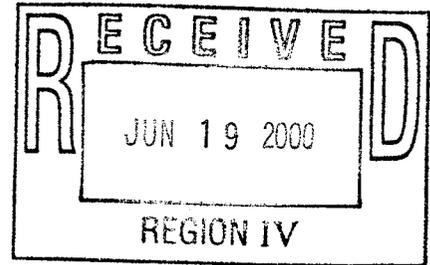




# Federal Emergency Management Agency

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

JUN 12 2000



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 November 16-18, 1999, Off-site Post-Plume Phase Exercise and the December 3, 1999 Annual Medical Drill 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 8 issues during this exercise, and 5 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 Arizona and the jurisdictions site-specific to PVNGS, together with the ability to implement these plans, were demonstrated in the referenced exercise and drill. Based on the results of this exercise and 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,

*Valley Beunting*  
for

Martha Whetstone  
Regional Director

Enclosure

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

ADAMS # \_\_\_\_\_  
Template NRR-036  
Date 6/29/00 QC'd by \_\_\_\_\_



**Post-Plume Phase Exercise  
and Annual Medical Drill  
Final Report**

**PALO VERDE  
NUCLEAR GENERATING STATION**

Licensee: Arizona Public Service Company

Exercise Dates: November 16-18, 1999  
December 3, 1999

Report Date: May 31, 2000

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

## I. EXECUTIVE SUMMARY

The Federal Emergency Management Agency (FEMA), Region IX evaluated a post-plume phase exercise on November 16-18, 1999, and an off-site medical drill on December 9, 1999, for the emergency planning zone (EPZ) around the Palo Verde Nuclear Generating Station (PVNGS). The purpose of the exercise and drill was to assess the level of State and local preparedness in responding to a radiological emergency. This exercise and drill 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 biennial exercise at this site was conducted on March 9, 1999. The most recent medical drill for Good Samaritan Regional Medical Center was conducted on October 22, 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 8 Areas Requiring Corrective Action (ARCA) identified as a result of this exercise and drill; 20 ARCAs from this exercise, previous exercises and medical drills were corrected, and 5 ARCAs remain uncorrected.

## REPORT CREDITS

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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 Post-Plume Phase Exercise on November 16-18, 1999, and an Off-site Medical Drill on December 3, 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 Post-Plume Phase Exercise on November 16-18, 1999, and the Medical Drill on December 3, 1999, 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, a description of the 50-mile ingestion pathway zone (IPZ) 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. Ingestion Pathway Zone Description**

The PVNGS Ingestion Pathway Zone extends for 50 miles around the PVNGS site and includes portions of the following Nations and Counties:

Gila Bend Indian Community  
Ak Chin Indian Community

La Paz County  
Maricopa County  
Pinal County  
Yavapai County  
Yuma County

## **C. Exercise Participants**

The following agencies, organizations, and units of government participated in the Palo Verde Nuclear Generating Station Off-site Post-Plume Phase Exercise on November 16-18, 1999, and the Off-site Medical Drill on December 3, 1999.

### **STATE OF ARIZONA**

Arizona Department of Agriculture  
Arizona Department of Environmental Quality  
Arizona Department of Game and Fish  
Arizona Department of Health Services  
Arizona Department of Public Safety  
Arizona Department of Transportation  
Arizona Department of Water Resources  
Arizona Division of Emergency Management  
Arizona National Guard  
Arizona Radiation Regulatory Agency

### **RISK JURISDICTION**

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

Gila Bend Indian Community

### **PRIVATE/VOLUNTEER ORGANIZATIONS**

Air Evac Services, Inc.  
American Nuclear Insurers  
American Red Cross  
Civil Air Patrol  
Good Samaritan Regional Medical Center  
Outdoor and Emergency Education Bureau  
Radio Amateur Civil Emergency Services

## **FEDERAL AGENCIES**

Department of Agriculture  
Department of Energy  
Food and Drug Administration  
National Weather Service  
Nuclear Regulatory Commission

## 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 Off-site Post-Plume Phase Exercise on November 16-18, 1999, and the Off-site Medical Drill on December 3, 1999 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 1

The matrix presented in Table 1, 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 1. Summary Results of Exercise Evaluation

Date and Site: November 16-18 1999 and December 3, 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		A	A	M								M	M														M	M	M	M					
Technical Operations Center		A	M	M																							M		A						
REAT-Forward		M	M	M	M																	M													
Field Monitoring Teams				M	M																				A										
ARRA Lab																										M									
Food Control Point					M																							M							
Re-entry Point					M																									A					
Department of Agriculture Command Post		M	M	M																								M							
Joint Emergency News Center/Russell Auditorium		M	M	M									A															M		M					
Maricopa County Emergency Operations Center		M	M	M							M																	M		M					
Good Samaritan Regional Medical Center					M																A	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 2  
EXERCISE ISSUES**

LOCATION	NEW ISSUE(S)	PREVIOUS ISSUE(S) RESOLVED	PREVIOUS ISSUE(S) UNRESOLVED
State Emergency Operations Center	45-99-3-A-17	45-99-13-A-3 45-99-3-A-17 45-97-3-A-1 ARCA #14 (1993) ARCA #15 (1993) ARCA#16 (1993) ARCA #17 (1993)	45-99-2-A-2 45-97-3-A-2 45-97-3-A-3 ARCA #18 (1993)
Technical Operations Center	45-99-2-A-18 45-99-28-A-19	ARCA #19 (1993)	NONE
REAT-Forward	NONE	45-99-5-A-6 45-99-5-A-7 45-97-22-A-9 45-97-22-A-10 45-97-22-A-11	NONE
Field Monitoring Teams	45-99-24-A-20	45-99-8-A-9 45-97-8-A-13	
ARRA Laboratory	NONE	NONE	NONE
Food Control Point	NONE	NONE	NONE
Re-entry Point	45-99-29-A-21	45-99-29-A-21	NONE
Department of Agriculture Command Post	NONE	ARCA #20 (1993)	NONE
Joint Emergency News Center	45-99-12-A-22 45-99-12-A-23	NONE	45-99-12-A-10
Maricopa County Emergency Operations Center	NONE	NONE	NONE
Good Samaritan Regional Medical Center	45-99-20-A-24	45-97-20-A-24 45-97-20-A-25 45-99-20-A-24	NONE

o EXERCISE DETAIL

The full-participation Palo Verde Nuclear Generating Station (PVNGS) Post-Plume Phase Exercise was held on November 16-18, 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
Joint Emergency News Center	Phoenix
Radiological Emergency Assessment Team Center	Phoenix

Maricopa County

<u>Facility/Function</u>	<u>Location</u>
Maricopa County Emergency Operations Center	Phoenix

o STATE EMERGENCY OPERATIONS CENTER

There were nine objectives selected for observation and evaluation at the State Emergency Operations Center (Objective Numbers 2, 3, 4, 12, 13, 26, 27, 28, and 29). Seven objectives were met, and one new ARCA was identified. Six ARCAs from previous exercises were corrected and four remain uncorrected.

The adequacy of facilities, equipment, displays, and other materials to support emergency operations was not adequately demonstrated in the State Emergency Operations Center (SEOC). The facility is a large dedicated facility that supports a large number of state agencies that fit into a combination Federal Response Plan (FRP) and Incident Command System (ICS) structure. Appropriate state agencies support the Policy, Plans, Logistics, Operations, and Finance and Administration command functions as well as the Communications, Public Information, Rumor Control functions and the switchboard group. The Technical Operations Center (TOC) also operates from the SEOC. The Policy, Plans and Operations groups are located on the large central floor area. Three elevated offices along the back house the Logistics group and the TOC. These offices have large windows so that operations on the main floor may be seen; the public address system can be heard throughout the building. Behind these offices, on the other side of a corridor, are more interior offices where the

Public Information and Rumor Control functions were located. The building has a kitchen that can serve a large number of people. The building is well lit with adequate ventilation. The restrooms are adequate to serve the large number of emergency workers that may be in the building at any one time during emergency operations. Backup power is provided by a 2500 kilowatt (kw) generator served by a 350-gallon fuel tank, which is sufficient to provide three to four days of emergency power. (It is tested for one hour a week.) In extended operations, the building manager would bring in a fuel tanker truck for refueling.

The kitchen is converted to a message center during emergency operations. It houses two copiers and four FAX machines. The majority of computers are located in the Plans and Logistics groups and the TOC. The Emergency Support Functions (ESF) communicate their requests and progress on tasks through a manual message system. Each ESF workstation has at least one telephone. The equipment available to players was adequate to support emergency operations.

The main operational area of the SEOC has a number of large screens where important information is displayed to participants during emergency operations. The information is generated using Emergency Information System (EIS) software. One screen tracked resource allocations; another projected a map with the deposition area (footprint) and various restricting boundaries for air space, food, milk and evacuation; the third was an activity log. There were wall maps showing the 10-mile Emergency Planning Zone (EPZ) (with the plume) and the 50-mile Ingestion Pathway Zone (IPZ). The activity log will be discussed at greater length below. The back wall had clipboards for road closures, Emergency Alert System (EAS) and Notification and Alert Network (NAN) messages, News Releases (NR) and Situation reports. The planning group produced one Incident Action Plan at noon on Thursday (Day 7).

The displays, as set up for this exercise, failed to include important management information. These included evacuation routes, reception and care centers (RCC), emergency classification levels (ECL), population by evacuation sector, special facilities, and access control points (ACP) for food and milk. This resulted in a confusing situation whereby newcomers could not easily grasp the entire situation or have critical information readily available. Therefore ARCA #45-99-2-A-1 and ARCA # 18 from the 1993 exercise remain uncorrected.

The Gila River Tribal representative, Agriculture and Environmental Quality liaisons were not aware that NRs were on a clipboard on the back wall. The weather status board was for Sky Harbor airport, many miles from the site; this may have been a scenario problem and not a player problem. Given the complex situation for this exercise, it would have been helpful to all participants if protective action decisions (PAD) had been posted. Some participants, such as the county, were playing controller injects of completed actions as if they were PADs to be implemented.

Each of these problems could have been overcome, as there is no one specified format for displays as long as players are well informed. The incident log, NRs, EAS and NAN messages could have been reproduced and distributed to the players. Situation reports are excellent sources of consolidated situation information. None were produced. In general, each section did seem to be aware of their field situation, but at the same time they lacked status information from other sections. EIS maps

were produced that showed areas of evacuation and food restriction as well as farm and ranch locations and these were distributed to ESF groups.

In his opening remarks, the Director of the Arizona Division of Emergency Management (DADEM) stated that a person coming into the SEOC should be able to become fully apprised of the situation in a very short time. This standard was not met for this exercise. For example, the number of people in shelters is of frequent concern in emergencies; this information was not displayed. In summary, displays in the SEOC were not adequate to support emergency operations.

An activity log served as the status board, which scrolled on a screen showing all of the entries from the inception of the exercise. An activity log does not serve the same purpose as a status board. The activity log contained a large number of entries and scrolled at a slow rate. This log was intended to supplement the map showing restricted boundaries and roadblocks. If a participant needed all entries related to Mass Care to make a decision or publish a NR, short of making a direct request to the American Red Cross (ARC) liaison, it would have required sitting in front of the screen for several minutes to collect the information. At various times during the response, the screen would jump back to Day 1 before showing the current day activity. Toward the end of the exercise (approximately 1100) display of the activity log was discontinued. The status board is intended to reflect an analysis of all activities into the few most important activities for action and tracking. Consequently, the activity log is not an adequate replacement for the status board.

Access to the facility was adequately controlled. Participants were required to sign in and wear name tags. Access to the operations area was further restricted to players, evaluators and controllers, allowing the organization to use its space as efficiently as possible.

Plans and procedures for this objective were followed. The inadequacy of displays was due to design problems of the display setups on the main floor of the SEOC. In general, given that this exercise emphasized recovery operations and not rapidly changing response operations, with few exceptions, the displays were adequately maintained.

The capability to direct and control the response in the SEOC was demonstrated by the DADEM on exercise Days 1 and 2 and by his designee on exercise Day 7. The DADEM was the chief of the policy group and served as the Governor's designee as the State decision-maker. He delegated the minute-by-minute direction of the response to his various group chiefs. Instructions were given to staff via the Operations Chief and periodic facility-wide briefings were conducted. Instruction on the use of the message system and runners were given at the beginning of the exercise. When recommendations were presented to the DADEM, he obtained input from staff before making a decision. The exercise started with a briefing to all exercise participants. The briefing, with its associated documentation, was a summary of actions taken on Day 0 (the day of the release of radioactive materials) including utility actions, public protective actions in place, and copies of simulated NRs. In addition, a copy of the initial Federal Radiological Monitoring and Assessment Center (FRMAC) Aerial Measuring System (AMS) flyover and a small number of sample analysis results were distributed. All participants, except those assigned to several SEOC groups, were dismissed until the start of the exercise on Day 1. The decision to start the response in the SEOC

while the staff from other locations were not participating was questionable. The effectiveness of having an all-hands briefing to get every one started with the same information was compromised.

The Lead Public Information Officer (PIO) brought some draft NRs to the DADEM before they were sent to the Joint Emergency News Center (JENC) for release, but not all releases received adequate review. Many NRs contained information that would have created impacts for various agencies and these agencies were unaware of the content until after the NRs had been issued. For example, NR #16, issued at 1155 on Day 1, stated that all private wells should be inspected before use without any indication of the area where the instruction was intended or exactly what the inspection of the wells should entail. When the representative of the Arizona Department of Water Resources (ADWR) became aware of the NR, he raised serious concerns. The system allowed questionable and erroneous information to be released to the public.

The DADEM demonstrated an excellent grasp of the needs of an effective response. When he received a recommendation to reduce the area from which the public had been evacuated on Day 0, he delayed his decision until staff ensured him that all necessary staff and resources were in place to implement the action. Only then was the decision actually made and the County was instructed to activate the EAS system and to release a NR to inform the public.

All decisions, either those injected by controllers or those made by the participants were announced during SEOC briefings. These briefings corrected ARCA # 15 from the 1993 exercise. The revised SEOC layout facilitated interactions between representatives of various agencies. When necessary, the DADEM convened meetings of his Group Chiefs and other advisors to discuss pros and cons of recommendations.

The capability to communicate with all appropriate emergency personnel at facilities and in the field was demonstrated at the SEOC. The Communications Center of the SEOC possesses a full communications ability to include commercial and dedicated telephone lines, FAX, EAS, radio and Radio Amateur Civil Emergency Services (RACES). The NAN is the primary system to communicate information from the utility to offsite organizations; it consists of dedicated voice and hard copy telephone lines. The NAN phone is located at the switchboard. Each workstation has at least one commercial line. There are four commercial FAX machines and lines. An 800 MHz radio backs up the NAN. ADEM had a mobile van that was activated for the exercise.

The exercise started on Day 2 of the event, after the response phase was completed. Consequently, there were normal primary emergency communications using commercial telephone between ESFs and field locations. Backup communications using radio were demonstrated, although traffic was light. RACES and the ADEM Communications van were activated for this exercise. The Civil Air Patrol (CAP) demonstrated radio communications as their primary communications system working their mission assignments.

The capability to coordinate the development and dissemination of clear, accurate and timely information to the news media was not adequately demonstrated at the SEOC. Actual interaction with the media occurred only at the JENC. The role of the SEOC was limited to the preparation of

NRs that would be released from the JENC. The PIO developed NRs and transmitted them to the JENC for release to the media. The timing of activities in the post-emergency phase of a response are not as critical as those in the emergency phase. However, there was no inordinate delay in transmitting decisions to the JENC. This timely transmission of decisions corrected ARCA #45-97-3-A-1. As stated above, some of the NRs did not receive an adequate review before being released. The content of the NRs is discussed under the JENC Section of this report. The PIO included information to address recurrent questions that were identified by the Public Inquiry staff. Questions relating to road closures and possible produce contamination, determined to be of concern to a significant number of public callers (i.e. rumors/trends), were adequately addressed in subsequent NRs.

The Public Inquiry group staff demonstrated the capability to establish and operate rumor control in a coordinated and timely manner. The public inquiry group was established at the SEOC to answer questions from the public and was operational by 0800 on both days. Three volunteers from the Outdoor and Emergency Education Bureau (OEEB) and one ADEM employee staffed public inquiry. There were one to three staff available at all times to answer calls, plus a public information supervisor who divided his time between updating staff, answering phones and gathering information on inquiry subjects. There was a Spanish translator within the group. The public inquiry section had three telephones dedicated to the function, but also has the option of adding more phones if necessary and could even be moved to another building to accommodate increased call volume. The telephone number for the public inquiry line, (714) 628-7085, was publicized in NRs, EAS messages and is provided in the Public Safety Plan and Calendar.

The public inquiry staff had access to several sources of information, including a status board, copies of NRs, internal SEOC messages, EAS messages, the Public Safety Plan and Calendar, maps, radio and television. The supervisor would attend briefings in the operations room and would gather information from function individuals to then brief the staff and update the status board.

Public inquiry staff answered 85 calls (averaging seven calls per hour) during the exercise. Each call was entered onto a Public Inquiry Log which included the staff person's name, the date, the time, name of the caller, caller's phone number and location, the question(s) asked, the answer given, who the caller is referred to (if applicable), and if follow-up was required. The staff made every effort to provide accurate and timely information. If an answer was not immediately available, these calls were impressively followed up with a return call with the appropriate information within the time frame given to the caller for the callback. These actions corrected ARCA #45-99-13-A-3.

Information on PADs was posted on a clipboard in the public inquiry area. Public inquiry staff were instructed not to use information on new protective actions for at least 15 minutes to avoid "scooping" the EAS. The supervisor did an exemplary job of providing answers to his staff's questions and providing them with up-to-date information. The supervisor also showed skill in "on-the-job training" for a new staff person with no previous experience.

The supervisor advised the public inquiry staff to be attentive to any emerging trends in the caller's questions and explained that this was important so that these subjects might be addressed in a NR to

eliminate future call volume to their section on these subjects.

On the second day of the exercise, the Lead Controller entered the public inquiry room where three of the staff were present. One of the staff said to the lead controller that they liked the new questions that were coming in over the phones because they were new and different from previous exercises. The lead controller responded to the staff that trends were not the issue in developing the questions, that the stress had been on new and innovative questions being developed.

