency		0820			0747						
Exercise Terminated		1152	1147	1152			1200	1200	1200	1149	1154
Early Precautionary Actions:		N/A									
1st Protective Action Decision Evacuate: 2-mile radius; Sectors Q,R,A,B to 5 miles; Ruth Fisher School		0740									
1st Siren Activation					0747						
1st EAS Message										0751	
Follow-up EAS Message										0800	

LEGEND: S - Support Jurisdiction

D - Decision Making Jurisdiction

A - Activating Jurisdiction

N/A - Not Applicable

Table 1. Exercise Timeline (cont'd)

Emergency Classification Level or Event	Time Utility Declared	Time That Notification Was Received or Action Was Taken									
		SEOC (D)	JENC	TOC	MCEOC (A)	MCSO WC	MCOSCP/ EVAC	REAT-FORWARD	FMTs	KTAR	BUCKEYE R&C
2nd Protective Action Decision Evacuate: 2-mile radius; Sectors Q,R,A,B to 5 miles; Ruth Fisher School		0817									
2nd Siren Activation					0822						
2nd EAS Message Follow-up EAS Message									0828 0836		
3rd Protective Action Decision Evacuate: 5-mile radius; Sectors Q,R,A,B to 10 miles		0951									
3rd Siren Activation					1002						
3rd EAS Message Follow-up EAS Message									1004 1014		
KI Administration Decision: no KI for emergency workers				0951 1148							

LEGEND: S - Support Jurisdiction

D - Decision Making Jurisdiction

A - Activating Jurisdiction

N/A - Not Applicable

IV. EVALUATION AND RESULTS

Contained in this section are the results and findings of the evaluation of all jurisdictions and functional entities which participated in the March 9, 1999, biennial exercise to test the off-site emergency response capabilities of local governments in the EPZ surrounding the Palo Verde Nuclear Generating Station.

Each jurisdiction and functional entity was evaluated on the basis of its demonstration of criteria delineated in exercise objectives contained in FEMA-REP-14, REP Exercise Manual, September 1991. Detailed information on the objectives and the extent-of-play agreement used in this drill are found in Appendix 3 of this report.

A. Summary Results of Evaluation - Table 2

The matrix presented in Table 2, on the following page, presents the status of all objectives from FEMA-REP-14 which were scheduled for demonstration during this drill by all participating jurisdictions and functional entities. Objectives are listed by number and the demonstration status of those objectives is indicated by the use of the following letters:

- M - Met (No Deficiency or ARCAs assessed and no unresolved ARCAs from prior exercises)
- D - Deficiency assessed
- A - ARCA(s) assessed or unresolved ARCA(s) from prior exercise(s)
- N - Not Demonstrated (Reason explained in Subsection B)

Table 2. Summary Results of Exercise Evaluation

Date and Site: March 9, 1999-Palo Verde Nuclear Generating Station

JURISDICTION/FUNCTIONAL ENTITY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33			
State of Arizona Emergency Operations Center	M	A	A	M					M	M		M	A				M															A	M	M		
Technical Operations Center	M	M	M	M			M						M																			A	M	M		
REAT-Forward	M	M	M	M	A	M		M					M																			M	M	M		
Field Monitoring Teams	M			M	A	A		A					M																			M	M	M		
Joint Emergency News Center	M	M	M	M									A																			M	M	M		
Maricopa County Sheriff's Office Warning Center	M			M																														M	M	
Maricopa County Emergency Operations Center	M	M	M	M							M	M			M	M	M	A														M	N	M	M	
Radio Station KTAR											M																									
Maricopa County On-Scene Command Post	M	M	M	M	A									M	M		M															M	N	M	M	
Backup Route-Alerting					M						M				M																					
Roadblock					M										M																					
Special-Needs Population Evacuation					M										M	M																				
Arlington School					A																															
Ruth Fisher School					M																															
Buckeye Union High School Reception and Care Center	M			M	M										M																			M	M	M

LEGEND:

M = Met (No Deficiency or ARCAs assessed)
 N = Not Demonstrated

A = ARCA(s) assessed and/or unresolved prior ARCAs and no unresolved prior ARCAs
 D = Deficiency(ies) assessed Blank = Not scheduled

B. Status of Jurisdictions Evaluated

This subsection provides information on the evaluation of each participating jurisdiction and functional entity, in a jurisdiction based, format. Presented below is a definition of the terms used in this subsection relative to objective demonstration status.

- **Met** - Listing of the demonstrated objectives under which no Deficiencies or ARCAs were assessed during this drill and under which no ARCAs assessed during prior drills remain unresolved.
- **Deficiency** - Listing of the demonstrated objectives under which one or more Deficiencies was assessed during this drill. Included is a description of each Deficiency and recommended corrective actions.
- **Area Requiring Corrective Actions** - Listing of the demonstrated objectives under which one or more ARCAs were assessed during the current drill or ARCAs assessed during prior drill remain unresolved. Included is a description of the ARCAs assessed during this drill and the recommended corrective action to be demonstrated.

The following are definitions of the two types of exercise issues which are discussed in this report.

- A **Deficiency** is defined in FEMA-REP-14 as "...an observed or identified inadequacy of organizational performance in an exercise that could cause a finding that off-site emergency preparedness is not adequate to provide reasonable assurance that appropriate protective measures can be taken in the event of a radiological emergency to protect the health and safety of the public living in the vicinity of a nuclear power plant."
- An **ARCA** is defined in FEMA-REP-14 as "...an observed or identified inadequacy of organizational performance in an exercise that is not considered, by itself, to adversely impact public health and safety."

FEMA has developed a standardized system for numbering exercise issues (Deficiencies and ARCAs). This system is used to achieve consistency in numbering exercise issues among FEMA Regions and site-specific exercise reports within each Region. It is also used to expedite tracking of exercise issues on a nationwide basis.

The identifying number for Deficiencies and ARCAs includes the following elements, with each element separated by a hyphen (-).

- **Plant Site Identifier** - A two-digit number corresponding to the Utility Billable Plant Site Codes.
- **Exercise Year** - The last two digits of the year the drill was conducted.
- **Objective Number** - A two-digit number corresponding to the objective numbers in FEMA-REP-14.
- **Issue Classification Identifier** - (D = Deficiency, A = ARCA). Only Deficiencies and ARCAs are included in exercise reports.
- **Exercise Issue Identification Number** - A separate two (or three) digit indexing number assigned to each issue identified in the drill.

**TABLE 3
EXERCISE ISSUES**

LOCATION	NEW ISSUE(S)	PREVIOUS ISSUE(S) RESOLVED	PREVIOUS ISSUE(S) UNRESOLVED
State Emergency Operations Center	45-99-2-A-1 45-99-2-A-2 45-99-13-A-3 45-99-30-A-4	NONE	45-97-3-A-1 45-97-3-A-2 45-97-3-A-3
Technical Operations Center	45-98-30-A-5	45-97-7-A-4	NONE
REAT-Forward	45-99-5-A-6	45-97-5-A-5 45-97-5-A-6 45-97-22-A-7 45-97-22-A-8	45-97-22-A-9 45-97-22-A-10 45-97-22-A-11
Field Monitoring Teams	45-99-5-A-7 45-99-6-A-8 45-99-8-A-9	45-97-8-A-12 45-97-8-A-14	45-97-8-A-13
Joint Emergency News Center	45-99-12-A-10 45-99-12-A-11	45-97-12-A-16	45-97-12-A-15
Maricopa County Sheriff's Office Warning Center	NONE	NONE	NONE
Maricopa County Emergency Operations Center	NONE	45-97-3-A-17	45-97-17-A-18
Radio Station KTAR	NONE	NONE	NONE
Maricopa County Sheriff's Office On-Scene Command Post	45-99-5-A-12	45-97-2-A-19 45-97-3-A-20	45-97-5-A-21
Backup Route-Alerting	NONE	NONE	NONE
Roadblock	NONE	45-97-14-A-22	NONE
Special-Needs Population	NONE	NONE	NONE
Arlington School	45-99-5-A-13	NONE	NONE
Ruth Fisher School	NONE	ARCA # 11 (1995)	NONE
Buckeye Union High School Reception and Care Center	45-99-18-A-14 45-99-18-A-15 45-99-18-A-16	45-97-5-A-23	NONE

o EXERCISE DETAIL

The full-participation Palo Verde Nuclear Generating Station (PVNGS) Off-site Biennial Exercise was held on March 9, 1999. The evaluation team observed the following functions and facilities:

State of Arizona

<u>Facility/Function</u>	<u>Location</u>
State Emergency Operations Center	Phoenix
Technical Operations Center	Phoenix
Radiological Emergency Assessment Team Forward	Buckeye Airport
Field Radiological Monitoring Teams	Field
Reception and Care Center Monitoring Teams	Buckeye Union High School
Joint Emergency News Center	Phoenix

Maricopa County

<u>Facility/Function</u>	<u>Location</u>
Maricopa County Emergency Operations Center	Phoenix
Reception and Care Center	Buckeye Union High School
Maricopa County Sheriff's Warning Center	Phoenix
Maricopa County Sheriff's On-Scene Command Post	Buckeye
Route-Alerting/Evacuation/Roadblock	Field
Palo Verde School	Palo Verde
Radio Station KTAR	Phoenix

This was an off-hours, unannounced exercise. Players had been notified, in advance, of a seven-day window for the exercise, but only the controllers knew the actual day and starting time. There was no evidence of any compromise to the confidentiality of this information.

The exercise started when the Utility declared a Notification Of Unusual Event (NOUE) Emergency Classification Level (ECL) at 0225, followed by an Alert ECL at 0242, a Site Area Emergency (SAE) ECL at 0748, and a General Emergency (GE) ECL at 0923. The exercise was terminated at 1152.

o STATE EMERGENCY OPERATIONS CENTER

There were thirteen objectives established for demonstration, observation, and evaluation at the State Emergency Operations Center. (Objective Numbers 1, 2, 3, 4, 9, 10, 12, 13, 17, 23, 30, 32, and 33.) Nine objectives were met, and ARCAs were identified for four objectives. Three ARCAs from the 1997 exercise remain uncorrected.

The capability to alert and fully mobilize personnel and to activate the State Emergency Operation Center (SEOC) for emergency operations during an off-hours, unannounced exercise was demonstrated. The Arizona Division of Emergency Management (ADEM) REP Program Manager received a telephone call from the PVNGS Satellite Technical Support Center at 0232 informing him of a NOUE ECL at Unit 1 of the facility, along with a weather report, a statement that there was no radioactive release, and no protective actions recommended at the time. The REP Program Manager then called the ADEM Operations Officer who, in turn, called the Duty Officer notifying them of the situation. The Duty Officer at the Alert ECL began calling the SEOC personnel from his home at 0248 and finished calling personnel at 0330. The first person arrived at 0332; with the last key person arriving shortly before the announcement at 0431 that the activation was completed and that they were now operational.

The Duty Officer used a personnel roster that had been updated on March 5, 1999, to make the telephone calls from his home. The roster contained the names of personnel on both shifts. There were no staff pre-positioned for this exercise. The activation process began with the Duty Officer calling personnel from his home and ended with the declaration at 0431 that the SEOC was operational.

Emergency Classification Level notifications were received and verified as follows:

**TABLE 4
EMERGENCY CLASSIFICATION LEVELS**

ECL	TIME NOTIFIED	TIME VERIFIED
Notice of Unusual Event	0232	0236
Alert	0253	0255
Site Area Emergency	0757	0757
General Emergency	0927	0927

The REP Program Manager verified the NOUE and Alert ECLs while on the telephone with the utility and the remaining ECLs were verified by the communications person receiving the telephone call.

The adequacy of facilities, equipment, displays and other materials to support emergency operations was demonstrated in the SEOC. The SEOC has enough well-organized space and adequate lighting, furnishings and ventilation to support emergency operations. Each work station in the Operations and Plans area has an in/out box with name plates identifying the station as "plans" or "operations" and slots for the worker to indicate their name, agency, and Emergency Support Function (ESF). The ESFs are organized to correspond with Federal ESFs in the Federal Emergency Response Plan.

The Men's and Ladies' restrooms each contained showers and adequate fixtures for the SEOC staffing. Backup power for the SEOC was demonstrated at the beginning of the exercise. The emergency generator in the mechanical room is run for one hour each week, and for 15 minutes at the beginning of each drill or exercise. It was run successfully at the beginning of the exercise.

The SEOC has an adequate supply of appropriate equipment to support emergency operations. The entry area contains a space for the Receptionist and Switchboard Operator where incoming messages from a fax machine and the Notification and Alert Network (NAN) are received and transcribed. The message center had three fax machines and two copiers.

The Computer Support Room contained servers for the Emergency Information System (EIS) network in the SEOC. There were no apparent computer problems and systems were up and running as staff arrived. Each station in the Operations and Plans area has a telephone and office supplies; some stations have computers networked to the EIS and others have ports for connecting laptop computers.

The Policy Group Room contains a small round conference table with a conference telephone along with desks and computers. A large monitor displays EIS or other data from the computer. This room contains a dedicated telephone.

The Logistics Group room provides two large workstation/offices with telephone and computer support, along with file cabinets and other office amenities.

The Public Information Office and Public Inquiry Office are co-located across the hall from the TOC and Logistics Group room. These areas contain standard office furnishings, dedicated telephones, computers and a Status display board.

Several large displays are located in the Operations and Plans area. Four large screens display projected EIS data consisting of a Resource Status screen, a scrolling Incident Log screen, a Situation/Logistics screen, and a Situation/Roads Screen. The latter screen provides data controlled by the Maricopa County Emergency Operations Center (MCEOC) and cannot be corrected by SEOC staff. The Situation screens consist of maps identifying the radial distances from the plant, the Emergency Planning Zone (EPZ) sectors, various evacuation routes with access/control points, and schools. Overlays identified the ECL and various icons to indicate resources arriving in the EPZ. In addition to the screens, a large weather board is available for manual update of weather information and clipboards are displayed for situation reports, NAN messages, Emergency Alert System (EAS) messages, and road closure information from the County.

The various display screens and boards were not always updated in a timely manner, however. For instance, at 1055 the weather display indicated a 1025 update but provided weather information from a 1000 report. This was in conflict with weather information on the County screen. Similarly at 1030, the Resource screen indicated a 0745 update, and while new information was posted, the time and date were not updated.

EAS messages were not posted on the message clipboard, though they were distributed to the staff. At 1055, the fourth situation report was being completed when the clipboard only had the 0930 report posted. NAN messages were also delayed in being posted to the bulletin board. In addition, there was a clipboard designated to contain road closure decisions. It was not updated until a controller was asked about it.

The Operations and Plans area also contains a podium with a console that controls the intercom system in the SEOC. This system caused loud static over the intercom sporadically for several hours until the Logistics Officer announced at 0610 that turning off the microphone at the podium caused the static. SEOC-wide briefings were held in the Operations and Plans area using the podium. Scrolling digital message screens continuously displayed the ECL data.

The various Operations and Plans area screens are visible to three adjacent rooms in addition to the Operations/Plans area; the Policy Group room, the Technical Operations Center (TOC) room, and the Logistics Group room. These rooms all had large glazed openings to allow a view of information and activity in the Plans and Operations area.

The communications center fax is set up as a multiple-user dedicated line with one primary and one backup.

Plans and procedures were located at most workstations and extra copies were available.

Access to the SEOC was controlled. The Receptionist in the entry area monitored the sign-in sheets on a counter immediately facing the entry and had control of a remote lock on the front door (not demonstrated for the exercise). The Receptionist and Switchboard Operator were professional and well versed in their tasks, particularly with regards to the priority activity of the NAN messages. On some occasions, however, people were allowed to enter the facility without signing-in.

The capability to direct and control emergency operations was demonstrated in the SEOC. The Acting Director and the Director of the ADEM served as the Policy Group Chief during the exercise. The Acting Director of ADEM served as the Policy Group Chief during the first shift and the Director of ADEM served in this role during the second shift. Both individuals effectively demonstrated the capability to coordinate with Maricopa County officials during the protective action decision-making process. Excellent briefings were provided during the Policy Group meetings as well as during the general SEOC briefings. The Logistics Officer provided an administrative briefing at the beginning of each shift that was concise and thorough to the Operations, Planning and Logistics groups. Both individuals demonstrated decision-making and coordination skill, resolved conflicts, issued instructions to staff, ensured the Standard Operating Procedures (SOP) were available, and ensured staff adhered to the SOPs.

There was, however, a problem getting important information promptly from the SEOC to the Joint Emergency News Center (JENC). Neither the first shift Acting Director nor the Director seemed to be aware of these information flow problems. This delay in information flow from the SEOC to the JENC perpetuated ARCA #45-97-3-A-1 from the 1997 exercise. Also, there were two other ARCAs, #45-97-3-A-2 and 45-97-3-A-3, from the 1997 exercise, not corrected because the scenario did not drive protective actions that would have addressed these ARCAs.

Message runners picked up messages from originators at their workstations and brought them here with distribution information checked by the originator. Staff copied messages for distribution and then placed the copies in the distribution box for the runners to pick up and deliver. Message center staff delivered NAN messages. This system worked well, though message runners worked both shifts and did not demonstrate a shift change.

The SEOC demonstrated the capability to communicate with all appropriate personnel at facilities and in the field. The communications officer arrived at 0416 and the Radio Amateur civil emergency Services (RACES) operator arrived at 0420. The Civil Air Patrol (CAP) operator arrived at 0515. The Communications Center, while somewhat restricted in size, has various radio consoles for multiple net radios and a receiving area off the main hallway for incoming and outgoing messages. The Communications Officer and the RACES and CAP players demonstrated successful communication with staff in the field using their respective Radio equipment. The Communications

Officer was not relieved at the shift change, however, and went on stand-by status before the close of the exercise.

The primary communications system utilized for notification from the PVNGS is the NAN, a dedicated line from the PVNGS providing simultaneous communication with the Arizona Department of Public Safety (ADPS), ADEM, the Arizona Radiation Regulatory Agency (ARRA), the Maricopa County Department of Emergency Management (MCDEM), and Maricopa County Sheriff's Office (MCSO). Also demonstrated was the use of the backup radio systems from the RACES and the CAP staff. The National Warning System (NAWAS) was not in use during the exercise. There were over thirty commercial telephone lines located in the SEOC.

The RACES system was used to communicate with the special evacuation vans, and the communications van which departed from the installation at 51st Avenue and McDowell Road at 0415 and arrived at the Buckeye Airport at 0634. The communications van provided communications support in the field by linking field personnel with the SEOC. The CAP communicated with helicopters that were transporting food for workers and taking air samples in the EPZ. The CAP staff demonstrated, on a laptop computer, a system that tracks helicopters as they take-off and land.

Incoming calls from the NAN are typically broadcast throughout the SEOC through an intercom system. The equipment used for this function was not operational. Message runners had to deliver hand-written messages to the message center for copying and distribution to proper staff. This malfunction delayed delivery of critical information, such as recommendations to evacuate the public, from getting to the Operations Officer.

The SEOC also has a Technical Voice System (TVS) and Technical Hardcopy System (THS) that provide a dedicated telephone line with an Arizona Public Service (APS) Company microwave redundant network for simultaneous exchange of technical data between the utility and the TOC, ARRA, MCDEM, and the JENC. These systems were demonstrated by use of the four yellow telephones in the TOC (TVS) and the fax machine in the TOC (THS).

During the shift change, however, the Communications Officer announced that the position would be on-call during the rest of the exercise. There was never a backup for this position. The RACES and CAP personnel, on the other hand, did have new personnel for the shift change.

The ability to make timely and appropriate protective action decisions (PAD) was demonstrated at the by the Policy Group Chief from each shift. Both Policy Group Chiefs consulted with their staffs during the decision-making process. The first PAD, evacuate a two-mile radius and out to five miles

in the downwind sectors (Q, R, A & B), occurred during the Alert ECL. This initial PAD was a conservative action, which took into consideration the low population numbers in the area for evacuation; the relatively high wind speed which would not have left any time to evacuate if a release were to occur, and the large uncertainty associated with the potential for additional damage to the PVNGS facility, if severe aftershocks were to occur.

The first PAD was made well in advance of any protective action recommendation (PAR) from the utility. At the GE ECL, plant conditions and dose projections were the basis for a TOC PAR to evacuate a five-mile radius and out to ten miles in the downwind sectors. The second shift Policy Group Chief polled the Operations Group and Planning Group before making the PAD to evacuate a five-mile radius and out to ten miles in the downwind sectors. Both PADs were effectively coordinated with the Maricopa County officials.

The responsibility to promptly alert and notify the public within the 10-mile emergency planning zone is a Maricopa County function following PADs made at the SEOC. The PADs were effectively coordinated with Maricopa County, which enabled Maricopa County to activate their siren system to alert the public and contact the EAS radio station to initiate the broadcast of an EAS message, which provided the protective action instructions to the public. All alert and notification sequences were completed within the required 15-minute time interval.

The capability to coordinate the development and dissemination of clear, accurate, and timely information to the news media was demonstrated. Public information staff at the SEOC gathered information on the State response activities and drafted news releases (NR) for dissemination at the JENC. In general the public information staff performed this function effectively and coordinated well with the State spokespersons at the JENC.

There were at least two Public Information Officers (PIOs) in the SEOC throughout the exercise. One PIO was stationed in the operations room and concentrated on gathering information on State response actions. The other (lead) PIO concentrated on drafting NRs and coordinating with the JENC. The lead PIO also attended Policy Group meetings. The division of labor among PIOs worked effectively for gathering information and feeding it to the JENC.

The lead PIO drafted NRs from pre-scripted, fill-in-the-blank forms, and faxed them to the JENC. Generally the lead PIO would let the State PIO at the JENC know that a fax was coming, and then confirm that it was received afterwards. At the JENC, information from the SEOC was edited and combined with input from the other organizations to produce final NRs. SEOC staff also provided verbal information to the JENC. To provide information of a technical nature, the ARRA Director communicated directly with the State technical expert at the JENC.

The information provided from the SEOC was generally timely and accurate, with some exceptions. Following the first PAD at 0740, the lead PIO composed a NR describing the protective actions for the public and attempted to fax it to the JENC. However, the fax message was not successfully transmitted, and this failure was not immediately noticed. At 0815 a call came from the JENC that the NR had not been received. This delay contributed to the fact that there were no NRs issued from 0651 until 0913, a gap of two hours and 22 minutes.

The Public Inquiry Group staff demonstrated the capability to establish and operate rumor control in a coordinated and timely manner. A public inquiry operation was set up at the SEOC to answer questions from the public about the emergency. It was operational by 0500. Volunteers from the Outdoor and Emergency Education Bureau (OEEB) staff the public inquiry function. At any given time during the exercise, there were one or two staff available to answer calls, plus a shift supervisor who split time between answering calls and gathering information to update the other staff. Three telephones were allotted to the public inquiry function. According to the first shift supervisor, the operation can be expanded as necessary, even moved to another building to accommodate an increased volume of calls. The telephone number for the public inquiry line was publicized in NRs and EAS messages, and is provided in the public information calendar.

The public inquiry staff had access to several sources of information during the exercise, including a status board, copies of NRs and internal SEOC messages, EIS, a copy of the public information calendar, and a radio and TV to monitor EAS broadcasts. The shift supervisor would attend briefings in the operations room and meetings of the Policy Group to gather information, and then brief the other staff and update the status board.

