



FEMA

FEB 06 2012

NRC Headquarters' Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

To Whom It May Concern:

Enclosed is the After Action Report for the Calvert Cliffs Nuclear Power Plant (CCNPP)/Calvert Memorial Hospital MS-1 Drill that was evaluated on December 7, 2011.

There were no "Deficiencies" or "Areas Requiring Corrective Action" identified during the drill.

Based on the review of the offsite radiological emergency response plans and procedures submitted, FEMA Region III has determined that they are adequate and there is reasonable assurance they can be implemented as demonstrated during the Calvert Cliffs Nuclear Power Plant MS-1 drill.

If you have any questions, please contact Darrell Hammons at (215) 931-5546.

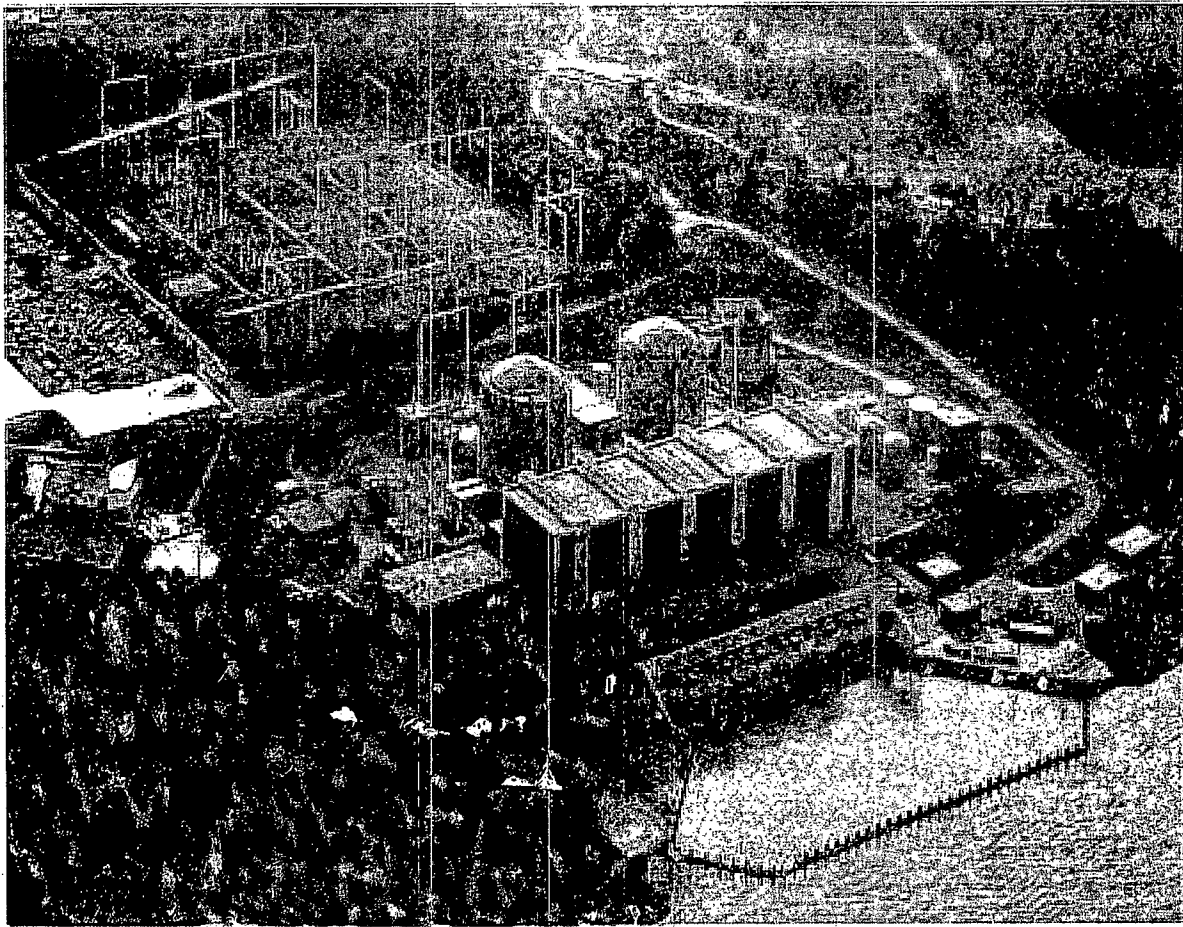
Sincerely,

MaryAnn Tierney
Regional Administrator

Enclosure

Designated Original
Douglas Pickett
3/9/12

IX491
NRR



Calvert Cliffs Nuclear Power Plant

After Action Report/ Improvement Plan

Drill Date - December 09, 2011

Radiological Emergency Preparedness (REP) Program



FEMA

Published

Calvert Cliffs Nuclear Power Plant After Action Report/Improvement Plan

Contents

Executive Summary	3
Section 1: Exercise Overview	8
1.1 Exercise Details	8
1.2 Exercise Planning Team Leadership	8
1.3 Participating Organizations	9
Section 2: Exercise Design Summary	10
2.1 Exercise Purpose and Design	10
2.2 Exercise Objectives, Capabilities and Activities	10
2.3 Scenario Summary	11
Section 3: Analysis of Capabilities	12
3.1 Drill Evaluation and Results	12
3.2 Summary Results of Drill Evaluation	12
3.3 Criteria Evaluation Summaries	14
3.3.1 Risk Jurisdictions	14
3.3.1.1 Calvert County, St. Leonard Fire and Rescue Squad	14
3.3.1.2 Calvert County, Calvert Memorial Hospital	14
Section 4: Conclusion	15
Appendix A: Drill Evaluators and Team Leaders	16
Appendix B: Acronyms and Abbreviations	17
Appendix C: Exercise Plan	18

This page is intentionally blank.

EXECUTIVE SUMMARY

Authorities

On December 7, 1979, the President directed FEMA to assume the lead responsibility for all offsite 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 Program (REPP) that was established following the Three Mile Island Nuclear Station accident in March 1979. In October 2005, the REP Program was moved to the Department of Homeland Security/Federal Emergency Management Agency/Radiological Emergency Preparedness Program (DHS/FEMA/REPP).

