



Arkansas Nuclear One

After Action Report/ Improvement Plan

Drill Date – November 8-9, 2017

Radiological Emergency Preparedness (REP) Program



FEMA

Published January 9, 2018

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After Action Report/Improvement Plan

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EXECUTIVE SUMMARY

On November 8-9, 2017, an out of sequence Medical Services Drill was conducted in Russellville, Arkansas for the Pope County Emergency Medical Services (EMS), Main Station and the University of Arkansas for Medical Sciences (UAMS) Hospital, Little Rock, Arkansas. Personnel from the U.S. Department of Homeland Security/Federal Emergency Management Agency (DHS/FEMA) Region VI, evaluated all activities. The drill was conducted to assess the level of preparedness of local responders to react to a simulated radiological emergency at Arkansas Nuclear One (ANO). The previous medical drill at this location was conducted on November 3-4, 2015.

Personnel from the Pope County EMS and UAMS participated in the drill. Evaluation Areas demonstrated included: Equipment and Supplies to Support Operations, Implementation of Emergency Worker Exposure Control, and Support Operations/Facilities Transportation and Treatment of Contaminated Injured Individuals. Cooperation and teamwork of all participants was evident during the drill, and DHS/FEMA wishes to acknowledge these efforts.

This report contains the final evaluation of the out of sequence drill. The participants demonstrated knowledge of their emergency response plans and procedures and adequately implemented them. There were no Level 1 Findings. One Level 2 Finding was identified (formally Area Requiring Correction Action) and was corrected during the drill. No Plan Issues were identified.

SECTION 1: EXERCISE OVERVIEW

1.1 Exercise Details

Exercise Name

Arkansas Nuclear One

Type of Exercise

Drill

Exercise Date

November 8-9, 2017

Program

Department of Homeland Security/FEMA Radiological Emergency Preparedness Program

Scenario Type

Radiological Emergency

1.2 Exercise Planning Team Leadership

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1.3 Participating Organizations

Agencies and organizations of the following jurisdictions participated in the ANO exercise:

Risk Jurisdictions

Pope County Emergency Medical Services, Main Station

Support Jurisdictions

University of Arkansas for Medical Sciences Hospital

Private Organizations

Arkansas Nuclear One

SECTION 2: EXERCISE DESIGN SUMMARY

2.1 Exercise Purpose and Design

The DHS/FEMA Region VI Office evaluated the drill on November 8-9, 2017 to assess the capabilities of local emergency preparedness organizations in implementing their Radiological Emergency Response Plans and Procedures to protect the public health and safety during a radiological emergency involving Arkansas Nuclear One (ANO). The purpose of this report is to represent the results and findings on the performance of the offsite response organizations during a simulated radiological emergency.

2.2 Exercise Objectives, Capabilities and Activities

Exercise objectives and identified Capabilities/REP Criteria selected to be exercised are discussed in the Exercise Plan (EXPLAN), Appendix C.

2.3 Scenario Summary

The drill scenario was developed to evaluate the response of drill participants to an incident at Arkansas Nuclear One (ANO) requiring the transportation, treatment and decontamination of a radiologically contaminated injured individual. The drill scenario provided for the evaluation of the University of Arkansas for Medical Sciences Hospital and Pope County Emergency Medical Services, Main Station.

SECTION 3: ANALYSIS OF CAPABILITIES

3.1 Exercise 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 Arkansas Nuclear One (ANO) Medical Services Drill to test the off-site emergency response capabilities of local governments and support medical centers for ANO.

Each jurisdiction and functional entity was evaluated on the basis of its demonstration of criteria delineated in the exercise evaluation areas as outlined in the January 2017 Radiological Emergency Preparedness (REP) Program Manual. Detailed information on the exercise evaluation area criteria and the extent of play agreement used in this drill are found in Appendix C of this report.