The American Red Cross (ARC) operated a simulation cell during the exercise to feed calls in to the public inquiry line. Public inquiry staff answered a total of 45 calls. Each call was logged on a public inquiry form. Each caller was asked to provide a name and telephone number for call back, if needed. The public inquiry staff made an effort to provide information to each caller as appropriate to the caller's question. Most callers also were advised to tune to EAS stations for the latest information.

Information on PADs was posted on the status board in the public inquiry area. Information on new protective actions was put "on hold" for 15 minutes (i.e., the public inquiry staff were instructed not to use it yet) to avoid scooping the EAS. The shift supervisors generally did a good job of providing up-to-date information to the public inquiry staff. However, there were some exceptions. For example, the phrase "no protective actions" was left on the status board long after the first set of PADs had been issued. The staff passed this erroneous information on to several callers, as late as 0950. Another caller was provided erroneous information on the wind direction, based on the 0700 weather data posted on the status board, which by the time of the call (1107) was out-of-date.

In some cases the public inquiry staff tended to answer questions a little too quickly, without considering what information was needed to give a full and complete reply. For example, at 1033 a call came in from a crop-dusting company asking about the safety of operating near the plant. The caller was reassured that the visible steam coming from the plant was not radioactive (true at the time based on information available at the SEOC). However, the question raises the issue of air space closure, which was not addressed. The decision to close the air space over the plume EPZ to 10,000 feet had been made at 0951.

The shift supervisors advised the public inquiry staff to look for trends among the calls and explained why that was important. However, the staff did not identify any trends during the course of the exercise, probably because only 45 of the 146 pre-scripted messages were used.

The organizational capability and resources necessary to control evacuation flow and to control access to evacuated areas was demonstrated. The overall operation went smoothly and effectively. Relevant ESFs arrived at the SEOC according to the plan: the MCEOC liaison arrived at 0410, the ADPS State Police liaison arrived at 0420 and the Arizona Department of Transportation (ADOT) liaison arrived at 0430. The ADOT maintenance yards at Gila Bend and Quartzite were notified by 0600 to standby for traffic access and control duties. By 0630 the ADPS command van and highway patrol officers were available at the intersection of County Highway 85 and Buckeye Road and in contact with SEOC.

The decision to close roads came in response to the GE ECL. ARRA, by 0900 in anticipation of the ECL, had asked the operations group to determine whether they could evacuate land space around PVNGS for 360° to five miles, and for sectors, Q, R, A, and B to 10 miles and air space to a ten-mile radius. Present in the operations group were liaisons from the MCEOC, ADPS, and ADOT. The request was evaluated by 0930, in time for the Policy Group meeting, which went ahead with the PAD by 0951. ADOT requested approval from the Federal Aviation Administration (FAA) for closure of airspace within a 10-mile radius of PVNGS at 0934.

As a practical matter, concerned elements in the Operations group were working on the closing roads well before the PAR was made. I-10 and US 85 are the only major roads near the plant under State responsibility. Given the wind direction and other conditions, I-10 north of the plant and US 85 east of the plant were the logical possible closures. ADPS had the closure points figured out and how long it would take to clear the stretch of road from sector Q to US 85, a stretch of about 80 miles, an hour before the PAR was made. However, the request to research the viability of the PAR was sent to the Operations group instead of the Planning group.

The displays were based on EIS products either directly from the SEOC or by the internet from the

MCEOC. The evacuation map on the situation-roads display was generated by MCEOC and sent to SEOC via Internet. The display was confusing because the chart explaining the symbols did not project through to the SEOC. In addition, there was a clipboard designated to contain road closure decisions. It was not updated until a controller was asked about it. The message log was displayed on a screen but was very hard to follow and often skipped by recent decisions and was not nearly as effective as the simultaneous posting of categorized, summarized posting of major events, such as a list of road closures. None of the players were confused by display information because they generated their own data. Few were using display information to carry out their assignments. High tech can reduce labor costs and make information instantaneously available; however, it is not always as discernable as a simple map and board updated with magic markers.

The ability to identify the need for external assistance and to request assistance from Federal or other support organizations was demonstrated at the SEOC. The SEOC coordinated State requests for supplementary assistance. The Incident Commander made the determinations to request assistance. There were several federal and non-federal assistance requests were made.

The TOC requested aerial monitoring from ESF-12 (Energy), which made the request to the Department of Energy (DOE) at 0816. ADOT requested approval from FAA for closure of airspace within a 10-mile radius of PVNGS at 0934. The ARC was requested to provide mass care assistance. The CAP was requested and provided communications and transportation assistance, and RACES provided assistance in SEOC communication operations.

The capability to maintain staffing on a continuous, 24-hour basis through an actual shift change was demonstrated. There was a roster of the key personnel for each shift. The shift change process began at 0550 with the Duty Officer recruiting two individuals to help with the recall process in order to expedite the process. He adequately briefed them on the process, explaining to them what they were supposed to do, including to be sure to mention that "this is a drill". They each indicated that they understood the instructions. He then gave each of them a portion of the names and telephone numbers on the roster to begin calling at 0630. At 0630 the two assistants and the Duty Officer began the recall process to bring in the second shift. The message to the second shift was that they were to report to the SEOC at 0800 and there would be a briefing at 0830.

Second shift personnel began arriving shortly thereafter (0700). They were waiting in the lobby of the facility and outside the building. There were three components to the briefing of the incoming shift; individuals with their counterparts, in a group over the public address system, and individual groups over the public address system. At 0730, the second shift began to enter the facility and receive briefings from the individuals they were to replace. The briefings took place at their assigned individual stations. They were briefed by the first shift personnel on the current situation.

At 0831 the overall briefing to the second shift began. The briefing was thorough, it contained as much information as the SEOC had at the time, each chart that was displayed in SEOC was reviewed and the representative of the utility addressed the situation. Each individual Group Chief gave a briefing as to what was going on in their individual area. The first shift was dismissed and told to go home at 0849.

The incoming shift demonstrated knowledge of their emergency response roles and functions by continuing to implement the decisions that had been made by the first shift as well as to make the required decisions to continue function and also to implement those decisions.

The shift change was a very smooth and orderly transition of responsibility. There were no interruptions in the operations process because of the shift change.

There was one exception to the completeness of the transition, there was no second shift replacement of the Communications Supervisor. The Communications Supervisor for the first shift remained at the post through the second shift. On the roster provided by the first shift Duty Officer there is no second shift name across from the first shift name for the Communication Supervisor.

Areas Requiring Corrective Action

45-99-2-A-1. Update of Displays

NUREG - 0654 Reference: H.

Objective #2

Demonstration Criterion #1

1. **Description:** The various display screens and boards were not always updated in a timely manner. For instance, at 1055 the weather display indicated a 1025 update but provided weather information from a 1000 report and was in conflict with weather information on the County screen. Similarly at 1030, the Resource screen indicated a 0745 update. While new information was posted, the time and date of the information were not updated. EAS messages were not posted on the message clipboard, though they were distributed to the staff. At 1055, the fourth situation report was being completed when the clipboard only had the 0930 report posted. NAN messages were also delayed in being posted to the bulletin board. In addition, there was a clipboard designated to contain road closure decisions. It was not updated until a controller was asked about it.

45-99-13-A-3. Public Inquiry Staff.

NUREG - 0654 Reference: G.4.a.b.c.

Objective #13
Demonstration Criterion #1

1. **Description:** Information on the status board in the public inquiry area was sometimes out-of-date, leading to erroneous information being given to callers. For example, the phrase "no protective actions" was left on the status board long after the first set of PADs had been issued. The staff passed this erroneous information on to several callers, as late as 0950. Another caller was provided erroneous information on the wind direction, based on the 0700 weather data posted on the status board, which by the time of the call (1107) was out-of-date.

In some cases the public inquiry staff tended to answer questions a little too quickly, without considering what information was needed to give a full and complete reply.

For example, at 1033 a call came in from a crop-dusting company asking about the safety of operating near the plant. The caller was reassured that the visible steam coming from the plant was not radioactive (true at the time based on information available at the SEOC). However, the question raises the issue of air space closure, which was not addressed. The decision to close the air space over the plume EPZ to 10,000 feet had been made at 0951.

2. **Recommendation:** Emphasize in procedures and training for the shift supervisors that information on the status board should be continually updated, and old out-of-date information removed. Also emphasize in training for staff the need to give complete replies to callers.

45-99-30-A-4. Failure to perform a shift change for Communications Supervisor.

NUREG - 0654 Reference: A.4

Objective #30
Demonstration Criterion #1

1. **Description:** There was no second shift replacement of the Communications Supervisor. The Communications Supervisor for the first shift remained at the post through the second shift. On the roster provided by the first shift Duty Officer there is no second shift name across from the first shift name for the Communication Supervisor.

2. **Recommendation:** Review the roster for shift change thoroughness, identify all second shift requirements, and identify an individual for each requirement.

Prior Areas Requiring Corrective Action-Uncorrected

45-97-3-A-1. Untimely Information provided to JENC

NUREG - 0654 Reference: A.1.d, A.2.a & b

Objective #3

Demonstration Criterion #1

1. **Description:** Information describing the first PAD was not provided to the JENC in a timely fashion. Following the first PAD at 0740, the lead PIO composed a NR describing the protective actions for the public and attempted to fax it to the JENC. However, the fax message was not successfully transmitted, and this failure was not immediately noticed. At 0815 a call came from the JENC that the NR had not been received. This delay contributed to the fact that there were no NRs issued from 0651 until 0913, a gap of two hours and 22 minutes. This issue repeats a problem identified in the previous exercise.
2. **Recommendation:** Emphasize in procedures and training that each fax transmission to the JENC should be followed up with a call to confirm receipt.

45-97-3-A-2. Implementation of IC decisions

NUREG - 0654 Reference: A.1.d, A.2.a & b

Objective #3

Demonstration Criterion #1

1. **Description:** As part of the 1156 decision involving evacuations to 5-miles in G, H, and J, the IC made the decision to sample milk out to 25 miles in sectors G, H, and J. A draft news release, prepared late in the exercise, stated that the sampling would occur out to 15 miles without regard to downwind sectors. It appears that the draft news release used the "boilerplate" pre-scripted message without appropriate modifications that reflected the official decision. Based on an interview with the ADA representative in the Plans Group, the draft news release accurately reflected the actions to be implemented by the Department.

2. **Recommendation:** Train staff to ensure that all IC decisions are understood and implemented.

45-97-3-A-3. Conflicting data

NUREG-0654 Reference: A.1.d, A.2.a & b

Objective #3
Demonstration Criterion #1

1. **Description:** During discussions concerning potential PARs, the Policy Group as well as other response groups had available several EIS outputs as support material. One of these documents was a plot of the 10-mile EPZ that showed the location of dairy operations. There were several dairies in the 10-mile EPZ, with approximately 5 in the affected sectors (G, H, and J) and several others in sector F near the sector G boundary. There was a message that indicated there were no dairies within 25 miles in the downwind sectors. Only one of these two data sources could be correct.
2. **Recommendation:** Investigate and determine which database is the correct one and revise all databases to include the accurate information.

o TECHNICAL OPERATIONS CENTER

There were nine objectives established for demonstration, observation and evaluation at the Technical Operations Center. (Objectives Numbers 1, 2, 3, 4, 7, 14, 30, 32 and 33.) Eight objectives were met, and an ARCA was identified for one objective. One ARCA from the 1997 exercise was corrected.

The capability to alert and fully mobilize personnel and to activate the TOC for emergency operations during an unannounced, off-hours exercise was demonstrated. The exercise was initiated at 0238 with a page transmitted from the ADPS Duty Officer to the TOC Director designee. This page announced the occurrence of an emergency at PVNGS with the NOUE ECL. The page was simultaneously verified with the transmission of a verifying code. According to plan, this ECL provides information only. No action was initiated. At 0252, the TOC Director designee received a second page from the ADPS Duty Officer announcing an Alert ECL. This page was also accompanied by a verifying code. This prompted the TOC Director to notify personnel by telephone to begin mobilizing to the TOC. Using a personnel roster, the personnel were notified and the TOC was mobilized and declared operational at 0357. The TOC staff conducted all activities and

operations identified by the plan. No TOC personnel were pre-positioned for this exercise. An up-to-date personnel roster was available for each shift.

As the emergency evolved, the PVNGS Emergency Operations Facility (EOF) notified the TOC of SAE and GE ECLs at 0757 and 0927 respectively. These notifications were transmitted by telephone and by fax.

The adequacy of equipment, displays and other materials to support emergency operations was demonstrated in the TOC. The TOC is a room in the SEOC. The TOC has several work stations and equipment for running the technical software for radiological predictive modeling. There are four yellow telephones providing direct access to the utility and radio access to the field teams. A large wall-mounted display board provides specific weather and plume information which is manually updated. Another large wall-mounted map indicates the radius distance from the plant with the EPZ sectors and various field monitoring locations.

The capability to direct and control emergency operations was demonstrated in the TOC. The Technical Director (TD) on each shift at the TOC issued appropriate instructions to the staff, had available a copy of applicable plans and procedures, conducted staff meetings and briefings, and provided a means for handling and retention of incoming and outgoing messages. Both provided meaningful and timely information in briefings of the SEOC staff. Both assumed a pro-active role in making appropriate and timely recommendations to the Policy Group concerning PARs for the public and property. They handled questionable or erroneous data and information from various sources with quick identification, verification and/or resolution before making decisions that data might have affected. Interaction with the PVNGS Technical Advisor (who was a member of the TOC staff and provided timely and important data concerning plant conditions and status) was excellent.

The capability to communicate with all appropriate personnel at facilities and in the field was demonstrated in the TOC. The staff of the TOC had available to them seven commercial telephone lines. In addition to the commercial lines, four dedicated lines to the PVNGS EOF were available and used. A two-way radio (Motorola Model MTS-2000) was used as primary means of communication with the Radiological Emergency Assistance Teams (REAT) field operations unit, the REAT-Center (located in Phoenix), and the REAT field monitoring teams (FMT). The TOC also demonstrated the use of the REAT system consisting of an 800 MH and a UHF radio net linking the TOC with the EOF and the REAT-Forward. The REAT-Forward maintains the radio net control station for up to 15 hand-held radios in the field. A facsimile machine (Panasonic Panafax UF-321) was used to provide hard-copy of messages transmitted to and received from the REAT. No malfunctions or breakdowns of communications equipment (primary or backup) occurred. Message logs were maintained, and delivery of messages to and from the SEOC's communications center was timely and efficiently

handled.

The capability to develop dose projections and PARs regarding evacuation and sheltering was demonstrated in the TOC. Within the TOC, the Accident Assessment staff has the responsibility to develop dose projections based on field monitoring data.

Because of the 100-degree temperature forecast, there were no recommendations for shelter of the off-site population. The areas recommended for evacuation were displayed on a large electronically-generated map located in the SEOC. This map was clearly visible in the TOC. At 0707, the TOC TD recommended the evacuation of the off-site areas for two miles for 360 degrees and five miles in Sectors Q, R, A, and B to the EOC Policy Group. This recommendation was not based upon licensee recommendations or dose projections. The recommendation was based upon the forecast of aftershocks following the event-creating earthquake and its unknown effects to the PVNGS.

The PVNGS EOF provided the TOC with source term release projections and meteorological data. The Accident Assessment staff used these data as input into the Radiological Assessment System for Consequence AnaLysis (RASCAL) computer program. The primary means for calculating projected dose was RASCAL, which was contained in a desktop computer. As a backup, RASCAL was also contained on a laptop computer. Both computer systems were demonstrated. Dose projections relating to whole body gamma exposure and iodine inhalation exposure pathways were calculated. The PVNGS EOF did not provide initial dose projections for residents in the off-site areas to the TOC. Therefore, no comparisons of dose projections were made.

The state and PVNGS FMTs provided monitoring data to the TOC. The state FMTs traversed the plume and provided radiological monitoring data that permitted the Accident Assessment staff to identify the plume location, plume boundaries, and the plume centerline. The plume was plotted on an overhead viewfoil map. The TOC Director briefed this viewfoil to the SEOC staff. Also, these monitoring data were used to calculate dose projections for the iodine inhalation exposure pathway. The PARs were modified based on these dose projections. At 1115, the TOC Director advised the Arizona Department of Agriculture (ADA) Director to protect the milk supply.

The TOC was not provided with radiological data regarding maximum gamma exposure rates in the unevacuated areas. The exercise did not continue for a long enough time interval to allow for monitoring in the unevacuated areas.

The TOC was provided with monitoring data relating to plume radioiodine concentrations and corresponding gamma exposure rate measurements. Two sets of radioiodine concentrations and gamma exposure rate measurements were received. The first set was received at 1055. As

mentioned previously, these monitoring data were used to calculate dose projections for the iodine inhalation exposure pathway. The PARs were modified based on these dose projections

The TOC Accident Assessment staff correctly converted a field monitoring datum in units of microcuries per cubic centimeter (10^{-6} Ci/cm³) to picocuries per cubic centimeter (10^{-12} Ci/cm³). This conversion was performed correctly. On one occasion the TOC TD requested a dose projection to be calculated based upon an assumed one percent coolant leak rate. Although this cannot be directly executed using RASCAL, the Accident Assessment staff successfully applied RASCAL and estimated the doses out to distances of 10 miles and 25 miles. In using RASCAL proper parameters such as units associated with the data were defined and proper calculations were made. This demonstration corrects ARCA #45-97-7-A-4 from the 1997 exercise.

Although the previous ARCA was corrected, the Accident Assessment staff did not demonstrate in-depth knowledge and understanding of dose, Total Effective Dose Equivalent (TEDE), Thyroid inhalation Committed Dose Equivalent (CDE), and the data produced by RASCAL. This was exemplified by the following: one plume Iodine-131 concentration field measurement was correctly used as input into RASCAL. The resulting printout provided both Thyroid CDE and 50-year inhalation TEDE dose projections. In this instance, the Thyroid dose is the dose of major importance, but the Assessment Group staff never considered it. They only considered and posted the 50-year inhalation TEDE dose on the Assessment Group's status board. Since the data input to RASCAL consisted of only one Iodine-131 concentration, no other radionuclides, the 50-year inhalation TEDE is not meaningful and it does not compare to any Protective Action Guide (PAG). However, the Thyroid CDE compares directly to the Thyroid PAG and has important implications. Knowledge, expertise, and familiarity with dose calculations and the interpretation of the resulting data are critical to the successful response to a real-world radiological emergency.

The capability to implement KI protective actions for emergency workers was demonstrated by the TOC TD and the TOC staff. For this exercise, the recommendation not to administer KI to emergency workers or others, based on dose projections by the TOC dose assessment personnel that dose to the thyroid of potentially affected persons would not exceed approximately two (2) rem, was made to the Policy Group by the TOC TD around 0951. At 1148, a decision was also made by the TD to reposition the FMTs to positions where they could perform further air sampling operations without incurring excessive exposure to radioiodine, thereby eliminating their need to ingest protective KI.

The capability to maintain staffing of a continuous, 24-hour basis through an actual shift change was partially demonstrated at the TOC within the EOC. Key positions were staffed. The shift change began at approximately 0733 and was completed at 0800 with the exception of two key personnel

positions that did not undergo personnel change. These positions were as follows: radio/telephone Communicator and the PVNGS Liaison. The incoming shift was sufficiently briefed regarding the current status of the emergency, and personnel of the incoming shift demonstrated knowledge of their emergency response roles. The portion of the shift change that took place was accomplished efficiently and in a manner that facilitated continuous and uninterrupted operations.

Area Requiring Corrective Action

45-99-30-A-5. Incomplete Shift Change

NUREG - 0654 Reference: A4.

Objective #30
Demonstration Criterion #1

1. **Description:** The Radio/telephone Communicator and PVNGS Liaison staff did not participate in the shift change.
2. **Recommendation:** Ensure that a sufficient number of personnel are trained and available to allow continuous, 24-hour coverage for functions.

Prior Area Requiring Corrective Action-Corrected

45-97-7-A-4. Dose Projections.

NUREG - 0654 Reference: I.10.

Objective #7
Demonstration Criterion #1

1. **Description:** The TOC Accident Assessment personnel made several errors during the RASCAL dose projections. These errors were made during the initial dose projections, when new input data were required for the Source Term-Dose or Field Measurement-Dose calculations, both subsections of the RASCAL code. Once the errors were brought to the dose assessor's attention, the errors were not repeated. However, the number and kinds of errors indicate the need for additional training on the use of the RASCAL dose projection program. The following is a list of the types of dose projection errors noted during the exercise:

1. The Technical Director requested a dose projection based upon a reactor coolant leak to containment, using the reactor coolant concentration values, coolant leak rate to containment and an assumed containment leak rate of 1%. The RASCAL dose code can not directly handle this type of calculation. However, the accident assessors made a dose projection using the reactor coolant concentration data when the program prompted for a sample concentration value. The RASCAL program option assumes that the data value is an air concentration value not a reactor coolant concentration. Neither the accident assessors nor the TOC Shift Supervisor questioned the resultant dose projections, since the projections were all zero doses.
2. The second type of RASCAL dose projection was based upon a utility-provided source term. The correct RASCAL dose projection option was chosen, but the incorrect time was used for the release to the environment. Again, the projected dose was very low and nobody questioned the input parameters. When the correct release to the environment time was used, the dose projections were found to be much higher, but not high enough to warrant any modification of the PAD.
3. REAT-Forward faxed PVNGS air sample data without complete units, i.e., μcc , with a request for a quick dose calculation. The dose assessors did not know what "cc" meant. When the TOC Shift Supervisor indicated that a "cc" was equivalent to a ml, the dose assessor chose to convert the volume units to liters. The wrong conversion was used to convert ml to liters, thus the dose projection was off by a factor of one million. The dose assessors also ran the dose calculation using the units of cm^3 , but they didn't know what cm^3 units were so they decided to ignore this dose calculation, which was correct, and go with the dose projection which was a factor of one million too low. Later, the TD requested that this calculation be repeated and the TOC Shift Supervisor made the correct conversion to units of liters and this produced the same result as the calculation which used the cm^3 units. This was the first indication that the thyroid PAG would have been exceeded.

4. Sample count rate data was faxed from REAT-Forward. The dose assessors correctly converted the sample count rate to unit of $\mu\text{Ci}/\text{m}^3$. The sample data was properly entered into the FM-Dose option; however, the ground deposition was selected for the calculation option. This produced zero results, which were accepted by the dose assessors and the dose projection sheet was placed in the dose projection file. Since the dose projections were zero, there was no immediate attempt to pass this information to the TOC Shift Supervisor or the Technical Director. When the TOC evaluator questioned the dose assessors about the deposition units, $\mu\text{Ci}/\text{m}^2$ and the printed out statement that air sample calculations had not been performed, the dose assessors realized that something must have been wrong and then correctly recalculated the air sample. This air sample also exceeded the thyroid PAGs.
5. When using the ST-Dose option, an incorrect exposure duration time interval was utilized based upon the scenario meteorological conditions, which indicated wind speeds as low as one mile per hour. The accident assessors were trying to use a default 2-hour dose projection and as a consequence, they set the exposure duration to be two hours after the release to the environment. This caused the dose projections for distances beyond 3-miles to be underestimated because the RASCAL code calculates doses for the actual time that a receptor location is contacted by the plume. Based on the wind speed, receptors at locations beyond 3-miles did not get a full 2-hours of plume contact time, therefore, the doses were underestimated for the 2-hour default dose projection.
2. **Recommendation:** Provide more hands-on training to the dose assessors who use the RASCAL computer program. Task a member of the TOC staff to provide an independent quality assurance review of the data input and dose projection outputs from the RASCAL dose projections. All dose projections that exceed the PAGs need to be brought to the immediate attention of the TOC Shift Supervisor or the TOC Technical Director.

o REAT-FORWARD

There were twelve objectives established for demonstration, observation, and evaluation at REAT-Forward (Objective Numbers 1, 2, 3, 4, 5, 6, 8, 14, 22, 30, 32, and 33). Eleven objectives were met, and an ARCA was identified for one objective. Four ARCAs from the 1997 exercise were corrected; three ARCAs still remain uncorrected.