The capability to project dose to the public and recommend PADs in the ingestion exposure pathway was demonstrated in the SEOC. As part of the Day 1 exercise start information, precautionary agricultural actions were in place from the previous day's response. There was an embargo for milk produced in the entire 50-mile IPZ and for other field produced foods in an extension of sectors E, F, and G to the edge of the 50-mile IPZ. This embargo required sampling of all commodities before leaving the embargo zone, and if proven clean, the commodity would be allowed to be shipped out of the area. The Arizona Radiation Regulatory Agency (ARRA) agency staff in the TOC analyzed the laboratory results and made appropriate dose projections. These activities are discussed later in the report.

Several decisions were made to reduce the size of the embargo areas, all based on the sampling data that indicated the areas being released were free of contamination. The initial reduction was made during the morning of Day 2 and the embargo was reduced to E, F, and G to 50-miles for milk and to E, F, and G to approximately 25-miles for other commodities. On Day 7, the embargo was again reduced to coincide with relocation area that was approximately 21 miles in E, F, and G. The distances given are approximate and exact road boundaries determined the exact distances under embargo.

There were no decisions made that were based on the Protective Action Guides (PAG) as specified in the State plan. Commodities had to be tested clean to be released from the embargo zone.

The SEOC successfully demonstrated the capability to implement protective actions for the ingestion exposure pathway. Staffing the SEOC were representatives of the Arizona Department of Agriculture (ADA), ADWR, Department of Game and Fish (ADGF), Department of Health Services (ADHS) and Department of Environmental Quality (ADEQ). Maps showing the location of all commercial dairy and feedlot operations, poultry operations and water sources (wells and public water sources) were available. Information on crops was at hand as well. ADA determined that there were no food crops growing in the contaminated area at the real time of the incident, only cotton and alfalfa hay, and this information was transmitted to the public in NR # 17.

The public was provided with information to protect it from ingestion of contaminated foodstuffs. Early in the exercise, NRs advised the public of general ways to protect themselves including to wash, scrub, shell or peel fresh fruits and vegetables. A later release advised the public in the affected areas to not eat home grown food until tested (NRs # 10 and 17). Food and milk in stores and restaurants was declared to be safe for consumption (NR #13). This corrected a portion of ARCA #16 from the 1993 exercise.

ADA addressed commercial food and dairy products by establishing embargo areas. Initially the area for food covered all sectors out to 10 miles except E, F, & G that were out to 50 miles, while for milk it was extended to 50 miles in all directions. Food control points (FCP) were established at several locations around the food control area, initially four in number on Day 2, with 2 more being added that day, while on Day 7 they had been reduced to 5. Vehicles with commercial foodstuffs transiting an ACP were directed to a FCP for processing. The ADA representatives at the SEOC solicited information from ARRA as to what areas had been sampled and found free from contamination. Initially the tank trucks of the United Dairymen's Association (UDA), which would have picked up the milk from the control area, would not enter the area. ADA examined the possibility of the disposal of fluid milk with a representative of ADEQ. With time, the arrangement changed such that the tankers visited dairies in areas found not to be contaminated, but the milk was not unloaded at the plant until tested and found clean. Milk from the contaminated areas was not loaded onto the tanker until tested and found clean. These embargo areas were modified several times during exercise play as the contaminated areas were better defined and other areas sampled to ensure they were not contaminated. Descriptions of the revised food and milk control zones were contained in several NRs.

The representative of ADWR had information indicating there were about 380 wells in the evacuated/relocated areas. He did not know which were used for potable water supply or for crop/other use since the information on well use came only as a result of information associated with a change of property ownership since about 1983. He did have a problem with a NR # 16 early on Day 2 that indicated that residents should not use these wells until inspected. He indicated he did not know where the release information originated, that he did not have the resources to do inspecting and that the term "inspected" was not clearly defined. A replacement NR was prepared (NR# 27) which clarified the situation, that public water sources had been found safe and that private wells should also be safe. This release indicated that residents who returned to their homes after relocation or evacuation could schedule a test of their well if they were still concerned.

Operators of dairy farms, feedlots and poultry operations were advised by NR # 23 to place their animals on stored/covered feed and water and to keep animals indoors or covered. ADA individually contacted operators in the contaminated areas as well. While the operators were originally evacuated from the contaminated areas, they were subsequently allowed back in under controlled conditions to care for the animals.

The ADA has reproduced a version of a United States Department of Agriculture (USDA) brochure on protective actions the individual can take in an ingestion pathway incident. It was not available at the SEOC.

The ADHS representative was concerned primarily with cooperation with the ARC in counseling those who had been evacuated/relocated. On Day 2 he did begin consideration of developing information for residents who would be returning home, but no action was taken prior to termination of play that day. A second representative picked up the problem again on Day 7 and drafted two NRs directed at all area residents as well as those who would be returning to their homes. These ensured that retail food supplies in the valley (restaurants and stores) were safe. They also indicate that those

who were returning home should dispose of any opened foods but those foods not opened were safe. Returning residents were cautioned not to eat homegrown foods until the food embargo was lifted or the vegetables were tested and found safe. The draft releases were transmitted to the ADHS PIO but were never completed and released prior to termination of the exercise. This corrected ARCA #16 from the 1993 exercise.

ADGF was concerned with the possible contamination of areas populated by migratory waterfowl. A team from the FRMAC gathered samples and found some contamination. The ADGF subsequently closed the affected areas to hunting as well as the Gila River to fishing (they did realize there was little they could do to stop the waterfowl from migrating, however). Information on the closures was contained in a NR # 26. ADGF also contacted their constituents such as licensing agents and passed the information on to them.

There were two waste disposition problems addressed by the assembled food/milk/water representatives in addition to the fluid milk problem. The first problem concerned 90,000 chickens at a poultry operation in the contaminated area that had died on Day 0 of the incident when a cooling system malfunctioned. When it was learned the birds had been dead for two days; the ADA representatives considered them animal waste and a concern of the ADEQ. The ADEQ representative did a thorough job of researching responsibility for the waste material and developed several possible scenarios for action depending on the contamination level involved. The second problem involved 2900 cattle at four feedlots in the contaminated area. ADA arranged for samples of the cattle to be slaughtered after exterior decontamination and the carcasses tested at a nearby Environmental Protection Agency (EPA) laboratory (Luke Air Force Base). The results indicted the hides to be contaminated but the meat clean. Upon the USDA representative indicating the animals would not be accepted at any USDA-controlled slaughterhouse, the ADA representatives began exploring euthanizing of the animals and disposing of the carcasses as waste, a process already explored by the ADEQ representative. The issue remained incomplete at termination of the exercise.

The capability to develop decisions on relocation, re-entry, and return was demonstrated at the SEOC. On Day 1 of the response, the TOC provided dose projections based on two calculational methods. These two methods were interpreted by the Technical Director (TD) of the TOC as giving dose projections that differed by a factor of ten thousand. In fact, the two methods when correctly interpreted gave dose projection within less than 20 %. At approximately 1600 on Day 1, the TD recommended an expansion of the previously evacuated area to include the relocation of residents of Sectors E and F out to 16 miles. This recommendation was made in part based on the higher of the two dose projections and in part to the default alternate FEMA approach to relocation decisions. No decision was made on this recommendation. Staff in the SEOC were working on developing a means to implement the recommendation when the Day 1 exercise was terminated.

The startup message for Day 2 of the exercise included a controller inject stating that during the previous night, a relocation out to 14-miles in sector E had been accomplished. There was a discussion between the TD and the Lead Federal Agency (LFA) representative concerning a further expansion of the relocation area. The TD stated that the technical data being interpreted by TOC staff, did not indicate that there were any areas outside the relocation area (i.e. 0-10 miles in the entire

plume EPZ and 10-14 miles in sector E) that exceeded the PAGs in the State plan and therefore no additional relocations were warranted. The State plan is in agreement with the federal relocation PAG as published by EPA. The use of data from field measurements and lab sample analyses in preparing recommendations corrects ARCA #14 from the 1993 Exercise.

The LFA provided a recommendation to relocate residents out to 17 miles in sectors E and F. The recommendation included the acknowledgement that the area did not exceed the EPA PAGs for relocation. In addition to uncontaminated areas, the area being recommended for relocation was as much as 150 times lower than the EPA PAGs. It was not clear what criteria was used by the LFA because the map that had been produced by the FRMAC helicopter flights indicated that there were low levels of measurable deposition out to 21-miles in these sectors. The Federal Radiological Emergency Response Plan (FR 61, No. 90, May 8, 1996, page 20958) states that: "The LFA will assist State and local authorities, if requested by advising them on protective actions for the public. The development or evaluation of protective actions will be based upon the Protective Action Guides (PAGs) issued by EPA and HHS." The State considered the LFA recommendation and decided to concur with the LFA recommendation, recognizing that the action was not in accordance with State plan.

After the expansion of the relocation area had been implemented, the TD recommended that the previously evacuated areas, other than sectors E, F, and G, within the 10-mile EPZ be allowed to return because there was no detectable contamination in those areas. The ADEM waited until the staff was prepared to implement the action before he approved the decision. This occurred at 1308 on Day 2.

At the start of the Day 7 exercise, the controllers injected a new relocation area based on the presence of contamination at or above 2 times background. This relocation zone included the area out to 21-miles in sectors E, F, and G. All decisions were stated as a fixed distance; however, it was accepted by all participants that roads near the specified distances would be used to describe the actual areas to be impacted. The inclusion of the G sector was due to lack of roads to describe the impacted area.

On Day 1, the TD responded to a request from the ADEQ representative to allow a hazardous materials team to re-enter the restricted zone to respond to a potential chlorine leak. Dose (exposure) limits were established and dosimetry requirements defined. Personnel exiting the restricted zone were to be monitored at the Radiological Emergency Assessment Team-Forward (REAT-Forward). These actions corrected ARCA # 17 from the 1993 exercise. As the exercise progressed, additional re-entry requests to care for livestock and to attend to problems at the egg ranch were approved with the same restrictions. On Day 7, re-entry by the relocated population was allowed through specified roadblocks as long as appropriate documentation and dosimetry had been obtained from REAT-Forward.

The capability to implement relocation, re-entry, and return was demonstrated in the SEOC. There was some confusion on exactly what was to be demonstrated and what had been accomplished because of the controller injects that stated that actions had been taken. That issue aside, the staff addressed the problem of the expanded relocation area. The Maricopa County liaison was in almost

constant contact with staff in the Maricopa County Emergency Operations Center (MCEOC). The County staff advised the SEOC staff of appropriate road intersections to be used to establish access control to the relocation or restricted area. Based on a discussion of available roads and the lack of permanent population, a part of the extension of Sector G was included in the restricted area even though the data available indicated that there was no significant deposition in that area. The law enforcement personnel coordinated the establishment of 31 roadblocks. Some of the intersections were blocked by physical barriers and some were staffed. Barriers were the responsibility of either the Maricopa County Department of Transportation (MCDOT) or the Arizona Department of Transportation (ADOT). Staffing was arranged via discussions between the Maricopa County Sheriff's Office (MCSO), the Arizona Department of Public Safety (ADPS) and the Arizona National Guard.

Re-entry was to be allowed for specified necessary activities. All individuals requesting re-entry were directed to obtain documentation and dosimetry from REAT-Forward at the Buckeye Airport. The staffed roadblocks were to allow re-entry only if the individual was carrying appropriate paper work (received from REAT-Forward). On egress from the restricted area, individuals were directed back to REAT-Forward for monitoring and decontamination.

Return was allowed to those areas found to be free from any deposition, 0-10-miles in all Sectors except E, F, and G. Before the return decision was announced, the DADEM confirmed that all ACPs had been moved to new locations to accommodate the return decision. As the exercise terminated, staff were working on the reduction in size of the restricted area; however, since the original relocation decision was not based on existing PAGs, it was difficult to determine how to reduce the size of the restricted area.

### Areas Requiring Corrective Action

45-99-3-A-17. Unreviewed Information Disseminated to the Public

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

Objective 3

Demonstration Criterion: 1

1. **Description:** The Lead PIO brought some draft new releases to the ADEM before they were released but not all releases received adequate review. Many NRs contained information that would have created impacts for various agencies and these agencies were unaware of the content until after the NRs had been issued. As an example, New Release number 16, issued at 1155 on Day 1, stated that all private wells should be inspected before use without any indication of the area where the instruction was intended. When the representative of the ADWR became aware of the NR, he raised serious concerns. The system allowed questionable and erroneous information to be released to the public.

2. **Recommendation:** Ensure that all NR receive adequate review. Perhaps require that all NRs be signed by the appropriate Group Chief (Operations, Logistics, Policy etc) that is most impacted by the information in the NR.
3. **Corrective Action:** News Release #27 corrected this issue, that public water sources had been found safe and that private wells should also be safe. This release indicated that residents who returned to their homes after relocation or evacuation could schedule a test of their well if they were still concerned.

**Prior Areas Requiring Corrective Action – Corrected**

14. Initial Relocation Decision

NUREG-0654 Reference N.I.a.

Objective #28

Demonstration Criteria # 6

1. **Description:** The initial relocation decision made on Day 2 of the exercise was not made in accordance with the plan or the existing federal guidance for relocation. The initial decision was based on the DOE fly-over measurements which indicated that there were some areas which exceeded an exposure rate of 2 mR/hr. The ARRA Director did not want anyone to be exposed at these levels, so the decision to relocate was made before the DOE fly-over data was verified by field team measurements, sample analyses and relocation PAG dose calculations based on the field gamma measurements and laboratory isotopic analyses.
2. **Recommendation:** Follow the plan and procedures. If it is determined based on other factors, such as population density, that it is desirable to take relocation actions based on a pre-established exposure rate, such as 2 mR/hr, then revise the plan and have the revisions approved by the Regional Assistance Committee.

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 re-assured 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.

45-97-3-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.

ARCA #15 (from the 1993 IPZ exercise). SEOC Briefings

NUREG-0654 Reference A.2.a., A.2.b.

Objective 3  
Demonstration Criterion 1

1. **Description:** SEOC briefings did not include any discussion of information to the public regarding implementation of protective actions: ingestion of foodstuffs, re-entry process, etc.
2. **Recommendation:** Ensure that information is produced and made known to the SEOC staff regarding the public information aspects of ingestion protective action implementation.

ARCA #16 (from the 1993 IPZ exercise). Information to the Public on Produce and Food

NUREG-0654 Reference E.7

Objective #27  
Demonstration Criteria #3

1. **Description:** There was no public information on whether home produce was edible (oranges, for example) and whether food from their kitchens was safe to eat. Also, some people might have dairy animals or poultry not listed among commercial producers.
2. **Recommendation:** Provide information in News Releases (as described in the Plan).

ARCA #17 (from the 1993 IPZ exercise). Re-entry

NUREG-0654 Reference M.1

Objective 28  
Demonstration Criterion 2

1. **Description:** ADA personnel were expecting the TOC to provide a recommendation that farmers could re-enter to care for livestock in restricted areas. However, that information never came, and, as a result, dairy and other animals were without care for 2-3 days.
2. **Recommendation:** Identify a time period during which this activity should take place, if the situation permits. Also, ADA personnel should be more aggressive in obtaining supporting data for recommending a re-entry.

Prior Areas Requiring Corrective Action – Uncorrected

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.
2. **Recommendation:** Provide training to ensure the timely updating of all status boards and posted information.
3. **Corrective Action:** The maintenance of various displays has been centralized whereby a single operator now has the responsibility of updating displays. This change will enable consistent and accurate displays. Also, the handwritten message process has been fully automated. Information can be quickly disseminated to the emergency management community and throughout the SEOC. FEMA will look for correction of this issue during the next exercise, or a demonstration during a site visit.

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 NR, 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 NR 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 NR 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.
3. **Corrective Action:** The off-site plan and the EIS database have been updated to reflect current dairy location information. FEMA will look for correction of this issue during the next exercise, or a demonstration during a site visit.

ARCA #18 (from the 1993 IPZ exercise). Status Board Maintenance

NUREG - 0654 Reference A.1.d

Objective 2  
Demonstration Criterion 1

1. **Description:** No one posted the RCC Centers that were opened on Day 2 on the SEOC status board. This affected the timely update of the Public Inquiry status board since the Day 2 NRs were not available until 1045 of Day 3.
2. **Recommendation:** Train staff to maintain status boards in a timely manner.

#### o TECHNICAL OPERATIONS CENTER

There were five objectives established for demonstration, observation, and evaluation at the Technical Operations Center. (Objective numbers 2, 3, 4, 26, and 28). Three objectives were met, and two ARCAs were identified for two objectives. One ARCA from a previous exercise was corrected.

### FRMAC Advance Party Meeting:

The FRMAC Advance Party Meeting was conducted in the SEOC on November 16, at 1430. Those attending included representatives from the state of Arizona, the Gila Indian Nation, Maricopa County, U.S. Nuclear Regulatory Commission (NRC), and the U.S. Department of Energy (DOE). As defined in the Federal Radiological Emergency Response Plan (FRERP), the NRC was participating as the LFA and the DOE was fulfilling its responsibilities to establish a FRMAC. The FRMAC Director provided a brief overview of FRMAC operations, resources, and capabilities. Following this presentation, the FRMAC Director distributed a checklist to guide the Advance Party meeting. Items identified on this checklist included the following:

- Status of the emergency on-site
- Status of the emergency off-site including protective actions and confounding conditions that could impact field operations
- Establishment of communications and liaisons
- Possible integration of state, county, and FRMAC technical response assets
- Identification of state, Indian nation, county, and NRC areas of concern

Upon completion of the Advance Party Meeting, a smaller group convened to develop the initial FRMAC Monitoring and Sampling plan. This group consisted of the TOC TD; NRC's On-scene Commander and Protective Measurers Coordinator; and the FRMAC Director, Assessment Manager, and Monitoring Manager. The initial FRMAC monitoring and sampling plan focused on the following:

- Assessing the deposition footprint to support relocation protective action recommendations. This included identifying boundaries of the footprint and the isotopic composition
- Determining the re-suspension factors for the deposited radioiodines
- Documenting the radiological contamination of Interstate 10 and State Highway 85
- Confirming areas in the EPZ (except in Sectors E, F, & G) are not contaminated
- Determining radiological conditions at facilities, and residences located in the evacuated areas, which were not evacuated or must be reentered (chemical plants, farms, etc.) and assisting with radiological surveys of individuals exiting the contaminated area,
- Characterizing open water supplies (livestock) and open swimming pools

### Technical Operations Center

The adequacy of facilities, equipment, displays and other materials to support emergency operations was demonstrated. The TOC was well equipped to perform its emergency functions. Furnishings

and lighting were adequate, but the ventilation system within the TOC seemed to be overtaxed. Restrooms for men and women were available. A 125-kw emergency power generator provides backup power with a 350-gallon fuel supply. This is sufficient fuel for three days of continuous operation. As a capability check, the generator is operated for one hour each week. The generator underwent a major preventive maintenance and operational assurance check in May, 1999.