FEMA Rule 44 CFR 350 establishes the policies and procedures for FEMA's (now DHS/FEMA/REP's) initial and continued approval of tribal, 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.

Responsibilities

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

- The review and evaluation of Radiological Emergency Response Plans (RERPs) developed by State and local governments;
- The evaluation of exercises conducted by State and local governments to determine whether such plans can be implemented;
- 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 (44 CFR Part 354, Appendix A, September 14, 1993), now under revision to reflect DHS responsibilities;

Coordinating Elements

• Coordinating the activities of the following Federal agencies with responsibilities in the radiological emergency planning process:

- U.S. Department of Agriculture
 - U.S. Department of Commerce
 - U.S. Department of Defense
 - U.S. Department of Energy
 - U.S. Department of Health and Human Services
 - Food and Drug Administration
 - Center for Disease Control
 - U.S. Department of Housing and Urban Development
 - U.S. Department of the Interior
 - U.S. Department of Justice
 - U.S. Department of State
 - U.S. Department of Transportation
 - U.S. Department of Veterans Affairs
 - U.S. Environmental Protection Agency
 - General Services Administration
 - National Aeronautics and Space Administration
 - Nuclear Regulatory Commission
- Providing regulatory oversight, rule-making and guidance, as necessary.

Purpose

A REP Medical Services Drill was evaluated on December 9, 2011, by FEMA, Region III, REPP to assess the capabilities of State and local emergency preparedness organizations in implementing their RERPs and procedures to protect the public health and safety during a radiological emergency involving the Calvert Cliffs Nuclear Power Plant (CCNPP). The purpose of this report is to present the drill results and findings on the performance of the offsite response organizations (OROs) during a simulated radiological emergency involving a radiologically contaminated, injured individual. Please note that throughout this report the terms Drill and Exercise may be used synonymously.