ARRA successfully demonstrated the capability to alert, notify and fully mobilize personnel necessary to operate both the emergency facilities and the emergency field operations designated for the REAT-Forward, during an off-hours, unannounced, full scale exercise. The ARRA duty officer began the notification to implement the recall plan (as planned) after the declaration of an Alert ECL had been made at 0242. This notification was received from the Arizona DPS Warning Center. The ARRA Duty Officer then began the telephone notification of REAT-Forward personnel about 0247 and was finished about 0310.

The mobilization process started at about 0247 and was completed with the arrival of most of the personnel at REAT-Forward located at the Buckeye Municipal Airport about 0513. This location is about 45 miles west of Phoenix, Arizona, and at the eastern edge of the PVNGS 10-mile EPZ. There was no evidence of any pre-positioning of personnel and the real time mobilization of about 2.5 hours provided for activation of the REAT-Forward in a timely manner.

The REAT emergency organization followed its plans and procedures in setting up the REAT Facility. The facility consists of two, approximately 50' X 50' airplane hangers. The hanger doors were opened about 0515 and the REAT-Forward was declared operational at 0540. There are several emergency functions carried out at the REAT-Forward and some of these functions are not needed immediately. After accomplishing the tasks necessary to become operational, the operations group staff continued to ready REAT-Forward and all functions were in place by about 0740. Again, the total activation was accomplished in a timely manner.

The REAT-Forward functions were all established. However, the Extent-of-Play agreement did not include demonstration of the decontamination procedure for contaminated emergency workers or emergency vehicles. In addition, there was no demonstration of the monitoring of emergency vehicles.

The REAT-Forward facility includes the following groups:

1. REAT-Forward Operations Group provides:
 - a. Direction and Control
 - b. Area Contamination Control
 - c. Hot-line operation
 - (1) Field Monitoring Team Sample Receipt
 - (2) Emergency Worker Dosimetry Receipt
 - (3) Emergency Worker Monitoring
 - (4) Emergency Worker Decontamination
 - (5) Emergency Vehicle Monitoring
 - (6) Emergency Vehicle Decontamination
2. Field Radiological Monitoring Teams
 - Four Terrestrial FMTs: Alpha, Bravo, Charlie & Delta - 3 members each
 - One Reception and Care Center Team - 7 members
 - One FMT (Team Echo) acted as a Runner or Courier Team
3. ARRA's Mobile Emergency Radiation Counting Laboratory
4. ADEM Emergency Auxiliary Communication Capability (Mobile Communications Van)
5. MCSO Helicopter Unit
6. CAP Aircraft Capability

The adequacy of facilities, equipment, displays and other materials to support emergency operations was demonstrated. There was plenty of space available at the REAT-Forward location to provide for parking and decontamination of vehicles. The two, 250 ft² airplane hangers also provided ample space for the REAT-Forward operational and field activities. Throughout the morning a large butane heater was available to provide heat; during hot weather a specially configured swamp cooler provides air-cooling. In addition, refrigerators and coolers were available for beverage and food storage. These items are essential for survival in the desert summer. Additional equipment included telephones, radios and a facsimile machine. The facsimile machine also functioned as a copy machine. A generator that is carried on the Mobile Laboratory vehicle provides backup power.

An operations status board was maintained in the staff mobilization area. In addition in this area are large, plastic engraved signs that are different colors and display the accident classification or ECLs. These signs can be easily seen throughout REAT-Forward.

Inside the Operations Room, there are status boards and area maps. Magnets were utilized with the maps and the locations of Field Radiation Monitors were displayed. These maps are secured directly to the room wall. Both of the status boards were promptly updated.

Copies of the Arizona Response Plan were available.

There were no special security officers provided for the facility, but the REAT-Forward is in a very remote, rural area. If special security became necessary, there were two armed MCSO deputies present with a helicopter. Additional deputies could arrive from the Maricopa County On-Scene-Command Post (MCOSCP), which is only about five miles away.

The REAT-Forward Captains demonstrated their ability to direct and control the emergency operation associated with each shift. The REAT-Forward Captain coordinated sample collection and monitoring activities of the FMTs; assigned tasks to teams; received and assimilated data as reported by FMTs; and transmitted data to the TOC for evaluation. In addition, they were responsible for the radiological safety of the monitors, and oversaw the issue of dosimetry. The REAT-Forward Captains issued instructions to staff, provided instructions on adherence to the plan, made available a copy of the current plan and procedures, conducted staff meetings and briefings, provided for the retention of message logs for in-coming and out-going messages and transmissions, provided leadership in decision-making, and involved the staff in decision-making.

The capability to communicate with all appropriate personnel at facilities and in the field was demonstrated. Communications were established with the TOC and six FMTs (four terrestrial, one Reception and Care Center and one courier team). In addition, an ADEM Supplemental Communications Van was also present to provide backup communications.

The primary communications system consisted of radios using a PVNGS frequency. Several of these radios can also be used in a cellular telephone mode. Backup radios were also available and "dead area" surveys have been completed for the backup units. There are no reported "dead areas" for the PVNGS radios. There was also a dedicated telephone line to the TOC.

There were facsimile machines available including one that is portable in case the REAT-Forward would have to relocate. There were no malfunctions or breakdowns of communications equipment.

The REAT-Forward personnel demonstrated the capability to continuously monitor and control radiation exposure to emergency workers. All participating personnel are supposed to have a non-self-reading dosimeter or a thermoluminescent dosimeter (TLD). The TLD wallet cards are issued annually at the end of the calendar year; but the TLD serial number is not routinely verified or recorded for the exercises or drills. Thus, there is no record that each emergency worker actually had a TLD on his or her person. The TLD is used for a year unless an actual event would occur and then

the TLDs would be turned in for processing to ARRA at the Hot-Line at the end of a mission. There were spare TLDs available for issue, but there was no form that could be used to record the issue of a new TLD.

All REAT-Forward radiological personnel were assigned two direct-reading dosimeters (DRD), a 200 mR and a 5 R; and all radiological personnel had DRDs in their possession which corrected ARCA #45-97-5-A-6 from the 1997 exercise. Other non-radiological REAT-Forward personnel were assigned a 5 R DRD. The dosimeter serial numbers were recorded on the Tab A dosimeter log sheets. In addition, the Tab A dosimeter sheets contained complete names, a social security number, the beginning and ending dosimeter reading, and the integrated reading for the team's digital electronic dosimeter. The proper completion of these forms corrected ARCA #45-97-5-A-5 from the 1997 exercise.

All DRDs checked were within the electrical leakage calibration period and instructions were available for their use. In addition, each FMT had a dosimeter charger available in the Team's Kit, but the charger was not listed on the inventory lists. Also, there were three electronic dosimeter chargers in the dosimeter issue area.

All DRDs were periodically read about every 15 minutes and these readings could be recorded on the reverse side of the Field Monitoring Sheet (Field Sheet 99 (2-19-99)).

REAT-Forward radiological emergency workers were informed about turnback numbers (1,000 mR/hr) and the administrative reporting number (200 mR). Both of these values are also on the Field Monitoring Sheet, but they were not provided the Administrative Dose Limit (500 mR) which would be a mission limit. Also, there was no mention of the need to report to the REAT-Forward FMT Coordinator if a 2 mR/hr line was crossed (page B-4-2). In addition, there is no indication in the provided plan and procedures of the turnback number that would be given to individuals during an intermediate phase re-entry activity.

Emergency workers had KI available and the KI was within the expiration date (May 2000). There was no decision made to take KI.

Special administrative approval is required for the radiological emergency workers to receive more than their mission limits; but the scenario did not provide these conditions and there was not a demonstration of this type of administrative action.

The FMT monitoring pool members were assigned to the four FMTs, one Reception and Care Center (RCC) Team and one sample courier team. There were 3 members for each Terrestrial FMT and 7 members were assigned to the RCC Team. In addition, the REAT-Forward Hot-Line Team provided for the Hot Line personnel and vehicle monitoring. The teams obtained their Equipment

Kit and demonstrated the procedures to utilize the equipment to determine field radiation measurements. Low-range instruments (Victoreen Model 190) and high-range instruments (Ludlum Model 9 and Ludlum Model 17-1) 0-5R and 0-500R, respectively were provided. An equipment inventory list attached to the top of the Kit was used, but this list (both Terrestrial and RCC inventory) did not contain the dosimeter charger that is present. Spare instruments were available for replacement and all of the instruments were within the current calibration period. Check sources contained the range that one would expect to see for proper operation for the specific instrument and probe, except for the high-range instruments.

The procedures provided for the different instrument use with a check source were followed except for the high-range instrument.

Plume traverses were attempted and open- and closed-window measurements were made to determine if a plume was present. However, the terrain is extremely rough, the roads are poor, and it was not always possible for the FMTs to implement the best plume tracking procedures.

All of the instrument probes were covered with a good quality plastic.

Each of the four FMTs demonstrated the capability to promptly report the radiological data collected to the REAT-Forward Field Team Coordinator.

The four Terrestrial FMTs obtained the provided air samplers and all of the samplers were within their designated calibration period. The Teams all demonstrated the ability to take an air sample, count it in the field, and promptly report their measurements to REAT-Forward. The actual iodine air cartridge and particulate filter were then transferred to the Mobile Counting Laboratory. The Laboratory performed a field laboratory count, and the reported concentrations were faxed to the TOC.

As per the extent-of-play agreement, charcoal cartridges were utilized for the exercise sampling rather than the more expensive silver zeolite cartridges. However, the silver zeolite cartridges were not even present at the REAT-Forward; they were all back in Phoenix.

The FMTs were directed to traverse the plume once contact was established, but the country adjacent to and in the vicinity of the PVNGS Site Boundary is very rough and the roads are poor. Thus, it was not always possible to perform a traverse; and in fact, occasionally the only traverse possible was a direct line downwind.

The capability and resources to implement KI protective actions for emergency workers were demonstrated. A sufficient supply of KI was available for REAT-Forward personnel. The KI had an expiration date of May 2000. Instructions regarding the reason for use, dosages, and possible side

effects were available. There was no implementation decision made.

The adequacy of procedures for monitoring and decontamination of emergency workers, equipment and vehicles was demonstrated. This objective was not originally included for demonstration in this exercise for the non-radiological emergency workers. However, the monitoring of radiological emergency workers is an integral part of the REAT-Forward mission and demonstration of these functions corrected some ARCAs from the 1997 exercise. There was no monitoring of the non-radiological emergency workers.

The Field Monitoring Hot-Line was not required at the start of the exercise play (there was no release of radioactive material into the environment); thus, the Hot-Line was not established until 0730. The returning FMTs knew what to do and the Hot-Line personnel worked well together.

The field samples were dropped off at the indicated position and these samples were checked for contamination before transferring them to the mobile laboratory.

The radiological monitors removed their latex gloves, placed them in the waste containers, and were monitored by the Hot-Line personnel. One person monitored and one person recorded the personnel monitoring information on the Personnel Decontamination Log. All of the instruments used had plastic probe protectors and were utilized with the audio function in the on position. The monitoring went well, and the monitoring personnel identified the proper decontamination level as net 250 counts per minute (cpm). This successful demonstration corrected ARCAs #45-97-22-A-7 and #45-97-22-A-8 from the 1997 exercise. There were no contaminated field personnel included in the play; thus, there was no demonstration of decontamination or re-monitoring of decontaminated personnel.

The step-off pads used have multiple layers (60) that can be removed and disposed of if they become contaminated. There was only one Hot Line monitor working for this demonstration, but three step-off pads had been established. The Field Sample Drop Off Table should be located closer to the east wall of the hanger to allow for more space between the step-off pads. If there is contamination present on the field monitors, it is impossible to operate the step-off pads right next to each other. They should be 5 - 10 feet apart. In addition, the Hot-Line Monitor should occasionally step back off the Hot-Line to ensure his instrument is not contaminated and that the waste containers are not affecting the monitoring position.

After Hot-Line monitoring, personnel were allowed to enter the uncontaminated side of the facility. If contaminated, they would be directed to the showers. Signs were also in place informing personnel that, "FEMA advises evacuees monitored and not contaminated to bathe and change clothes within three days."

Shower stalls were available although not demonstrated. There were water and hoses available in the

facility and a flash, hot water heater available for the system. There is a Post-Decontamination Log form provided for re-monitoring the decontaminated personnel, but this was not demonstrated.

All of the forms and diagrams used for set-up and monitoring were together in a packet. This is convenient for the Hot-Line Monitors for an exercise (training). However, for an actual event, the use of only one form in this packet each time a person or vehicle was monitored may become very cumbersome. The folded, stapled packets with one form completed were placed on a chair that may result in lost records.

The vehicle monitoring and contaminated parking areas were set up according to the SOP. However, there is a new fence along most of the juncture of the Palo Verde Road and the Buckeye Airport boundary. As a result, the original dirt, return road could not be used. The new method of entry or return does not separate the potentially-contaminated field vehicles returning and the uncontaminated vehicles leaving the REAT-Forward/Airport property.

Since the non-radiological EPZ emergency workers were not demonstrating this objective, none of these workers returned to the REAT-Forward Hot-Line to be cleared before entering the uncontaminated area outside the EPZ; their understanding of the "hot" and "cold" side of the parking lot could not be demonstrated, and there was not a decontamination demonstration. Therefore, ARCA #45-97-22-A-9, #45-97-22-A-10, and #45-97-22-A-11 remain uncorrected.

Overall, the REAT-Forward demonstration went well and there is a lot of space currently available in the vicinity of the hangers that can be used for various contamination monitoring and decontamination efforts.

The REAT-Forward organization demonstrated the capability to maintain staffing on a continuous, 24-hour basis with an actual shift change. The time for the shift change varied for the different functions since shift changes occurred both at the REAT-Forward and in the field.

Prior to the start of the exercise, all personnel were assigned an emergency position for either the first or the second shift. Because of the distance involved, both shifts reported at the same time. An actual shift change occurred for each function and position except for the RCC Team. This was provided for by the Extent-of-Play agreement because the RCC demonstration was performed out-of-sequence. The RCC Team reported their arrival at the Buckeye High School at 0835.

The incoming shift personnel all demonstrated knowledge of their emergency response roles and functions; and the transition in almost all cases occurred very smoothly and was accomplished in a manner that facilitated continuous, uninterrupted operations.

The REAT-Forward Operations Group shift change occurred at 0740. The 2nd shift Captain held

a briefing for the incoming 2nd shift staff as soon as a briefing was received from the first shift Captain. The briefing given by the 2nd shift Captain included the following information:

1. As of 0730, there was no release.
2. The meteorological data included wind from 167°, 5.8 mph, and F stability.
3. Team Alpha was at A1UM and Team Charlie would replace them.
4. Team Bravo was at B3LR and would be replaced by Team Delta.
5. The turnback number was 1,000 mR/hr.
6. Each person should have a 200 mR and 5 R DRD. Also each team has a Dositec dosimeter.
7. Each team also has a dosimeter charger.
8. Check the DRDs every 15 minutes.
9. The 250 cpm is considered a net 250 cpm.
10. Booties are simulated, but use gloves.
11. A statement regarding pregnancy and dose to the fetus was read.
12. A plant condition update (wind - 165°, and 7.5 mph) was provided.
13. RCC Team: Make sure Dositec dosimeter is on and audio is on. Do a 90-second scan.

In addition during the briefing, the first PAD had been made and this was indicated to be "2 miles evacuated and shelter 0-5 miles in designated downwind sectors." The briefing ended with the 0800 announcement that a SAE ECL had been declared at 0748.

Area Requiring Corrective Action

45-99-5-A-6. Administrative Dose Limit (500 mR)

NUREG - 0654 Reference: K.3.b.4

Objective #5

Demonstration Criterion #2

1. **Description:** The briefing provided to the FMTs did not contain all of the necessary dose control criteria for emergency workers. According to the plan, ARRA is responsible for establishing the dose control criteria for emergency workers, but individuals are responsible to ensure established limits are not exceeded. The reporting "dose" of 200 mR and the turnback exposure rate (1,000 mR/hr) were provided. The Administrative "Dose" Limit (500 mR) was not given (Appendix 4, III, A. 2., p. B-4-2). In addition, there was no mention of the need to report the crossing of a 2 mR/hr contour line. The latter two are also not included on the Field Monitoring Sheet under Protective Guidelines.

2. **Recommendation:** Include the Administrative Dose Limit and 2 mR/hr to the information given at the initial and shift change briefings and add them to the Field Monitoring Sheet (Field Sheet 99 2-19-99).

Prior Areas Requiring Corrective Action-Corrected

45-97-5-A-5. Completion of Dosimeter Logs

NUREG - 0654 Reference: N.I.a.

Objective #5

Demonstration Criterion #4

1. **Description:** The TAB A: DOSIMETER LOG completed at the REAT-Forward is incomplete/incorrect:
 - a. Last names or first names (Charles G (?), Arche (?)) are missing.
 - b. Two annual TLD wallet cards were issued during the exercise demonstration and the serial numbers were entered under the Dositec Digital Team Reading column.
 - c. Some of the recorded readings for the DRDs were not appropriate based on the equipment used.
2. **Recommendation:** Include a column on the TAB A: Dosimeter Log to indicate the TLD serial number. Verify the TAB A: DOSIMETER LOG is completed at the end of the demonstration, and that DRD readings are appropriate to the equipment. And this should be noted on the form, e.g., 80 mR on a 200 mR dosimeter and 0.9 R on a 5 R dosimeter. One might be able to extrapolate 20 mR (.02 R) on a 5 R dosimeter, but 0.001 R on a 5 R dosimeter is a very "fine" reading

45-97-5-A-6. Lack of DRDs.

NUREG - 0654 Reference: K.3.a

Objective #5
Demonstration Criterion #1

1. **Description:** One Reception and Care Center (RCC) Team Member left the REAT-Forward without obtaining the DRDs. There was a digital dosimeter that the emergency worker could have worn located in the RCC Equipment and Supply Kit; but it was not worn.
2. **Recommendation:** Add another item to the Monitoring Team Leader's check list: ensure that all team members have their dosimetry before leaving the REAT-Forward.

45-97-22-A-7. Emergency Worker Monitoring

NUREG - 0654 Reference: K.5.a,b.

Objective #22
Demonstration Criterion #2

1. **Description:** The audio function on one Victoreen 190 being utilized for Emergency Worker monitoring at the REAT-Forward Hot-Line was not turned on. The instrument has a keypad "switch" rather than a toggle switch or ear phones. Also, personnel performing the Emergency Worker monitoring at the REAT-Forward Hot Line continually touched the individual being surveyed with the plastic bag covering the probe; thus, possibly contaminating the probe covering. Continually having to monitor the probe cover or continually changing the probe cover would take time and probably frustrate other REAT Hot-Line workers.
2. **Recommendation:** Ensure training includes checking if the instrument's audio "switch" is on and emphasizing the need to listen for speaker noise. If the speaker noise increases, one can look at the instrument dial to compare the level to 250 net cpm. Otherwise, one should concentrate on following the body contour 1 inch away and avoid touching the possibly-contaminated worker.

45-97-22-A-8. Contamination Level.

NUREG - 0654 Reference: K.5.a.,b.

Objective #22
Demonstration Criterion #4

1. **Description:** Personnel performing the Emergency Worker Hot-Line monitoring did not know the counts per minute that indicated contamination. They indicated it was 200 cpm (net) rather than 250 cpm (net).
2. **Recommendation:** Provide continuing training and practice and perhaps provide a briefing to the Hot-Line monitors before the start of the Hot-Line procedure and then subsequently at the time of a shift change.

Prior Areas Requiring Corrective Action-Uncorrected

45-97-22-A-9. MCSO Deputies return to REAT-Forward.

NUREG - 0654 Reference: K.5.a.,b.

Objective #22
Demonstration Criterion #4

1. **Description:** Only two MCSO units dispatched from the OSCP to accomplish tasks inside the EPZ returned through the REAT-Forward Emergency Worker Vehicle Monitoring Station before entering a unrestricted area.
2. **Recommendation:** Ensure that all agencies sending emergency workers into a restricted EPZ are trained to return through the REAT-Forward Vehicle and Emergency Worker Monitoring location. If the unit is assisting with transportation of evacuees to a Reception Center, the stop at REAT-Forward would not be necessary since the vehicle and occupants could be monitored once they reached the Reception Center. ARRA must also remember to coordinate a new REAT-Forward location if the REAT-Forward was to relocate.

45-97-22-A-10. Parking Area.

NUREG - 0654 Reference: K.5.a.,b.

Objective #22
Demonstration Criterion #4

1. **Description:** A MCSO unit returned to the REAT-Forward location, entered the normal entrance to the Buckeye Airport and parked in a clean area before being monitored.

2. **Recommendation:** Place additional signs on Palo Verde Road at the regular entrance directing the Emergency Vehicles to the secondary entrance, e.g., ARRA Emergency Worker Vehicle Monitoring and an arrow. In addition, add ARRA Vehicle Monitoring to the present Returning Field Monitoring Teams sign; and add some arrows to the cone lane which leads to the Vehicle Monitoring Area.

45-97-22-A-11. Decontamination.

NUREG - 0654 Reference: K.5.a.,b.

Objective #22
Demonstration Criterion #4

1. **Description:** The extent-of-play stated there would be no actual decontamination at Buckeye Airport. However, there was no demonstration of a simulated contaminated worker or discussion of decontamination. There also was not a demonstration of re-monitoring after decontamination.
2. **Recommendation:** Demonstrate this at next exercise.

o FIELD MONITORING TEAMS

There were nine objectives established for demonstration, observation, and evaluation for the FMTs (Objective Numbers 1, 4, 5, 6, 8, 14, 30, 32 and 33). Six objectives were met, and ARCAs were identified for three objectives. Two ARCAs from the 1997 exercise were corrected and one ARCA remains uncorrected.

The capability to alert and notify and fully mobilize personnel during an unannounced, off-hours exercise was demonstrated. The FMTs were deployed as part of the initial call-down tree after the site manager notified off-site authorities. Team members deployed from home to the motorpool, were assigned a vehicle, and arrived at REAT-Forward in little more than two hours. Unavailable members were replaced from the monitor pool, and all members were performing activation roles at REAT-Forward in time for teams to be dispatched within about four hours of notification.

The FMTs demonstrated the capability to communicate with all appropriate emergency personnel at facilities and in the field. Each FMT used radios as the primary system and used cellular telephones as a backup to communicate with REAT-Forward and the TOC. During a check of the cellular telephones on first shift, the FMTs were unable to contact the number provided; they were able to contact a the backup telephone number available in the procedures. One person on each team was designated the radio operator. When the radio/cellular telephone primary system of FMT Delta intermittently indicated incoming telephone traffic, the operator returned the equipment to radio

function. There were no delays caused by equipment malfunctions or breakdowns.