The TOC was equipped with seven commercial telephone lines. Four additional telephone lines were dedicated to provide direct communication with PVNGS. The TOC had a facsimile machine with copier capability. It had three computers, two of which were used to process field sampling and monitoring data, and the other was used to operate MAPINFO. MAPINFO is a Geographical Information System (GIS) program used for displaying maps containing data and information of operational concern, e.g. the evacuated and relocation areas, food embargo contour, locations of dairy farms, sampling and monitoring points, etc. In addition to the video display in the TOC, two large displays were active in the SEOC. This system provided an excellent vehicle to accurately and quickly display information resulting from field sampling, monitoring, and dose assessment activities and to graphically portray information resulting from PADs. However, while evacuation and relocation areas, food embargo zones, FCPs, and other areas and points of recovery-related interest were shown on the screen, these items were not labeled, and therefore not readily distinguishable for use by a busy SEOC staff. Also, the title of the GIS map on Day 2 was "Day 2 Evacuation Area," instead of the more accurate "Day 2 Relocation Area." On Day 7, the map was titled simply "Day 7."

The TOC was well equipped with maps, displays, and status boards to support the post-plume exposure pathway (ingestion-phase) operations of the TOC and the SEOC. During Day 2 activities, the status board in the TOC was updated promptly upon receipt of applicable information, and weather information was updated at not more than 30-minute intervals. However, on Day 7, the status board was not updated to reflect the current status of protective actions until 1048.

Access to the facility was controlled, and copies of the applicable plans and TOC procedures were available to persons in the TOC.

Two computers were provided and successfully used to process field team monitoring and radio-analytical data and perform dose calculations. This corrected ARCA #19 from the 1993 exercise.

The capability to direct and control emergency operations was demonstrated. The TOC Director was in-charge of the TOC. Under the TOC Director, the TOC Shift Supervisor was responsible for the execution of TOC responsibilities and activities. The TOC Director demonstrated the ability to effectively manage the TOC and the related emergency response activities and the TOC Shift Supervisor effectively supervised all operations and activities executed within the TOC.

The TOC Director provided timely and appropriate coordination and protective action recommendations (PAR) to other organizations and the SEOC Decision-makers.

The capability to communicate with all appropriate emergency personnel at facilities and in the field was demonstrated by personnel at the TOC. The following communications systems were available for use: seven commercial telephone lines, four dedicated telephone lines for communication with the PVNGS, a two-way radio system (Motorola Model DGT 9000) for communicating with REAT-Forward, a facsimile machine, as well as access to all of the communications systems of the SEOC. No malfunctions or breakdowns of equipment occurred. Backup systems were demonstrated, and all functioned properly.

The TOC demonstrated the capability to project dose to the public for the ingestion exposure pathway and recommend protective actions. The identification of the initial geographical area of concern was based on dose projections using the potential source term and relevant meteorology. The contaminated area was verified and redefined by field measurements of the gamma radiation levels and laboratory determinations of the radionuclide concentrations. The first radio-analytical results of leafy vegetables and produce samples were provided to the TOC on Day 2 at approximately 0955.

As stated in the state plan, Annex B – Radiological Technical Operations, Appendix 2: Accident Assessment, Tab A: Dose Calculations (page B-2-A-3); the state of Arizona applies the food Derived Intervention Levels (DILs) defined in the U.S. Department of Health and Human Services, Food and Drug Administration (FDA) Guidance document, *Accidental Radioactive Contamination of Human Food and Animal Feeds: Recommendations for State and Local Agencies* (August 13, 1998). The DILs are in units of radionuclide concentrations. The TOC accurately compared the laboratory radioanalysis results to the appropriated DIL to determine which food items exceeded the applicable DIL and which ones did not. None of the milk samples analyzed exceeded a DIL, but numerous leafy vegetables and produce sample analysis results were greater than the applicable DIL.

The capability to utilize laboratory radioanalytical results and field team monitoring data to calculate radiation exposure rates and doses corresponding to federal relocation PAGs in order to develop decisions on relocation, re-entry, and return was demonstrated by the TOC. A sampling plan was transmitted to the field teams by telephone at 0910 on Day 2 (November 17). First results of laboratory analyses of isotopic concentrations in soil, vegetation, produce, and air samples were received at approximately 0953.

Initially, a sub-program of a dose projection program termed 99ARAA was executed on one computer, and the RASCAL (Radiological Assessment System for Consequence AnaLysis) program was executed on the other. Both programs calculated dose projections relating to relocation protective action recommendations. Results from the two programs did not compare well, but 99ARAA program results matched closely with those generated by the FRMAC. Therefore, the use of RASCAL was terminated at about 1048 and the 99ARAA program was henceforth used on both computers for all dose calculations.

Laboratory analysis data from 15 samples from twelve field locations were used on Day 2 to calculate exposure rates, accident-specific dose conversion factors, derived response levels (DRL), and first-, second-, and fifty-year projected doses to persons in the "footprint" of the plume. These data were used to define areas corresponding to the federal PAGs for relocation of populations. Laboratory

results from an additional twenty samples from seven field locations were likewise processed on Day 7.

A factor was developed for converting gamma exposure rate measurements taken in the field at waist level, directly into the projected dose (rem) that an individual would receive during the first year of exposure. This factor was approximately 780. An exposure rate was derived (in mR/hr) that would correspond to the relocation projected PAG dose (2 rem) that would be received during the first year of exposure. This derived level was about 2.5.

The TOC GIS displayed relocation and food embargo areas on a video screen in the TOC and on two large slave monitors located in the SEOC.

GIS maps generated by the TOC staff and provided to the TOC Director and other SEOC staff throughout the exercise contained a potentially significant misrepresentation of data as translated from the AMS flyover map. The area outlined in blue by the AMS contained radiation exposure rates of 15 to 50 micro-R/hour. This was translated to the TOC GIS maps as the area, which contained radiation exposure rates of 50 to 200 micro-R/hour.

At the beginning of exercise Day 7, the TOC was provided with the laboratory results from 30 milk, food, air, and water samples. Projected doses were calculated and these data were used to support protective action recommendations and decisions. The TOC successfully demonstrated the calculation of projected doses on exercise Day 2. By exercise Day 7, the FRMAC would have been well established. FRMAC's radioanalytical capability includes access to every federal radiological laboratory in the United States plus many state and commercial facilities. The radioanalytical results from hundreds to thousands of samples would be available to the TOC. The TOC participation in exercise Day 7 would have been more productive if the TOC was provided with radiologically assessed data. This would have provided an opportunity for the TOC to characterize the off-site situation and define contours relating to the relocation PAGs, food DILs, and the boundaries of the deposition footprint.

### Areas Requiring Corrective Action

45-99-2-A-18. Presentation of GIS Information to SEOC Staff

NUREG-0654 Reference: H.3, J.10.a.b., 11

Objective 2

Demonstration Criterion: 1

1. **Description:** Evacuation and relocation areas, food embargo zones, FCP displayed on the GIS were not labeled and, therefore, were not readily distinguishable for use by a busy SEOC staff. The title of the GIS map on Day 2 was incorrectly titled as "Day 2 Evacuation Area", instead of "Day 2 Relocation Area."

2. **Recommendation:** Appropriately label areas of recovery-related interest, such as evacuation and relocation areas, food embargo zones, and food control points. Title GIS maps to accurately describe the nature of the information presented

45-99-28-A-19. Inaccurate Transfer of Data from AMS Flyover to GIS Maps

NUREG-0654 Reference: I.10, M.1

Objective 28

Demonstration Criterion: 1

1. **Description:** GIS maps generated by the TOC staff and provided to the TOC Director and other SEOC staff throughout the exercise contained a potentially significant misrepresentation of data as translated from the AMS flyover map. The area outlined in blue by the AMS contained radiation exposure rates of 15 to 50 micro-R/hour. This was translated to the TOC GIS maps as an area, which contained radiation exposure rates of 50 to 200 micro-R/hour.
2. **Recommendation:** Ensure that information and data portrayed on the GIS maps are accurate.

#### Prior Area Requiring Corrective Action-Corrected

ARCA #19 (from the 1993 IPZ exercise). TOC Equipment

NUREG-0654 Reference H, I.8, J.10, J.11.

Objective 2

Demonstration Criterion 1

1. **Description:** The single computer used in the TOC would not be adequate to handle the data from the number of field teams required in a real nuclear plant emergency affecting the public. Because of the large number of sample analyses that came into the TOC between 1000 and 1030, the person calculating projected doses and comparing the results to the PAGs got swamped. The computer referred to is used to convert field data to dose projections/percent of PAGs.
2. **Recommendation:** Provide at least two more computers for function of converting field data to projected doses/ percent of PAGs.

#### o REAT-FORWARD

There were five objectives selected for demonstration at REAT- Forward (Objective Numbers 2, 3, 4, 5, and 22). All objectives were met, and five ARCAs from previous exercises were corrected.

The adequacy of facilities, equipment, displays, and other materials to support emergency operations was demonstrated. REAT- Forward is located at the Buckeye Municipal Airport, south of Freeway

I-10 on Palo Verde Road. This location is also at the edge of the 10-mile EPZ. REAT- Forward utilizes two 2500 square foot hangers, located at the Buckeye Airport for operational and field activities. There is adequate space, furnishings, lighting, separate male and female restrooms and ventilation. Backup power would be supplied by a generator carried on the mobile laboratory. A portable butane powered space heater is available to provide heat and a large portable swamp cooler to provide cooling. Refrigerators and coolers are available for water, beverage and food storage.

Additional equipment includes two land-line telephones, cellular telephones, radios, a copier and facsimile machine that can also function as a copier.

Appropriate maps and displays, including the Initial "Flyover-Footprint" map, PVNGS 10-mile EPZ and 50-mile IPZ maps, and a Field Monitoring Grid Map were available to support facility operations.

Status boards, located in the Operations Room and the hanger's highbay were used to post pertinent information and were updated in a timely manner. A copy of the emergency plan was available at the facility for review.

There was no special security provided for the facility. However, in a real event, Maricopa County would provide armed deputies.

The capability to direct and control emergency operations was demonstrated. The REAT- Forward Captain maintained control and direction of activities at all times. He observed the issuance of dosimetry, briefed the staff on current conditions, provided instructions to the staff on adherence to the plan, and made available a copy of the current plan and procedures.

The Captain briefed the staff on radiation safety, including the turn-back exposure rate, the reportable exposure and the administrative exposure limit. He assigned tasks to the field monitoring teams (FMT), coordinated sample collection and monitoring activities of the teams, received and assessed data and insured timely transmission of the data to the TOC for evaluation. The REAT- Forward Captain also, provided for the retention of incoming and outgoing messages and transmissions.

The capability to communicate with all appropriate emergency personnel at facilities and in the field was demonstrated. The primary communications system utilized by REAT- Forward is a PVNGS trunked radio system that provided two channels, one for direct communications with the field and the other with the TOC.

Additional backup communications systems include cellular telephones, two land-line telephones, the ADEM Trunked Radio System, RACES and a facsimile machine.

Communications were established with FMTs A, B, and C and the TOC. REAT-Forward communicated with other organizations without undue delay, and there were no malfunctions or breakdowns in the equipment. Use of the backup cellular telephones was successfully demonstrated.

The capability to continuously monitor and control radiation exposure to emergency workers was

demonstrated. Personnel working for State and County Agencies assigned to the REAT-Forward had in their possession a wallet card thermoluminescent dosimeter (TLD) which is re-issued annually. The name of the user, organization in lieu of the Social Security Account Number, and serial number of the TLD was entered on an ARRA "TLD LOG" for later assignment of dose. This corrected a planning issue identified during the March 1999, exercise.

Each individual was issued two direct-reading dosimeters (DRD): a 0-200 mR and a 0-5 R. The user's name, organization in lieu of the Social Security Account Number, devices serial numbers, beginning and ending reading for each DRD and total dose recorded was entered on an "ARRA Dosimeter Log Sheet (Logsheet 99 7-15-99)."

The DRDs had been previously zeroed using a DRD charger. Personnel were aware of the requirement to read the DRDs every 30 minutes. The REAT-Forward staff were aware of the 1,000 mR/hr turnback exposure rate, the 500 mR authorized mission limit and the 200 mR reporting limit. This action partially corrected ARCA #45-99-5-A-6.

Procedures were followed to manage radiological dose so that REAT-Forward staff did not incur excess dose. The REAT-Forward Captain briefed all REAT-Forward personnel, including the FMTs, on the current event status and expectations for the day. The briefing addressed personnel dosimetry requirements as well as radiation exposure and contamination limits. Potassium iodide was not addressed because the post-plume FMT members were not expected to encounter significant airborne radiological contamination. The REAT-Forward Captain's briefing addressed all the appropriate emergency worker dose control criteria. This corrected ARCA #45-99-5-A-6.

All the team members demonstrated that they knew and understood the radiation exposure reporting level (200 mR), the administrative exposure limit (500 mR), the exposure rate turn-back limit (1000mR/h), and the surface contamination limit of 250 counts per minute (cpm). This corrected ARCA #45-99-5-A-7.

The adequacy of procedures for the monitoring and decontamination of emergency workers, equipment, and vehicles was demonstrated during an out-of-sequence demonstration, on the third day of play, designated as Day 7 of the scenario on November 18, 1999. The demonstration was done at REAT-Forward. This facility, including the monitoring functions, is managed by ARRA, and the vehicle monitoring and decontamination was under the management and direction of REAT-Forward Captain. The demonstration was a very good exercise and training experience and the personnel participating which included ARRA field radiation monitors, FRMAC advisors and firemen from the Buckeye Fire Department, performed their roles in a very professional manner.

The participants had previously been issued the proper dosimetry and all were aware of the various exposure reporting and mission limits. In addition, the vehicle monitors understood the instrument radiation reading that would indicate there was contamination present on the vehicle [(250 cpm) above background (net) or greater].

The vehicle monitoring and decontamination demonstration was performed in the planned area to the

east and adjacent to the REAT-Forward. There were two REAT-Forward monitors, the REAT-Forward Captain, and three Buckeye Fire Department firemen participating in the demonstration.

The Vehicle Monitoring/Decontamination personnel were told to wear gloves, but booties would be simulated. Also, the firemen were told that the REAT-Forward would furnish them with "tyvek" suits so that they would not get their own turn-out suits contaminated. In addition, the fireman did have face shields that could be worn to protect their faces from spray.

Traffic cones were established starting at the entrance to the Buckeye Airport (off Palo Verde Road) and divided the entrance road into two lanes down to the location where returning vehicles turn left and are directed to the vehicle monitoring station. Depending on the results of the vehicle monitoring, the vehicles are either directed to park in the "clean" parking area or directed to the contaminated parking area. In addition, an "orange" status label is affixed to the contaminated vehicle's windshield which includes information about, "date, time, vehicle license, impound: Yes or No, and area contaminated." This corrects a planning issue identified during the March 1999, exercise.

During this exercise, a Buckeye Fire Department Fire Engine was present with a three-person crew in order to decontaminate vehicles, if necessary. (Their procedures were discussed by interview in accordance with the extent-of-play agreement.)

The fire engine system was capable of injecting "radiac" wash into the water delivery system and capable of adjusting the pressure of the water stream. Procedures included starting with low (not a mist) or medium pressure and then adding more pressure if the first decontamination was not successful, i.e., contamination still remained.

The State policy is that, "if contaminated, the vehicle will be parked in a designated contaminated parking area until resources and time will allow decontamination efforts." In this instance and for the first time, the fire engine was actually present. Because of this, it became very apparent that the particular portion of the desert chosen, if water was added, would very quickly become a "mud bog."

A cart with wheels was provided to hold instrumentation at the vehicle monitoring station. The portable, radiation detection instruments used were Victoreen Model 190s, with pancake probes (Model 489-110D) (there was also a Geiger-Muller, open-closed shield probe, Model 491-40 available.) All of this equipment had been calibrated on 7/08/99. All of the instrument probes utilized were covered with thin plastic to protect against accidental contamination of the probe; however, one probe had a "tail" which prevented the monitor from getting close enough to personnel to adequately monitor them for contamination.

There were three vehicles monitored. A FMT vehicle, a Hickmans Egg truck (semi-cab and trailer), and a Sheriff's vehicle. There was a "Vehicle Decontamination" form completed for each vehicle that arrived at the Vehicle Monitoring Control Point. This form is page 5 in the 8 page "Radiation Survey Packet" provided at all Vehicle or Personnel monitoring locations. This packet (pages 6, 7 and 8) also contains the ARRA procedures for "Personnel/Vehicle Monitoring and Decontamination."

The FMT vehicle was the only contaminated vehicle. The form indicated 370 cpm on the left front wheel and 840 cpm on the left rear wheel. All of the passengers were directed to the personnel monitoring "hot-line" inside REAT-Forward, and the driver remained with the vehicle to drive it to the decontamination area next to the fire engine. This vehicle was decontaminated and re-monitored. The "Vehicle Decontamination" form completed post-decontamination indicated that no measurements exceeded background (70 cpm).