3.2 Summary Results of Exercise Evaluation

The matrix in Table 3.1, on the following page, presents the status of all exercise evaluation area criteria from the REP Program Manual that were scheduled for demonstration during this drill by all participating jurisdictions and functional entities. Exercise evaluation area criteria are listed by number and the demonstration status of those evaluation area criteria is indicated by the use of the following letters or numbers:

M - Met (No Findings assessed and no unresolved Areas Requiring Corrective Action from prior exercises)

1 - Level 1 Finding (formerly Deficiency) Assessed

2 - Level 2 Finding (formerly Areas Requiring Corrective Action) Assessed

P - Plan Issue

N - Not Demonstrated

Table 3.1 - Summary of Exercise Evaluation – Criteria Met

Date: 11/8-9/2017		
Site: Arkansas Nuclear One		
Location	Criteria Title	Criteria
Pope County EMS, Main Station	Contaminated Injured Transport & Care	6d1
Pope County EMS, Main Station	EW Exposure Control Implementation	3a1
Pope County EMS, Main Station	Equipment and Supplies	1e1
UAMS	Contaminated Injured Transport & Care	6d1
UAMS	EW Exposure Control Implementation	3a1
UAMS	Equipment and Supplies	1e1

3.3 Criteria Evaluation Summaries

3.3.1 Risk Jurisdictions

3.3.1.1 Pope County EMS, Main Station

In summary, the status of DHS/FEMA criteria for the Risk Jurisdiction is as follows:

- a. MET: 1.e.1, 3.a.1, 6.d.1.
- b. LEVEL 1 FINDING: None
- c. LEVEL 2 FINDING: None
- d. PLAN ISSUES: None
- e. NOT DEMONSTRATED: None
- f. PRIOR ISSUES - RESOLVED: None
- g. PRIOR ISSUES - UNRESOLVED: None

3.3.2 Support Jurisdictions

3.3.2.1 University of Arkansas for Medical Sciences Hospital

In summary, the status of DHS/FEMA criteria for the Support jurisdiction is as follows:

- a. MET: 1.e.1, 3.a.1, 6.d.1.
- b. LEVEL 1 FINDING: None
- c. LEVEL 2 FINDING:

CRITERION: Transportation & Treatment of Contaminated/Injured Individual

CONDITION: Prior to transferring the patient to the Radiation Emergency Area (REA), the UAMS staff outside started to focus efforts on surveying the Emergency Medical Services (EMS) gurney instead of giving priority to transfer and treatment of the patient. The patient was then transferred to the REA. However, when transferring the patient from the EMS gurney to the wet decontamination table in the wrong orientation resulting in the patient's head being located at the foot of the table where the water drained. One of the nurses in the REA began gathering equipment after performing patient decontamination without changing her gloves.

POSSIBLE CAUSE: Staff unfamiliar with plans and procedures.

REFERENCE: NUREG-0654/FEMAREP-1, F.2; H.10; K.5.a, b; L.1, 4); University of Arkansas for Medical Sciences, Emergency Incident Command System, Revised: January 2017, CODE CURIE, Radiological Decontamination.

EFFECT: Treatment and decontamination of the patient would not occur as quickly as possible if patient transfer were not given priority. Contamination could be spread to uncontaminated areas on the patient and equipment when a patient is placed on the decontamination table in the wrong orientation and if glove changes are not conducted after touching contaminated areas.

CORRECTIVE ACTION DEMONSTRATED: A timeout was called by the Controller and discussion conducted that the patient should be transferred to the Radiation Emergency Area as soon as possible for treatment. Another timeout was called by the Controller and a discussion conducted concerning why the patient should have transferred in the opposite direction, and then the drill re-commenced. A final timeout was called by the Controller to provide re-training regarding proper glove changes. After this incident, frequent glove changes were performed.

- d. PLAN ISSUES: None
- e. NOT DEMONSTRATED: None
- f. PRIOR ISSUES - RESOLVED: None
- g. PRIOR ISSUES - UNRESOLVED: None

SECTION 4: CONCLUSION

Based on the results of the exercise, the offsite radiological emergency response plans and preparedness for the State of Arkansas and the affected local jurisdictions are deemed adequate to provide reasonable assurance that appropriate measures can be taken to protect the health and safety of the public in the event of a radiological emergency. Therefore, 44 CFR Part 350 approval of the offsite radiological emergency response plans and preparedness for the State of Arkansas site-specific to Arkansas Nuclear One will remain in effect.