The findings presented in this report are based on the evaluations of the Federal evaluator team,

with final determinations made by the Regional Assistance Committee Chairperson from FEMA, Region III, and approved by DHS/FEMA/REPP Headquarters. There were no Deficiencies, Areas Requiring Corrective Action, or Planning Issues identified as a result of this exercise/drill.

Criteria

The criteria utilized in the DHS/FEMA/REPP evaluation process are contained in the following:

- 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 Guidance Memoranda MS-1, "Medical Services," November 1986;
- FEMA-REP-14, "Radiological Emergency Preparedness Exercise Manual," September 1991; and
- 67 FR 20580, "FEMA Radiological Emergency Preparedness: Exercise Evaluation Methodology," April 25, 2002.

Section 1 of this report, entitled "Exercise Overview," contains basic details of the exercise/drill, the exercise planning team, and participating agencies.

Section 2 is titled "Exercise Design Summary" and includes the Purpose and Design, a description of the Objectives, Capabilities and Activities, and the Scenario Summary.

Section 3 is the "Analysis of Capabilities". It describes the overall Evaluation and Results and the Summary Results of Evaluation. It identifies the specific participants, the criteria that were evaluated, and indicates if the criteria were or were not met.

Section 4 expresses the "Conclusion" resulting from the exercise.

Appendix A identifies the Drill Evaluators and Team Leaders.

Appendix B catalogs the Acronyms and Abbreviations used in this report.

Appendix C is the Exercise Plan and contains the Exercise Plan, Extent of Play, and Controllers Handbook.

Appendix D is titled Improvement Plan. However, because there were no "Deficiencies," "Areas Requiring Corrective Action," or "Planning Issues" assessed in this drill, the Improvement Plan is not applicable and thus not included in this report.

Emergency Planning Zone Description:

The Calvert Cliffs Nuclear Power Plant (CCNPP) is located near Maryland Highway 2-4 in Calvert County, Maryland, on the west bank of the Chesapeake Bay near Lusby, Maryland. The site is owned and operated by Constellation Energy Group and covers an area of approximately 2,108 acres. Seventy percent of the area remains forested and relatively undisturbed by CCNPP activities. There are several endangered plant and insect species within the boundaries of the site. Two pressurized water reactors each generate an electrical output of 825 MW that provide power to around 400,000 residential customers. Unit 1 began commercial operation during May 1975 and Unit 2 in April 1977. On March 23, 2002, the license was renewed, thereby extending the life of the plant by 20 years.

Nearby communities include: Calvert Beach and Long Beach, approximately 3 miles to the northwest; Cove Point, approximately 4 1/2 miles to the southeast; Chesapeake Ranch Estates, approximately 6 miles to the south-southwest; and the Patuxent Naval Air Test Center, approximately 10 miles to the south. Camp Bay Breeze, a summer camp, is located 2 miles southeast of the site.

The topography of the vicinity around the plant defines several small watersheds. The watershed containing the plant and auxiliary structures drains into the Chesapeake Bay. The Chesapeake Bay has an average depth of 30 feet and receives the majority of its fresh water, sediment, and nutrients from the Susquehanna River.

A majority of the land in the area surrounding the site is devoted to agricultural and forest use, such as farming of tobacco, corn, soybeans, and hay. Dairy farming is of minor importance. The waters adjacent to the site are used for commercial fishing, primarily for shellfish such as clams, oysters, and crabs.

There are approximately 58,058 people in the 10-mile EPZ, 13,307 in the 5-mile EPZ, and 2,329 in the 2-mile EPZ. There are approximately 9,563 transients within the EPZ during peak seasonal activities, e.g., daytime, during the summer. No major populated cities (greater than 25,000) exist within the 10-mile EPZ.