The vehicle's passengers were all monitored for contamination at the REAT-Forward "hot-line" after being directed from the vehicle monitoring station to the REAT-Forward along an established path lined with small orange "traffic cones." The "hot-line" step-off pads were arranged so that there was 5-6 feet between any two personnel being simultaneously surveyed for contamination. In addition, the proper monitoring techniques were employed during monitoring activities at the "hot-line." This demonstration corrected ARCA #45-97-22-A-11.

The Hickmans Egg truck, an 18-wheel semi-cab and trailer, presented a real training experience. After discussion and with advice from a FRMAC advisor, the team surveyed the bumper, grill, flat surfaces on the fenders and hood, checked all the tires and monitored the trailers air conditioner/refrigeration system. Since the fire engine with a ladder was present, the top of the semi-trailer could have been swiped if necessary.

All of the participants worked well together. The REAT-Forward Captain supervised the operation and was able to immediately correct (provide training) to the vehicle monitoring team. One member was initially reading the instrument dial and touching the surface of the vehicle with the covered probe instead of listening to the audible speaker for any increase in noise and visually maintaining the distance between the vehicle and the probe as 1-2 inches.

The Maricopa County Sheriff's Deputies demonstrated appropriate "hot zone" procedures and contamination control protocols. These actions corrected ARCAs, #45-97-22-A-9 and #45-97-22-A-10.

### Prior Areas Requiring Corrective Action-Corrected

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. 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 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).

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.

45-97-22-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 Criteria 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 three objectives established for demonstration, observation, and evaluation for the FMTs (Objective Numbers 4, 5, and 24). Two objectives were met, and one ARCA was identified for one objective. Two ARCAs from previous exercises were corrected.

The capability to communicate with all appropriate emergency personnel at facilities and in the field was demonstrated. Each FMT was equipped with trunked radios as the primary means of communication between the FMTs and REAT-Forward. They had cellular telephones as a backup system. Each FMT performed communications checks prior to leaving REAT-Forward. Both systems operated without problems during the exercise

The capability to continuously monitor and control radiation exposure to emergency workers was demonstrated. Each FMT member had in their possession a wallet card TLD which is re-issued annually. The name of the user, organization in lieu of the Social Security Account Number, and serial number of the TLD was entered on an ARRA "TLD LOG" for later assignment of dose. Each individual was issued two DRDs: a 0-200 mR and a 0-5 R. Each team was also issued an electronic DRD with a range of 0-999 R. Stickers on the DRDs indicated that they had been calibrated within the last 12 months. The user's name, organization in lieu of the Social Security Account Number, devices serial numbers, beginning and ending reading for each DRD and total dose recorded was entered on an "ARRA Dosimeter Log Sheet (Logsheet 99 7-15-99)." The DRDs had been previously zeroed using a DRD charger. FMT members were aware of the requirement to read the DRDs every 30 minutes.

The REAT- Forward staff were aware of the 1,000 mR/hr turnback exposure rate, the 500 mR

authorized mission limit and the 200 mR reporting limit.

Post-plume phase environmental monitoring is normally limited to low level radiation background areas where samples are expected to be less than 250  $\mu$ R/hr. At 1116, the FMTs were directed into radiological hot-spots where unexpectedly high levels of radiation (5.34 mR/hr) were encountered.

The FMTs contacted REAT-Forward for instructions; they were told to remain and obtain air and soil samples. Two FMTs left the hot-spots immediately after sampling; the other remained until 1246 awaiting further instructions from REAT-Forward. Although this would not have caused the FMT members to exceed their dose, it is contrary to good ALARA practice. The scenario data injected by the controller was conflicting and confusing, and was probably caused the FMT to remain in the hot-spot.

The use of equipment and procedures for the collection and transportation of samples from areas that received deposition from the airborne plume was demonstrated. Three FMTs, operating from REAT-Forward, demonstrated post-plume phase environmental sampling. Each team inventoried its assigned equipment and supplies. All items specified by the facility monitoring team procedures and necessary to obtain samples were present. Extra equipment, supplies, and batteries were readily available if needed. Radiation detection instruments provided to the teams included a Ludlum Model 14C  $\mu$ R meter with a 44-9 Probe, a Victoreen Model 190  $\mu$ R meter with a 491-40 Probe, and a RADECO Model 810DC Air Sampler. The FMT members performed response checks on the two  $\mu$ R meters using the radiation check sources provided and according to the instructions posted on the meters. All the instruments inspected had been calibrated within the past year as evidenced by the calibration labels affixed to each instrument. The environmental samples obtained by the teams included milk, soil, air, and vegetation. The teams also frequently monitored DRDs while sampling and, per the extent-of-play agreement, the use of personal protective equipment, except gloves, was simulated. Though some problems were noted in this demonstration, the teams' sample gathering techniques improved with time and, in general, overall performance was good. Some of the problems that were noted while obtaining sampling activities are listed below.

As directed by the REAT-Forward Captain, all three FMTs started the demonstration by taking a milk sample at a local dairy. One FMT member handled a potentially-contaminated item. Then, without changing gloves, he reached into the milk sample equipment bag. Consequently, the team's entire sample bag was potentially-contaminated. Later, a team member handled an air sample filter holder immediately after helping to bag a soil sample and without changing gloves. Consequently, the filter holder may have been contaminated. The FMT members discussed among themselves ways of improving contamination control. Though the team's contamination control techniques improved with time, some contamination control problems continued to be noted throughout the demonstration.

According to the FMT procedures, soil samples are to be taken over a one square foot area to a depth of one inch. One team encountered a layer of straw when they tried to gather their first soil sample. Rather than move to a new location, the team continued to dig into the straw. Therefore, the soil sample was not representative of one square foot and was much deeper than one inch. The team discussed their problems with obtaining the soil sample, and the subsequent soil sample taken by the team showed good technique and conformed to their procedures.

When directed by the REAT-Forward to take an air sample, the FMT member attached the negative lead of the air sampler to the negative battery terminal. By procedure, the air sampler is supposed to be grounded to the vehicle chassis and not the negative battery terminal. When this situation was brought to the team's attention, the team carefully examined their procedures and re-connected the air sampler correctly.

One team displayed very good operational techniques in the course of conducting sampling in a high-level deposition area. The team held a very good discussion on dose reduction techniques, and the use of personal protective equipment such as respirators, gloves, booties, and Tyvek suits. Samples were moved to a lower background area prior to counting. Very good contamination control techniques were also displayed. The team also effectively integrated into team activities a member of the FRMAC.

Several issues were identified relating to scenario problems. They are detailed below. During sampling activities at Grid Location F-0 Lower Left, the scenario package identified radiation readings of 5.34 mr/hr at 3 feet above ground and 769 mr/hr at 3 inches above ground. These readings were provided to team members. A soil sample was collected and the controller failed to consult the sample results table contained in the scenario package when providing radiation reading for the soil sample. Instead the controller provided the team with a sample reading of 796 mr/hr.

An air sample was also collected at Grid Location F-0 Lower Left. Upon field analysis of the air sample, the instrument readings of background were provided as the radiation level in the scenario package. In the presence of these radiation levels, the scenario should have, but failed to, provide a slightly elevated reading to account for the presence of radon daughter products and minor quantities of re-suspended materials versus the "as read" reading provided. Additionally the scenario package did not contain dosimeter readings for teams in a higher radiation area. This caused confusion for the controller and players and significantly detracted from the quality of exercise play at the sample location. When the team arrived back at REAT-Forward and was processing the samples through the receiving line, no scenario information was available and no controller injects were provided to indicate that the survey instruments at the receiving line were indicating elevated readings due to the presence of the 769 mr/hr sample. This omission caused additional confusion for the players.

In addition, a planning issue was identified when one of the FMTs delivered the 769 mr/hr soil sample to the receiving line at REAT-Forward and there was no procedure for handling high radiation level samples. Samples with radiation levels of this nature would disrupt all operations in the REAT-Forward area by significantly raising background radiation levels. All personnel monitoring, and contamination smear counting operations would have to cease until the sample was placed in an appropriate location. Additionally, a higher dose would be indicated on all dosimetry worn or stored in the area of the sample. Lacking procedural guidance, performance of players can not be ensured to ensure appropriate actions are taken to minimize doses and prevent disruption of REAT-Forward operations.

The scenario did not include sufficient data to support environmental sampling in the hot-spot. FMT sampling procedures specify that both open and closed window radiation reading are to be taken at

the sample locations. The sample scenario did not include the open window data. In the absence of data, one controller incorrectly stated that the open window reading should indicate background. The actual readings should have read no less than the closed window reading. Later, after taking an air sample, one team attempted to take a field measurement of the air sample cartridge while still in the hot-spot. When asked to provide the background radiation level, the team's controller incorrectly reported that background should read normal (i.e. 20  $\mu$ R/h). Upon further discussion, the FMT members demonstrated that they knew that they had to relocate to a low background area to count the air sample cartridge. Objective 8 was not demonstrated, but the team demonstrated the proper procedures and knew where to find the procedure. This action corrected ARCA #45-99-8-A-9 and ARCA #45-97-8-A-13. Overall, the significant lack of detail in the data in this scenario provided for a negative training experience for the FMT members and all personnel in the receiving line area at REAT-Forward. Future scenarios should provide a broader spectrum of data to support realistic conditions for players to elicit a more realistic response. Additional controller training to ensure quality of material and method of presentation should be provided to all controllers to help ensure a positive training experience is provided to participants.

A planning issue was identified when FMT-ALPHA was directed to take a 10 cubic foot air sample at Grid Location F-0 Lower Left. The 10 cubic foot air sample is the standard volume used by FMTs for Plume Phase monitoring. However, during Ingestion Phase activities, a 10 cubic foot air sample will not give the necessary representative re-suspension data needed for validation of relocation or reentry decisions. A much larger sample volume and/or duration is more appropriate for the data needed to support operations in the ingestion phase of the response. Additionally the equipment currently used for Plume Phase air sampling requires the FMT vehicle to remain at the sample location for the full duration of the sample. The air sampler used relies on the vehicle electrical system to provide operating power. For larger volume air samples, either a different air sampler or a vehicle independent power supply would be needed.

### Area Requiring Corrective Action

45-99-24-A-20. Inadequate contamination control

NUREG-0654 Reference: I.8., J.11

Objective 24

Demonstration Criterion: 1

1. **Description:** One FMT member handled a potentially contaminated item and then reached into the milk sample equipment bag without changing gloves. Consequently, the team's sample bag may have been contaminated. Later, a team member helped to bag-out a soil sample and then, without changing gloves, handled an air sample filter holder. Consequently, the filter holder may have been contaminated. Though the team's contamination control techniques improved with time, some contamination control problems continued to be noted throughout the demonstration.
2. **Recommendation:** Provide additional training on proper contamination control techniques.

## Prior Areas Requiring Corrective Action-Corrected

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.

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 ARRA LABORATORY

One objective was selected for demonstration, observation and evaluation for the ARRA Laboratory at REAT-Center (Objective Number 25). The objective was met.

The ARRA Laboratory demonstrated laboratory operations and procedures for measuring and analyzing samples during an out-of-sequence drill on November 17, 1999. The laboratory personnel utilized their laboratory facility and equipment to fully demonstrate the laboratory operations, equipment, and procedures for measuring and analyzing samples. ARRA also maintains a Mobile Laboratory at the REAT-Center laboratory facility. The mobile laboratory is parked in a garage bay and utilized daily for various types of measurements. During the Plume Phase exercises the Mobile Laboratory is driven to REAT-Forward. In this manner, the Mobile Laboratory is available to

analyze field samples such as particulate filters and air cartridges; but if REAT-Forward has to move, the Mobile Laboratory also acts as a mobile command center.

The ARRA REAT-Center, Radiation Measuring Laboratory (RML) is located at 4814 S. 40th Street in Phoenix. As one approached the ARRA Office facility, there were signs in front of the corner of the building and at the building entrance. These signs included a diagram that directed persons delivering Palo Verde samples to a back door at the laboratory. The signs were very clear and they were mounted on metal stands that should withstand the wind. There is a doorbell located at this door and the doorbell makes a distinctive noise inside the laboratory.

The extent-of-play was explained to FEMA the day before the exercise to include a demonstration of the transfer of field samples, including a chain-of-custody form from REAT-Forward to the CAP early during the exercise. Laboratory samples were supposed to be separate, different samples; and they would be at the Laboratory for the start of play at 0900. However, this did not happen.

At about 1000, the RML controller was provided a number of locations and asked to inject isotopic mix data for each location. The Controller then injected data for 8 samples: 1 produce sample, 3 leafy vegetable samples, and 4 soil samples. The results for the first of these samples were sent by facsimile to the TOC at 1010. This transmission consisted of both soil and leafy vegetable analyses. Additional transmissions were made at 1021, 1024, 1041, 1050, 1055.

The real samples (1 milk, 2 animal feeds, and 2 soils) arrived by courier at 1115. The samples had been flown from Buckeye Airport (REAT-Forward) to the Phoenix Sky Harbor Airport and were picked up by the courier. Unfortunately, the courier was not told whether it was South or North 40th Street.

A wheeled cart was placed outside at the back door on which arriving samples could be set. The back door opened into an area immediately adjacent to the "Wet Chemistry Laboratory." The floors in both rooms had been covered with absorbent paper, the carts also had paper coverings, and the inside of the fume hood was also lined.

A clean and contaminated waste bag was prepared and located within easy reach of the sample preparer. A scale located inside the fume hood was covered with plastic to prevent contamination. This scale or balance is checked daily with a standard set of weights. There are actually two scales. One with a 300 gram limit (used for particulate filters and iodine air cartridges, and etc.; and the larger "fume hood" scale with a 5 kilogram limit. Both of these scales are checked and certified annually.

After filling the sample counting container (a 1.8 liter Marinelli Beaker), any void space is filled with distilled water. The laboratory manufactures its own distilled water at a rate of about 20 -30 gallons per hour. There is also routine storage for about 20 gallons.

There were several radiation area monitors located throughout the facility.

At 1115, a courier arrived with a Chain-of-Custody Record for a chest with five samples. These samples had been received from a CAP pilot. The ARRA Screening Team wore gloves and utilized a radiation detection instrument to monitor the chest thoroughly before opening it. There was no external contamination. Upon inspection, one soil sample had a bright pink label affixed to the sample bag. This label was to indicate that the sample exceeded 250  $\mu\text{R/hr}$  on contact. Since the ARRA RML is a routine background counting laboratory, no sample exceeding 250  $\mu\text{R/hr}$  is allowed inside the RML unless the ARRA Director approves it. This type of sample is taken around the outside of the building and stored inside a room that is used for instrument calibration and source storage. This sample (#016) was taken to this temporary storage area. In addition, the Laboratory Manager is to be informed immediately that the sample is in the temporary storage area. The screening team did not want to interrupt the Manager and they told another person to tell the Manager when he was available. But the other employee was very busy and it was about an hour before the Manager was informed. As it turned out, the sample was not to be counted; but the problem did identify an area that could be improved.

The other four samples received from the courier were carefully checked, and the sample was enclosed in another new plastic bag. These samples were then wheeled on the cart to the fume hood to prepare the sample for counting. Procedures are available for Milk or Water, Fruit/Vegetable, and soil samples. Each of these procedures was used for the specific type indicated by the color of the field sample label: neon green - vegetation, neon orange - soil, and white-milk.

After preparation for counting, the excess sample was taken to the planned storage area and excess milk samples were taken to a refrigerator. The refrigerator already had about 20 samples being stored in it. Thus, there was only room for about five more. However, one of ARRA's neighbor businesses is an icemaker. Thus, ARRA personnel believe, if necessary, ice could be obtained and any milk or other perishable samples could be kept cool.

A "Sample Request Form Worksheet" was then completed for each sample. The entire sample was weighed. The empty counting geometry container and a clean plastic bag was weighed or tared, and the actual weight of the sample and container was recorded. The sample preparation team also assigned a laboratory number to the sample. The prepared samples were placed on another cart and the counting technician was notified. The samples were then taken to the Nuclear Instrument Laboratory (NIL). During this procedure the counting technician noticed that some of the controller-injected samples had the wrong units indicated. This was just one example of the excellent manner in which the participants performed the demonstration. They were not just following procedures. They also knew what had to be done and what the expected results of the tasks should be.

The ARRA NIL has three Germanium detectors in the instrument laboratory and another in the Mobile Laboratory. These are Ortec detectors with 42, 55, and 118% efficiencies. An 18% detector is in the Mobile Laboratory. The NIL also has a I220 Quantalus liquid scintillation counter and other automatic detectors used to count routine air sample cartridges. All of the counting equipment is routinely calibrated with calibration geometries which include a 1.8 Marinelli beaker, a "bean dip" can, a particulate filter, and an iodine air cartridge. All of the sources are traceable to the National Standards Institute of a foreign counterpart.

The software utilized is called Ortec Gamma Vision and provides a menu for the inclusion of units and the desired analyses units. The isotopes considered by the program can also be customized for each event depending on the type of accident. Emergency counting procedures have also been developed so that counting time is minimized to see what is desired. Emergency counting times are typically 10 minutes compared to a typical routine soil count of 5500 seconds (about 90 minutes).

The printout not only contains the results of the spectrum and activities for the isotopes included in the program; but it also indicates peaks that are real, but not identified by the library of isotopes provided. The counting results are then given to the Laboratory Manager; and after review, they are transmitted to the TOC.

#### o FOOD CONTROL POINT

There were two objectives selected for demonstration, observation and evaluation (Objective Numbers 5 and 27) at the Food Control Point. Both objectives were met, and no ARCAs were identified. There were no previous ARCAs.

The capability to continuously monitor and control radiation exposure to emergency workers was demonstrated. ADA and ARRA had in their possession a wallet card TLD that is re-issued annually. The name of the user, organization in lieu of the Social Security Account Number, and serial number of the TLD was entered on an ARRA "TLD LOG" for later assignment of dose. The ADA staff were issued two DRDs: a 0-200 mR and a 0-5 R. The user's name, organization in lieu of the Social Security Account Number, devices serial numbers, beginning and ending reading for each DRD and total dose recorded was entered on an "ARRA Dosimeter Log Sheet (Logsheet 99 7-15-99)." The DRDs had been previously zeroed using a DRD charger. Personnel were aware of the requirement to read the DRDs every 30 minutes. The FCP staff were aware of the 1,000 mR/hr turnback exposure rate, the 500 mR authorized mission limit and the 200 mR reporting limit. Procedures were followed to manage radiological dose so that REAT- Forward staff did not incur excess dose.