The capability to continuously monitor and control radiation exposure to FMT emergency workers was demonstrated. The first shift (two FMTs) was issued dosimetry at REAT-Forward and the second shift was issued dosimetry at REAT-Forward before the shift change. Each member of the three-person team was issued two DRDs: a Dosimeter 611 with a range of 0 - 5 R, and either a Dosimeter 862 or a Victoreen 541 R with a range of 0 - 200 mR. The DRDs were charged and zeroed. The initial readings and the serial numbers were recorded before issuance to the FMT personnel. A sticker on each dosimeter indicated that each DRD was calibrated within the past twelve months. The personnel assigned to the teams had a TLD issued to them on 12-31-98. The TLD is issued to each team member at the beginning of the year and exchanged at the end of the year. The TLD is brought with them for use during a real or simulated emergency at PVNGS. A bottle containing KI tablets with an expiration date of May 2000 was in the field monitoring kits for use in the event of an radioiodine release from the plant.

During the briefing to the first shift, the REAT-Forward Captain reminded team members of their turnback value of 1000 mR/hr exposure rate, the reporting limit of 200 mR, the surface contamination limit of 250 cpm (net), and the exposure limit to pregnant females. Page B-4-2 in the State Plan (March, 1997) identifies an "Administrative Dose Limit of 500 mR" which is the turnback value whereas the "Procedures/Responsibilities for REAT Forward and Monitoring Teams" (4-28-97) identifies a turnback exposure rate value of 1000 mR/hr. Until a new plan has been approved, accepted, and implemented, the 500 mR Administrative Dose Limit is the approved turnback value which must be implemented and not the 1000 mR/hr exposure rate identified in the procedure.

While in the field, the team members read their dosimeters at 15-minute intervals and recorded the readings on a log sheet. FMTs Bravo and Charley were confused in the understanding of turnback values, reporting levels, and surface contamination levels. They were unsure of the turnback values and did not know how to determine when they might have exceeded the values.

The four FMTs demonstrated the appropriate use of equipment and procedures for determining field radiation measurements. Two hand-held instruments were issued to each FMT at the REAT-Forward a self-ranging Victoreen Model 190 rate meter with an end-window probe for the low-range survey instruments; and either a Ludlum 17-1 ion-chambers with a range of 0 - 500 R/hr (FMTs Alpha and Delta) or a Ludlum Model 9 ion-chambers with a range of 0 - 5 R/hr for the high-range instruments (FMTs Beta and Charlie). All instrument calibrations were current. An equipment inventory check was made of all items in the field sampling kits and all hand-held instruments were battery- and source-checked with the exception of the high-range ion-chambers. Spare batteries were in sufficient supply for the hand-held instruments and the probes were covered with plastic.

Following the initial briefing, FMTs Alpha and Beta received instructions to go to sampling locations

based on meteorological conditions and instructions were modified as the meteorological data changed. The FMTs arrived at their assigned locations with no delays based on knowledge of the area, use of the maps provided, and adequate vehicles. Both FMTs traversed the roads searching for the edges and center-line of the plume. Upon arrival at a measurement location, the team members demonstrated proper use of the instruments to make window-open and window-closed readings at waist-level and near-ground level with the Victoreen Model 190 instrument. All readings were reported timely and correctly to the radio dispatcher at REAT-Forward.

During the shift change, FMT Delta replaced FMT Alpha and FMT CHARLIE replaced FMT Beta. The outgoing teams gave good briefings to the incoming teams that included the latest meteorological data, the current ECL, and the FMTs current monitoring and traversing instructions. FMT Charlie continued with the most recent directives by traversing a road in order to be positioned to intercept a plume should a release occur. FMT Delta, however, did not continue with the current traversing and monitoring directives and had to call REAT-Forward to clarify exactly what they were supposed to do. Team Alpha radioed FMT Delta and reiterated the traversing instructions given at the shift change. Additionally, FMT Delta did not completely follow subsequent monitoring and traversing directives from the Team Coordinator.

The FMTs demonstrated the use of equipment and procedures for the measurement of airborne radioiodine concentrations as low as 10^{-7} microcuries per cubic centimeter in the presence of noble gasses and for obtaining samples of particulate activity in the airborne plume. Equipment was available to each team for measuring airborne particulate activity and airborne radioiodine. All equipment was within its period of calibration. The FMTs performed operational checks on instruments. The kits were inventoried for anti-contamination clothing, and radio checks were performed. Sampling was demonstrated using charcoal canisters. All four FMTs properly assembled the samplers. Also, the FMTs kept the lids on their kits closed and monitored outside the plume, the radiation levels while taking samples. This corrected ARCA #45-97-8-A-12 from the 1997 exercise.

Personnel were not familiar with the sampling procedures in their kit, and followed written procedures that they had brought with them. For example, the air sampler was not purged prior to taking measurements. When asked why a purge was not performed during their air sample, all team members referred to the lack of any purge step in the written materials they had followed. When the clipboard procedures were compared to those followed, all team members expressed concern that the two written procedures differed, and all stated that their training was consistent with the written procedures they had brought with them. FMT Delta did not purge the air sampler prior to replacing the cartridge. Therefore ARCA #45-97-8-A-13 remains uncorrected.

Transfer of samples was performed with documented custody forms. All teams adhered to the plan to carry out assigned tasks and procedures. The teams promptly relayed the field data to the REAT-Forward. REAT-Forward had available retention efficiency correction factors which corrected ARCA

#45-97-8-A-14 from the 1997 exercise. This correction factor did not appear to be utilized by the mobile counting laboratory.

The FMTs demonstrated the capability and resources to implement KI as a protective action for emergency workers. A bottle containing a sufficient quantity of KI tablets with an expiration date of May 2000 is contained in each field monitoring kit. The reason for taking KI, the frequency of use, and possible side effects are included with the instructions provided with the bottle. Although there was no recommendation to take KI, each FMT was prepared in the event a recommendation was received.

The FMTs demonstrated the capability to maintain staffing on a continuous, 24-hour basis with an actual shift change. The out-going shift provided a concise briefing of their knowledge of current plant conditions. This included no knowledge of any release, and that the current task was to traverse an assigned stretch of fence line. The in-coming team was advised of the current time as indicated by the TOC via radiochecks with REAT-Forward, and the current conditions of the FMT vehicle.

The incoming team accepted the FMT vehicle and swapped equipment and kits. The outgoing team returned to REAT-Forward in the smaller vehicle. The incoming team immediately called REAT-Forward to request a change to their traverse. They immediately set the vehicle clock to their watch time, stating that they were synchronized to Naval Observatory time and they did not proceed with their traverse until again directed to do so by REAT-Forward.

Areas Requiring Corrective Action

45-99-5-A-7. Exposure Limits

NUREG - 0654 Reference: K.3.a.

Objective #5
Demonstration Criterion #2

1. **Description:** FMTs Bravo and Charley were confused in the understanding of turnback values, reporting levels, and surface contamination levels. They were unsure of the turnback values and did not know how to determine when they might have exceeded the values.
2. **Recommendation:** Ensure FMTs are trained in subject of exposure and dose limits, turn-back values, and surface contamination levels.

45-99-6-A-8. FMT Delta Not Following Current Monitoring Directives

NUREG - 0654 Reference: N.1.a

Objective #6
Demonstration Criterion #2

1. **Description:** FMT Delta did not comply with the current monitoring and traversing directives given to them by FMT Alpha at the briefing during the shift change or by the Team Coordinator at REAT-Forward.
2. **Recommendation** Train FMTs to follow the current directives from the Team Coordinator within the grid map locations.

45-99-8-A-9. Field Measurement Procedures

NUREG - 0654 Reference: 1.9.

Objective #8
Demonstration Criteria #4&7

1. **Description:** Personnel were not familiar with the sampling procedures in their kit, and followed written procedures that they had brought with them. For example, the air sampler was not purged prior to taking measurements. When asked why a purge was not performed during their air sample, all team members referred to the lack of any purge step in the written materials they had followed. When the clipboard procedures were compared to those followed, all team members expressed concern that the two written procedures differed, and all stated that their training was consistent with the written procedures they had brought with them.
2. **Recommendation:** Ensure that training is based only on approved procedures, and that all FMT members are instructed to follow only those procedures supplied in the plan.

Prior Areas Requiring Corrective Action-Corrected

45-97-8-A-12. Sampling Procedures

NUREG - 0654 Reference: I.9; N.1.a.

Objective #8
Demonstration Criteria #3&7

1. **Description:** For the second and third air samples that they took, Team Alpha assembled the sampler head inside the plume rather in an area of low background. Additionally, the team left the lid to their field kit open throughout the exercise. These actions are not in compliance with Step 6 of the Field Monitoring Checklist (4/16/97). Team Charlie did not monitor the changing radiation levels within the plume while they were taking an air sample, as required by Step 9.a of the Field Monitoring Checklist (4/16/97).
2. **Recommendation:** Emphasize the requirement and need to assemble sampler heads in an area of low background outside of the plume, the requirement and need to keep field kits closed inside the plume, and the requirement and need to monitor for changing radiation fields within the plume while air samples of radioiodine and particulates are being taken. Require field monitoring team members to read the Field Monitoring Checklist before taking air samples to ensure that all tasks are properly performed.

45-97-8-A-147. Field Measurement Data

NUREG - 0654 Reference: I.9.

Objective #8
Demonstration Criterion #5

1. **Description:** No retention efficiency correction factor for silver zeolite cartridges was established by REAT-Forward or by the TOC to compensate for the high flow (approximately 3 cfm for Team Bravo) that is automatically adjusted by the SAIC H-810 air sampler.
2. **Recommendation:** Ensure that the sampler air flow for the SAIC H-810 air sampler is approximately 2 cfm or provide an adjustment factor for the specific brand of silver zeolite cartridges used in the field to compensate for higher sample collection air flow.

Prior Area Requiring Corrective Action-Uncorrected

45-97-8-A-13. Field Measurement Procedures

NUREG - 0654 Reference: 1.9; N.1.a.

Objective #8
Demonstration Criteria #4&7

1. **Description:** FMT Delta did not purge the air sampler prior to replacing cartridge, as required by Step 9.a.7 of the Field Monitoring Checklist (4/16/97).
2. **Recommendation:** Emphasize the requirement and need to purge the cartridge. Require FMT members to read the Field Monitoring Checklist before taking air samples to ensure that all tasks are properly performed.

o JOINT EMERGENCY NEWS CENTER

There were eight objectives established for demonstration, observation, and evaluation at the Joint Emergency News Center (Objective Numbers 1, 2, 3, 4, 12, 30, 32, and 33). Seven objectives were met, and two ARCAs were identified for one objective. One ARCA from the 1997 exercise was corrected and another ARCA remains uncorrected.

The capability to alert and fully mobilize personnel and to activate the JENC for emergency operations during an unannounced off-hours exercise was demonstrated. Verification of ECL notification receipt was not necessary because a direct utility line was used. As soon as the Alert ECL was declared at 0242, the message was sent through the NAN to pre-designated agencies for notification. In turn these agencies have call-down rosters of response personnel. Key individuals were alerted and notified via telephone, automatic dialing system and pagers. One State individual was not notified but reported to the JENC after being informed by colleagues at her workstation. Another received the alert via voice mail. Individuals started to arrive at 0341. Activation of the JENC began at 0341 and the JENC was fully operational at 0433. No notification to the JENC was received at the NOUE and Alert ECLs because it was not operational at that time. There was no additional mobilization of personnel during the SAE and GE ECL because full mobilization occurred at the Alert ECL. No staff were pre-positioned at the JENC.

As agency representatives arrived at their designated JENC work area, they did the necessary communication links with their agencies and their counterparts at the State emergency operations center and proceeded to perform tasks identified in their checklist.

The adequacy of facilities, equipment, displays and other materials to support emergency operations was demonstrated. The JENC is located several hundred yards from the SEOC on the Papago Military Reservation. The JENC has been established so that the utility, the state, the county, and Federal government can coordinate briefings and press releases and can provide them to the media at one location. The facility is located on a State Military Reservation and the National Guard has successfully demonstrated security during previous exercises.

The facility was adequate and met the necessary space and furnishings needed for the amount of personnel that reported for the operations. The facility had a Media room where briefings for the media were conducted. The major portion of the facility housed the state, county, utility, ARC, and their support personnel. Another small room was available for spokesperson meetings prior to media briefings. There was adequate heating, ventilation, lighting, and restroom facilities. In the event of loss of power, there is an existing link-up for backup power. An agreement with the National Guard is in place that identifies the responsible department that will respond when the need arises. A power back-up system is in place situated in the outside left (from front door) corner. Should there be a need to use it, a member of the National Guard will be notified to provide the support needed to activate the back-up power and equipment.

Equipment such as telephones, computers, copiers and facsimile machines were available. Designated personnel operated the copiers and facsimile machines, which facilitated the distribution process.

Maps were displayed in both the Media Room and the PIO work room. The maps were big enough and were visible from the far corner of the room. Markers that identified evacuated areas and blocked roads were affixed. The status boards were updated in a timely manner and contained the sequence of events and the significant changes. The evacuation routes and reception centers were not marked on the map but the information was available from the ARC and the Maricopa County representatives. The schools were marked on the map. There were no nursing homes and hospitals within the 10-mile EPZ. Another board displayed the appropriate ECL and updates were made as levels changed and information was received.

Access to the facility was controlled. A sign-in/out log was placed at the entrance of the facility. A copy of the emergency plan was available and was used by several individuals to verify implementation procedures.

The capability to direct and control emergency operations was demonstrated. The PVNGS Joint Public Information Procedures state that the Facility Coordinator, a utility employee, is responsible for coordination of overall operation of the JENC. The Facility Coordinator (both first and second shift) oversaw the production of NRs by ensuring that the JENC staff worked in an efficient, coordinated manner. The Coordinator held frequent spokesperson coordination briefings as well as

briefings for the entire JENC staff to ensure that information was coordinated among agencies prior to presentation in media briefings. He issued instructions to staff, provided leadership during the coordinating briefings, clarified authorities and ensured that all staff viewpoints were heard.

The capability to communicate with all appropriate personnel at facilities and in the field was demonstrated. There was ample communication equipment to meet and satisfy this objective. Primary systems include telephones, dedicated telephone lines between the JENC and PVNGS, computer links with the represented agencies and facsimile machines. Cellular telephones were the backup communication system. There is an existing agreement with US West, a communications company, to provide telephone equipment should there be a demand for additional communication lines. There were neither radio systems used nor amateur radio participation during this exercise.

Communication occurred between state and local agencies, ARC and their outreach personnel, and the various technical and administrative departments of the Public Services. A minor malfunction was observed. (One of the telephones in the Media Room was not operational and was removed. This did not hamper or delay any communications or impact the emergency operation.) There were no delays in communication from equipment malfunctions or breakdowns.

The capability to coordinate the development and dissemination of clear, accurate, and timely information to the news media was demonstrated. The JENC staff produced ten News Releases (NR). Seven full media briefings as well as several follow-up and plant-specific side-briefings were held at the JENC during the exercise.

**TABLE 5
JENC NEWS RELEASES**

NUMBER	ECL	TIME	COMMENTS
1	ALERT	0518	Agencies respond to PVNGS emergency.
2	ALERT	0645	Palm Springs Identified as Earthquake Epicenter
3	ALERT	0654	TOC Activated
4	ALERT	0651	Media Advisory (JENC Activated)
5	SAE	0913	PVNGS Declares SAE ECL
6	SAE/GE	0923	Emergency declared in Maricopa County
7	GE	0938	Reception and Care Center Ready for PVNGS Evacuees
8	GE	0957	Traffic access restrictions
9	GE	1104	PVNGS Declares GE ECL
10	GE	1146	Update on Traffic Restrictions Around PVNGS

**TABLE 6
MEDIA BRIEFING TIMES**

NUMBER	TIME	COMMENTS
1	0506	
2	0607	
3	0722	
4	0824	PAD #1 briefed
5	0854	Governor has declared State of emergency as of 0820
6	1021	PAD #2 briefed / air space restricted; radiation reading of 160 mR/hr At site boundary
7	1121	

The staff gathered information on PADs from the SEOC, on PAD implementation from the MCEOC, and on plant status from the EOF to produce NRs. Prior to each NR, the text was distributed in draft form on colored paper to clearly distinguish it as draft information. The JENC staff reviewed draft NRs prior to release to the media. However, a NR that contained significant protective action information was not released in a timely fashion. Another NR contained apparently contradictory information and an EAS message and three supplemental EAS messages were not distributed in the JENC:

NR #5 reported on the precautionary evacuation of all residents within a 2-mile radius of the plant and out to 5 miles in Sectors Q, R, A and B. This NR was issued at 0913, approximately 75 minutes after the PAD had been issued. The EAS message that contained this information had been distributed throughout the JENC, and the PAD had been briefed in Press Conference #4 at 0824. However, given that there had been over a two-hour gap from the time the previous NR had been issued (NR #4/issued at 0651), it is not clear why the PAD information could not have been issued in NR form in a more timely fashion. Therefore, ARCA #45-97-12-A-15 which concerned untimely news releases remains uncorrected.

NR #6 was issued at 0923, ten minutes after NR #5. NR #6 stated in part: "Residents living near the plant will be notified by the primary Emergency Alert System radio stations...if there is need to shelter or to evacuate the area." This would imply that there had been no such need at the time NR #6 was issued.

EAS message #3 was received in the JENC at approximately 1014. Three supplemental EAS messages (follow-ups to the three main EAS messages) were received at approximately 0813, 0845 and 1023. None of these documents was distributed internally once they reached the JENC.

Final NRs and EAS messages were posted in both the media production and briefing areas of the JENC.

The County and State spokespersons briefed the media in a succinct, complete and informative manner during the seven media briefings. Frequent reference was made to telephone numbers the public could call for more information or to obtain transportation assistance. During each briefing, speakers provided a description of current emergency conditions and stated whether or not a radioactive release had taken place. After the evacuation PADs had been issued, speakers gave a listing of items people should take with them to the reception centers. The reception centers ready to receive evacuees were listed. Parents were told that they could pick up their children at these reception centers. People were also referred to the emergency information in their calendars. Areas subject to PADs were referenced and clearly indicated on the wall-size EPZ map located in the media briefing area. The ADEM and ADA spokespersons followed-up on questions asked at previous briefings for which they did not immediately have the answers (Public Inquiry Line busy; what to do about livestock). This corrects ARCA #45-97-12-A-16 from the 1997 exercise which concerned inaccurate and inconsistent briefings.

Each organization represented at the JENC demonstrated the capability to maintain staffing on a continuous 24-hour basis through an actual shift change. The utility performed a shift change for three key positions: facility coordinator, spokesperson and media room coordinator. These shift changes occurred at 0635, 0535 and 0945, respectively. The State demonstrated a shift change for the spokesperson and communications coordinator at 0850. A PIO also arrived at 0850 but this position had not been staffed for the first shift. The first-shift spokesperson had fulfilled both roles and no impact on the ability to perform essential functions was noted. A shift change for the ADA PIO had occurred at 0755. Maricopa County demonstrated a shift change for the positions of spokesperson, county EOC contact and PIO staff person at 0655. The Central Arizona Chapter of the ARC demonstrated a shift change for the position of spokesperson at 0737.

In each case, the outgoing staff person conducted a detailed briefing for the incoming replacement. The transition from the outgoing shift to incoming shift was accomplished without discontinuity in operations. The incoming shift was knowledgeable and capable of fulfilling their emergency response duties.

Areas Requiring Corrective Action

45-99-12-A-10. Confusing Text

NUREG - 0654 Reference: E.7

Objective #12
Demonstration Criterion #2

1. **Description:** NR #6 was issued at 0923, ten minutes after NR #5. NR #6 stated in part: "Residents living near the plant will be notified by the primary Emergency Alert System radio stations...if there is need to shelter or to evacuate the area." This would imply that there had been no such need at the time NR #6 was issued. This error most likely resulted from the use of JENC Boilerplate message "E" without proper modification of the scripted text.
2. **Recommendation:** Ensure that all portions of pre-scripted messages are appropriate before it is issued.

45-99-12-A-11. EAS Message Distribution

NUREG - 0654 Reference: E.7

Objective #12
Demonstration Criterion #2

1. **Description:** EAS message #3 was received in the JENC at approximately 1014. Three supplemental EAS messages (follow-ups to the three main EAS messages) were received at approximately 0813, 0845 and 1023. None of these documents was distributed internally once they reached the JENC.
2. **Recommendation:** Ensure that all EAS messages are put into the JENC document distribution system.

Prior Area Requiring Corrective Action-Corrected

45-97-12-A-16. Inaccurate and inconsistent news briefings

NUREG - 0654 Reference E.7

Objective #12
Demonstration Criterion #2

1. **Description:** The ARC spokesperson stated on several occasions that people evacuating their homes could bring their pets to the reception and care center where they would be looked after by the humane society. This information contradicted information in news releases and EAS messages that said that evacuees were not to bring their pets to reception and care centers.

An ADA spokesperson addressed the media at 1255 during media briefing #5. He stated that there was no problem with the food supply "be it vegetables, milk or meat". According to a message from an agricultural representative in the planning group at the SEOC, there were 5 dairy farms within the 10 mile EPZ in Sections G,H and J. Since the sampling of dairy farms had not begun at the time the spokesperson made his statement, he had no basis for telling the media that all food products in the EPZ were safe.

2. **Recommendation:** Ensure that information given during briefings is accurate and consistent with policy.

Prior Area Requiring Corrective Action-Uncorrected

45-97-12-A-15. Untimely News Release

NUREG - 0654 Reference: E.7

Objective #12
Demonstration Criterion #2

1. **Description:** NR #5 reported on the precautionary evacuation of all residents within a 2-mile radius of the plant and out to 5 miles in Sectors Q, R, A and B. This NR was issued at 0913, approximately 75 minutes after the PAD had been issued. The EAS message that contained this information had been distributed throughout the JENC, and the PAD had been briefed in Press Conference #4 at 0824. However, given that there had been over a two-hour gap from the time the previous NR had been issued (NR #4/issued at 0651), it is not clear why the PAD information could not have been issued in NR form in a more timely fashion.

2. **Recommendation:** Ensure that PAD information has highest priority for being incorporated in NRs.

o MARICOPA COUNTY SHERIFF'S OFFICE WARNING CENTER

There were four objectives established for demonstration, observation and evaluation at the Maricopa County Sheriff's Office Warning Center (Objectives Numbers 1, 4, 32, and 33). All objectives were met.

The capability to alert and mobilize personnel was demonstrated. The Maricopa County Sheriff's Office Warning Center (MCSO WC) is located in the Sheriff's Office Dispatch Center in downtown Phoenix. The Dispatch Center is staffed twenty-four hours a day and is the designated contact point for notification from the PVNGS. The initial notification call, transmitted from the STSC Communicator at PVNGS, was received on the NAN telephone in the Dispatch Center at 0232 on March 9, 1999. It announced the NOUE ECL, declared at 0225. Information from the NAN call was recorded and notification to staff was begun at 0235. Commercial telephones and pagers were used to contact personnel identified on an up-to-date roster.