APPENDIX A: EXERCISE EVALUATORS AND TEAM LEADERS

DATE: Nov. 8-9, 2017

SITE: Arkansas Nuclear One, AR

LOCATION	TEAM LEADER	AGENCY
Pope County EMS, Main Station	Brad DeKorte	DHS - FEMA
University of Arkansas for Medical Sciences Hospital	Tim Pflieger	DHS - FEMA

LOCATION	EVALUATOR	AGENCY
Pope County EMS, Main Station	Brad DeKorte	DHS – FEMA
	Tim Pflieger	DHS – FEMA
University of Arkansas for Medical Sciences Hospital	Tim Pflieger	DHS - FEMA
	Brad DeKorte	DHS - FEMA

APPENDIX B: ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
ANO	Arkansas Nuclear One
DHS/FEMA	Department of Homeland Security/Federal Emergency Management Agency
DRD	Direct Reading Dosimeter
ED	Emergency Department
EMS	Emergency Medical Services
EOP	Extent of Play
EPD	Electronic Personal Dosimeter
EW	Emergency Worker
HPT	Health Physicist Technician
KI	Potassium Iodide
OSL	Optically Stimulated Luminescent
PPE	Personal Protective Equipment
PRD	Permanent Record Dosimeters
REA	Radiological Emergency Area
REP	Radiological Emergency Preparedness
TLD	Thermoluminescent Dosimeter

APPENDIX C: EXERCISE PLAN

Arkansas Nuclear One 2017 MS-1 Drill
Pope County EMS and University of Arkansas for Medical Sciences Hospital (UAMS)
November 8-9, 2017
Extent-of-Play (EOP) Agreement
Between
The Arkansas Department of Health's Nuclear Planning and Response Program,
representing the Off-Site Response Organizations, and FEMA Region VI

EVALUATION AREA 1 - Emergency Operations Management

Sub-element 1.e – Equipment and Supplies to Support Operations

INTENT: This sub-element is derived from NUREG-0654, which provides that Offsite Response Organizations (ORO) have emergency equipment and supplies adequate to support the emergency response.

Criterion 1.e.1: Equipment, maps, displays, monitoring instruments, dosimetry, potassium iodide (KI) and other supplies are sufficient to support emergency operations (NUREG-0654/FEMA-REP-1, H.7, 10; I.7, 8, 9; J.10.a, b, e; J.11, 12; K.3.a; K.5.b)

Locations: UAMS Hospital, Little Rock; Pope County EMS (Main Station), Russellville.

- EOP: 1. It is Arkansas policy to issue KI only to Emergency Workers (EW) in the 10-mile EPZ and institutionalized individuals. KI is not issued to the general public.
2. Meters have calibration sticks on the meters. Operational checks will be performed before use, using range of reading stickers on the meters. DRDs have "bar code" labels. Calibration dates of the DRDs and quarterly operational check dates of the meters and DRDs can be verified with the master database maintained by the NP&RP HP.
3. The quantities of Dosimetry and the quantities and expiration of KI will be confirmed by evaluators at locations identified in plans.
4. Meters that do not have "bar code" labels will have appropriate calibration stickers attached
5. Correction-on-the-spot will be considered at these locations at the discretion of and concurrence between the evaluator and the controller. Caution should be exercised to ensure that exercise play is not interrupted.

ARCA: None

EVALUATION AREA 3 - Protective Action Implementation

Sub-element 3.a – Implementation of Emergency Worker Exposure Control

INTENT: This Sub-element is derived from NUREG-0654/FEMA-REP-1, which requires that OROs have the capability to provide for the following: distribution, use, collection, and processing of direct-reading dosimetry and permanent record dosimetry; reading of direct-reading dosimetry by emergency workers at appropriate frequencies; maintaining a radiation dose record for each emergency worker; establishing a decision chain or authorization procedure for emergency workers to incur radiation exposures in excess of the PAGs, and the capability to provide KI for emergency workers, always applying the —as low as is reasonably achievable principle as appropriate.

Criterion 3.a.1: The OROs issue appropriate dosimetry, KI, and procedures, and manage radiological exposure to emergency workers in accordance with the plans/procedures. Emergency workers periodically and at the end of each mission read their dosimeters and record the readings on the appropriate exposure record or chart. OROs maintain appropriate record-keeping of the administration of KI to emergency workers. (NUREG-0654/FEMA-REP-1, J.10.e; K.3.a, b; K.4)

Locations: UAMS Hospital, Little Rock; Pope County EMS (Main Station), Russellville.