SECTION 1: EXERCISE OVERVIEW

1.1 Exercise Details

Exercise Name

Calvert Cliffs Nuclear Power Plant

Type of Exercise

Drill

Exercise Date

December 09, 2011

Program

Department of Homeland Security/FEMA Radiological Emergency Preparedness
Program

Scenario Type

Radiological Emergency

1.2 Exercise Planning Team Leadership

Robert Neff

Site Specialist

FEMA Region III

Technological Hazards Specialist

615 Chestnut Street

Philadelphia, Pennsylvania, 19106

215-931-5531

Robert.Neff@dhs.gov

Rick Woods

Planner

Constellation Energy

Sr. EP Analyst CCNPP

1650 Calvert Cliffs Parkway

Lusby, Maryland, 20678
410-495-3866
Rick.Woods@CENGLLC.com

Andy Moffitt
Coordinator
Calvert Memorial Hospital
Emergency Manager/Life Safety Specialist
100 Hospital Road
Prince Frederick, Maryland, 20678
410-414-4721
amoffitt@cmhlink.org

Fred Frey
Exercise Planner
Maryland Emergency Management Agency
Senior Planner
5401 Rue Saint Lo Drive
Reisterstown, Maryland, 21136
410-517-3613
FFrey@mema.state.md.us

1.3 Participating Organizations

Agencies and organizations of the following jurisdictions participated in the Calvert Cliffs Nuclear Power Plant drill:

State Jurisdictions

Maryland Department of Health
Maryland Emergency Management Agency

Risk Jurisdictions

Calvert County Department of Health
St Leonard Fire and Rescue Squad
Calvert County Memorial Hospital

SECTION 2: EXERCISE DESIGN SUMMARY

2.1 Exercise Purpose and Design

On December 9, 2011 a medical services drill was evaluated in relation to the Calvert Cliffs Nuclear Power Plant by the Department of Homeland Security (DHS), Federal Emergency Management Agency (FEMA), Region III, Radiological Emergency Preparedness Program (REPP). The purpose of the drill was to assess the level of State and local preparedness in responding to a radiological emergency. The drill was held in accordance with DHS's policies and guidance concerning the exercise of State and local radiological emergency response plans (RERPs) and procedures. The most recent previous FEMA evaluated medical services drill for this site was conducted on October 1, 2009.

FEMA, Region III, wishes to acknowledge the efforts of the many individuals in the State of Maryland, the risk jurisdiction of Calvert County, the St Leonard Fire and Rescue Squad, and the Calvert Memorial Hospital which participated in this drill.

Protecting the public health and safety is the full-time job of some of the drill participants and an additional 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.

2.2 Exercise Objectives, Capabilities and Activities

The objective of the CCNPP/Calvert Memorial Hospital Medical Services Medical Services (MS-1) Drill was to demonstrate that the response organizations have the personnel, equipment, training, and knowledge to effectively assess the condition of a potentially radioactively contaminated patient, protect against cross contamination, transport, and transfer the patient to a hospital where the patient can then be decontaminated and treated. The hospital personnel are responsible for preparing a receiving and treatment area, operating radiological detection equipment, and implementing proper emergency worker protective procedures.

All activities were evaluated in accordance with current FEMA directives and guidance and were performed in accordance with current hospital plans and procedures.

2.3 Scenario Summary

The exercise scenario for this Medical Services Drill consisted of simulated events during loading of radioactive waste into a Sealand cargo container in preparation for off-site shipment; a 55 gallon radioactive waste drum ruptured due to buildup of pressure inside the drum caused by an exothermic chemical reaction. The drum rupture caused radioactive waste to be expelled from the sealand and the chemical reaction caused the radioactive waste to catch fire. An employee using a forklift on the exterior of the Sealand container lost their balance when the drum ruptured and fell approximately eight (8) feet sustaining a laceration from what appeared to be a broken right leg. The injured employee was working in a clean area, not wearing protective clothing, and was able to exit the area through the radioactive waste spread on the ground.

SECTION 3: ANALYSIS OF CAPABILITIES

3.1 Drill Evaluation and Results

Contained in this section are the results and findings of the evaluations of all jurisdictions and locations that participated in the December 9, 2011, CCNPP/Calvert Memorial Hospital MS-1 Drill.