The capability to implement protective actions for the ingestion exposure pathway was demonstrated. The FCP was set-up in an open area adjacent to REAT-Forward. There were no signs or other posted information to indicate that a FCP was in operation at this location. A large tractor-trailer from Hickmans, a local egg producer arrived at the scene. Since the Hickman facility is located in the evacuated area and there was no manifest, and no controller data or injects, some confusion as to what actions to take was apparent. Based on the advice of the supervisor of ADA Egg Control, the truck was held for monitoring and checking the load.

When given some scenario clarification, the ADA correctly simulated the actions they would take and demonstrated the completion of a Form #1 ADA Palo Verde" which is a State of Arizona Certificate stating that commodities/items listed on the form are certified free from Radiological contamination.

The plan, Appendix 6 "Operations of Food Control Points" page 1, paragraph 3, states " no precedents for the operation of FCPs in Arizona. These instructions are intentionally written very

broadly to enable the person in charge the maximum latitude in the operation of the FCP. Standard ADA philosophy should be followed." A plan and a detailed implementing procedure needs to be prepared to specify set-up, staffing and operation of a FCP. The present plan specifies a positive survey result as twice background. It does not specify background in an area that may be elevated.

#### o RE-ENTRY POINT

Two objectives (Objective Numbers 5 and 29) were selected for demonstration, observation, and evaluation at the Re-entry Point. One objective was met, and one ARCA was identified for one objective. There were no previous ARCAs.

The capability to continuously monitor and control exposure to Re-entry Point workers and personnel entering the controlled areas was successfully demonstrated. All Re-entry Point workers were issued dosimetry at the REAT-Forward dosimetry distribution point prior to deployment. Each Re-entry Point worker was issued two DRDs. One DRD was a Dosimeter Corporation of America Model 611 DRD with a range of 0 to 5 R. The other DRD was a Dosimeter Corporation of America Model 862 DRD with a range of 0 to 200 mR. Additionally, each person assigned as a Re-entry Point worker possessed a permanently assigned wallet TLD card. All personnel reentering the controlled areas were issued a Dosimeter Corporation of America Model 611 DRD. All DRDs were charged and zeroed. A sticker on each dosimeter indicated that each DRD was calibrated within the last twelve months. Personnel in the Re-entry Point area monitored their DRDs at thirty-minute intervals. Personnel reentering the controlled areas were instructed to frequently monitor their DRDs and to exit the area when the DRD reads 0.2R (200mr per the procedure). Personnel at the Re-entry Point were briefed on the administrative limit of 500mr for termination of activities. Exposure records for all personnel were maintained at the REAT-Forward. The DRD and TLD identification numbers as well as the initial DRD readings were recorded at the time of issue.

The capability to implement appropriate measures for re-entry was demonstrated. The Re-entry Point was established at REAT-Forward. Facilities put in place to support the Re-entry Point demonstration included a contamination control point where the people returning from the evacuated areas are surveyed for contamination and an administrative area established in the REAT-Forward and two simulated re-entry control points established a short distance from the contamination control point.

Two REAT-Forward administrative personnel staffed the contamination control point along with and an individual assigned to perform radiation monitoring. The contamination control point setup included all the equipment and supplies needed to support the re-entry demonstration. Equipment available at the contamination control point included two Victoreen Model 190 portable  $\mu$ R meters with model 491-40 probes. The instrument response checks had been demonstrated the previous day and were not observed during this demonstration. Both Victoreen instruments were visually inspected and found to be within the calibration period. Sheriff's deputies staffed the simulated Re-entry Points. When available, the Re-entry Point staff also included a person assigned to perform radiation monitoring.

In this demonstration, three REAT-Forward staff members posed as dairy farmers requesting access to their respective dairies to tend to their animals. Administrative personnel at the contamination control point assisted the farmers in completing the necessary forms, issued each re-entering farmer a zeroed 0 to 5 R DRD, established the farmers allowable stay time, instructed the farmers in the special procedures and precautions associated with the re-entry, and directed the farmers to return directly to the REAT-Forward after they had left the evacuated zones. The instruction given to the re-entering farmers included directions for reading the assigned DRD. These instructions were very technical and possibly difficult for a member of the general population to understand. For example, the re-entering farmers were told to return to the REAT-Forward immediately if they noted a 200 mR reading on the 0 to 5 R DRD issued to them. In reality, 200 mR corresponds to the first tic mark on the 5 R DRD scale and may be difficult to read. Moreover, it is not intuitively obvious that the first tic mark on the 0 to 5 R scale corresponds to 200 mR. In addition, the persons to whom the DRDs are issued may not understand what the DRD "R" units mean or what the purpose of the DRD is.

Forms titled "Special Purpose Emergency Worker Procedure/Responsibilities" were used to document the re-entry and also advise the individual to check the DRD every 30 minutes and return to the REAT-Forward if a reading of 200 mR was observed. The issuance of a DRD and the identification of a maximum exposure limit clears the planning issue Number 7 that was identified during the March 9, 1999 exercise. In addition, these forms were completed in duplicate and included a detachable portion that served as an entry pass. The original copy of the form was retained at the REAT-Forward and served as the record of the farmer's entry into the evacuated area. When the farmer returned to REAT-Forward for radiological monitoring, the farmer's return time and route was supposed to be recorded on the pass. In one case, this form was incorrectly filled out. The contamination control point administrative staff member incorrectly understood that the form's return time block provided instruction to the re-entering farmer. When this farmer simulated the re-entry/return the sheriff's deputy working at the Re-entry Point did not notice that the form was incorrectly filled out. In addition, the deputy did not direct the farmer to return to REAT-Forward. Instead, the deputy instructed the farmer that he was free to proceed as he chose. Consequently, the REAT-Forward would not have had a record that the farmer had returned or that he had been surveyed for contamination.

Many people gathered in the area of the re-entry setup and were having an adverse impact on the Re-entry staff's exercise performance. People not associated with the re-entry demonstration were asked to leave the area and the Re-entry staff were asked to re-demonstrate the objective. At this point the REAT-Forward Captain stepped in, clarified the use of the re-entry form, and helped refocus the re-entry demonstration. Subsequently, REAT-Forward personnel successfully demonstrated the Re-entry objective including the appropriate use of the Special Purpose Emergency Worker Procedure/Responsibilities form.

### Area Requiring Corrective Action

45-99-29-A-21 Re-entry control forms were not filled out correctly.

NUREG-0654 Reference: N.I.a

Objective 29

Demonstration Criteria: 2

1. **Description:** In one case, the Special Purpose Emergency Worker Procedure/Responsibilities form was incorrectly filled out. The contamination control point administrative staff member incorrectly understood that the forms return time block provided instruction to the re-entering farmer. The sheriff's deputy working at the Re-entry Point did not notice that the form was incorrectly filled out. In addition, he did not direct the farmer to return to REAT-Forward. Instead, the deputy instructed the farmer that he was free to proceed as he chose. Consequently, the REAT-Forward would not have had a record that the farmer had returned or that he had been surveyed for contamination.
2. **Recommendation:** Train personnel to use the re-entry control forms.
3. **Corrective Action:** REAT-Forward personnel successfully re-demonstrated the Re-entry objective including the appropriate use of the Special Purpose Emergency Worker Procedure/Responsibilities form.

#### o DEPARTMENT OF AGRICULTURE COMMAND POST

There were four objectives (Objective Numbers 2, 3, 4 and 27) identified for demonstration, observation and evaluation at the Arizona Department of Agriculture Command Post. All four objectives were met, and the one ARCA from the 1993 exercise was corrected.

The adequacy of facilities, equipment, displays and other materials to support emergency operations was demonstrated. The ADA established the ADACP at their downtown office building at 1688 W. Adams in conference room 325. This room is not of sufficient size to hold all of the ADA personnel who would respond during a real event. A larger conference room on the second floor has been identified and is intended to be used in the future. Maps of the EPZ and IPZ, GIS maps with information on crops and livestock/dairies were displayed, and status boards were utilized and updated as play proceeded. This corrected ARCA #20 from the 1993 exercise. Computers, facsimile machines, and copiers, printers and other electronic equipment were available outside of the conference room in nearby offices. This equipment was accessible and used as needed.

The capability to direct and control emergency operations was demonstrated. The ADACP Chief is responsible for direction and control and for coordinating with the ADA personnel at the SEOC. This function and responsibility was adequately demonstrated during both days of the exercise. The ADACP Chief provided instructions to the staff as to the availability of the plan, the appropriate use

of the information in the plan, their responsibilities and what they needed to do to accomplish their tasks. The staff interacted in an effective and efficient manner to resolve questions, obtain data and research requested information. The staff provided expertise from their areas of responsibility to ensure that the organization was making informed decisions. All participants were involved in discussions, and decisions were made as appropriate between the ADACP and the ADA representatives at the SEOC.

The ADACP staff demonstrated the capability to communicate with all appropriate emergency personnel at facilities and in the field. The primary system is the commercial telephone located in the conference room. The primary backup system was cellular telephones. Each staff member had access to a cellular telephone. All ADA personnel have pagers so they can be contacted (paged with message/text) or notified to call the ADACP. There were no breakdowns in the communication systems, although there were breakdowns in communicating some exercise information. The ADA personnel at both locations communicated effectively regarding ADA activities. The ADACP staff researched information in response to SEOC ADA staff requests, and their responses were provided promptly. All verbal communications in response to requests were followed by hard copy facsimiles.

However, the information flow between the ADACP and the ADA personnel in the SEOC regarding actions taken by the State and the County was non-existent. Outside of the information provided by the controllers in the initial package, the ADACP staff received little, or no, information as to the other jurisdiction's actions. For example, ADPS re-opened I-10 on Day 2 and the ADACP did not know of this until the exercise terminated on Day 7. In addition, although the boundaries of the relocation areas were redefined early on Day 7, the ADACP staff was never provided the information. The concept of operations for this agency is that all information must be coordinated and all contact with other agencies/jurisdictions participating must be made through the ADA SEOC personnel. Because of the level of concentration and effort the SEOC ADA personnel must spend to focus on the activities taking place in the SEOC, they do not often have the time to describe actions taken by other participants. In order to relieve them of the burden of providing inter-jurisdictional information, perhaps an additional staff person could be utilized to relay such information to the ADACP staff. The ADACP staff have a "need to know" what Maricopa County and the State are deciding and how they are implementing those decisions.

The ADACP staff demonstrated the capability to implement protective actions for the ingestion exposure pathway. The ADACP staff were in constant communication with the ADA staff at the SEOC. Between the two locations, PARs were researched, and decisions were made and implemented.

At the start of the exercise on Day 2, documents consisting of the emergency plume phase data were provided to all participants. The ADACP was provided with a summary of the plant status, the utility NAN forms, PADs, EAS messages, MCSO roadblock locations, FMT results, the FRMAC flyover data, and the JENC NRs. The ADACP staff updated their EOC status boards and maps to reflect the information. On Day 1, the State and FRMAC had reviewed the data package, and defined additional actions taken. This included the activation of four FCPs (briefed to ADACP by SEOC ADA staff at the start of Day 2), the requirement to sample milk products coming out of the 50-mile

IPZ, and the extension of contaminated areas within the County (the "relocation" area). This information was provided to the ADACP staff during their first briefing.

ADACP staff then initiated discussions regarding the milk sampling and dairy operations in the evacuated/relocated areas. They identified 4 dairies which would be in the plume footprint. They contacted the UDA to determine what the Co-Op would do in case of an event like this. The UDA instructed the ADACP staff that their procedures would preclude the Co-Op from accepting any potentially contaminated milk from the area. All milk coming into the Co-Op would have to be monitored for contamination. No additional tanker trucks would be sent into the evacuated area or relocation zone area to collect milk. Later, the sampling area was reduced to the 10-mile EPZ (360<sup>0</sup>) and the 50-mile IPZ sectors E&F. ADA would have to have ARRA laboratory results indicating that there was no contamination prior to the UDA accepting milk or permitting their trucks to collect milk.

Concurrently, the ADACP staff initiated discussions regarding the crops and livestock in the evacuated and relocated areas. Feedlots were identified and crops were located on a map. The flyover map data was compared with the crop map to determine if there was any threat to crops intended for human consumption. The only crops identified in the potentially contaminated area were cotton and alfafa. All other crops, such as vegetables, had been harvested prior to the accident. No new crops were being planted. Cotton would be harvested in the near future. The disposition of the cotton and the cottonseed was discussed. The ADACP staff requested that the SEOC ADA staff inquire with ARRA as to the potential for the cottonseed to be contaminated and what precautions needed to be taken, e.g., sampling.

ADACP received a request for a staff person to accompany the CAP on a flyover to assist in identifying crops, dairies, feedlots, and to locate any range cattle. ADACP contacted one of their field staff and instructed him to arrive at Goodyear airport and assist the CAP. The ADA staff person went on a three-hour flight over the affected area. Photographs were taken and information was gathered and crops, locations and activities were confirmed.

During the exercise ADACP received a request to set up a "food restricted zone." The boundaries of the zone were provided, and the ADACP suggested that two more FCPs would be required. To ensure no one attempted to circumvent the FCPs, the ADACP requested assistance from Maricopa County to establish and staff additional roadblocks. In addition, the ADACP requested Arizona National Guard assistance at the six FCPs.

On Day 7 of the exercise, new data from the previous 4 days was injected by the controllers. This information included the downgrade of plant status to a Site Area Emergency ECL, an appropriate NR, and a new FRMAC flyover map. Additional sampling data was not provided. The ADACP staff started the Day 7 exercise by updating their status boards and maps with the new information. The ADACP relocated FCPs to appropriate locations, according to the new data, and they reduced the number of FCPs to five. The food restricted zone was reduced in size. Since milk samples results determined the milk was uncontaminated, the restriction of milk pick-up was released and UDA resumed normal operations.

ADACP was requested to facilitate the obtaining of two steers from four feedlots in the impacted area, take them to REAT-Forward, humanely destroy them, wrap them in a tarp, and take them to an EPA laboratory at Luke Air Force Base for monitoring and sampling. ARRA was contacted to determine stay times in the contaminated area, in order to determine resources needed to conduct this operation. ARRA instructed the ADACP that personnel could stay in the area for up to 12 hours in order to conduct work. ADACP staff requested National Guard support for transport of the deceased steers to Luke Air Force Base, ADA Livestock Officers would be the only persons permitted under law to euthanize the animals. The discussion included where the animals would be decontaminated prior to euthanasia and loading, the process for doing so, the means of loading them, the equipment needed to contain body fluids (tarps, tape), and straps to keep them from falling off during transport. Arrangements were made to purchase necessary supplies and get everything in place at REAT-Forward.

The result of sampling of the steers indicated that the meat was uncontaminated, but the hides were still contaminated after three washings. This caused new discussion as to what to do with the 2900 steers in those four feedlots. Euthanasia was discussed, but the disposal of the carcasses was an issue that took up the rest of exercise play. ADEQ was contacted to determine if there were any hazardous waste incinerators in a state that would accept radioactive contaminated steers. ADEQ responded that there were none. A local landfill was discussed as a location to bury the carcasses. Although ADEQ had made an agreement to accept chickens that had died during the emergency response phase of the event, they did not have an agreement in place to allow them to accept the cattle. Other possibilities were discussed, but none were identified before the exercise was terminated.

### Prior Area Requiring Corrective Action-Corrected

ARCA # 20 (from the 1993 IPZ exercise). ADACP Status Boards

NUREG-0654 Reference H.

Objective 2

Demonstration Criterion 1

1. **Description:** There were no status boards available in the ADACP to show the following: sample identification numbers, sampling times, sampling locations, products sampled or results of analyses if known.
2. **Recommendation:** Provide a status board in the ADACP facility for tracking important information.

## o JOINT EMERGENCY NEWS CENTER

There were six objectives established for demonstration, observation and evaluation at the Joint Emergency News Center (Objective Numbers 2, 3, 4, 12, 27, and 29). Five objectives were met and two new ARCAs were identified. One ARCA remains uncorrected.

The adequacy of facilities, equipment, displays and other materials used to support emergency operations was demonstrated. The JENC is located along with the SEOC on the Papago military reservation and has been established so that the utility, state, county and the federal government can coordinate briefings and NRs and provide them to the media at one location. National Guard personnel at the entrance to the reservation maintain security. The JENC has adequate space, furnishings, lighting, restrooms and ventilation. Backup power is available. The facility is divided into a separate PIO workroom and a media briefing area, both of which are adequate for their purposes. During this exercise however, media briefings were held in the Russell Auditorium which is a short distance away from the JENC facility. The PIO area contained both 10 and 50-mile IPZ maps. These maps were large enough to be visible from most areas of the PIO workroom. Stickers indicating evacuated zones and roadblocks were positioned on the map. Wind direction was also indicated on this map. Another board displayed the current ECL, EAS message number and NR number. The maps and status boards were promptly updated.

The capability to direct and control emergency operations was demonstrated. The Plan states that each JENC shift will be managed by a government or Arizona Public Service Company (APS)/PVNGS representative. On both days, the JENC was under the direction of the ADEM Spokesperson. She coordinated the efforts of staff from ADEM, Maricopa County Division of Emergency Management (MCDEM) and ADA and held several briefings to ensure that information released from the JENC was coordinated and accurate. She also moderated the three media briefings during the two-day exercise. In addition, the facility coordinator (a PVNGS employee) was available to moderate status update briefings among the PIOs from the various organizations.

The capability to communicate with all appropriate emergency personnel was demonstrated. Communications were conducted over commercial telephone and facsimile machines. The JENC has a sufficient number of commercial telephone lines for use by staff at the facility. Most staff also had access to cellular telephones. Communications were conducted primarily between the JENC and the SEOC and the JENC and the MCEOC. No communications equipment breakdowns were observed.