Prior to completion of the notification call-down, the NAN system was activated at 0245 and the Alert ECL was announced. The Alert ECL was declared by PVNGS at 0242. Once again, the dispatcher recorded the information transmitted on the NAN and promptly continued to notify Maricopa County personnel. All County personnel identified on the Notification List were contacted and informed of the emergency at PVNGS by 0300.

The capability to communicate with all appropriate emergency personnel was demonstrated by the MCSO WC. The Dispatch Center is equipped with multiple communication systems available to support a response at PVNGS. The NAN telephone system was used at the primary mean of notification from PVNGS, it operated without any malfunctions or delays. Notification to County personnel was made using commercial telephone and pagers. The dispatcher in the Warning Center was familiar with procedures associated with PVNGS and demonstrated the ability to notify County personnel promptly. Communication equipment and procedures worked well during the exercise.

The capability to carry out emergency response functions in an unannounced exercise was demonstrated by the MCSO WC. Advanced notification of a seven-day window for initiating the exercise was provided to the staff of the Warning Center. MCSO personnel did not know the day or start time of the exercise and there was no evidence of a compromise in the confidentiality of the exercise. MCSO WC staff promptly notified key County emergency personnel in accordance with the declared ECLs.

The capability to carry out emergency response functions during an off-hours exercise was demonstrated by the MCSO WC. The full-scale exercise was initiated by a NAN telephone call from the PVNGS to the Warning Center at 0232. The Warning Center is the initial contact point for all Maricopa County emergency response operations. Proper notifications were made to County personnel.

o MARICOPA COUNTY EMERGENCY OPERATIONS CENTER

There were 14 objectives established for demonstration, observation, and evaluation at the Maricopa County Emergency Operations Center (Objective Numbers 1, 2, 3, 4, 10, 11, 14, 15, 16, 17, 30, 31, 32, and 33). Twelve objectives were met, and an ARCA remains uncorrected for one objective. One ARCA from the 1997 exercise was corrected. Objective 31 was not demonstrated due to the exercise scenario.

The capability to fully alert and mobilize the MCEOC for emergency operations was demonstrated. The MCEOC is activated at the Alert ECL. The Alert ECL from the plant came to the MCSO WC located in downtown Phoenix and personnel were called from there and told to report to the MCEOC. The Alert ECL was declared at 0242 and personnel began arriving at 0319. The MCEOC Director declared the MCEOC operational at 0448 with the arrival of the MCSO personnel.

The alert and mobilization during an unannounced and off-hours exercise was demonstrated. Advanced warning of a seven-day window for starting the exercise was given the players but advanced notification of the day of the exercise was limited to those with a need to know. The MCEOC is organized for two shifts and a roster of both shifts was available, was accurate. All essential emergency operations were performed at the facility. The MCEOC demonstrated a shift change at 0700.

The MCEOC demonstrated the adequacy of their facility, equipment and work environment in support emergency operations. The facility had adequate space, furnishings, lighting, restrooms, kitchen facility, ventilation and backup power. The facility had computers, telephones, fax machines, radios, maps, display boards (both fixed and computerized), and status boards were used effectively and updated promptly. Maps, both computerized and fixed, were available to show the plume pathway EPZ with sectors, evacuation routes, RCCs, population by EPZ sector and distance, ECLs, weather, schools and traffic control points (TCPs). A computerized Emergency Information System was used to develop a master log of events and actions. A new computerized Display Board was tested during this exercise, and performed without any major problems. The fixed board was available as a backup. Access to the facility was controlled through a sign in managed by two MCSO deputies. A copy of the plan was available at all workstations.

The capability to direct and control emergency operations was demonstrated at the MCEOC Maricopa County. The MCEOC is under the direction of the Maricopa County Department of Emergency Management. Two players during the exercise filled the MCEOC Director position and both provided the leadership to implement the facilities responses during the exercise. Instructions were issued to staff, briefings were held on a regular and timely basis, messages were logged and recorded for future reference, staff, as appropriate, were involved in decision-making, coordination with other jurisdictions was done, and PADs were coordinated and implemented.

The notification of the escalation to the SAE ECL status was received by the MCEOC just as the sirens were being sounded and the EAS message announcing an evacuation of certain sectors surrounding the plant was being announced. Since the PADs recommended did not change, the director decided not to sound the sirens again right away but to wait 30 minutes and then put out a revised EAS message with the new ECL.

ARCA #45-97-3-A-17 from the 1997 exercise, dealt with incorrect school information being given to the MCOSCP by MCSO deputies at the MCEOC. During this exercise, there was close coordination between the MCSO deputies and the MCEOC Operations chief, and the information on school evacuation and the reception center to which the children would be taken which was transmitted to the MCOSCP matched the information in the EAS messages. This ARCA is corrected.

The capability to communicate with all appropriate emergency personnel at facilities and in the field was demonstrated. The MCEOC has 19 commercial telephone lines. There are three dedicated lines, which are tied to PVNGS, (NAN), the SEOC and the EAS station. There is conferencing capability, a computer link, two facsimile machines and the Internet. These systems are all primary. Cellular telephones, a radio system with 15 frequencies and amateur radio (RACES) are available as backup. The Internet allows staff at the SEOC, as well as the public, to access emergency information. During the exercise, the Computerized Display Board was sent over the Internet. (MCDEM has a web site). MCEOC was able to communicate with many organizations, to include the SEOC and JENC, the EAS Radio Station, and all county support staff including MCSO, ARC, County Health, PVNGS, the schools, Maricopa County Department of Transportation (MCDOT) and other EOCs fields operations. There were no delays caused by malfunctions or breakdown in equipment.

All computers and the telephone systems are equipped with an Uninterrupted Power Source.

The capability to promptly alert and notify the public within the ten-mile plume pathway EPZ and disseminate instructional messages to the public on the basis of decisions by appropriate State or local officials was effectively demonstrated at the MCEOC. During this exercise, the primary alert and notification (A&N) systems and backup route-alerting were demonstrated.

The Incident Commander on the state level is the decision-maker for PADs, while the MCEOC Director authorizes each of the A&N sequences and directs their commencement within a 15-minute window following the PAD. During the exercise, a total of three A&N sequences were demonstrated. The initial A&N sequence was completed within eleven minutes of the PAD time by the simulated activation of the siren systems and a simulated broadcast of the EAS message by KTAR to evacuate all sectors from 0 to 2 miles and sectors Q, R, A and B within the two- to five-mile radius of the PVNGS. The first evacuation was at the Alert ECL. The first sequence began with the PAD at 0740, the simulated siren activation at 0747 and the simulated EAS message broadcast at 0751. The second sequence began with the decision at 0817, the simulated siren activation at 0822, and the simulated EAS message broadcast at 0826. There was no change in the PAD. This A&N sequence upgraded the ECL from Alert to Site Area Emergency. The third sequence began with the PAD at 0951, the simulated siren activation at 1002, and the EAS broadcast at 1004.

**TABLE 7
A&N SEQUENCES**

PROTECTIVE ACTION DECISION	TIME OF DECISION	TIME SIRENS SOUNDED	TIME OF EAS BROADCAST	TIME OF FOLLOW-UP EAS BROADCAST
#1. Evacuate all sectors 0 to 2 miles, Sectors Q, R, A & B 2 to 5 miles, Ruth Fisher School	0740	0747	0751	0800
#2. Evacuate all sectors 0 to 2 miles, Sectors Q, R, A & B 2 to 5 miles Ruth Fisher School	0817	0822	0828	0836
#3. Evacuate all sectors 0 to 5 miles, Sectors Q, R, A & B 5 to 10 miles	0951	1002	1004	1014

During the siren activations, siren #39 failed (simulated). The MCEOC Communications Officer notified the Operations Officer, and the MCSO. The MCSO Deputies notified the MCOSCP, and Deputies were dispatched to provide backup route-alerting. This was demonstrated each A&N sequence. Each time,

the Deputies completed route-alerting action within twenty-five minutes.

The Assistant Operations Chief was in direct contact over a dedicated line with the EAS radio station, relaying the information for the pre-scripted, fill-in-the-blank EAS message. There is a radio for the EOC staff to monitor the EAS broadcast message for validation, but this was not performed.

The MCEOC procedure is for the radio station to broadcast the EAS message for ten minutes, then begin broadcast of the follow-up broadcast message immediately following the ten minutes of the initial EAS message, and then broadcast both messages once every 15 minutes. This procedure was followed during the exercise (simulated).

The MCEOC demonstrated the capability to coordinate the formulation and dissemination of accurate information and instructions to the public. The Director of the MCEOC coordinated with the SEOC director to determine the content of EAS messages to ensure consistency with the PAD. Pre-scripted, fill-in-the-blank EAS messages were used which accurately reflected the PADs. All EAS messages contained information, in clearly understandable language, consistent with public information brochures (PVNGS calendar), and were clearly distinguishable between current and previous information. There were problems with information contained in one of the EAS messages. The third EAS message indicated that a release of radiation had occurred. This information was obtained from a NAN message received at 0957 from the Utility EOF and both the MCEOC and the SEOC records indicate that they heard the release had occurred. The FMTs did not verify there had been a release until 1010. The EAS messages were transmitted to the JENC so those public affairs officials had accurate information.

The EAS messages contained information on the emergency conditions at PVNGS, release of radiation, health hazards, the affected area in geographical terms with familiar boundaries, evacuation orders, school protective actions, location of reception and care centers, additional instruction which could be found in the Palo Verde Safety Calendar, the public inquiry telephone number, and in addition, the message instructed to stay tuned to the radio station for further information and instructions. A follow up message was broadcast in addition to each three EAS messages. These follow up messages contained information on evacuation procedures, such as what to leave at home, what to bring along with you, what to do while traveling to the RCC, the transportation assistance telephone number and what to do about pets and livestock.

The capability and resources to implement KI protective actions for emergency workers was not applicable for the MCEOC since there was no decision for emergency workers to take KI. The decision to take KI does not rest with the county and on at least one occasion the county did inquire as to whether the decision had been made but was told that KI was not necessary.

The capability and resources necessary to implement appropriate protective actions for special populations were demonstrated. MCDDEM used the EAS system as the primary notification

mechanism for special populations. In addition, the MCSO and the MCEOC Intelligence officer coordinated on the special-needs listing to ensure contact (via telephone) was made and assistance was provided. Calls were made to a simulation cell. The MCSO has a call list that would be used for an actual event. This list contains names, addresses, telephone numbers and pertain comments e.g. transportation requirement, medical conditions, etc., and is current.

During the first EAS sequence, no special needs were identified. During the remainder of the exercise, three calls were received for assistance in the evacuation. One call was for motorist assistance, where the driver lost his glasses and could not drive. The second was also for motorist assistance: three adults and six children required transportation when their white Ford van broke down. The third call was for motorist assistance: six adults and a pot-bellied pig required transportation when their white Ford van broken down. The MCSO personnel contacted the OSCP and officers were dispatched to assist. In addition, special-needs populations were informed on how to obtain assistance in the EAS messages. There were no gaps in resources.

The capability and resources necessary to implement protective actions for school children within the plume EPZ were demonstrated. The MCEOC Intelligence Officer notified, by telephone, Ruth Fisher Elementary School and Buckeye High School (at 0740) about the Alert ECL and the protective actions required for the children to evacuate Ruth Fisher students to Buckeye High School (simulated). This occurred at the time when students were arriving to school. Busses were already at the school, and the bus drivers were instructed to move the students to Buckeye High School. The EAS messages instructed the parents of this evacuation and were also instructed to pick up the children at Buckeye High School.

The MCEOC demonstrated the organizational ability to establish traffic and access control points surrounding the evacuated areas. There were two decisions made during the exercise which involved evacuation of areas around PVNGS and which instructed the establishment of TCPs. The plans and the MCSO personnel make no distinction between TCPs and access control points (ACP) and refer to all such points as "roadblocks." MCDOT utilizes a computer program which, when given the sectors to be evacuated, determines the points at which roadblocks are to be established. That program appeared to do a good job of determining roadblock points. Those points are then transmitted to the MCOSCP.

MCSO Deputies at the MCEOC requested that roadblocks be established. They reported that MCSO deputies in the field were dispatched (simulated) from the OSCP to the points and remained there until MCDOT personnel arrived with a barricade and signage. At this point, all the personnel returned to the MCOSCP, according to the MCSO deputies and MCDOT personnel at the MCEOC. (The one exception was a roadblock, not selected by the computer, which was to be evaluated.) The first deployment of MCSO deputies came with the first PAD. The MCOSCP reported to the MCEOC at 0850 that all necessary roadblocks had been established. The MCSO reported to the MCEOC Operations Chief at 0905 that 100% of the people in these areas had been evacuated. A second

deployment was initiated with a change in PAD at 0951. MCSO personnel reported to the MCEOC Director that roadblocks were established at 1005.

During the second deployment, the MCEOC Director made a request to the State for National Guard personnel to assist with the evacuation. The MCSO later reported to the Operations Chief that the National Guard was on-scene.

There were no instructions issued from the MCEOC as to what the MCSO personnel staffing the roadblocks were to tell the residents who passed the points (i.e. residents cannot enter the area and cannot return once they have left the area), and once the deputies and MCDOT personnel left, there was no one at the roadblock. There was no assurance that traffic could not circumvent the roadblocks and enter the evacuated areas.

The staffing of the TCPs and ACPs is not specified in the plan but it is implied. Without such staffing there is no one to ensure that residents do not return to evacuated areas or to determine the extent of an evacuation or report difficulties. Deputies in the field are given a briefing at the MCOSCP before being dispatched to establish the roadblocks. They are given an information packet at that time dealing with basic responder operations, which addresses some aspects of roadblocks. The deputies who were queried in the field indicated that they would remain at the roadblock to ensure its effectiveness, but this is not specifically called for in the instruction packet given to the deputies. Those deputies in the MCEOC indicated that all MCSO personnel would withdraw to the MCOSCP as soon as MCDOT personnel arrived with signage and barricades. Because of the conflicting information, the ARCA #45-97-17-A-18 from the 1997 exercise was not corrected.

There were no impediments to traffic flow identified during the exercise.

The MCDOT and MCSO personnel at the MCEOC were knowledgeable with regard to why and where the "roadblocks" were needed, what protective action was triggering the need, the evacuation of schoolchildren and location of the RCCs.

There are no special facilities or institutions in the affected areas. The request to control air traffic does not rest with the County.

The capability to maintain continuous, 24-hour staffing through an actual shift change was demonstrated. A roster of key personnel for each shift was provided. The MCEOC is organized on the basis of two 12-hour shifts and routine shift change times are 0700 and 1900. At 0530 on the morning of the exercise, all key players notified their replacements to report to the MCEOC at 0630 for a 0700 shift change. All replacements arrived on time and last minute changes (ill replacements etc.) were accommodated. Players being relieved filled out an "Outgoing Shift Checklist" with their

shift change counterparts covering such items as logs, key events, tasks in-progress and resources being used. Incoming players filled out a similar "Incoming Shift Checklist." In-coming players demonstrated knowledge of their roles and functions. There was an essentially seamless shift change.

The capability to provide off-site support for the evacuation of on-site personnel was not applicable since no request was received to provide such support.

Prior Area Requiring Corrective Action-Corrected

45-97-3-A-17. Incorrect school evacuation information.

NUREG - 0654 Reference: A.1.d.,2.a.

Objective #3
Demonstration Criterion #1

1. **Description:** The MCSO representative in the EOC transmitted incorrect information regarding the evacuation of Palo Verde School to the OSCP. The MCSO EOC representative indicated that the school population would be evacuated to Agua Fria High School South. The PAD did not indicate which RCC would receive the school population evacuation. The EAS message indicated to the public (and especially the parents) that the school population would be evacuated to Tolleson High School. The PAD and EAS did indicate that Agua Fria High School would be opened.
2. **Recommendation:** Train EOC staff to transmit consistent information to their counterparts in the field, i.e., information that is contained within the EAS or the PAD.

Prior Area Requiring Corrective Action-Uncorrected

45-97-17-A-18. Non-Staffing of Traffic/Access Control Points

NUREG - 0654 Reference: J.10.g.,j.,k.

Objective #17

Demonstration Criterion #2

1. **Description:** The staffing of the TCPs and ACPs is not specified in the plan but it is implied. Without such staffing there is no one to ensure that residents do not return to evacuated areas or to determine the extent of an evacuation or report difficulties. Deputies in the field are given a briefing at the MCOSCP before being dispatched to establish the roadblocks. They are given an information packet at that time dealing with basic responder operations, which addresses some aspects of roadblocks. The deputies who were queried in the field indicated that they would remain at the roadblock to ensure its effectiveness, but this is not specifically called for in the instruction packet given to the deputies. Those deputies in the MCEOC indicated that all MCSO personnel would withdraw to the MCOSCP as soon as MCDOT personnel arrived with signage and barricades. Because of the conflicting information, the ARCA #45-97-17-A-18 from the 1997 exercise was not corrected.
2. **Recommendation:** Give specific instructions to the deputies staffing the roadblocks and those at the MCEOC that they are to remain at the roadblocks until relieved. Included these in the information package given out at the MCOSCP and distribute to those deputies at the MCEOC. Develop policies as to when that relief should come (when sector is 100% evacuated, when additional sectors are to be evacuated, etc.)

o RADIO STATION KTAR

There was one objective established for demonstration, observation, and evaluation at Radio Station KTAR (Objective Number 10). The objective was met.

Activation of EAS at KTAR is the responsibility of the Editors. The evaluator arrived during the shift change of the Night Editor and the Morning Editor. During the Night Editor's shift, the Editor and the radio host are the only two people at the station. The Editor is the one person available for the EAS during this shift, and there is no backup. This potentially could cause an EAS "coverage" problem if the Editor is indisposed for some reason.

Within an extremely hectic and fast-paced work environment, these Editors demonstrated the ability to receive and process information for swift and accurate delivery to the public. Their professionalism, conscientiousness and combined years of experience in the field have made them an ideal "fit" and great human resources for the EAS system.

KTAR Radio Station (610 AM) simulated to the public by way of AM radio EAS transmission (simulated) in a timely and proficient manner. The Editors responsible were well-prepared, enthusiastic and proficient in the EAS procedures. KTAR Radio Station is a state-of-the-art facility that can easily facilitate the tasks it is expected to perform.

The MCEOC Assistant Operations Chief authorized all EAS sequences at KTAR to commence. Coordination between the MCEOC and KTAR allowed KTAR to (simulate) broadcast all of the specified EAS messages occurred within the allowable 15-minute time frame of the A&N sequence.

Procedures at KTAR are all included in a blue spiral binder titled "Palo Verde EAS Message Binder/KTAR." They are kept in the workstation of the Editor. The binder contains the necessary EAS checklists and forms.

Following each of the EAS broadcasts was a "Follow-Up Message For EAS (form C)" giving (identical) evacuation instructions in each instance. These were initiated by coordination telephone call by the MCEOC to KTAR and broadcast (simulated) within one minute of receiving this instruction to transmit.

All broadcasts were simulated and prior to broadcasting there was confirmation that all messages were from the County. Radio Station personnel verified that the EAS messages were correct before transmitting and the (simulated) broadcasts were all correct in content. The editor then gave the EAS message to the booth to the radio host. Both the editor and hosts were familiar with the re-transmission intervals (also included in the procedures).

The message telephone from MCEOC and the MCSO, located in the Editors workstation, does not "ring" very loud. During some periods, general work noise at KTAR can be quite loud, possibly interfering with hearing the telephone.

During certain periods of the Overnight Editors work shift, it is the Editors work responsibility to be in the broadcast booth with the radio host. This responsibility cannot be avoided and if this task should occur during a time when the MCEOC is trying to reach them for an EAS message KTAR would not be in a position to respond to the call.

o MARICOPA COUNTY ON-SCENE COMMAND POST

There were twelve objectives established for demonstration, observation, and evaluation at the MCOSCP (Objective Numbers 1, 2, 3, 4, 5, 14, 15, 17, 30, 31, 32, and 33). Ten objectives were met, one objective was not demonstrated, and an ARCA were identified for one objective. Two ARCAs from the 1997 exercise were corrected, and one ARCA remains uncorrected.

The MCOSCP demonstrated the capability to fully mobilize personnel for both emergency facilities and field operations and demonstrated the capability to activate and staff emergency facilities for emergency operations during an unannounced, off-hours exercise. Staff were notified by the MCSOWC via telephone or pager. The MCEOC sheriff deputies and MCDOT staff are responsible for mobilizing their crews to staff the MCOSCP once an Alert ECL is issued. They began arriving around 0300 at the MCDOT service yard located in Buckeye. The MCOSCP was declared operational at 0540. Staff consisted of about 3-4 MCSO managers and 30 deputies, and about 30 MCDOT staff and supervisors. There were 3-5 MCSO and 2 MCDOT staff in the Mobile Command Post. In addition, there were staff from ADPS at the MCOSCP. No staff were pre-positioned.

The MCOSCP demonstrated the adequacy of facilities, equipment, displays, and other materials to support emergency operations. The MCDOT corporation yard is located just outside the 10-mile EPZ. The yard stores gas and diesel fuel. MCOSCP's operating facilities included the large Mobile Command Post van (tractor-trailer), which contains the radios (CB, UHS and VHS radios, cellular telephones and fax devices) and other communication equipment. The MCOSCP also had 5-6 four-wheel drive vehicles, 9-10 patrol cars, some smaller vans, and had access to MCSO buses and ADPS vehicles if needed. The MCDOT garage building, about 250 ft², had sufficient space, tables and chairs, lighting, ventilation, backup power, and restroom facilities. There were computers and fax machines both in the Mobile Command Post and garage offices. The computer in the garage office was used to view the MCDEM internet web site on which current exercise information was posted. The Mobile Command Post van had sufficient space, lighting, heat and ventilation.

Ten-mile EPZ maps and status boards were placed in the Mobile Command Post and at the deputies' table near the main garage door. MCDOT staff used an EPZ map to post their road closure information. The EPZ maps and status boards updated promptly. This corrects ARCA #45-97-2-A-19 from the 1997 exercise.

There were sufficient copies of the MCSO SOP "Basic Responder Information for the PVNGS" available. The presence of MCSO deputies and ADPS officers provided access control.

The MCOSCP demonstrated the capability to direct and control emergency operations. The MCOSCP Commander issued instructions to the staff, provided for the retention of message logs for

message traffic, and resolved any conflicts. MCSO and MCDOT staff worked as a single unit. The MCSO deputies and MCDOT crew members received copies of the MCSO SOP, "Basic Responder Information for the PVNGS" (revised 3/99), soon after being mobilized. A MCSO deputy read the entire SOP to all the deputies and MCDOT members together, and briefed all members about the Alert ECL status and known plant and weather conditions. The deputy provided another briefing when the MCDOT crew made a shift change at 0800. These briefings corrected ARCA #45-97-3-A-20 from the 1997 exercise. The Mobile Command Post staff coordinated information and instructions from MCEOC, issued assignments, and monitored MCOSCP field operations.

The MCOSCP demonstrated the capability to communicate with all appropriate and emergency personnel and facilities in the field. The MCSO radio system is the primary means of maintaining control over dispatched deputies. The radio system was the primary means of contact between the MCEOC and MCOSCP supervisors, and between MCOSCP and its dispatched crews in patrol cars and other emergency vehicles. The Mobile Command Post had the following communications equipment: computers, CB radio, cellular telephones, UHF and VHF radios, cellular-fax machine, and other systems.