Each jurisdiction and functional entity was evaluated on the basis of its demonstration of the Exercise Evaluation Area Criteria contained in the REP Exercise Evaluation Methodology. Detailed information on the Exercise Evaluation Area Criteria and the Extent-of-Play Agreement used in this exercise are found in the Exercise Plan, Appendix C.

3.2 Summary Results of Drill Evaluation

The Calvert Cliffs Nuclear Power Plant 2011 Medical Services Drill evaluation included two (2) participating locations. Two evaluators provided analyses of six (6) Exercise Criteria. These analyses resulted in a determination that all criteria were successfully demonstrated and there were no Deficiencies, Areas Requiring Corrective Action, or Planning Issues.

Table 3.1 - Summary of Drill Evaluation

DATE: 2011-12-09 SITE: Calvert Cliffs Nuclear Power Plant, MD M: Met, A: ARCA, D: Deficiency, P: Plan Issue, N: Not Demonstrated		CalCo SLFRS	CalCo, CMH
Emergency Operations Management			
Mobilization	1a1		
Facilities	1b1		
Direction and Control	1c1		
Communications Equipment	1d1		
Equip & Supplies to support operations	1e1	M	M
Protective Action Decision Making			
Emergency Worker Exposure Control	2a1		
Rad Assessment and PARs for the Plume Phase Emergency	2b1		
PADs for the General Public for the Plume Phase Emergency	2b2		
Protective Action Decisions for protection of special populations	2c1		
Rad Assessment and Decision making for the Ingestion Exposure Pathway	2d1		
Rad Assessment and Decision making concerning Relocation/Reentry/Return	2e1		
Protective Action Implementation			
Implementation of emergency worker exposure control	3a1	M	M
Implementation of KI decision	3b1		
Implementation of protective actions for special populations	3c1		
Implementation of protective actions for Schools	3c2		
Implementation of traffic and access control	3d1		
Impediments to evacuation	3d2		
Implementation of ingestion pathway decisions - availability/use of info	3e1		
Materials for Ingestion Pathway PADs are available	3e2		
Implementation of relocation, re-entry, and return decisions.	3f1		
Field Measurement and Analysis			
Adequate Equipment for Plume Phase Field Measurements	4a1		
Field Teams obtain sufficient information	4a2		
Field Teams Manage Sample Collection Appropriately	4a3		
Post plume phase field measurements and sampling	4b1		
Laboratory operations	4c1		
Emergency Notification and Public Info			
Activation of the prompt alert and notification system	5a1		
Activation of the prompt alert and notification system - Fast Breaker	5a2		
Backup Route Alerting	5a3		
Alert and Notification	5a4		
Emergency information and instructions for the public and the media	5b1		
Support Operations/Facilities			
Monitoring, decontamination, and registration of evacuees	6a1		
Monitoring and decontamination of emergency workers and their equipment	6b1		
Temporary care of evacuees	6c1		
Transportation and treatment of contaminated injured individuals	6d1	M	M

3.3 Criteria Evaluation Summaries

3.3.1 Risk Jurisdictions

3.3.1.1 Calvert County, St. Leonard Fire and Rescue Squad

In summary, the status of DHS/FEMA criteria for this location is as follows:

- a. MET: 1.e.1, 3.a.1, 6.d.1.
- b. AREAS REQUIRING CORRECTIVE ACTION: None
- c. DEFICIENCY: None
- d. PLAN ISSUES: None
- e. NOT DEMONSTRATED: None
- f. PRIOR ISSUES - RESOLVED: None
- g. PRIOR ISSUES - UNRESOLVED: None

3.3.1.2 Calvert County, Calvert Memorial Hospital

In summary, the status of DHS/FEMA criteria for this location is as follows:

- a. MET: 1.e.1, 3.a.1, 6.d.1.
- b. AREAS REQUIRING CORRECTIVE ACTION: None
- c. DEFICIENCY: None
- d. PLAN ISSUES: None
- e. NOT DEMONSTRATED: None
- f. PRIOR ISSUES - RESOLVED: None
- g. PRIOR ISSUES - UNRESOLVED: None

SECTION 4: CONCLUSION

Based on the review of the offsite radiological emergency response plans and procedures submitted, FEMA Region III has determined they are adequate and there is reasonable assurance they can be implemented, as demonstrated during the Calvert Cliffs Nuclear Power Plant/Calvert Memorial Hospital 2011 MS-1 Drill.