The capability to coordinate the development and dissemination of clear, accurate, and timely information to the news media was not adequately demonstrated. The JENC staff issued a total of 19 NRs (see Table 3). The JENC also issued one NR requested by NRC that carried that agency's name in the header. PIOs from the ADEM, MC DEM and ADA worked diligently to gather, refine and verify information that went into the NRs issued by the JENC. However, several NRs contained information that was inaccurate, confusing or conflicted with other sources.

NR #16 states in part that "private wells should be inspected". It was not stated what this process entailed, or who would perform the inspection.

NR #19 listed the roads that formed the boundary of the evacuated area. The description was in a form that was not easily understandable, and appeared to conflict with the description of the same boundary contained in EAS #4.

Two conflicting versions of NR #24 were issued by the JENC. The version (in final form) posted in the SEOC, with a release time of 1159, stated that there were FCPs at five specified locations. The version of NR #24 posted in the JENC, with a release time of 1302, listed the above five points, but referred to them as roadblocks. This version of NR #24 listed five different locations as food control check points.

NR #25 states in part that once the emergency phase is over, Emergency Classification Levels will not apply. This contradicts information contained in the EAS message and NR "J-00A" which were issued as part of the Day 7 briefing package. The JENC also displayed ECL status during the two days of the exercise.

In addition to these specific inaccuracies, several of the area descriptions contained references to sectors beyond the 10-mile EPZ without any reference to familiar landmarks, for example: "sector E from 10 to 14 miles was evacuated" (NR #10); "The food control zone was reduced today to sectors E and F to 21 miles" (NR #24). The sector boundaries stop at the 10-mile EPZ and it is therefore inaccurate to refer to areas beyond the 10-mile EPZ in terms of sectors.

The ADA Command Post (ADACP) did not receive any NRs from the JENC on Day 7. Several NRs were not sent to the MCEOC in a timely fashion (Example: NR #10, which contained the expanded "evacuation" was not sent to the MCEOC until 1020, almost one hour after it had been issued at the JENC.

As a result of these inaccuracies, ARCA #45-99-12-A-10, dealing with inaccurate NR text was not corrected.

**TABLE 3  
JENC NEWS RELEASES**

NUMBER <sup>1</sup>	ECL	TIME	COMMENTS
10	GE	0928	State continues to respond to conditions near PVNGS
11	GE	0945	DOE flyovers aid state response
12	GE	1023	ADEM provides post-emergency actions
13	GE	1035	Emergency Officials remind residents shelf-foods are safe
14	GE	1106	Doses computed following PVNGS release
15	GE	1137	"Information on radiation"
16	GE	1155	Water sampling concerns
17	GE	1229	"Radiation information" (residents in specified area advised against con- homegrown foods; dairy workers allowed to reenter)
18	GE	1256	Media advisory about next media briefing
19	GE	1351	Officials lift some reentry restrictions
20	SAE	0857	Insurance Assistance Available for PVNGS Event
21	SAE	0949	Public Meetings on Palo Verde
22	SAE	1006	Media advisory about next media briefing
23	SAE	1033	New borders for food and milk containment areas
25	SAE	1157	Terms used in responding to events at PVNGS
26	SAE	1158	Emergency Status Update
27	SAE	1300	Well water and public water supply systems are safe
24	SAE	1302	Food control point and roadblock locations; Workers to clean up egg ranch: Cattle from four feedlots sampled for radiation. <i>(issued out of sequence)</i>
28	SAE	1313	West Valley Residents invited to public meeting

<sup>1</sup> NRs 1 through 9 were plume-phase releases issued as part of the initial briefing package and were not developed by the players.

Three media briefings (see Table 4) were conducted at the Russell Auditorium, which is listed as an alternate media briefing location in the Joint Public Information Procedures. Representatives from ADEM, ARRA, DOE/FRMAC, NRC, MCDEM and ADA conducted the first briefing. For the second and third briefings these representatives were joined by spokespersons from American Nuclear Insurers (ANI) and PVNGS. The first briefing suffered from a lack of specifics regarding the emergency. Agency speakers tended to make general statements about their response to the situation. There was no mention of any ingestion protective actions to be taken by the public. There was also no mention of the extent of and revision to the evacuated area until this subject was brought up by a question from the audience. The next two briefings tended to have more specifics on these matters. There was a 50-mile IPZ map available to show the extent of the evacuated area, but this was not used. During the second briefing a spokesperson pointed from his chair to the "AMS flyover map that you see on the board." The map could have been used as an aid to helping the audience

understand the extent of the contamination. During the third briefing which took place on “Day 7” of the incident, this same AMS map (Day 2 data) was also on the platform and referred to in passing even though this was no longer the most current data available. During the first briefing, none of the speakers acknowledged that “this is an exercise” before making their statement. This was less of a problem during the second briefing and not a problem during the third briefing.

**TABLE 4  
MEDIA BRIEFINGS**

NUMBER	TIME	COMMENTS
1	1100	Conditions at plant have stabilized; Area in Sectors E & F to 17 miles is area contamination is being found; 300-plus soil and vegetation samples have been gathered.
2	1500	All residents except those in sectors E, F and G to 17 miles will be allowed to return. No restrictions on activities for people allowed to return. People needing to reenter EPZ for specific reasons must go to Buckeye airport.
3	1100	Area currently evacuated will remain so for at least 21 days; 7,000 samples have been analyzed to date; Food control and milk control zones reduced to E and F to 21 miles.

The capability to implement protective actions for the ingestion exposure pathway was demonstrated. The following protective actions were disseminated to the public via NRs:

- Place milk-producing animals on stored feed and protected water
- Place animals in a sheltered area
- Do not eat home-grown fresh fruit/vegetables until sampling is completed
- Monitor poultry and egg production
- Quarantine and embargo agricultural products.

The capability to implement relocation, re-entry, and return was demonstrated. Public instructions on relocation were issued. Evacuated individuals, who were not allowed to return to the restricted zone, were advised of their change in status from evacuated to relocated.

**Areas Requiring Corrective Action**

45-99-12-A-22 Media Briefings

NUREG-0654 Reference: E.7.G.4.a.

Objective 12

Demonstration Criterion: 2

1. **Description:** During the first media briefing, speakers did not provide specifics on the extent of the evacuated area, which ingestion PAs were in effect, did not use available graphics to clarify the incident specifics and neglected to begin and end their statements with “This is an exercise”. Out-of-date AMS flyover data was displayed during the third briefing.

2. **Recommendation:** Ensure that the guidance for JENC briefings contained in the Joint Information Procedures is followed

45-99-12-A-23 External distribution of NRs

NUREG-0654 Reference: E.7.;G.4.b.

Objective 12

Demonstration Criterion: 3

1. **Description:** The ADACP did not receive any NRs from the JENC on Day 7. Several NRs were not sent to the MCEOC in a timely fashion (example: NR #10, which contained the expanded evacuation was not sent to the MCEOC until 1020, almost one hour after it had been issued at the JENC).
2. **Recommendation:** Ensure that NRs are distributed to all appropriate locations in a timely fashion.

### Prior Areas Requiring Corrective Action – Uncorrected

45-99-12-A-10 Confusing NR text

NUREG-0654 Reference: E.7

Objective 12

Demonstration Criterion 2

1. **Description:** Several NRs contained information that was inaccurate, confusing or conflicted with other sources. NR #16 states in part that "private wells should be inspected". It was not stated what this process entailed, or who would perform the inspection. NR #19 listed the roads which formed the boundary of the evacuated area. The description was in a form that was not easily understandable, and appeared to conflict with the description of the same boundary contained in EAS #4. Two conflicting versions of NR #24 were issued by the JENC. The version (in final form) posted in the MCEOC, with a release time of 1159, stated that there were FCPs at five specified locations. The version of NR #24 posted in the JENC, with a release time of 1302, listed the above five points, but referred to them as roadblocks. This version of NR #24 listed five different locations as food control check points. NR #25 states in part that once the emergency phase is over, Emergency Classification Levels will not apply. This contradictory information contained in the EAS message and NR "J-00A" which were issued as part of the Day 7 briefing package. The JENC also displayed ECL status during the two days of the exercise. In addition to these specific inaccuracies, several of the area descriptions contained references to sectors beyond the 10-mile EPZ without any reference to familiar landmarks, for example: "sector E from 10 to 14 miles was evacuated" (NR #10); "The food control zone was reduced today to sectors E and F to 21 miles" (NR #24). The sector boundaries stop at the 10-mile EPZ and it is therefore inaccurate to refer to areas beyond the 10-mile EPZ in terms of sectors.

2. **Recommendation:** Ensure that all portions of the news releases are appropriate and accurate.

o MARICOPA COUNTY EMERGENCY OPERATIONS CENTER

There were six objectives identified for demonstration, observation and evaluation at the MCEOC (Objective Numbers 2, 3, 4, 11, 27 and 29). All objectives were met.

The adequacy of facilities, equipment, displays and other materials to support emergency operations was demonstrated. The facility had adequate space and furnishings to support the number of personnel that reported for the operations. The major portion of the Operations Center housed the representatives from MCDOT, Health and Environmental Services, MCSO, ARC, the PIO, Communications Officer, and support staff. A policy room, adjacent to the main work area is under construction. Ventilation and lighting is adequate. Health and comfort needs such as the restroom, sleeping areas, kitchens, and laundry area were available. An electrical generator and 2400-gallon fuel tank can provide backup power for up to twenty-eight days in the event of a power failure.

Computers at each workstation supported GIS capability and the Emergency Information System EIS. The GIS database contained information such as population densities, location of sirens, food processing plants, agricultural areas, meat and poultry producers, feed lots, dairy farms and other pertinent. The GIS capability has the potential to facilitate the creation of maps that indicate deposition area, affected populations and businesses, roadblocks, entry points and information relevant to the scenario and response actions. A sliding board map was also available as a backup should the GIS system fail. However, the lack of information from the lead controllers prevented the timely update of the status boards.

The capability to direct and control emergency operations was demonstrated. At the onset of Day 2, the MCEOC was prepared to respond to the situation as discussed at the Day 1 meeting. As exercise activities got underway, information relayed from the SEOC changed the situation. Maps could not be transmitted electronically from the SEOC to the MCEOC because there is no email system between the two centers. The SEOC sent a copy of the new map to the MCEOC via facsimile. A period of time elapsed before the MCEOC administrative staff realized that there was no paper in the fax machine, which added to the delay in receiving the updated map. In the meantime, a runner was sent to the SEOC to collect the new data and map. The delay in set-up to depict the appropriate situation took all morning. This also caused them to neglect updating the status board with the PADs. Despite this, the MCDOT, MCSO, Health Services, and ARC continued to work their responses with their SEOC counterparts to get the correct information and in turn, coordinated with their base organizations to mobilize personnel. The delay in getting the correct map did not impact the implementation of the protective actions.

The representatives of the other county agencies and the support staff coordinated efficiently in implementing the PADs made by the decision group in the SEOC. The Chief held hourly briefings so staff were updated on activities that were underway, resolved conflicts, provided new information, requested follow-up on some issues, and emphasized the need to log entries in the EIS. Frequent

updates to other towns not directly affected by the incident were accomplished via telephone.

The capability to communicate with all appropriate emergency personnel at facilities and in the field was demonstrated. Communication equipment was sufficient to support emergency operations. Dedicated voice and facsimile lines between the SEOC and MCEOC were in use. Microwave communication was also available between PVNGS and the MCEOC. The EIS was used to maintain logged entries of activities taken by participants and messages sent and received within the MCEOC.

Commercial telephone lines were used by the other organizations to communicate with their respective agencies and personnel in the field. These communication lines and equipment did not malfunction during the exercise. However, because there was no paper in the fax machine, there was a minor delay in receiving some messages.

The capability to coordinate the formulation and dissemination of accurate information and instructions to the public was demonstrated. The Operations Chief, his deputy, and the PIO simulated sending an EAS message to KTAR Radio Station via a Red telephone that is directly linked to the station. It clearly and accurately stated the protective action recommended by the decision-makers, instructed the public to remain tuned to the EAS station and gave a telephone number for the public to call for additional information. Sectors and road boundaries were identified for return. This message was also translated into Spanish. The pre-scripted EAS message was not used because it did not contain the necessary information that needed to be disseminated. The towns and cities that were not under the protective action recommendations were provided updates directly by the Intelligence Officer in the MCEOC via telephone. Copies of the messages and NRs were maintained.

The capability to implement protective actions for the ingestion exposure pathway was demonstrated. The MCEOC easily identified the impacted area, water sources, food supplies, and milk products and populations that needed to be reached by using the GIS. It facilitated the implementation of the protective actions for the ingestion exposure pathway. The Health Service representatives acted immediately upon being notified of the food embargo on food processors and food warehouses in an area south of Broadway and east to Meridian Road. A list was prepared quickly. At approximately 0925, sanitarians were mobilized to the field. Rumors regarding contaminated water and food in some areas were addressed and corrected immediately. A list of wells located within the impacted area in sectors E, F, & G was prepared, and inspection of wells for possible contamination was available to those that requested it. This issue of well testing, among other issues, was being addressed at the evening meeting conducted by the State.

The capability to implement relocation, re-entry, and return was demonstrated. The Chief made sure that everyone understood information regarding return, relocation, and re-entry. Transportation was available for those that needed it. The relocation of evacuees to hotels was also accomplished. Deputies were dispatched to re-entry and control points and instructed to check that those seeking re-entry had obtained the appropriate pass. Evacuees that lived in areas not contaminated by the plume were instructed to return after the evacuation restriction was lifted.

## 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
ADACP	Arizona Department of Agriculture Command Post
ADHS	Arizona Department of Health Services
ADOT	Arizona Department of Transportation
ADEM	Arizona Division of Emergency Management
ADEQ	Arizona Department of Environmental Quality
ADGF	Arizona Department of Game and Fish
ADPS	Arizona Department of Public Safety
ADWR	Arizona Department of Water Resources
A&N	Alert and Notification
AMS	Aerial Measuring System
ANI	American Nuclear Insurers
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
μcc	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
μCi	micro-curie
cm <sup>3</sup>	cubic centimeter
cpm	counts per minute
DADEM	Director, Arizona Division of Emergency Management
DIL	Derived Intervention Level
DOE	Department of Energy
DRD	Direct-Reading Dosimeter
DRL	Derived Response Level

EAS	Emergency Alert System
ECL	Emergency Classification System
EEM	Exercise Evaluation Methodology
EIS	Emergency Information System
EOC	Emergency Operations Center
EOF	Emergency Operations Facility
EPA	Environmental Protection Agency
EPZ	Emergency Planning Zone
ESF	Emergency Support Function
FAA	Federal Aviation Administration
FCP	Food Control Point
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
FMT	Field Monitoring Team
ft <sup>3</sup>	cubic foot
FR	Federal Register
FRERP	Federal Radiological Emergency Response Plan
FRMAC	Federal Radiological Monitoring and Assessment Center
FRP	Federal Response Plan
GE	General Emergency ECL
GIS	Geographic Information System
GM	Geiger-Müller
GSRMC	Good Samaritan Regional medical Center
HF	High Frequency
ICS	Incident Command System
IPZ	Ingestion Pathway Zone
JENC	Joint Emergency News Center
KI	potassium iodide
kw	kilowatt
LFA	Lead Federal Agency
l	liters
ml	milliliters

m <sup>3</sup>	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
MCSSO	Maricopa County Sheriff's Office
MP	Medical Physicist
NAN	Notification and Alert Network
NAWAS	National Warning System
NIL	Nuclear Instrument Laboratory
NMT	Nuclear Medical Technician
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
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
REA	Radiation Emergency Area
REAT	Radiological Emergency Assessment Team
REAT-F	Radiological Emergency Assessment Team - Forward
rem	Roentgen Equivalent Man
REP	Radiological Emergency Preparedness
RERP	Radiological Emergency Response Plan
RML	Radiation Monitoring Laboratory
RPT	Radiation Protection Technician
R/hr	Roentgen(s) per hour
mR	milliroentgen (10 <sup>-3</sup> Roentgen)
mrem	millirem (10 <sup>-3</sup> 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
UDA	United Dairymen's Association
UHF	ultra-high frequency
USDA	United States Department of Agriculture
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 Post-Plume Phase Exercise on November 16-18, 1999, and the Off-site Medical Drill on December 3, 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  
DOT - Department of Transportation  
FDA - Food and Drug Administration  
INEEL - Idaho National Engineering and Environmental Laboratory

#### POST-PLUME PHASE EXERCISE

##### NOVEMBER 16, 1999

<u>EVALUATION SITE</u>	<u>EVALUATOR</u>	<u>ORGANIZATION</u>
Technical Operations Center	Daryl Thomé Lyle Slagle	ANL (TL) ANL

##### NOVEMBER 17, 1999

<u>EVALUATION SITE</u>	<u>EVALUATOR</u>	<u>ORGANIZATION</u>
Arizona State Emergency Operations Center	Joe Keller Chuck Arnold Bill Van Pelt Neil Johnson Ed Henry	INEEL (TL) FEMA RIX ANL FEMA RIX DOT
Technical Operations Center	Daryl Thomé Lyle Slagle	ANL (TL) ANL
Arizona Department of Agriculture Command Post	Jacques Mitrani	ANL
ARRA Laboratory	Dave Duncan	ANL

<u>EVALUATION SITE</u>	<u>EVALUATOR</u>	<u>ORGANIZATION</u>
Radiological Emergency Assessment Team Forward	Frank Bold	ANL (TL)
Field Sampling Teams	Ron Alexander Forrest Holmes Gerry Gibeault	FDA INEEL INEEL
Joint Emergency News Center	Richard Converse	ANL
Maricopa County Emergency Operations Center	Tessa Badua-Larsen Elena Joyner	FEMA RIX (TL) FEMA RIX

**NOVEMBER 18, 1999**

<u>EVALUATION SITE</u>	<u>EVALUATOR</u>	<u>ORGANIZATION</u>
Arizona State Emergency Operations Center	Joe Keller Chuck Arnold Bill Van Pelt Neil Johnson Ed Henry	INEEL (TL) FEMA RIX ANL FEMA RIX DOT
Technical Operations Center	Daryl Thomé Lyle Slagle	ANL (TL) ANL
Arizona Department of Agriculture Command Post	Jacques Mitrani	ANL

<u>EVALUATION SITE</u>	<u>EVALUATOR</u>	<u>ORGANIZATION</u>
Radiological Emergency Assessment Team Forward		
Emergency Worker Vehicle Monitoring and Decontamination	Dave Duncan	ANL
Food Control Point	Frank Bold Ron Alexander	ANL (TL) FDA
Re-entry Point	Forrest Holmes Gerry Gibeault	INEEL INEEL(TL)
Joint Emergency News Center	Richard Converse	ANL
Maricopa County Emergency Operations Center	Tessa Badua-Larsen Elena Joyner	FEMA RIX (TL) FEMA RIX

Richard Echavarría, FEMA RIX, Evaluation Team Leader  
Tom Ridgeway, FEMA RIX, RAC Chair  
Elena Joyner, FEMA RIX, Administrative Support

**MEDICAL DRILL**

<u>EVALUATION SITE</u>	<u>EVALUATOR</u>	<u>ORGANIZATION</u>
Good Samaritan Regional Medical Center	Frank Bold	ANL

## APPENDIX 3

### 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 Post-Plume Phase Exercise on November 16-18, 1999, and the Off-site Medical Drill on December 3, 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 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 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 20: MEDICAL SERVICES - TRANSPORTATION**

Demonstrate the adequacy of vehicles, equipment, procedures, and personnel for transporting contaminated, injured, or exposed individuals.