MCDOT supervisors used hand-held radios for maintaining control over their road crews in the field. There was a dedicated telephone line, fax machine and copier located in the large MCDOT garage facility. MCDOT use telephones, computers and fax machines to communicate to MCEOC. MCDOT faxes issued from the MCEOC to the MCDOT supervisors at the MCOSCP, conveying information about completed or pending roadblocks, did not have the correct times displayed on the fax copies: e.g., a fax received at 1030, displayed a time of "0932"; another received at 1045 displayed a time of "0940." The display of incorrect times could cause confusion during a later review of MCDOT faxes.

There were no undue delays caused by equipment malfunctions.

The MCOSCP demonstrated the ability to continuously monitor and control radiation exposure to emergency workers. A designated deputy began issuing (simulated) KI, and DRDs (0-5 R range) to all deputies MCOS and MCDOT personnel. The DRDs were noted as being calibrated on 1/18/99 and due 1/18/00. The KI was within expiration date (expires 9/2000). The TLDs are issued annually to all MCDOT and MCOS deputies who may become potential emergency workers. MCDOT and MCOS deputies filled out the dosimeter record following the initial muster and during the MCDOT shift change. The dosimeter record includes employee name, title or assigned department (MCDOT, deputy...) identification number, social security number, DRD initial readings (DRDs were all zeroed when issued), DRD serial numbers, and final DRD readings. About 24 of the 60 of the emergency workers did not include their TLD identification numbers on the MCOSCP dosimeter log. The MCOSCP dosimeter log (no revision date) is not the same dosimeter log displayed in the state's procedures (dated March 1997; procedure B-4 A-1). The MCOSCP form includes a place for

recording TLD identification numbers, the state's form does not include this information

At the close of the exercise, a deputy turned-in his DRD, which displayed a reading of 0.3 r. The supervising deputy stated this reading was possibly due to electro-static charge to the DRD; the DRDs of the other deputies who had accompanied the him had readings of zero. The supervising deputy stated he would write a summary report about the 0.3 r reading.

The MCOSCP sheriff deputies and MCDOT crews demonstrated they could effectively provide emergency exposure control briefings. A MCSO deputy conducted briefings that included detailed discussion about taking KI, reading the DRDs, and the need for TLDs. The briefings also informed the staff to read their DRDs every 15 minutes, and to report any readings showing an increase of 0.2 R on their DRD. The workers were not told nor did they know about the authorized mission exposure limits of 1 R/hr turn-back value and 500 administrative dose level. The MCOSCP "SOP does not include a description of these values and limits. Thus ARCA # 45-97-5-A-21 from the 1997 exercise remains uncorrected. The emergency workers are not equipped with proper instrumentation which could allow the field workers to determine when they reach a radiation field of 1 R/hr or greater. However, the workers are already required to report to their supervisors at MCOSCP any increases of 0.2 R on their DRDs which could be used to determine if the workers are in a high radiation field (1 R/hr or higher).

The SOP includes inconsistent and potentially confusing information: the levels for dose limits are expressed in "mr", while in other parts of the procedure the unit "mrem" is interchanged for "mr", and to report "rem" dosimeter readings to MCOSCP. The DRDs read in R (0-5 R).

The MCOSCP demonstrated the capability and resources to implement KI protective actions for emergency workers. Simulated KI tablets were included in the emergency workers exposure control kits distributed at the MCOSCP. (The simulated KI was empty film containers marked "KI.") The briefings included information about the ingestion of KI and need for the MCEOC and/or medical personnel authorization prior to consumption. The MCSO SOP contains instructions for taking KI. MCSO deputies had a box containing actual KI tablets in bottles. The KI bottles contained 14 tablets each and have labeled instructions and had an expiration date September, 2000.

The emergency workers at the MCOSCP did not record that they were issued KI. The current dosimeter logs used by MCOSCP (as well as the dosimeter log approved by the state for use) do not include a place for recording that specific emergency workers were issued KI. Several times during the post-briefing period, the deputy responsible for issuing KI asked the assembled workers if they had KI, and several workers stated they had forgotten to take a bottle (simulated), then were provided some KI. Under this condition, it is possible for several workers to not have KI in the field when orders are received to consume KI.

No authorizations were made during this exercise for the administration of KI to emergency workers.

The capability and resources necessary to implement appropriate protective actions for special populations were demonstrated. The MCOSCP deputies successfully demonstrated that they could respond to to quickly evacuate small groups of special populations who needed transportation assistance:

1. Assist a visually-impaired man at the Intersection of 339th Avenue and I-10 Assignment issued 0814, completed at 0925.
2. Assist a broken-down vehicle with six individuals and a pet, at the intersection of Salome Highway and Dobbins Road Assignment issued 0814 and completed 0855.
3. Assist six children and three adults without transportation at the intersection of 339th Avenue and Broadway Road. Assignment issued at 820 and completed by 0843.

The above assignments were appropriately posted on the status board located in the Mobile Command Post, along with assignment receipt and completion times. The sheriff deputies also used the County "speedletters" (comes in 4 colored parts) to issue the assignments to the deputies and monitor operations.

The organizational capability and resources necessary to control evacuation traffic flow and to control access to evacuated areas was demonstrated. The MCOSCP sheriff deputies and MCDOT crews demonstrated during this exercise that they could establish TCPs and ACPs as requested by MCEOC. The MCEOC DOT supervisors assign and monitor the roadblocks established by the MCOSCP deputies and MCDOT crews. The MCEOC issues periodic "Roadway Status Reports" and 10 mile Emergency Barricade Location reports back to the MCDOT supervisors at the MCOSCP

The 10-mile EPZ maps have pre-determined places noted and coded where traffic could best be controlled and roadblock established. MCDOT had 7-8 trucks loaded with large 3'x4' "Road Block" signs, cone / road markers, and barricades. The MCDOT staff used the EPZ map for identifying sectors evacuated and locations where roadblocks would be placed.

Roadblocks were established quickly following the PADs at 0755- evacuate all zones to 2 miles and 5 miles for zones Q, R, A and B, and later at 0950-all zones at 5 miles and 10 miles for Q, R, A and B.

The control points have letter-number designations such as A-1, A-2...B-1, etc., so not to be confused with evacuation zone or highway and road designations. The deputies and MCDOT crews were provided a briefing about their role in carrying out roadblocks and maintaining ACPs. The

MCSO SOP includes information about traffic and access control.

The above assignments were appropriately posted on the status board located in the Mobile Command Post, along with assignment receipt and completion times. The MCSO deputies also used the County "speedletters" (comes in 4 colored parts) to issue the assignments to the deputies and monitor operations.

The capability to maintain a continuous 24-hour staffing through an actual shift change was demonstrated. The MCSO deputies maintain shifts throughout the 24-hour day, throughout the year. The MCDOT, on the other hand, routinely operate using the 8-hour working day as their core operating time, but generally maintains emergency crews to take care of roadway emergency 24 hours a day.

The MCDOT department was able to muster 12-14 MCDOT emergency workers to the MCDOT yard at Buckeye. The MCDOT staff demonstrated a successful shift change at 0740 to 0800. Full briefings were provided to the initial MCDOT responders and to the shift change workers. Both MCDOT shifts filled out their dosimeter logs and were then assigned to duties.

The capability to provide off-site support for the evacuation of on-site personnel was not applicable since no request was received to provide such support.

Area Requiring Corrective Action

45-99-5-A-12. Logs

NUREG - 0654 Reference: K.3.b

Objective #5

Demonstration Criterion #2

1. **Description:** About 24 of the 60 of the emergency workers did not include their TLD identification numbers on the MCOSCP dosimeter log.
2. **Recommendation:** Ensure the MCOSCP emergency workers properly fill in the approved dosimeter forms during the sign-in and briefing period

Prior Areas Requiring Corrective Action-Corrected

45-97-2-A-19. Status Boards

NUREG - 0654 Reference H

Objective #2

Demonstration Criterion #1

1. **Description:** The 10-mile EPZ maps in the garage area were not kept up-to-date along with the evacuation information and the information on the 10-mile EPZ map located in the Mobile Van:
 - a. MCDOT's 10 mile-EPZ map, located in the garage, was not updated with evacuated sectors along with directives from the MCEOC and MCOSCP. The last update on the MCDOT map was at 1205, and showed the sectors J, H, G and F being evacuated out to 5 miles (Mobile CP received a directive to add "Deny Access to 5 miles for Sector F", and sectors J, H, and G already directed to be evacuated to 5 miles.)
 - b. The MSCO deputies' EPZ map was last updated at 1055 to show evacuation out to 2 miles.
 - c. Information about the evacuation of Palo Verde and Arlington Schools was received but not posted on any of the status boards.
2. **Recommendation:** Ensure maps and status boards are kept up-to-date.

45-97-3-A-20. Briefings

NUREG - 0654 Reference A.1.d.,2.a.

Objective #3

Demonstration Criterion #1

1. **Description:** The MCDOT dispatcher did not brief the MCDOT crew, once they mustered, on plant and weather conditions, meaning of Alert status, how to effectively administer KI, read their DRDs, turn-back values, etc.
2. **Recommendation:** Ensure all staff at MCOSCP are adequately briefed.

Prior Area Requiring Corrective Action-Uncorrected

45-97-5-A-21. Mission Limits

NUREG - 0654 Reference: K.3.b

Objective #5
Demonstration Criterion #2

1. **Description:** The MCOSCP emergency workers do not know the authorized mission exposure limits of 1 R/hr turn-back value and 500 mr administrative dose level.
2. **Recommendation:** Ensure the MCOSCP emergency workers are aware of the authorized mission exposure limits of 1 R/hr turn-back value and 500 administrative dose level and that they have appropriate equipment to measure these levels.

o EVACUATION/TRANSPORTATION

There were five objectives established for demonstration, observation and evaluation for Maricopa County in evacuation and transportation (Objectives Numbers 5, 10, 14, 15 and 17). All five objectives were met. One ARCA from the 1997 exercise was corrected.

The ability to continuously monitor and control radiation exposure to emergency workers was demonstrated by the MCSO and MCDOT personnel assigned to conduct back-up route alerting for a failed siren, establish and man an access control roadblock and provide transportation assistance for persons with special needs. Each worker at all evaluated locations had a TLD, a 0-5R DRD, and KI. They were familiar with the theory and use of dosimetry and knew of their reporting level of 0.2 Rem. DRDs were read at 15 minutes intervals. Dosimetry and KI were issued to the emergency workers at the MCOSCP prior to dispatch into the field. Equipment was turned back in and proper documentation completed at the MCOSCP upon completion of field assignment.

The capability to promptly alert the public within the 10-mile EPZ and disseminate instructional messages to the public on the basis of decisions by appropriate State officials was demonstrated. Two MCSO personnel were dispatched into the EPZ to perform back-up route-alerting in the area of a failed siren (#39). A controller-injected message, detailing the failed siren, initiated route-alerting activities. The MCSO vehicle arrived at the location of the failed siren (located on 339th Avenue south of I-10 in Sector C, approximately seven miles from the PVNGS) at 0820.

The Deputies demonstrated their procedures through an interview and discussion with the evaluator. They were familiar with their responsibilities and assignment. Route-alerting would be conducted for a one-mile area surrounding the failed siren. The vehicle's public address system would be used

to announce protective actions and emergency information to the residents in the area. The Deputies knew the current PAR and the corresponding EPZ sectors effected. They were familiar with the roads in the area and could accomplish the route-alerting in approximately twenty-five minutes. They knew the local EAS radio and television station's call numbers, frequencies and settings and the location of the RCCs (primary and backup).

The capability and resources to implement KI protective actions for emergency workers was demonstrated. The MCSO Deputies at all field locations evaluated and the MCDOT worker assigned to conduct access control at a roadblock were provided with a vial containing (simulated) KI. They all knew that they would only take the KI if instructed to do so by the MCOSCP. This corrects ARCA #45-97-14-A-22 from the 1997 exercise. An order to take KI was not made during the exercise.

The capability and resources necessary to implement appropriate protective actions for special populations were demonstrated by the MCSO. The MCOSCP received three requests (through controller inject) for transportation assistance:

1. Assist a visually-impaired man at the Intersection of 339th Avenue and I-10;
2. Assist a broken-down vehicle with six individuals and a pet, at the intersection of Salome Highway and Dobbins Road;
3. Assist six children and three adults without transportation at the intersection of 339th Avenue and Broadway Road.

MCSO Deputies responded from the MCOSCP to each location to provide assistance to the evacuees, assess the transportation needs, and request additional transportation resources. At one location, Salome Highway and Dobbins Road, the Deputies and evacuees left prior to the evaluator's arrival. At the other two locations, the MCSO Deputies knew their assignments and responsibilities. They requested the appropriate transportation resources to assist the evacuees. The Deputies knew the location of the primary and backup RCCs and where to go if radiological monitoring or decontamination was needed.

The resources necessary to control evacuation traffic flow and to control access to evacuated and sheltered areas were demonstrated. A MCSO Canine Deputy was directed to set up a roadblock at the intersection of 339th Avenue and Salome Highway. MCDOT staff provided the signs and barricades to support the operation of the roadblock. The MCSO Deputy and the MCDOT staff arrived at the site of the roadblock prior to the evaluator, at 0850.

The Deputy was knowledgeable in his assignment and procedures. He knew that only certain individuals could be allowed into the effected area and what information to provide to the evacuees leaving the EPZ. The Deputy stated that he would remain onsite at the location of the roadblock to

monitor and prevent unauthorized entrance into to evacuated area. He was familiar with the location of the RCCs, evacuation routes, the details contained in the PADs and who to contact for assistance with traffic impediments.

Prior Area Requiring Corrective Action-Corrected

45-97-14-A-22. MCDOT instructions on KI ingestion.

NUREG - 0654 Reference: J.10.e.,f.

Objective #14
Demonstration Criterion #2

1. **Description:** The MCDOT person at roadblock F6 was unfamiliar as to when to ingest KI.
2. **Recommendation:** Provide training on KI for MCDOT personnel.

o ARLINGTON SCHOOL

There were two objectives established for demonstration, observation, and evaluation for the Arlington Elementary School (Objective Numbers 5 and 16). One objective was met, and an ARCA was identified for one objective.

An interview was conducted at on March 10, 1999. The school business manager and a staff person who was both a bus driver and a teacher were interviewed.

The ability to continuously monitor and control radiation exposure to emergency workers was demonstrated. The bus driver/teacher had been issued the plan required TLD card. The plan does not call for drivers to be issued a DRD because they would make one trip out of the EPZ with the students on their bus and not return. The driver was unsure of the purpose of the TLD and expressed a desire for training or information on the use and purpose of the TLD. There was no record kept of the serial number of the TLD issued to each driver

The capability and resources necessary to implement protective actions for school children within the plume pathway EPZ was demonstrated. According to the business manager, Arlington School has an enrollment of 185 students. There are twenty-five staff and six buses are stationed at the school.

The business manager was aware that information about an emergency would come from Maricopa County EOC over the telephone. The one protective action to be taken would be evacuation. A

copy of the "School Procedures" document issued by Maricopa County was available. The school takes twice-daily attendance and these records are kept in the administrative office. There are no written procedures specific to the school for an emergency at PVNGS and the business manager was not able to describe a procedure that would be used to ensure that all children had boarded the appropriate evacuation bus. The assignment of teachers to buses would be on a random basis. There is no written information distributed to parents on what actions might be taken for school children if there is an emergency at PVNGS, other than the information contained in the calendar mailed to residents. However, the business manager said she was aware that a number of residents in the EPZ had not received the most recent version of the calendar. The school will consider developing a procedure to address these issues.

Although the buses are not equipped with maps to the reception and care centers, the driver was aware of the location of the seven possible reception and care centers specified in the "School Procedures" document issued by Maricopa County. Since the driver is also employed at the school full-time, he is readily available if needed to drive an evacuation bus. The buses are equipped with cellular telephones. Evacuation drills are held semi-annually. The next drill was scheduled during March, 1999.

Area Requiring Corrective Action

45-99-5-A-13. Training

NUREG - 0654 Reference: K.3.b

Objective #5

Demonstration Criterion #2

1. **Description:** The bus driver was unsure of the purpose of the TLD card he was given. There was no record kept of the serial number of the TLD issued to each driver.
2. **Recommendation:** Ensure bus drivers receive training of the use of TLDs. Consider developing an information sheet which explains the purpose and of the TLD. This could be given to bus drivers when they exchange their TLD. Ensure the TLD serial numbers are recorded.

o RUTH FISHER SCHOOL

There were two objectives established for demonstration, observation, and evaluation for the Ruth Fisher Elementary School (Objective Numbers 5 and 16). Both objectives were met. An ARCA from the 1995 exercise was corrected.

An interview was conducted at Ruth Fisher Elementary School on March 10, 1999. The school superintendent and a bus driver were interviewed.

The ability to continuously monitor and control radiation exposure to emergency workers was demonstrated. The superintendent stated that a record is kept of the serial number of the TLD assigned to each driver. The drivers would discard the old TLD when they received the annual replacement.

The capability and resources necessary to implement protective actions for school children within the plume pathway EPZ was demonstrated. According to the superintendent, Ruth Fisher School has an enrollment of 365 students. There are forty-three staff and seven buses are stationed at the school. The superintendent was aware that information about an emergency would come from MCEOC over the telephone. The one protective action to be taken would be evacuation. A copy of the "School Procedures" document issued by Maricopa County was available. The school takes daily attendance and these records are kept in the administrative office. This corrected ARCA #11 from the 1995 exercise.

In addition, the school has developed a plan to show how buses will be staged for boarding by students if an evacuation is ordered. Their regular teacher would accompany students on the bus to the reception center. The buses are equipped with two-way radios. Evacuation drills are held semi-annually. The superintendent stated that during the last drill the buses were loaded and dispatched in less than 15 minutes. The superintendent stated that information to parents on protective actions for school children was included in the student handbook. He also stated that if the school were to evacuate, a recorded message would be left for anyone calling the school informing them of the emergency and where parents could pick up their children.

The superintendent and driver were very enthusiastic and are to be commended on their knowledge of the procedures to be used in the event of an emergency at PVNGS.

Prior Area Requiring Corrective Action-Corrected

11. School Interview

NUREG - 0654 Reference J.9

Objective #16
Demonstration Criterion #1

1. **Description:** The plan provided by the principal was incomplete. School officials were not adequately familiar with the meaning of the ECLs, and indicated they would respond to information provided from the plant (e.g., an order to evacuate).
2. **Recommendation:** Complete school plan and provide thorough training of school staff in their plan.

o BUCKEYE UNION HIGH SCHOOL RECEPTION AND CARE CENTER

There were eight objectives established for demonstration, observation and evaluation at the Buckeye Union High School Reception and Care Center (Objectives 1,4,5,14,18, 19,32, and 33). Seven objectives were met, and three ARCAs were identified for one objective. An ARCA from the 1997 exercise was corrected.

The capability to alert and fully mobilize personnel for field operations and activate facilities for emergency operations during an off-hours, unannounced exercise was demonstrated at the Buckeye RCC. According to the plan, the Maricopa County is responsible for the administration of RCCs. A MCDEM RCC Coordinator was assigned to the Buckeye RCC to supervise operations. In addition, the MCDEM RCC Coordinator stated that two co-coordinators shared supervisory duties. The MCDEM RCC Coordinator received an initial notification telephone call from the MCEOC at 0530. She was told that this was a drill and to report to the Buckeye RCC center at 0900. In addition, two co-coordinators received similar calls from the Maricopa County Department of Public Health (MCDPH) at 0515 and 0530. However, none were advised of the current ECL (Alert). Also, none were familiar with the acronym ECL or the ECL designations, i.e., Alert, SAE, or GE.

The co-coordinators arrived at the Buckeye RCC at approximately 0900 traveling between one and one and a half hours to reach the facility. No staff were pre-positioned. Setup of the Buckeye RCC was accomplished within 45 minutes by members of the MCDEM, ARC, ARRA - REAT team, and the Buckeye Police Department. The facility was declared operational at 0930 and shortly thereafter received 20 Honor Society students from the Buckeye Union High School who played the role of evacuees.

Unannounced off-hours exercise requirements were followed. Response personnel from the MCDEM, ARRA-REAT, and ARC were advised that an exercise would occur sometime during the week of March 7, 1999. (The law enforcement representative from the Buckeye Police Department, because of scheduling arrangements, was advised of the date and time of the exercise one day prior to the exercise.) The exercise started at 0245 on Tuesday, March 9, 1999 with notification to the MCEOC of an Alert ECL. Through interview, it was determined that MCEOC staff, ARRA-REAT, and the ARC liaisons were notified shortly thereafter. These agencies were responsible for notifications and were in a position to notify all field -based personnel within the designated off-hours window. Activities at the Buckeye RCC were dependent upon the availability of high school students who were due to arrive for monitoring at approximately 0930. ARRA-REAT elected to notify and mobilize RCC teams at approximately 0300. ARC notified personnel at approximately 0439 and the MCEOC notified personnel starting at 0515 to report to the RCC at 0900 and begin setup activities.

The capability to communicate with all appropriate emergency personnel at facilities and in the field was demonstrated at the Buckeye RCC. According to the plan, the MCDEM RCC Coordinator utilized a cellular phone as the primary means of communication. Contact was made with the MCEOC and MCDPH. Other agencies represented at the RCC utilized primary and backup communications. RCC-REAT used multi-frequency radios as the primary means to communicate with the REAT-Forward. Using this radio, other REATs could be contacted. Cellular phones were used as backup. The ARC established a Disaster Communications Area where operators used RACES radio equipment and frequencies to communicate with the ARC Phoenix Chapter office and other open shelters. Battery chargers were available so equipment operability could be maintained. Cellular phones and radios located in ARC vehicles were also available. These systems allowed the ARC to expand their communication network to include the MCEOC. The Buckeye Policeman utilized a hand-held radio to communicate with the Buckeye Police Radio Dispatcher. Multi-frequencies also allowed him to communicate with fire/rescue services, MCSO, Avondale Police Department and other law enforcement agencies. Primary and back-up systems were tested and all organizations were able to communicate with other agencies without delays caused by malfunctions or breakdowns in equipment.

The capability to continuously monitor and control radiation exposure to emergency workers was adequately demonstrated. The ARRA REAT-Forward provided evacuee monitoring and decontamination and vehicle monitoring teams at the Buckeye RCC. Members of the monitoring team had been issued TLDs and two DRDs (0-200mR and 0-500 mR) at REAT-Forward. The DRDs had been zeroed at REAT-Forward using a properly-operating DRD charger. Each DRD was labeled with the most recent electrical leakage check, (either 1/99 or 2/99). Records of the electrical leakage checks are within the time frame of the plan and are maintained at REAT-Forward.

TLD and DRD serial numbers were recorded on a dosimeter log, maintained at REAT-Forward, to identify user and assign dose. Dosimetry was to be turned in to the REAT-Forward Captain or

designee at the end of the mission.

Monitoring team members were aware of the maximum authorized mission limit (1000mR) and of the requirement to inform the REAT-Forward Captain of a DRD reading of 200 mR. DRDs were read every fifteen minutes and any increase was to be reported to the REAT-Forward Captain. This corrected ARCA #45-97-5-A-23 from the 1997 exercise.