- EOP: 1. Correction-on-the-spot will be considered at these locations at the discretion of and concurrence between the evaluator and the controller. Caution should be exercised to ensure that exercise play is not interrupted.
2. The State of Arkansas may not consider the termination of Emergency Worker (EW) exposure control to be at the end of the “plume phase”. The transition from EW exposure control to occupational exposure control will be made by the TOCD. The TOCD will make this decision after conferring with the Governor and County Judges who declared Emergencies in the State and County and after determining the potential for additional exposure during response activities.
 3. The listing of EWs who have ingested KI would be developed after the exposure forms are turned in. Because of the length of this exercise, this requirement will not be demonstrated. Each EW who simulates taking KI will have a form documenting when it was taken. These forms would be the basis for developing this list. Forms will be available for evaluator review.
 4. It is Arkansas policy to issue KI only to Emergency Workers (EW) and institutionalized individuals. County EWs who decline to take KI are not identified in advance. If they decline to take KI at their duty stations, they will not be placed in positions that would expose them to radiation. KI is not issued to the general public

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5. EMS crews will use gloves and booties as necessary. Hospital teams will wear "anti-Cs" IAW hospital plans.
 6. Dosimetry and KI will be issued IAW plans.
 7. The RO or designee will demonstrate the EW briefing, record keeping, and procedures for issuing and returning dosimetry and KI. The use of KI will be simulated.

ARCA: None

EVALUATION AREA 6 - Support Operation/Facilities

Sub-element 6.d - Transportation and Treatment of Contaminated Injured Individuals

INTENT: This Sub-element is derived from NUREG-0654/FEMA-REP-1, which requires that OROs have the capability to transport contaminated injured individuals to medical facilities with the capability to provide medical services.⁹⁸

Criterion 6.d.1: The facility/ORO has the appropriate space, adequate resources, and trained personnel to provide transport, monitoring, decontamination, and medical services to contaminated injured individuals. (NUREG-0654/FEMA-REP-1, F.2; H.10; K.5.a, b; L.1, 4)

Locations: Pope County EMS (Main Station), Russellville

- EOP:
1. The Controller will contact Pope County 911 with the exercise message. Communication between the ambulance and the EMS dispatch will be demonstrated. EMS dispatch will discuss procedures for passing information to UAMS.
 2. The EMS crew will pick up the patient at an ANO facility. Prior to transfer of the patient, ANO and EMS personnel will demonstrate monitoring the patient. After patient simulated transfer, the EMS crew will demonstrate vehicle monitoring. The ambulance will not be draped.
 3. This EA will be demonstrated at approximately 1500 on November 8, 2017.
 4. Any real emergency will take precedence.
 5. Correction-on-the-spot will be considered at these locations at the discretion of and concurrence between the evaluator and the controller. Caution should be exercised to ensure that exercise play is not interrupted.

ARCA: None

Locations: UAMS Hospital, Little Rock.

- EOP:
1. This EA will be demonstrated at approximately 1000 on November 9, 2017.
 2. *Any real emergency will take precedence.*
 3. The patient will be transported to UAMS via a non-emergency vehicle.
 4. Radiation decontamination, monitoring and contamination control will be performed by ANO and UAMS personnel.
 5. The State Controller will contact UAMS Emergency Room with the alerting message approximately one and half (1.5) hours prior to patient arrival
 6. The State Controller will contact UAMS Emergency Room with an update message approximately fifteen (15) minutes prior to patient arrival
 7. UAMS personnel will not take any action to prepare for the demonstration of these evaluation areas before the one and half (1.5) hour notification.
 8. No shift change will be performed. A list of second shift Key Personnel will be given to the evaluator.
 9. The 1st shift may be over staffed for training purposes. Some staff identified on the 2nd shift roster may play with the 1st team. In an actual emergency this over staffing would not be used. .
 10. Correction-on-the-spot will be considered at this location at the discretion of and concurrence between the evaluator and the controller. Caution should be exercised to ensure that exercise play is not interrupted.

ARCA: None

Arkansas Nuclear One**2017 MS-1 Drill****Day 1 (ANO and Pope County EMS, Main Station)****SCENARIO: ANO and Pope County EMS**

This event will take place in a radiation area in the plant, however, for exercise purposes, the patient will be presented for transport by the Pope County Ambulance Service at the Reeve E. Ritchie Training Center (RERTC).

An employee is performing routine maintenance in a radiation area when the employee pulls on a wrench, loses balance and falls backward on a concrete surface. During the fall, anti-c clothing is ripped and a laceration occurs to the right side of the chest, resulting in bleeding and extreme pain with breathing. The area around the wound is sensitive to the touch. The area around the wound has an initial radiation reading of 30,000 cpm.