**OBJECTIVE 21: MEDICAL SERVICES - FACILITIES**

Demonstrate the adequacy of equipment, procedures, supplies, and personnel of medical facilities responsible for treatment of contaminated, injured, or exposed individuals.

**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 24: POST-EMERGENCY SAMPLING**

Demonstrate the use of equipment and procedures for the collection and transportation of samples from areas that received deposition from the airborne plume.

**OBJECTIVE 25: LABORATORY OPERATIONS**

Demonstrate laboratory operations and procedures for measuring and analyzing samples.

**OBJECTIVE 26: INGESTION EXPOSURE PATHWAY - DOSE  
PROJECTION AND PROTECTIVE ACTION DECISION-  
MAKING**

Demonstrate the capability to project dose to the public for the ingestion exposure pathway and to recommend protective actions.

**OBJECTIVE 27: INGESTION EXPOSURE PATHWAY - PROTECTIVE  
ACTION IMPLEMENTATION**

Demonstrate the capability to implement protective actions for the ingestion exposure pathway.

**OBJECTIVE 28: RELOCATION, RE-ENTRY, AND RETURN - DECISION  
MAKING**

Demonstrate the capability to develop decisions on relocation, re-entry, and return.

**OBJECTIVE 29: RELOCATION, RE-ENTRY, AND RETURN -  
IMPLEMENTATION**

Demonstrate the capability to implement appropriate measures for relocation, re-entry, and return.

## **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 Post-Plume Phase Exercise on November 16-18, 1999, and the Off-site Medical Drill on December 3, 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.



JANE DEE HULL  
GOVERNOR

STATE OF ARIZONA  
*Division of Emergency Management*  
5636 EAST McDOWELL ROAD  
PHOENIX, ARIZONA 85008-3495  
(602) 244-0504 1-800-411-2335



MICHAEL P. AUSTIN  
DIRECTOR

July 29, 1999

Mr. Tom Ridgeway  
Chair, Radiological Assistance Committee, Region IX  
Federal Emergency Management Agency  
Building 105, P.O. Box 29998  
Presidio of San Francisco, CA 94129

Dear Mr. Ridgeway:

Enclosed for your information and action is the joint State of Arizona and County of Maricopa Exercise Objectives and Extent of Play for the November 17-19, 1999 Post Plume Exercise.

This joint Federal, State, County and Utility Exercise will complete the requirements of the six year cycle for Arizona as stipulated in NUREG-0654, Revision 1.

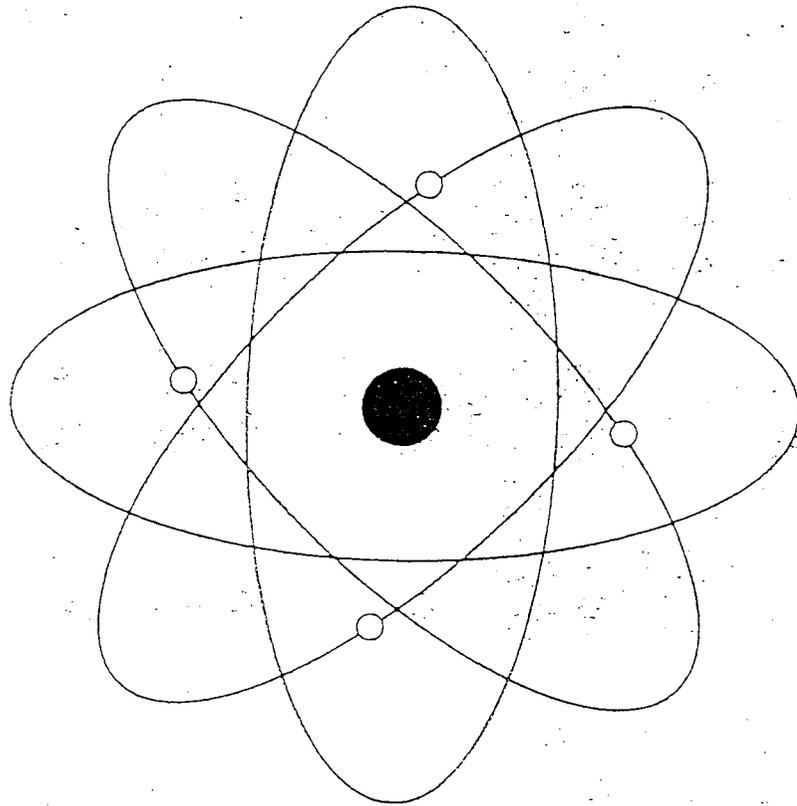
If you have any questions, please contact Mr. Harry Border at (602) 231-6214.

Sincerely,

  
Michael P. Austin  
Director

# Post - Plume Exercise

"99"



*Ingestion, Relocation, Re-  
Entry and Return*

*16-18 Nov 99*

*EVALUATED POST PLUME EXERCISE - PALO VERDE  
NUCLEAR GENERATING STATION 16-18 NOV 99*

*OBJECTIVES AND EXTENT OF PLAY*

- Objective 2. Group A: Facilities, etc.

Extent-of-Play: Demonstrated at each location as appropriate.

- Objective 3. Group A: Direction and Control

Extent-of-Play: Operations administered by each facility will be directed and controlled by the appropriate managerial staff.

- Objective 4. Group A: Communications

Extent-of-Play: Primary communications systems will be utilized as required by the scenario.

- Objective 5. Group A: Emergency worker, etc.

Extent-of-Play: The appropriate dosimetry and equipment will be utilized to control radiological exposure to emergency workers. Radiological assessments will control personnel deployments where necessary.

- Objective 11. Group A: Public Instructions, etc.

Extent-of-Play: State protective action decisions (PAD) will be formulated and transmitted to the appropriate locations. The dissemination of accurate information and instructions to the public will be demonstrated.

- Objective 12. Group A: Emergency Information-Media

Extent-of-Play: The media will be simulated for emergency information dispensation. The Joint Emergency News Center (JENC) staff will produce coordinated press releases and conduct oral briefings to simulated media personnel. The JENC will be partially activated. Oral briefings will be conducted in Russell Auditorium, Building 101.

NOTE: See attached Summary for Objectives, Dates and Locations.

- **Objective 13. Group A: Emergency Information - Rumor Control**

Extent-of-Play: This objective will be fully demonstrated.

- **Objective 22. Group B: Emergency workers, etc: monitoring and decontamination.**

Extent-of-Play: The monitoring of one vehicle will occur at the Buckeye Airport though out-of-sequence with scenario. Procedural and equipment requirements will be demonstrated. Personnel and equipment decontamination will be simulated. During an interview, the decontamination process will be described to an evaluator.

- **Objective 24. Group C: Post-Emergency Sampling**

Extent-of-Play: This objective will be fully demonstrated. REAT team members will simulate the use of protective clothing and related equipment. REAT forward will have been activated and in place when play begins. Sample collection and transportation will occur using the appropriate equipment, instrumentation, and procedural instructions. Charcoal filters will substitute for Silver Zeolite in performance of sampling techniques. Several samples will be pre-staged for transport and laboratory evaluation at the start of play.

- **Objective 25. Group C: Laboratory Operations**

Extent-of-Play: This objective will be fully demonstrated, though out-of-sequence with scenario. This demonstration will take place at the ARRA Laboratory, 4814 S. 40<sup>th</sup> Street, Phoenix.

- **Objective 26. Group C: Ingestion Exposure Pathway - Dose Projection and Protective Actions**

Extent-of-Play: This objective will be fully demonstrated. Radiological dose assessments, projections and protective action recommendations by State personnel will be continuously performed and demonstrated as necessary. Specific portions of several follow-up activities will be simulated. All roadblocks and the establishment and activation of the Maricopa County Sheriffs' Office (MCSO) On-Scene Command Post will be simulated, as they were demonstrated during the 1999 plume phase exercise.

- **Objective 27. Group C: Ingestion Exposure Pathway - Protective Action Implementation**

Extent-of-Play: This objective will be fully demonstrated, though the food control point will be out-of-sequence with scenario. The Arizona Department of Agriculture (ADA) will coordinate activities and implement the protective strategies associated with the embargo of contaminated agricultural products. Information and instructions will be available for distribution to pre-determine individual and businesses.

- Objective 28. Group C: Relocation, Re-Entry and Return - Decision Making.

Extent-of-Play: This objective will be fully demonstrated. Classroom 1, Building 101, will be utilized as a conference facility during the exercise.

- Objective 29. Group C: Relocation, Re-Entry and Return Implementation

Extent-of-Play: This objective will be fully demonstrated. Three Reception and Care Centers will be designated for evacuees, however operations will be simulated. The re-entry point demonstration will be out-of-sequence with scenario.

## SUMMARY OF EXPECTED EXERCISE OBJECTIVES, DATES AND LOCATIONS

	DATE			OBJECTIVES													
	NOVEMBER			2	3	4	5	11	12	13	22	24	25	26	27	28	29
Jurisdiction/Functional Entity	16	17	18														
State of AZ Emrgcy. Operations. Center		X	X	X	X	X			X	X				X	X	X	X
Technical Operations Center	X	X	X	X	X	X								X		X	
REAT-Forward (Buckeye Airport)		X	X	X	X	X	X				X*						
Field Sampling Teams(Buckeye Arpt)		X				X	X					X					
Joint Emergency News Center		X	X	X	X	X			X						X		X
Maricopa County Emrgcy.Oprtns.Ctr.		X	X	X	X	X		X							X		X
ARRA Laboratory		X											X				
Dept. of Agriculture Command Post		X	X	X	X	X									X		
Food Control Point (Buckeye Airport)			X				X								X		
Re-entry Point (Buckeye Airport)			X				X										X

\* Objective 22 is only demonstrated on 18 Nov 99

## APPENDIX 4

### 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 Post-Plume Phase Exercise on November 16-18, 1999, and the Off-site Medical Drill on December 3, 1999.

These scenarios, on the following pages, was submitted by the State of Arizona and Arizona Public Service Company, and approved by FEMA Region IX.

## Activity Summary

It is currently about 18 hours after the *General Emergency* declaration in Unit 1 at the Palo Verde Nuclear Generating Station. The emergency declaration, which remains in effect, was based on a Loss Of Coolant Accident (LOCA) complicated by partial fuel clad failure and a breach of Containment. The resulting radiological release lasted approximately 5½ hours, ending at 5:00 pm yesterday. General wind direction during the release carried the plume to the East-Southeast of the plant. The plant is currently in Mode 5 (cold shutdown) and stable in Shutdown Cooling System operations.

Present weather conditions are clear with light winds from 290° (West-Northwest) and a temperature of 50°F (10°C). The evacuation of all sectors in the Palo Verde 10-mile Emergency Planning Zone (EPZ) is complete. Approximately 75% of the 2,300 evacuees are in three Reception and Care Centers (RCC) operated by Maricopa County and the American Red Cross. The remaining evacuees are with relatives and friends. Some of the evacuated people are becoming concerned about their farming, livestock, mail, banking, and the general welfare of their property. They are anxious to know who can return to their homes and when.

At 12:01 pm yesterday, Arizona Division of Emergency Management, in conjunction with the Arizona Radiation Regulatory Agency, recommended that Governor Jane D. Hull declare a "State of Emergency" based on the conditions at PVNGS. A "State of Emergency" was subsequently declared by Governor Hull yesterday at 12:20 pm, ordering the evacuation of all persons within a 2-mile radius of PVNGS. Ten minutes following the declared "State of Emergency", Maricopa County Board of Supervisors declared a Local Emergency. Rail lines south of PVNGS have been closed and air space restricted to 8,000 feet for a radius of ten miles around the plant. At 3:08 pm yesterday, plant officials issued a Protective Action Recommendation to evacuate the 10-mile radius and 12 miles in Sectors E, F, and G.

The following support areas / facilities are activated at this time:

- ◆ all utility onsite facilities (Unit 1 STSC, OSC, TSC, EOF)
- ◆ State Emergency Operations Center (SEOC)
- ◆ State Technical Operations Center (TOC)
- ◆ Maricopa County Emergency Operations Center (MCEOC)
- ◆ Joint Emergency News Center (JENC)
- ◆ ARRA Radiological Emergency Assistance Team (REAT Forward) and the Radiation Measurements Laboratory
- ◆ Arizona Department of Agriculture Command Post
- ◆ three Reception and Care Centers (RCC):
  - Gila Bend High School
  - Trevor G. Browne High School
  - Wickenburg High School
- ◆ Federal Radiological Monitoring [and] Assessment Center (FRMAC) - Phase 1
- ◆ FEMA Regional Operations Center (ROC) - San Francisco CA

The FRMAC Advance Party is currently situated near the State EOC. American Nuclear Insurers (ANI) personnel and the Advisory Team for Environment, Food, and Health are currently en route and should arrive later. Additionally, several other federal agencies have activated emergency support personnel and will establish their presence shortly. These include a FEMA A-Team, additional monitoring teams, EPA and NRC mobile laboratories, etc. A preliminary DOE fixed-wing Aerial Monitoring Survey (AMS) fly-over deposition plot has been generated and is available for FRMAC, State, and NRC personnel.

### 3.3 Guideline

The following summary of anticipated activities is a guideline only and may not denote the specific sequence in which events are anticipated to occur:

#### 16 NOV 1999 -- Simulated DAY 1

Information and data acquired from the plume phase are distributed to participants during briefings. A gubernatorial declared "State of Emergency" currently exists. Briefings are conducted by ARRA, State TOC personnel, the FRMAC Advance Party, FEMA, and possibly ANI personnel. Topics discussed may include a synopsis of radiological data acquired thus far, the DOE fixed-wing Aerial Monitoring Survey plot, FRMAC data, the formulation of a sampling and analysis plan, any additional evacuation plans, etc. Plans and activities for managing and recovering from radiological deposition are formulated and discussed by the participants following the briefings. If present, ANI personnel may develop a plan for allocation of resources based on preliminary information.

#### 17 NOV 1999 -- Simulated DAY 2

Activities commence in efforts to determine the extent and mitigate the consequences of radiological contamination of consumable products and the environment. The sampling plan is implemented by ARRA and supported by federal personnel. Evolutions include continual staffing of facilities, DOE rotorcraft Aerial Monitoring Surveys, dose assessments, the establishment of a DFO, and the distribution of news briefings. The Radiation Measurements Laboratory, re-entry and relocation, organization of Reception and Care Center evacuees, and the quarantine of consumables, when required, will be evaluated. The formulation and implementation of protective action decisions will be made by State and County personnel. Radiological field sampling will continue and analysis will be ongoing. In addition, the discussion of efforts for the release of contaminated areas, utility support, recovery, and return may begin.

#### 18 NOV 1999 -- Simulated DAY 7

Four days ago, PVNGS downgraded the classification to a **Site Area Emergency**. They remain in Mode 5 (cold shutdown) with event recovery progressing. The DOE Aerial Monitoring Surveys are complete. Activities for the past several days have identified the extent and levels of radiological deposition in affected areas. The environmental impact to some areas has been reduced based on aggressive sampling and analysis efforts. Subsequently, portions of these areas have been isolated, decontaminated, and released. Identification and quarantine of consumables deemed hazardous to health continues via the established Food Control Point.

The utility continues to provide support for mitigation efforts. State personnel continue to address inquiries from the public. Plans for recovery of affected areas, Food Control Point evaluations and potential reimbursement, evacuee release, and the eventual return of the environment to non-contaminated conditions are implemented.