Monitoring team members were aware of the potential need to take KI for thyroid blocking and would take KI only when instructed to do so by the REAT-Forward Captain.

The capability and resources to implement KI protective actions for emergency workers was demonstrated. Members of the ARRA-REAT arrived at the Buckeye RCC with three bottles, containing 14 tablets each, of KI. The expiration date for each bottle was May, 2000. This supply was sufficient to maintain the teams for three days, after which individual supplies would be obtained from REAT-Forward. Personnel were knowledgeable of the reason for taking KI, dosages and time periods within which KI should be taken, and possible side effects. The RCC REAT was in communication with REAT-Forward. No order to take KI was relayed to this team. Through interview it was determined that if the RCC REAT was to take KI, REAT-Forward would call each REAT, identifying them by alpha (terrestrial teams) and RCC (reception care center team) designations, and specifically stipulate which teams needed to ingest KI.

The adequacy of procedures, facilities, equipment, and personnel for the radiological monitoring, decontamination and registration of evacuees was demonstrated. The Buckeye RCC has adequate space for monitoring and decontamination of evacuees and vehicles and for registration of evacuees. However, no written procedures, specific for the Buckeye RCC facility, exist which depict a graphic layout of the facility, inside and outside, which identifies the location of the following: vehicle quick "go" "no go" monitoring point; vehicle decontamination area; parking areas for contaminated and non-contaminated vehicles; Animal Retention and Care area; evacuee monitoring point; path to male/female showers for contaminated evacuees and ultimately into the RCC; path into the RCC for non-contaminated evacuees, registration area, ARC special service areas (i.e. counseling, nurse), sleeping area, children's play area, quiet room for sick evacuees; food services, bathrooms, and public telephones.

The facility was set up in a timely and efficient manner and was operational prior to the arrival of evacuees. Evacuee monitoring occurred outside the RCC in an area adjacent to the facility. However, the monitoring station is not located in proximity to the vehicle arrival area. Re-design of the traffic flow pattern would allow for the placement of the evacuee monitoring station near the vehicle arrival area.

There were two large locker rooms, one designated for male and one for female evacuees, each equipped with showers, sinks, and clothing change areas setup as personnel decontamination areas. Both decontamination areas had direct routes from the monitoring station to the registration areas.

The facility was setup to separate contaminated and non-contaminated individuals. The non-contaminated evacuees entered the registration area directly from the monitoring area. Contaminated evacuees entered the decontamination area from the monitoring area by way of a temporarily covered walkway and when decontaminated proceeded into the registration area.

Four Victoreen model E-190 electronics with Victoreen model 489-110 Geiger-Muller (GM) pancake probes were used to monitor evacuees. All monitoring instruments were equipped with speakers and the probes were covered with plastic. Check sources of known value were available for each instrument, and were used to check the instrument prior to use. Seven radiological monitors and a team leader were available for monitoring evacuees. TAB B: RECEPTION AND CARE CENTER TEAM EQUIPMENT (p. B-3-B-1) of APPENDIX 3: RADIOLOGICAL MONITORING POOL which identifies RCC monitoring equipment more appropriately belongs in APPENDIX 4: DOSE CONTROL AND DECONTAMINATION of the plan.

Two monitoring teams, each team consisting of one monitor and a recorder monitored six evacuees in 15 minutes and 15 minutes and 30 seconds respectively for an average time per evacuee of 152.5 seconds. This individual monitoring time is consistent with good monitoring practices.

Information concerning evacuees was recorded on a personnel decontamination log and included name, telephone number, age, address, date, time of arrival at the RCC, special medical attention needs, and monitoring results. A separate form "Post Decontamination Log" was used for monitoring results of the simulated contaminated evacuee after simulated decontamination. Decontamination measures included simulated washing in a sink, and re-monitoring. A sign advising evacuees who were monitored and found not contaminated to bathe and change clothes at their convenience within three days was posted in the monitoring area.

Individuals with fixed contamination 250 cpm above natural background would be referred to a medical facility. However, no agency representative knew who had the responsibility to make arrangements or transportation. TAB B, RECEPTION AND CARE CENTER OPERATIONS, Section IV. C. (p. D-3-B.3) of the Plan, dated March 1997, states in part that "RCC personnel will arrange transport to an emergency medical facility for those individuals who cannot be readily decontaminated..." Agency representatives volunteered to call for an ambulance. The MCDEM RCC Coordinator stated that she would call the MCEOC to arrange transport. The ARC Disaster Communications Officer stated that it was not his responsibility but that he could make arrangements for transport by placing a call to the ARC Phoenix Chapter. The local Buckeye Policeman stated that he would call for an ambulance utilizing the Town of Buckeye Fire/Rescue or Buckeye Valley Rural Fire Department.

Vehicle monitoring was demonstrated using the same instrument used for evacuee monitoring and followed the procedures identified in the plan. The front grill, bumpers, wheel wells, tires and rear window were monitored in a timely and effective manner. The extent-of-play agreement required that vehicle decontamination be demonstrated by interview. At the time of the exercise, a representative

of the responsible agency tasked with decontamination of evacuee vehicles was not available for interview. The RCC REAT monitors stated that they were not tasked with decontamination and re-monitoring of evacuees' vehicles. The Plan, in various sections, states that vehicles will be decontaminated, however it does not identify the agency who is responsible for this activity.

PERSONNEL/VEHICLE MONITORING AND DECONTAMINATION, VEHICLES, Section B of the plan, dated March 1997, states "If contaminated, the driver of vehicles will remain with the vehicle, passengers (pets go the Animal Retention and Care) will be escorted to the Reception and Care Center (RCC) for monitoring. The plan in Section E. Disposition, paragraph 1 states " If impounded, driver should be given reason for impoundment and location where vehicle will be stored. The driver then should be escorted to the RCC for monitoring. The plan does not identify who is responsible for ensuring that the passengers and driver are escorted to the monitoring area.

Further, TAB B, RECEPTION AND CARE CENTER OPERATIONS, Section C.2.a. (p. D-3-B-2) of the plan, dated March 1997, states that "Vehicles or personal effects found to be contaminated will be impounded until decontamination can be effected. Impounding actions will be conducted by local authorities." For this exercise, the Buckeye Police responded and stated that he would perform all law enforcement activities, However, the specific local authority or law enforcement agency responsible for this duty is not identified in the Plan

Each evacuee was registered upon completion of monitoring, and/or successful decontamination. Each individual who was monitored and determined to be "clean" was given a pink plastic "Clean" tag prior to entering the registration area. Contaminated individuals who were successfully decontaminated also received a pink plastic "Clean" tag before entering the registration area. There was a gauntlet of staff who made certain that only pink-tagged "Clean" persons entered the registration area.

The registration of nineteen evacuees, role-played by Buckeye High School Honor Society students, took place from 0940 to 1010. There were three ARC registrars at the registration table, located just inside the northeast corner of the gymnasium. The registrars used the standard ARC Disaster Shelter Registration Form 5972, which contains blocks for family last name, address and telephone number, date & time left shelter, post-disaster address, male & female heads of household, children and family members not in the RCC, and a release of confidential information signature block. One ARC Family Service volunteer staff served as Spanish-language translator for one evacuee. The registrars processed the registration forms without a backlog. The registrars identified six evacuees with physical health and three with mental health issues and brought those evacuees to the appropriate tables on the east side of the gymnasium. The other evacuees were directed to the congregate care sleeping areas on the south side of the gymnasium.

The lead registrar indicated by interview that nineteen evacuees were registered, but only eighteen

registration forms (ARC Disaster Shelter Registration Form 5972 5/79) were turned into the evaluator as exercise documentation. One of the evacuees was decontaminated, but this was not noted on the registration record of that evacuee. Thirteen of the eighteen forms lacked a telephone number, which could also present difficulties for locating and reuniting families. Two of the eighteen also lacked pre-disaster (primary residence) addresses. The failure to capture basic identifying information does not appear to correlate to the role-playing of physical and mental health problems by six and three evacuees, respectively. Likewise, the sheer volume does not appear to be a factor that could explain partial capture of information as three registrars processed nineteen evacuees in thirty minutes without a backlog of more than four evacuees at any point.

The eighteen registration records did not leave the registration table during over two hours of exercise play (from 0940 to 1154). The ARC Form 5972 comes with carbon inserts and a carbon copy of each record was provided to the evaluator (at the request of the evaluator) during the interview with a registrar after the registration ended (1010). The original and carbon copies were not shared with any other ARC staff in the congregate care center or with the ARC Disaster Welfare Inquiry unit at ARC Central Arizona Chapter headquarters in Phoenix.

The adequacy of facilities, equipment, personnel and procedures for congregate care of evacuees was demonstrated. The ARC and Arizona Humane Society (AHS) had well-trained staff at the Buckeye RCC and at headquarters to assure that quality congregate care was available to all evacuee personnel and animals. ARC Congregate Care Center (CCC) staff arrived at 0820 hours after a one-hour trip from ARC Central Arizona Chapter headquarters in Phoenix. The ARC began to activate the CCC and other staff at 0302 hours when the Alert ECL was declared at PVNGS. The twenty-six (26) ARC CCC volunteer staff were processed and provided orientation, training and breakfast with other ARC staff between 0400 and 0700 hours at the Washington Senior Center near the ARC chapter in Phoenix. The ARC Mass Care Officer dispatched the staff to the RCC at 0720 hours. The ARC CCC manager and assistant manager provided detailed briefings at Washington Senior Center and during set-up at the RCC CCC to the following staff: Physical Health Services (6); Mental Health Services (2); Security (4); Feeding (4); Family Service (2); Communications (2); and Registration (3).

Six AHS Emergency Response Team staff arrived at 0949 hours. The CCC manager arranged for space and a table inside the main gymnasium and the RCC manager provided space in the smaller gym room located between the main gym and the entrance door for monitored, uncontaminated evacuees. AHS brought three vehicles, two high-cube vans and a kennel van for placement of animals. AHS staff were not called upon to demonstrate animal care. The AHS supervisor indicated that AHS is making a strong effort to have animal care incorporated into PVNGS plans, procedures and public information.

Each of the seven ARC CCC staff sections and the two managers had cellular telephones and thereby remained in constant contact with ARC chapter headquarters. In addition, two ARC communications

staff, certified amateur radio operators, had personally-owned portable amateur radios that enabled constant communication with ARC chapter headquarters and the MCEOC. The ARC Communications and Registration staff actually served both the ARC-managed CCC and the RCC itself.

During an interview, the CCC manager indicated that the capacity was 200 people. There was adequate space to handle this. However, the plan does not mention any information on the Buckeye High School CCC, including its capacity. The manager indicated that she was in constant contact with ARC chapter headquarters, which had activated backup CCC staff in case additional CCC(s) needed to be opened. ARC brought in refreshments, which were available for the evacuees and emergency workers during exercise play.

The center was accessible to persons with disabilities. Six evacuees role-played physical health problems, ranging from forgotten eyeglasses to a woman who reported that she thought she was pregnant and needed prescription medication, which was left at home, to be taken no later than 1200. Another evacuee role-played an asthmatic condition with breathing apparatus left at home. One evacuee was decontaminated. Another evacuee requested transport to a medical facility and the physical health supervisor made arrangements for that to be done. Three evacuees indicated mental health problems. One evacuee role-played a schizophrenic, who complained of sleepiness. Evacuees also role-played children, who were provided toys and games by the mental health staff and brought to the designated children's play area on the west side of the gym.

Areas Requiring Corrective Action

45-99-18-A-14. Vehicle Decontamination

NUREG - 0654 Reference: J.12.

Objective #18

Demonstration Criterion #4

1. **Description:** The extent-of-play agreement requires that "vehicle decontamination be demonstrated by interview." At the time of the exercise, a representative of the responsible agency tasked with decontamination of evacuee vehicles was not available for interview. The RCC REAT monitors stated that they were not tasked with decontamination and re-monitoring of evacuees' vehicles.

2. **Recommendation:** Ensure that the responsible agency tasked with decontamination of evacuees vehicles is familiar with, understands, and complies with the extent-of-play agreement. Ensure that RCC REAT monitors understand their responsibility for the re-monitoring of vehicles following decontamination.

45-99-18-A-15. Registration Records

NUREG - 0654 Reference: J.12.

Objective #18
Demonstration Criterion #4

1. **Description:** The eighteen registration records did not leave the registration table during over two hours of exercise play (from 0940 to 1154). The ARC Form 5972 comes with carbon inserts and a carbon copy of each record was provided to the evaluator (at the request of the evaluator) during the interview with a registrar after the registration ended (1010). The original and carbon copies were not shared with any other ARC staff in the congregate care center or with the ARC Disaster Welfare Inquiry unit at ARC Central Arizona Chapter headquarters in Phoenix.
2. **Recommendation:** The registration staff training should include specific guidance on the requirement to report the registration information to the ARC DWI unit, so that the information can be used to locate and reunite separated families and households.

45-99-18-A-16. Incomplete Registration Records

NUREG - 0654 Reference: J.12.

Objective #18
Demonstration Criterion #4

1. **Description:** The lead registrar indicated by interview that nineteen evacuees were registered, but only eighteen registration forms (ARC Disaster Shelter Registration Form 5972 5/79) were turned into the evaluator as exercise documentation. One of the evacuees was decontaminated, but this was not noted on the registration record of that evacuee. Thirteen of the eighteen forms lacked a telephone number, which could also present difficulties for locating and reuniting families. Two of the eighteen also lacked pre-disaster (primary residence) addresses. The failure to capture basic identifying information does not appear to correlate to the role-playing of physical and mental health problems by six and three evacuees, respectively. Likewise, the sheer volume does not appear to be a factor that could explain partial capture of information as three registrars processed nineteen evacuees in thirty minutes without a backlog of more than four evacuees at any point.

2. **Recommendation:** Emphasize in future registration staff training the requirement that comprehensive identifying information, particularly addresses and telephone numbers, be captured with all blocks on the ARC Form 5972 completed by the individual registrars. Future training of registration supervisors (or shelter managers providing oversight and supervision of peer registrars) should stress the need for early, regular quality control to assure that the registration records are complete. That training should also highlight the requirement to make quick and periodic summaries of the numbers of evacuees needing congregate care, so that the capacity is not exceeded.

Prior Area Requiring Corrective Action-Corrected

45-97-5-A-23. Monitoring team checked their DRDs at 20-minute intervals.

NUREG - 0654 Reference K.3.b

Objective #5
Demonstration Criterion #2

1. **Description:** Monitors at the Tolleson High School RCC checked their DRDs every 20 minutes. The Plan states that "Monitors will check their DRDs every 15 minutes while in the field and at monitoring points during the plume phase."
2. **Recommendation:** Ensure that monitors are aware of the plan requirement to read SRDs at 15-minute intervals.

□

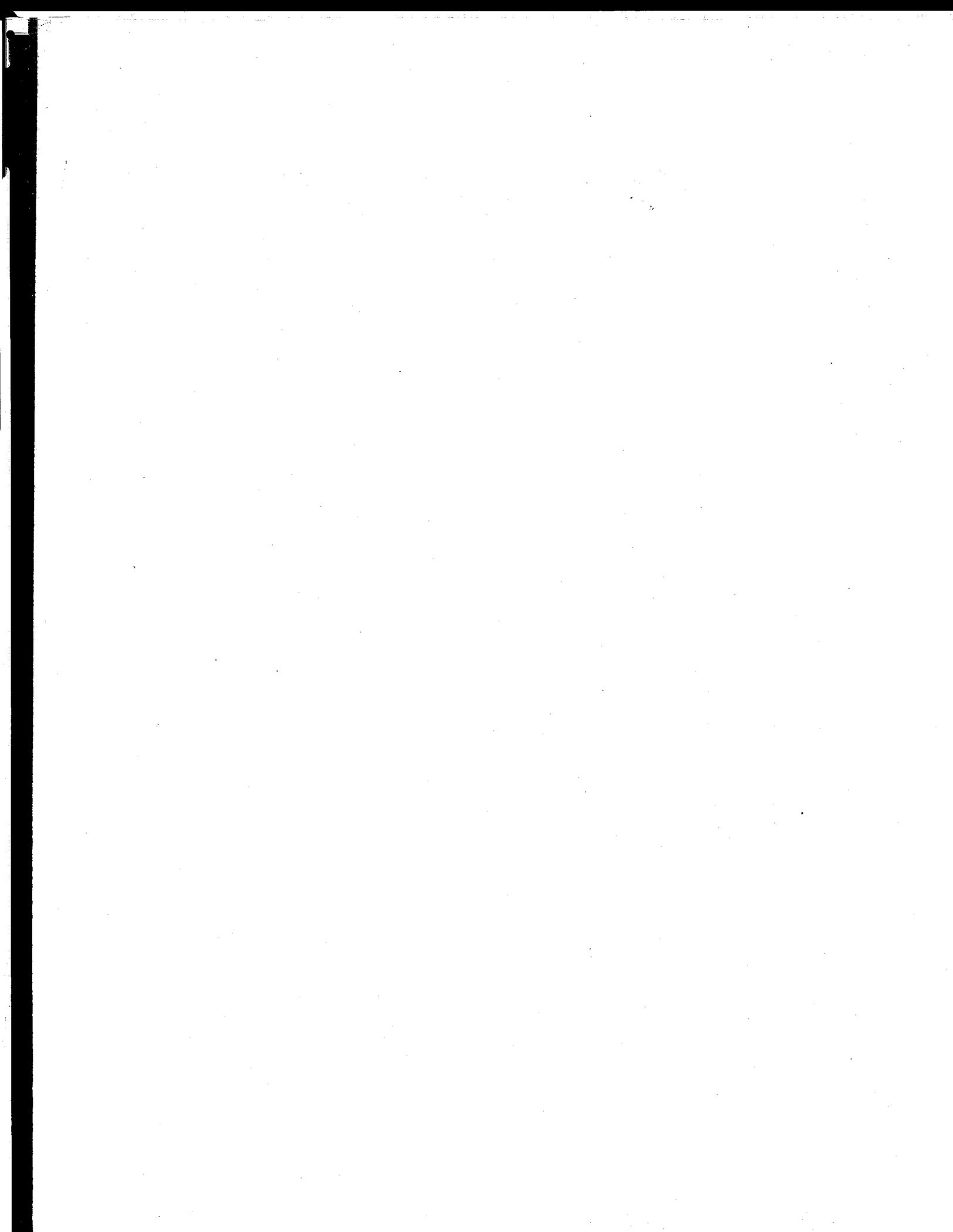
APPENDIX 1

ACRONYMS AND ABBREVIATIONS

The following is a list of the acronyms and abbreviations that were used in this report.

ACP	access control point
ADA	Arizona Department of Agriculture
ADPS	Arizona Department of Public Health
ADOT	Arizona Department of Transportation
ADEM	Arizona Division of Emergency Management
AHS	Arizona Humane Society
A&N	Alert and Notification
APS	Arizona Public Service Company
ARC	American Red Cross
ARCA	Area Requiring Corrective Action
ARRA	Arizona Radiation Regulatory Agency
CAP	Civil Air Patrol
cc	cubic centimeter
μ cc	micro-cc
CCC	Congregate Care Center
CDE	Committed Dose Equivalent
CD-V	Civil Defense - Victoreen
cfm	cubic feet per minute
CFR	Code of Federal Regulations
Ci	curie
μ Ci	micro-curie
cm^3	cubic centimeter
cpm	counts per minute
DOE	Department of Energy
DRD	Direct-Reading Dosimeter
EAS	Emergency Alert System
ECL	Emergency Classification System
EEM	Exercise Evaluation Methodology
EIS	Emergency Information System
EOC	Emergency Operations Center
EOF	Emergency Operations Facility
EPZ	Emergency Planning Zone
ESF	Emergency Support Function

FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FMT	Field Monitoring Team
ft ³	cubic foot
FR	Federal Register
GE	General Emergency ECL
GM	Geiger-Müller
HF	High Frequency
JENC	Joint Emergency News Center
KI	potassium iodide
l	liters
ml	milliliters
m ³	cubic meter
MCDEM	Maricopa County Department of Emergency Management
MCDPH	Maricopa County Department of Public Health
MCDOT	Maricopa County Department of Transportation
MCEOC	Maricopa County Emergency Operations Center
MCOSCP	Maricopa County On-Scene Command Post
MCSO	Maricopa County Sheriff's Office
MCSO WC	Maricopa County Sheriff's Office Warning Center
NAN	Notification and Alert Network
NAWAS	National Warning System
NOUE	Notification of Unusual Event ECL
NR	News Release
NRC	U.S. Nuclear Regulatory Commission
NUREG-0654	NUREG-0654/FEMA-REP-1, Rev. 1, <i>"Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," November 1980</i>
OEEB	Outdoor and Emergency Education Bureau
OSC	On-Scene Commander



PAD	Protective Action Decision
PAG	Protective Action Guides
PAR	Protective Action Recommendation
PIO	Public Information Officer
PVNGS	Palo Verde Nuclear Generating Station
R	Roentgen
RACES	Radio Amateur Civil Emergency Services
RCC	Reception and Care Center
RAC	Regional Assistance Committee
RASCAL	Radiological Assessment System for Consequence AnaLysis
REAT	Radiological Emergency Assessment Team
rem	Roentgen Equivalent Man
REP	Radiological Emergency Preparedness
RERP	Radiological Emergency Response Plan
R/hr	Roentgen(s) per hour
mR	milliroentgen (10^{-3} Roentgen)
mrem	millirem (10^{-3} Rem)
SAE	Site Alert Emergency ECL
SEOC	State Emergency Operations Center
SOP	standard operating procedure
TCP	traffic control point
TD	Technical Director (TOC)
TEDE	Total Effective Dose Equivalent
THS	Technical Hardcopy System
TLD	thermoluminescent dosimeter
TOC	Technical Operations Center
TVS	Technical Voice System
UHF	ultra-high frequency
VHF	very high frequency

APPENDIX 2

EXERCISE EVALUATORS AND TEAM LEADERS

The following is a list of the personnel who evaluated the Palo Verde Nuclear Generating Station Off-site Biennial Exercise on March 9, 1999. The letters "(TL)" after their names indicate evaluator Team Leaders. The organization that each evaluator represents is indicated by the following abbreviations:

FEMA	- Federal Emergency Management Agency
ANL	- Argonne National Laboratory
FDA	- Food and Drug Administration
INEEL	- Idaho National Engineering and Environmental Laboratory

<u>EVALUATION SITE</u>	<u>EVALUATOR</u>	<u>ORGANIZATION</u>
Arizona State Emergency Operations Center	Ken Lerner Brad Salmonson Chuck Arnold Tom Ridgeway Elena Joyner George Vukovich	ANL INEEL (TL) FEMA RIX FEMA RIX FEMA RIX ANL
Technical Operations Center	Daryl Thomé Lyle Slagle	ANL (TL) ANL
Radiological Emergency Assessment Team Forward	Dave Duncan	ANL (TL)
Field Monitoring Teams	Bill Serrano Ron Alexander	ANL FDA
Joint Emergency News Center	Richard Converse Tessa Badua-Larsen	ANL (TL) FEMA RIX
Maricopa County Emergency Operations Center	Bill Van Pelt John Tarca	ANL (TL) FEMA RIX
Radio Station KTAR	Neil Johnson	FEMA RIX

<u>EVALUATION SITE</u>	<u>EVALUATOR</u>	<u>ORGANIZATION</u>
Reception and Care: Buckeye High School	Frank Bold Dave Vargo Sandra Bailey	ANL (TL) FEMA RIX ANL
On-Scene Command Post	Ken Miles	FDA-SF
Sheriff's Warning Center/ Evacuation-special needs/ Backup route-alerting/ Roadblock	Bill Gasper	ANL
Interviews:		
Arlington School	Richard Converse	ANL
Ruth Fisher School	Richard Converse	ANL

Evaluation Team Leader, Richard Echavarria, FEMA RIX
Sally Ziolkowski, FEMA RIX, RAC Chair
Elena Joyner, FEMA RIX, Administrative Support

APPENDIX 3

EXERCISE SCENARIO

This appendix contains a summary of the simulated sequence of events -- Scenario -- which was used as the basis for invoking emergency response actions by OROs in the Palo Verde Nuclear Generating Station Off-site Biennial Exercise on March 9, 1999.