The Unit Two Control Room is called to report a medical emergency. The control room pages the ANO Emergency Medical Team and calls the Pope County Ambulance Service to request an ambulance.

The ANO Emergency Medical Team stabilizes and packages the patient, and moves to an area accessible to responding Pope County Ambulance Service personnel (at the RERTC).

The Pope County 911 center dispatches the Pope County Ambulance Service to the accident at ANO and advises the patient may be contaminated.

Upon arrival at the RERTC, ambulance personnel are met by members of the ANO Emergency Medical Team and a Health Physicist who have the patient stabilized and in a body bag to contain contamination.

The ANO Emergency Medical Team provides the following patient information to the ambulance personnel:

- Patient is suffering from a laceration to the right chest, with bleeding present.
- There is bleeding around the wound site, which is being controlled with a pressure bandage.
- The patient reports pain when breathing.
- The patient is alert and denies loss of consciousness, but reports to be in a great deal of pain and is requesting pain medication.

-
- The following vital signs are noted:
 - ✓ BP is 160/90
 - ✓ Pulse 130 and strong
 - ✓ Respiration is 50, shallow and labored
 - ✓ The wound site is contaminated with a reading of 30,000 cpm

The following patient information is available on request:

- Lung sounds are diminished on the right side
- Movement is noted in all extremities
- Medical history is positive for hypertension and type II Diabetes
- There are no known allergies

The patient is assessed and loaded into the ambulance for transport to the University for Medical Sciences hospital in Little Rock.

Arkansas Nuclear One

2017 MS-1 Drill

Day 2 (UAMS)

SCENARIO: UAMS

An employee is performing routine maintenance in a radiation area when the employee pulls on a wrench, loses balance and falls backward on a concrete surface. During the fall, anti-c clothing is ripped and a laceration occurs to the right side of the chest, resulting in bleeding and extreme pain on breathing. The area around the wound is sensitive to the touch. The area around the wound has an initial radiation reading of 30,000 cpm.

The Unit Two Control Room is called to report a medical emergency. The control room pages the ANO Emergency Medical Team and calls the Pope County Ambulance Service to request an ambulance.

The ANO Emergency Medical Management Team stabilizes and packages the patient, and moves to an area accessible to responding Pope County Ambulance Service personnel (at the RERTC).

The Pope County 911 center dispatches the Pope County Ambulance Service to the accident at ANO and advises the patient may be contaminated.

Upon arrival at the RERTC, ambulance personnel are met by members of the ANO Emergency Medical Team and a Health Physicist who have the patient stabilized and in a body bag to contain contamination.

The patient is stabilized and transported via ambulance to UAMS in Little Rock.

Pope County EMS notifies UAMS that they are inbound with an injured and radiologically contaminated patient. An ANO Radiation Technician is onboard the ambulance to provide radiological support to medical personnel.

Upon arrival at UAMS, the following patient information is provided to UAMS personnel:

The ANO Emergency Medical Team provides the following patient information to the ambulance personnel:

- Patient is suffering from a laceration to the right chest, with bleeding present.
- There is bleeding around the wound site, which is being controlled with a pressure bandage.
- The patient reports pain when breathing.

-
- The patient is alert and denies loss of consciousness, but reports to be in a great deal of pain and is requesting pain medication.
 - The following vital signs are noted:
 - ✓ BP is 160/90
 - ✓ Pulse 130 and strong
 - ✓ Respiration is 50, shallow and labored
 - ✓ The wound site is contaminated with a reading of 30,000 cpm

The following patient information is available on request:

- Lung sounds are diminished on the right side
- Movement is noted in all extremities
- Medical history is positive for hypertension and type II Diabetes
- There are no known allergies

The initial radiological survey of the patient reveals a slow increase to a reading of 30,000 CPM at the wound site. All other survey results yield counts of less than 300 CPM.

Radiation readings following each decontamination step are noted in the chart below:

Initial Reading prior to Decontamination	30,000 CMP
Reading Following Decontamination Step #1	21,000 CPM
Reading Following Decontamination Step #2	15,500 CPM
Reading Following Decontamination Step #3	7,000 CPM
Reading Following Decontamination Step #4	7,000 CPM
Reading Following Decontamination Step #5	3,000 CPM
Reading Following Decontamination Step #6	175 CPM

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