Medical Scenario	Anticipated Actions
<p><b><u>General Situation: Day #1</u></b></p> <p>A mechanic has been simulated to have been opening a valve on a filter in the Unit 1 Radwaste Building 100' compactor area when the operator complained of dizziness and chest pain and fell against a contaminated piece of hardware protruding from the lower front of the filter, causing a severe laceration from the left hairline across the right eye. The medical victim will be provided by a volunteer. The scenario will be played out fully to include AirEvac Services, Inc. transport of the victim to Samaritan Regional Medical Center for treatment. The volunteer victim will be moulaged and pre-staged in a simulated Contaminated Area set up at the Radiation Worker Dress-out Area on the second floor of Building F.</p>	<p><b><u>MEDICAL EMERGENCY SCENE:</u></b></p> <p>(Unit 1 RW Bldg 100' Compactor Room inside a simulated contamination control area.)</p> <p>The Medical Controller at the scene (C-2) should initiate the drill by phoning in a report of the accident on a plant phone extension 4444. When EMTs and a Security Officer are dispatched to the scene, they will find the simulated victim and the medical emergency drill will commence.</p>
<p><b><u>Medical Emergency Initiation: Day #1</u></b></p> <p>The victim is wearing protective clothing (PCs) and a plastic outer suit..</p> <p><b><u>Victim: Day #1</u></b></p> <p>Conscious, lying on left side. Upper portion of the PCs is covered with blood.</p>	

Medical Scenario	Anticipated Actions
<p><b><u>MT Arrival: (MSG M-1): Day #1</u></b></p> <p><b><u>victim:</u></b>            respiration: 18            pulse: 80 / Irregular            BP: 180 / 110            skin: Pale, diaphoretic            pupils: Slightly dilated</p> <p>conscious, responds to verbal commands. Full-thickness laceration (6") running from the upper left orbit diagonally towards the right eye. Airway is clear. Experiencing extreme pain in chest and abdominal laceration. Room is warm and humid.</p> <p><b><u>victim Medical History: Day #1</u></b>            age 54.            history of angina, high blood pressure, and hypertension.            takes "nitro" as needed for angina.            takes Zestril 10 mg. once daily for blood pressure.            smokes 2+ packs of cigarettes a day.</p>	<p><b><u>PVNGS EMT:</u></b>            Communications are established between Fire Protection, Medical and Security. Vital signs and victim condition are assessed. Protective clothing is removed to facilitate treatment. Pressure dressings are applied to control bleeding.</p> <p><b><u>U-1 CONTROL ROOM:</u></b>            Ensure that Radiation Protection (RP) responds.</p> <p><b><u>SITE MEDICAL:</u></b>            Contingency Message M-A if off-site calls to Samaritan Regional Medical Center and AirEvac Services Inc. are not made in a timely manner.</p>
<p><b><u>Initial Radiological Conditions: (MSG M-2): Day #1</u></b></p> <p>Immediate Victim Area: (per smear of 100cm<sup>2</sup>) 50,000cpm&gt;Bkg*            Areas other than victim: (per 100cm<sup>2</sup> smear) 30,000-100,000 cpm&gt;Bkg*            Radiation Levels: 2-120 mr/hr general area            Airborne Contamination: &lt;0.1 DAC            Victim's Pcs: Not Friskable Here            Wounds and exposed skin: Not Friskable Here  <b>These readings possible only if smears are taken elsewhere for count.</b></p>	<p><b><u>PVNGS RPTs:</u></b>            Perform initial surveys possible within the 15 mr/hr background of the area. Take smears and count them in areas of lower background and report survey results to the EMTs and U1 CR.</p>

**Medical Scenario**

**Anticipated Actions**

**PVNGS Radiation Protection Technicians (RPTs) Respond: (MSG M-2): Day #1**

**PVNGS RPTs:**

After the initial quick assessment of radiological conditions, the following detailed radiological data should be ascertained by the RPTs:

While PVNGS EMTs are performing initial treatment, PVNGS RPTs should be performing detailed radiological surveys of the victim and the area. As soon as medically possible, the victim should be moved to a lower background area. Once victim is in an area of lower background, direct frisk readings of PCs and skin areas may be obtained.

**General Radiological Conditions: Day #1**

Victim's SRD	25 mr/hr
Radiation Level:	15 mr/hr
Airborne Contamination:	As read
Smearable in immediate vicinity: (per 100 cm <sup>2</sup> smear):	30,000 to 50,000 cpm>Bkg*
Smearable in surrounding areas: (per 100 cm <sup>2</sup> smear):	As read

**Contingency message M-B** if RPT or RP Island does not initiate call for off-duty RPT to meet AirEvac Services, Inc. and victim at Samaritan Regional Medical Center.

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After Victim is moved to an area of lower background which permits direct frisking:

**Victim: Day #1**

PCs (general)	30,000 cpm>Bkg*
Left Coverall Leg:	55,000 cpm>Bkg*
Gloves:	35,000 cpm>Bkg*
Shoe Covers:	50,000 cpm>Bkg*
After PC removal:	
Upper Chest:	50,000 cpm>Bkg*
Left Forearm:	5,000 cpm>Bkg*
Face:	5,000 cpm>Bkg*
Hands:	5,000 cpm>Bkg*
All Other areas:	As read

**\*These readings must be obtained by counting in a low background area.**

Medical Scenario	Anticipated Actions
<p><b>Initial treatment: (MSG M-3): Day #1</b>  <b>During initial patient treatment and preparation for transport to PVNGS Site Medical)</b></p> <p><b>Victim: Day #1</b></p> <p>Respiration: 22</p> <p>Pulse: 80 / Irregular</p> <p>BP: 190 / 110</p> <p>Appearance: Pale, diaphoretic</p> <p>Pupils: Slightly dilated</p> <p>Alert and conscious, responds to verbal commands.</p> <p>Experiencing radiating chest pains.</p> <p>Complaining of nausea.</p> <p>Bleeding from facial laceration has been controlled, wound is manageable.</p> <p><b>NOTE: These vital signs will also apply on arrival at the PVNGS Site Medical Facility.</b></p>	<p><b><u>PVNGS EMTs</u></b></p> <p>As soon as the patient is stabilized and the initial radiological status is verified, the victim should be set up for movement with contamination control out of the area of high background in order to continue treatment and radiological evaluation. EMTs should evaluate victim in preparation for transport. After completion of the removal of PCs, O2 may be given by mask.</p> <p><b><u>PVNGS SECURITY:</u></b></p> <p>Assist in the movement to the site medical facility.</p> <p><b><u>PVNGS RPTs:</u></b></p> <p>Continue to provide contamination control and monitoring of the victim.</p>

**Medical Scenario**

**Anticipated Actions**

**Secondary treatment: (Site Medical Facility) (MSG M-4): Day #1**

**Provided on arrival at Site Medical Facility :**

**Victim: Day #1**

Respiration: 22  
Pulse: 80 / Irregular  
B/P: 190 / 110  
Skin: Pale, diaphoretic  
Pupils: Slightly dilated

Conscious and responds to verbal commands.  
Radiating chest pain.  
Complaining of nausea.  
Bleeding from facial laceration has been controlled, wound is manageable.

**NOTE:**

**If Site Medical administers "nitro 150" the blood pressure should drop to 80 / 60 within 15 minutes and the victim should become "bradycardia." The heart rate should drop to 40 and then 35. The victim may complain of headache.**

**If Site Medical administers "atropine" (via IV) the blood pressure should then rise to 100/60, 110/70 and stabilize at 136/84 within 3-5 minutes. The heart rate should become more normal at 60.**

**PVNGS SITE MEDICAL:**

Perform evaluation and prepare for transport to Good Samaritan by AirEvac Services, Inc. Stabilize victim and prepare for transport. Begin preliminary decontamination efforts while awaiting helicopter arrival. Notify U1 Control Room of impending transport.

**Contingency message M-C** if AirEvac Services, Inc. does not provide an ETA to PVNGS Site Medical Facility.

**PVNGS RPTs:**

Continue to monitor and assist in decontamination efforts. Prepare to provide coverage following transport.

Medical Scenario	Anticipated Actions
<p><b><u>Reliminary Decon (RW/Ambulance) (MSG M-5): Day #1</u></b>  <b>Contamination Levels and Decon Results:</b>  <b><u>Victim: Day #1</u></b>  Left Upper Leg: 20,000 cpm&gt;Bkg  Face: 3,000 cpm&gt;Bkg  Hands: 5,000 cpm&gt;Bkg  Left Forearm: 3,000 cpm&gt;Bkg</p> <p><b><u>On the Site Medical Facility, after First Decon: Day #1</u></b></p> <p><b><u>After First Decon: Day #1</u></b>  Left Upper Leg: 20,000 cpm&gt;Bkg  Face: 3,000 cpm&gt;Bkg  Hands: 5,000 cpm&gt;Bkg  Left Forearm: 3,000 cpm&gt;Bkg</p> <p><b><u>After Second Decon: Day #1</u></b>  Left Upper Leg: 15,000 cpm&gt;Bkg  Face: 1,000 cpm&gt;Bkg  Hands: 2,000 cpm&gt;Bkg  Left Forearm: 2,000 cpm&gt;Bkg</p> <p><b><u>After Third Decon: Day #1</u></b>  Left Upper Leg: 10,000 cpm&gt;Bkg  Face: As Read/ Background  Hands: 1,000 cpm&gt;Bkg  Left Forearm: As Read/ Background</p>	<p><b><u>DECON IN RW BLDG / AMBULANCE:</u></b>  The readings in cpm are to be given to the RPT as surveys are properly taken after each decontamination process. Nasal smears taken, if any, are all to read Background/As Read during the entire process.</p> <p><b><u>DECON IN SITE MEDICAL FACILITY:</u></b>  Decontamination attempts performed in the Site Medical Facility will be successful as listed in the table at left. RPTs should be given the appropriate numbers while surveying following the decon procedure. Victim will not be free of contamination at the time of transport. Survey and release stretcher and other first aid equipment as time permits. Collect and control contaminated material and waste.</p> <p><b>Day #1 activities will terminate when personnel are ready to transfer the victim to the AirEvac Services, Inc. helicopter.</b></p>

Medical Scenario	Anticipated Actions
<p><b><u>Initial Conditions for Commencement of Day #2 Activities: (MSG M-6): Day #2</u></b></p> <p><b><u>Secondary Treatment: (PVNGS Site Medical Facility) (MSG M-7): Day #2</u></b>  <b>Final medical data as AirEvac Services, Inc. arrives and patient departs:</b></p> <p><b><u>Victim: Day #2</u></b></p> <p>Respiration: 20  Pulse: 65  B/P: 136 / 84  Skin: Warm and Dry  Pupils: Equal and Reactive  ECG: 60, normal rhythm</p> <p>Stable, conscious, responds to verbal commands.</p> <p><b><u>Notification to Unit 1 Control Room of victim transport offsite (MSG M-8): Day #2</u></b></p> <p><b>Note: (MSG M-9): Day #2</b>  <b>With the arrival of AirEvac Services, Inc. and the transport of the victim, the PVNGS on-site medical emergency drill is completed. The PVNGS Site Medical Facility and materials utilized in the treatment of the injured person should be controlled and cleaned up by PVNGS RPT. Surveys and release of the site medical facility, ambulance and stretchers are also expected.</b></p>	<p><b><u>PVNGS SITE MEDICAL:</u></b></p> <p>Review of data and activities from PVNGS site response on Day #1.</p> <p><b><u>PVNGS SITE MEDICAL:</u></b></p> <p>Assist with the arrival of the AirEvac Services, Inc. helicopter and loading of the victim for transport. This completes the treatment portion of the medical emergency drill. Full attention should now be given to the contaminated facility and equipment.</p> <p><b><u>PVNGS RPTs:</u></b></p> <p>Survey, decon and release the site medical facility. Collect all trash and material utilized in the treatment of the victim and perform controlled disposal of contaminated waste.</p>

**Medical Scenario**

**Anticipated Actions**

Vital Signs on arrival at Samaritan Regional Medical Center: (MSG M-10): Day #2

SAMARITAN REGIONAL  
MEDICAL CENTER:

Victim: Day #2

Respiration: 20  
Pulse: 60  
BP: 136 / 84  
Skin: Warm and Dry  
Pupils: Equal and Reactive  
ECG: 60, Normal rhythm.

Assist with the arrival of the AirEvac Services, Inc. helicopter and provide vital signs as requested.

Alert, conscious, responds to verbal commands.

Vital Signs once victim reaches REA (MSG M-11): Day #2

Victim: Day #2

Respiration: 20  
Pulse: 60  
BP: 136 / 84  
Skin: Warm and Dry  
Pupils: Equal and Reactive  
ECG: 60, Normal rhythm

Alert, conscious responds to verbal commands.

Medical Scenario	Anticipated Actions
<p><b><u>Initial Survey Results at Samaritan Regional Medical Center (MSG M-12): Day #2</u></b></p> <p><b><u>Victim: Day #2</u></b></p> <p>Left Upper Leg      10,000 cpm&gt;Bkg  Face:                    Bkg / As Read  Hands:                  1,000 cpm&gt;Bkg  Left Forearm:        Bkg / As Read</p>	<p><b><u>PVNGS RPTs:</u></b></p> <p>Survey victim and provide results to medical staff. Assist in contamination control as appropriate.</p>
<p><b><u>After First Decontamination at Samaritan Regional Medical Center (MSG M-13): Day #2</u></b></p> <p><b><u>Victim: Day #2</u></b></p> <p>Left Upper Leg      7,000 cpm&gt;Bkg  Face:                    Bkg / As Read  Hands:                  Bkg / As Read  Left Forearm:        Bkg / As Read</p>	
<p><b><u>After Second Decontamination at Samaritan Regional Medical Center (MSG MSG-14): Day #2</u></b></p> <p><b><u>Victim: Day #2</u></b></p> <p>Left Upper Leg      4,000 cpm&gt;Bkg  Face:                    Bkg / As Read  Hands:                  Bkg / As Read  Left Forearm:        Bkg / As Read</p>	

**Medical Scenario**

**Anticipated Actions**

**After Third Decontamination at Samaritan Regional Medical Center (MSG M-15): Day #2**

**Victim: Day #2**

Left Upper Leg      Bkg / As Read  
Face:                      Bkg / As Read  
Hands:                      Bkg / As Read  
Left Forearm:              Bkg / As Read

**PVNGS RPTs:**

Survey victim and provide results to medical staff. Assist in contamination control as appropriate.

**Drill Termination and Debrief (MSG M-16): Day #2**

Once Samaritan Regional Medical Center has satisfactorily demonstrated their performance, the radiological portion of the emergency medical drill is terminated.

**PVNGS RPTs:**

If needed, assist in collecting radiological trash and material utilized in the treatment of the victim.

**PVNGS E-PLAN:**

Conduct drill debrief with players and controllers

## APPENDIX 5 OFF-SITE MEDICAL DRILL December 3, 1999

### o BACKGROUND

As licensee for the PVNGS, APS held the required annual medical drill on December 3, 1999. The drill scenario included simulated injuries to one on-site individual that required treatment at the participating medical facility. This drill demonstrated and exercised the response capability of the Good Samaritan Regional Medical Center (GSRMC), which has an agreement with APS to provide care and treatment for the general public sustaining injuries involving the complication of ionizing radiation or radioactive contamination.

### o DETAIL

There were three objectives established for demonstration, observation, and evaluation during the PVNGS Off-site Medical Drill (Objective Numbers 5, 20, and 21). Two objectives were met and an ARCA was identified for one objective. Two ARCAs from previous exercises were corrected.

The GSRMC staff demonstrated the capability to continuously monitor and control radiation exposure to emergency workers. Each emergency worker was provided with a TLD and two DRDs: 0-200mR and 0-1000 mR. In addition, emergency workers working in the Radiation Emergency Area (REA) were issued a right and left hand TLD extremity monitoring device. Names of the users and the serial numbers of the devices were logged on the "Hospital/Medical Facility Dosimeter Log for later assignment of dose to each user. In addition the "Reading at Issue" and "Reading at Exit" for the DRDs was also logged on the same form.

The GSRMC Nuclear Medicine Technicians (NMT) and Medical Physicist and the PVNGS Radiation Protection Technician (RPT) who participated in the response utilized prior issued dosimetry that had been appropriately logged for later identification of the user and assignment of dose.

An operating DRD charger was available and used to zero the DRD's prior to issue. Emergency workers were aware of how to read the DRDs and they were read at 30-minute intervals at the prompting of radiation control personnel.

The GSRMC Radiation Safety Officer was present and available to discuss exposure limits. When the response was completed, the NMT collected the dosimetry from the staff. Procedures were followed to manage radiological exposure so that emergency workers wouldn't incur excess dose.

GMRMC demonstrated the adequacy of vehicles, equipment, procedures, and personnel for transporting contaminated injured or exposed individuals was demonstrated although the current procedure was not followed. The initial monitoring, stabilization, partial decontamination and

packaging for transport of the simulated injured and contaminated point was carried out at the PVNGS. Although observed, this part of the exercise was not evaluated. The activities on-site were carried out in an effective and efficient manner.

The simulated injured and contaminated patient was transported from the PVNGS site to the GSRMC by an Air Evac Services Inc. helicopter. The arriving helicopter was met by a GSRMC NMT, Medical Physicist (MP), and a security officer. The NMT and MP wore lab coats and rubber gloves and the security officer wore his uniform. Herculite pads were not laid from the South trauma doors to the elevator as specified in the procedures. In addition, the flight elevator arrival alcove was not properly configured, the REA team did not receive the patient in the alcove, and the two flight nurses wearing their flight suits accompanied the patient to the REA.

GSRMC Procedure No: EP2-004A, Subject: "Emergency Preparedness: PVNGS Occupational Radiation Injury" Rev 10/26/98, page 2, "PATIENT ACCEPTANCE" paragraph A states in part, "Security and Trauma nurse will dress with one layer of protective clothing and meet the helicopter... The NMT will roll up the Herculite pads from the South Trauma doors to the elevator... Page 3 "PATIENT ENTRY" paragraph B "HELIPAD" states: A cart will be taken to the helipad covered with a sheet (to contain contamination). Divide the flight elevator arrival alcove in half via magnetized radiation rope or tape. Ensure elevator is locked up in the arrival alcove, the patient will be transferred across the rope in the alcove to the REA team. The flight nurse and plant health physics technicians can add one layer of protective clothing at that point and proceed down with to the REA for patient turnover.

The actions performed in receiving the properly packaged simulated injured and contaminated patient at the helipad and transfer to the REA were adequate to prevent the spread of contamination. They included the immediate monitoring of the area from the helipad to the REA after transfer of the patient.

Monitoring of the pilot, two flight nurses and the helicopter was accomplished using a thin window GM pancake with the beta shield properly covered to prevent contamination of the probe and with the audio system on. These actions corrected ARCA #45-97-20-A-24.

There was a good transfer of patient medical and contamination from the flight nurses to the REA staff including a body outline chart indicating areas and levels of contamination.

GSRMC demonstrated the adequacy of the equipment, procedures, and personnel of medical facilities responsible for treatment of contaminated or exposed individuals. The receipt of a call from the PVNGS that a simulated injured and contaminated patient would be transported by helicopter from PVNGS to GSRMC initiated the activation of the "Information Checklist for Radioactively Contaminated Patients."

These actions included: receipt of patient medical and contamination information; a confirmation call back to PVNGS; notification of appropriate staff; and setup of the REA. All actions were accomplished in a timely and efficient manner.