This scenario, on the following pages, was submitted by the Arizona Public Service Company, and approved by FEMA Region IX.

I. TIMELINE SUMMARY

- 0130 All 3 Palo Verde Units are operating at 100% full power. This unit has been at 100% power for the last 116 days. Core age is 225 Effective Full Power Days (reference Unit S Cycle 7 Core Data Book). The Unit is operating with the Condensate Demineralizer Bypass Valve CD-HV-195 open (i.e., no Condensate Demineralizers are in service). RCS Boron concentration is 687 ppm per Chemistry sample. Operations Management has requested that 100% power operation be maintained.
- 0200 Facility time synchronization / begin event timeline.
- 0215 The Control Room crew receives various control panel alarms and telephone calls regarding felt ground motion indicative of a moderately strong earthquake. The STA performs procedural actions to validate the alarm indications. The Devers 525KV line isolates due to ground faults in California. The EC may conservatively declare an NUE (EAL V-110) while waiting for OBE validation by the STA.
- 0245 The Shift Manager (SM) refers to Technical Specification TRM TLCO 3.3.103. Concurrently, he reviews EALs in accordance with 16DP-0EP13, Emergency Classification, and classifies the event as an ALERT based on EAL V-124, Confirmed earthquake > OBE levels per 79IS-9SM01 such that preliminary analysis indicates OBE validity. Offsite agencies are notified of the event within 15 minutes of emergency classification. Onsite and offsite emergency response organizations will be mobilized and emergency response facilities will be staffed and activated within the time frames specified in the PVNGS Emergency Plan (i.e., 1-2 hours during off-hour periods). Per management direction, operators commence a plant shutdown at 8% per hour in accordance with 40OP-9ZZ05, Power Operations, Section 7.0, Decreasing Power by Boration.
- 0445 Emergency response facilities are staffed and activated. Staffing schedules are completed and alternate teams are released and scheduled for relief.
- 0700 Personnel begin arriving at state facilities to receive shift turnover and assume ERO responsibilities and duties.
- 0735 The crew receives increasing RMS indication of a primary system leak in Containment. They perform 40AO-9ZZ02, Excessive RCS Leakrate, to quantify the leak. The Emergency Coordinator (EC) refers to Technical Specification ITS LCO 3.4.14. Concurrently, he reviews EALs in accordance with 16DP-0EP13, Emergency Classification, and determines the event requires an ALERT classification based on EAL V-10, RCS leak > 44 gpm. However, he determines no classification upgrade is necessary due to the current applicability of EAL V-124.
- 0745 The Control Room crew receives various control panel alarms and telephone calls regarding felt ground motion indicative of a moderately strong seismic aftershock. The crew responds to a gross increase in RCS leakage caused by the aftershock. A reactor trip occurs and the crew commences emergency boration due to 4 CEAs not fully inserting on the trip. During performance of Standard Post Trip Actions (SPTA), the crew recognizes various other abnormalities associated with the seismic event. Additionally, RCS activity levels begin increasing and reactor vessel plenum level lowers to 0%.

- 0800 The Emergency Coordinator (EC) reviews EALs in accordance with 16DP-0EP13, Emergency Classification, and classifies the event as an SAE (Site Area Emergency) based on potential loss of the Fuel Clad and loss of the RCS fission product barriers (EALs V-7 and V-10). Offsite agencies are notified of the event within 15 minutes of emergency classification. The notification also includes recommended protective actions (i.e., shelter within a 2-mile radius) for the state.
- 0830 As RWT (Refueling Water Tank) level reaches the RAS (Recirculation Actuation Signal) setpoint, a RAS is received. ECCS pump suction is swapped and Containment sump water serves as a source of core cooling.
- 0910 The Control Room crew receives various control panel alarms and telephone calls regarding felt ground motion indicative of another moderately strong seismic aftershock. The crew responds to an apparent Turbine Cooling Water System (TC) header rupture resulting from the aftershock. The release of fission product gases into the RCS slowly begins increasing due to further seismic related clad damage. In addition, the event breaches Containment at a main feedwater line penetration envelope, resulting in commencement of a radiological release to the environment. Current meteorological conditions will transport the radioactive plume to the North.
- 0930 Due to elevated RCS activity and the breach of Containment, the Emergency Coordinator (EC) reviews EALs in accordance with 16DP-0EP13, Emergency Classification. S/he upgrades the current emergency classification to a GE (General Emergency) based on a loss of the RCS and Containment barriers and a potential loss of the Fuel Clad Barrier (EALs V-10, V-24 or V-18, and V-9). Offsite agencies are notified of the event within 15 minutes of emergency classification. Additionally, the notification includes recommended protective actions (i.e., evacuation in a 2-mile radius and 5 miles in potentially affected sectors) for the state. The EC instructs the Security Director to initiate procedural actions for a site evacuation.
- 1030 Efforts continue to mitigate the event and decrease Containment pressure to stop the offsite radiological release. Offsite agencies work to support the state's Protective Action Decisions that are based on the GE. Additionally, any long-term recovery efforts must include the determination and analyses of the amount of damage caused by the earthquake and the seismic aftershocks that followed. Due to radiological deposition associated with Iodine plume entrainment, government officials will expand their emergency response out to 50 miles from the source of the nuclear related incident. In addition, their response may include an expanded sector path due to the plume track.
- Offsite agencies are taking measures to protect the health and safety of the public within the 10-mile EPZ. Since the time of the RAS, RP personnel have been working to identify and control areas of the plant requiring restricted access. ERO personnel continue to address those areas requiring their attention. Under current plant conditions, ERO personnel should have the knowledge and ability to project the time remaining to consider the release terminated. The objective to support this goal may encompass time estimations to reduce Containment pressure to a value where the radiological release through the main feedwater line Containment penetration envelope can be secured. Further core cooling will reduce the amount of decay heat to a point where the effects of steam production would be negligible. Entry into Containment to subsequently repair the penetration envelope may not occur until weeks into the long-term recovery effort. The expanded government response will ensue following mitigation of the event and subsequent termination of the radiological release. It may take weeks by offsite authorities to fully complete their work associated with this event.
- 1130 Conclude event timeline.

APPENDIX 4

EXERCISE OBJECTIVES AND EXTENT-OF-PLAY AGREEMENT

This appendix lists the objectives that were scheduled for demonstration in the Palo Verde Nuclear Generating Station Off-site Biennial Exercise on March 9, 1999, and the extent-of-play agreement approved by FEMA Region IX.

The objectives, contained in FEMA-REP-14, "Radiological Emergency Preparedness Exercise Manual," September 1991, represent a functional translation of the planning standards and evaluation criteria of NUREG-0654/FEMA-REP-1, Rev. 1, "Criteria for the Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," November 1980.

Because the exercise objectives are intended for use at all nuclear power plant sites, and because of variations among off-site plans and procedures, an extent-of-play agreement is prepared by the State and approved by FEMA to provide evaluators with guidance on expected actual demonstration of the objectives.

A. Objectives

Listed below are the specific radiological emergency preparedness objectives scheduled for demonstration during this exercise.

OBJECTIVE 1: MOBILIZATION OF EMERGENCY PERSONNEL

Demonstrate the capability to alert and fully mobilize personnel for both emergency facilities and field operations. Demonstrate the capability to activate and staff emergency facilities for emergency operations.

OBJECTIVE 2: FACILITIES - EQUIPMENT, DISPLAYS, AND WORK ENVIRONMENT

Demonstrate the adequacy of facilities, equipment, displays and other materials to support emergency operations.

OBJECTIVE 3: DIRECTION AND CONTROL

Demonstrate the capability to direct and control emergency operations.

OBJECTIVE 4: COMMUNICATIONS

Demonstrate the capability to communicate with all appropriate emergency personnel at facilities and in the field.

OBJECTIVE 5: EMERGENCY WORKER EXPOSURE CONTROL

Demonstrate the capability to continuously monitor and control radiation exposure to emergency workers.

OBJECTIVE 6: FIELD RADIOLOGICAL MONITORING - AMBIENT RADIATION MONITORING

Demonstrate the appropriate use of equipment and procedures for determining field radiation measurements.

OBJECTIVE 7: PLUME DOSE PROJECTION

Demonstrate the capability to develop dose projections and protective action recommendations regarding evacuation and sheltering.

OBJECTIVE 8: FIELD RADIOLOGICAL MONITORING - AIRBORNE RADIOIODINE AND PARTICULATE ACTIVITY MONITORING

Demonstrate the appropriate use of equipment and procedures for the measurement of airborne radioiodine concentrations as low as 10^{-7} (0.0000001) microcuries per cubic centimeter in the presence of noble gases and obtain samples of particulate activity in the airborne plume.

OBJECTIVE 9: PLUME PROTECTIVE ACTION DECISION-MAKING

Demonstrate the capability to make timely and appropriate protective action decisions.

OBJECTIVE 10: ALERT AND NOTIFICATION

Demonstrate the capability to promptly alert and notify the public within the 10-mile plume pathway emergency planning zone and disseminate instructional messages to the public on the basis of decisions by appropriate State or local officials.

OBJECTIVE 11: PUBLIC INSTRUCTIONS AND EMERGENCY INFORMATION

Demonstrate the capability to coordinate the formulation and dissemination of accurate information and instructions to the public.

OBJECTIVE 12: EMERGENCY INFORMATION - MEDIA

Demonstrate the capability to coordinate the development and dissemination of clear, accurate, and timely information to the news media.

OBJECTIVE 13: EMERGENCY INFORMATION - RUMOR CONTROL

Demonstrate the capability to establish and operate rumor control in a coordinated and timely manner.

OBJECTIVE 14: IMPLEMENTATION OF PROTECTIVE ACTIONS - USE OF POTASSIUM IODIDE FOR EMERGENCY WORKERS, INSTITUTIONALIZED INDIVIDUALS, AND THE GENERAL PUBLIC

Demonstrate the capability and resources to implement potassium iodide protective actions for emergency workers, institutionalized individuals, and, if the State plan specifies, the general public.

OBJECTIVE 15: IMPLEMENTATION OF PROTECTIVE ACTIONS - SPECIAL POPULATIONS

Demonstrate the capability and resources necessary to implement appropriate protective actions for special populations.

OBJECTIVE 16: IMPLEMENTATION OF PROTECTIVE ACTIONS - SCHOOLS

Demonstrate the capability and resources necessary to implement protective actions for school children within the plume pathway emergency planning zone.

OBJECTIVE 17: TRAFFIC AND ACCESS CONTROL

Demonstrate the organizational capability and resources necessary to control evacuation traffic flow and to control access to evacuated and sheltered areas.

**OBJECTIVE 18: RECEPTION CENTER-MONITORING,
DECONTAMINATION AND REGISTRATION**

Demonstrate the adequacy of procedures, facilities, equipment, and personnel for the radiological monitoring, decontamination and registration of evacuees.

OBJECTIVE 19: CONGREGATE CARE

Demonstrate the adequacy of facilities, equipment, supplies, personnel, and procedures for congregate care of evacuees.

**OBJECTIVE 22: EMERGENCY WORKERS, EQUIPMENT, AND VEHICLES
- MONITORING AND DECONTAMINATION**

Demonstrate the adequacy of procedures for the monitoring and decontamination of emergency workers, equipment, and vehicles.

OBJECTIVE 23: SUPPLEMENTARY ASSISTANCE (FEDERAL/OTHER)

Demonstrate the capability to identify the need for external assistance and to request such assistance from Federal or other support organizations.

OBJECTIVE 30: CONTINUOUS, 24-HOUR STAFFING

Demonstrate the capability to maintain staffing on a continuous, 24-hour basis through an actual shift change.

**OBJECTIVE 31: OFF-SITE SUPPORT FOR THE EVACUATION
OF ON-SITE PERSONNEL**

Demonstrate the capability to provide off-site support for the evacuation of on-site personnel.

OBJECTIVE 32: UNANNOUNCED EXERCISE OR DRILL

Demonstrate the capability to carry out emergency response functions in an unannounced exercise or drill.

OBJECTIVE 33: OFF-HOURS EXERCISE OR DRILL

Demonstrate the capability to carry out emergency response functions during an off-hours exercise or drill.

B. Extent-of-Play Agreement

The extent-of-play agreement on the following pages was submitted by the State of Arizona and Maricopa County, and was approved by FEMA Region IX in preparation for the Palo Verde Nuclear Generating Station Off-site Biennial Exercise on March 9, 1999. The extent-of-play agreement includes any significant modification or change in the level of demonstration of each objective listed in Subsection A of this appendix.



Federal Emergency Management Agency

Region IX
Building 105
Presidio of San Francisco
San Francisco, California 94129

JAN 11 1999

Michael Austin
Director
Division of Emergency Management
State of Arizona
5636 McDowell Road
Phoenix, Arizona 85008

Dear Mr. Austin: *Mike*

We have completed our review of the off-site exercise objectives for the Off-site Palo Verde Nuclear Generating Station Biennial Exercise planned for the week of March 7, 1999. The objectives established by your office conform to FEMA Guidance Document REP-14. They are as follows: Group A Objectives-1 through 13; Group B Objectives-14 through 19; and Group C Objectives 23 and 30 through 33.

We have also reviewed and are in agreement with the exercise extent-of-play. The basic purpose of the extent-of-play agreement is to identify deviations from the implementation of the plan. Consequently, we understand that the State of Arizona and Maricopa County will provide full implementation of all plan elements not specified as exceptions in the extent-of-play.

We have based our review on the March 1997 version of the State of Arizona/County of Maricopa Fixed Nuclear Facility Emergency Response Off-Site Plan and Procedures. We will need a copy of the current State and County plans, and all pertinent procedures, in order to effectively evaluate the exercise. We will need these by February 8, 1999, so that evaluators for the exercise have sufficient time to familiarize themselves with the plans and procedures. Subsequent revisions to these procedures may affect the preparation of our evaluation team for the exercise.

Your attention to this matter is appreciated. Contact me directly at (415) 923-7103, or Tom Ridgeway at (415) 923-7277, if you have any questions about this letter

Sincerely,

Sally Zolkowski

Sally Zolkowski

Chair

Regional Assistance Committee

cc: NRC-RIV



JANE DEE HULL
GOVERNOR

STATE OF ARIZONA
Division of Emergency Management

5636 EAST McDOWELL ROAD
PHOENIX, ARIZONA 85008-3495
(602) 244-0604 1-800-411-2336



MICHAEL P. AUSTIN
DIRECTOR

December 17, 1998

Ms. Sally Ziolkowski
Chair, Radiological Assistance Committee, Region IX
Federal Emergency Management Agency
Building 105, P.O. Box 29998
Presidio of San Francisco, CA 94129
Attn: Mr. Richard Echeverria

Dear Ms. Ziolkowski:

Enclosed for your information and action is the joint State of Arizona and County of Maricopa Exercise Objectives and Extent of Play for the March, 1999 PVNGS EPZ exercise.

If you have any questions, please contact Mr. Harry Border at (602) 231-6214.

Sincerely,

A handwritten signature in cursive script, appearing to read "Michael Austin".

Michael Austin
Director

**EXERCISE OBJECTIVES
AND
EXTENT OF PLAY
EXPOSURE PATHWAY EPZ**

**State of Arizona
"EXERCISE 99"
County of Maricopa**

Phoenix, Arizona

*STATE OF ARIZONA
REP EXERCISE OBJECTIVES
GROUP A OBJECTIVES*

- OBJECTIVE 1: MOBILIZATION OF EMERGENCY PERSONNEL
- OBJECTIVE 2: FACILITIES - EQUIPMENT, DISPLAYS, AND
WORK ENVIRONMENT
- OBJECTIVE 3: DIRECTION AND CONTROL
- OBJECTIVE 4: COMMUNICATIONS
- OBJECTIVE 5: EMERGENCY WORKER EXPOSURE CONTROL
- OBJECTIVE 6: FIELD RADIOLOGICAL MONITORING
AMBIENT RADIATION MONITORING
- OBJECTIVE 7: PLUME DOSE PROJECTION
-

*STATE OF ARIZONA
REP EXERCISE OBJECTIVES
GROUP A OBJECTIVES (Continued)*

- OBJECTIVE 8: FIELD RADIOLOGICAL MONITORING -
AIRBORNE RADIOIODINE AND PARTICULATE
ACTIVITY MONITORING
- OBJECTIVE 9: PLUME PROTECTIVE ACTION DECISION
MAKING
- OBJECTIVE 10: ALERT AND NOTIFICATION
- OBJECTIVE 11: PUBLIC INSTRUCTIONS AND EMERGENCY
INFORMATION
- OBJECTIVE 12: EMERGENCY INFORMATION - MEDIA
- OBJECTIVE 13: EMERGENCY INFORMATION - RUMOR
CONTROL
-

*STATE OF ARIZONA
REP EXERCISE OBJECTIVES
GROUP B OBJECTIVES*

- OBJECTIVE 14: IMPLEMENTATION OF PROTECTIVE ACTIONS
- USE OF KI FOR EMERGENCY WORKERS,
INSTITUTIONALIZED INDIVIDUALS, AND THE
GENERAL PUBLIC
- OBJECTIVE 15: IMPLEMENTATION OF PROTECTIVE ACTIONS
- SPECIAL POPULATIONS
- OBJECTIVE 16: IMPLEMENTATION OF PROTECTIVE ACTIONS
- SCHOOLS
- OBJECTIVE 17: TRAFFIC AND ACCESS CONTROL
- OBJECTIVE 18: RECEPTION CENTER - MONITORING,
DECONTAMINATION, AND REGISTRATION
-

STATE OF ARIZONA
REP EXERCISE OBJECTIVES
GROUP B OBJECTIVES (Continued)

OBJECTIVE 19: CONGREGATE CARE

OBJECTIVE 23: SUPPLEMENTARY ASSISTANCE
(FEDERAL/OTHER)

STATE OF ARIZONA
REP EXERCISE OBJECTIVES
GROUP C OBJECTIVES

OBJECTIVE 30: CONTINUOUS, 24 HOUR STAFFING

OBJECTIVE 31: OFFSITE SUPPORT FOR THE EVACUATION
OF ONSITE PERSONNEL

OBJECTIVE 32: UNANNOUNCED EXERCISE OR DRILL

OBJECTIVE 33: OFF-HOURS EXERCISE OR DRILL

EXPOSURE PATHWAY (EPZ) "EXERCISE 99" EXTENT OF PLAY

OBJECTIVE	STATE EXTENT-OF-PLAY	COUNTY EXTENT-OF-PLAY
1	FULL; FIELD MONITORING TEAMS, RADIOLOGICAL EMERGENCY ASSISTANCE TEAM-FORWARD, RED CROSS, TECHNICAL OPERATIONS CENTER, RECEPTION AND CARE CENTER WILL BE OUT OF SCENARIO TIME SEQUENCE AND SPECIAL NEEDS PERSONS WILL BE PRE-STAGED. REAT FIELD PERSONNEL, BOTH SHIFTS, DEPLOY AT SAME TIME IN CONSIDERATION OF TIME COMPRESSION AND TRANSPORTATION.	FULL :
2	FULL: STATE EMERGENCY OPERATIONS CENTER, RADIOLOGICAL EMERGENCY ASSISTANCE TEAM-FORWARD, TECHNICAL OPERATIONS CENTER, JOINT EMERGENCY NEWS CENTER.	FULL: MARICOPA COUNTY EMERGENCY OPERATIONS CENTER, MARICOPA COUNTY SHERIFF'S COMMAND POST, RECEPTION AND CARE CENTER.
3	FULL	FULL
4	FULL: PRIMARY AND BACKUP	FULL: PRIMARY AND BACKUP
5	CATEGORY 1 & 2 (FIELD MONITORING TEAMS, REAT FORWARD PERSONNEL, RECEPTION AND CARE CENTER TEAM): TLDS AND DRDS; CATEGORY 3 (OTHER RECEPTION AND CARE CENTER): SCHOOL BUS DRIVER'S, TLD'S ONLY.	CATEGORY 1 & 2 (MARICOPA COUNTY SHERIFF'S OFFICE, MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION): TLDS AND DRDS; CATEGORY 3 (OUTSIDE EPZ); ONLY TLDS
6 & 8	CHARCOAL INSTEAD OF SILVER ZEOLITE CARTRIDGES. 2 MONITORING TEAMS (1 st SHIFT) 2 MONITORING TEAMS (2 nd SHIFT)	
7	FULL	
9	FULL	
10		SIMULATE SIREN-SOUNDING; BACK-UP ROUTE-ALERTING; ONE GROUP OF SIMULATED EPZ RESIDENTS PRE-STAGED AT FAILED SIREN: MARICOPA COUNTY SHERIFF'S OFFICE WILL GIVE VERBAL INSTRUCTIONS, NO SIRENS OR LIGHTS.
11		SIMULATE EAS RELEASE, KTAR WILL PLAY; INTERVIEW ON PREVIOUS DAY.

12	FULL: SIMULATED MEDIA	FULL: SIMULATED MEDIA
13	FULL	
14	SIMULATE INGESTION OF KI; KI STOCKS SHOWN	SIMULATE INGESTION OF KI; KI STOCKS SHOWN, BUT EMERGENCY WORKERS GIVEN SIMULATED KI.
15		FULL: THREE GROUPS OF SIMULATED SPECIAL NEEDS POPULATION TO EVACUATE
16		NO ACTUAL EVACUATION OF CHILDREN; INTERVIEW WITH RUTH FISHER SCHOOL AND ARLINGTON SCHOOL PRINCIPLE, TEACHER AND BUS DRIVER.
17		FULL: ONE ROADBLOCK DEMONSTRATED AND THEN SECURED.
18	ONE MONITORING TEAM; BUCKEYE HIGH SCHOOL; 12 PERSONS TO BE MONITORED, NO ACTUAL DECONTAMINATION. VEHICLE MONITORING TO BE DEMONSTRATED. VEHICLE DECONTAMINATION TO BE DEMONSTRATED BY INTERVIEW.	BUCKEYE HIGH SCHOOL
19		FULL: BUCKEYE HIGH SCHOOL
23	SCENARIO DEPENDENT	SCENARIO DEPENDENT
30	SCENARIO DEPENDENT	SCENARIO DEPENDENT
31	SCENARIO DEPENDENT	SCENARIO DEPENDENT
32	SCENARIO DEPENDENT	SCENARIO DEPENDENT
33	SCENARIO DEPENDENT	SCENARIO DEPENDENT