APPENDIX A: DRILL EVALUATORS AND TEAM LEADERS

DATE: 2011-12-09, SITE: Calvert Cliffs Nuclear Power Plant, MD

LOCATION	EVALUATOR	AGENCY
Calvert County, St. Leonard Fire and Rescue Squad	*Robert Neff	FEMA RIII
Calvert County, Calvert Memorial Hospital	Joseph Suders	FEMA RIII
* Team Leader		

APPENDIX B: ACRONYMS AND ABBREVIATIONS

Acronym	Meaning
CCNPP	Calvert Cliffs Nuclear Power Plant
DRD	Direct Reading Dosimeter
EPZ	Emergency Planning Zone
MW	Mega Watt
NRC	Nuclear Regulatory Commission
REA	Radiation Emergency Area
REPP	Radiological Emergency Preparedness Program

APPENDIX C: EXERCISE PLAN



Calvert Cliffs Nuclear Power Plant Calvert Hospital Medical Drill

Drill Scenario (Master Copy)

Drill Date: 12/09/2011

If found unattended please return to the
Emergency Preparedness Unit

Calvert Cliffs Nuclear Power Plant

EMERGENCY PREPAREDNESS DRILL SCENARIO

Medical Drill

(12/09/2011)

Drill Number: CAL-EP-MD-11-8

Submitted by: _____ / 11/29/2011
R.R. Woods, Sr. EP Analyst Date

Approved by: _____ /
M.J. Fick, Director Emergency Preparedness Date

Approved by: _____ /
C.R. Costanzo, Plant General Manager Date

Approved by: _____ /
G.H. Gellrich, Vice-President Date

Calvert Cliffs Nuclear Power Plant MS-1 2010

INTRODUCTION

The purpose of this document is to establish initial conditions and scenario timeline for the Calvert Memorial Hospital FEMA evaluated drill to be conducted on December 09, 2011

This exercise is being conducted in cooperation with the Calvert County Emergency Management Agency, Health Department, St. Leonard Volunteer Fire Department, Calvert Memorial Hospital and the Calvert Cliffs Nuclear Power Plant

Calvert Cliffs Nuclear Power Plant CALVEX 11

Date

TABLE OF CONTENTS

INTRODUCTION.....	5
FEMA EVALUATION AREAS TO BE DEMONSTRATED.....	6
SCENARIO.....	12
CENG PERFORMANCE OBJECTIVES AND DEMONSTRATION CRITERIA.....	20

INTRODUCTION

The purpose of this document is to establish those exercise evaluation areas and corresponding extent of play parameters expected to be demonstrated during the Calvert Cliffs Nuclear Power Plant MS-1 exercise to be conducted on December 9, 2011

This exercise is being conducted in cooperation with the Calvert County Emergency Management Agency, Calvert Health Department St. Leonard Volunteer Fire Department, Calvert Memorial Hospital and the Calvert Cliffs Nuclear Power Plant

These evaluation areas have been developed through reviews of past exercises, associated plans and procedures, the proposed exercise scenario, applicable FEMA guidance documents, and discussions with FEMA representatives.

All demonstrations will be conducted in accordance with established plans and procedures, except as noted for specific exercise evaluation areas described herein.

FEMA REP Program Manual Based Objectives -
Evaluation areas to be demonstrated are as follows;

- Equipment and Supplies to Support Operation (1.e.1)
- Implementation of Emergency Worker Exposure Control (3.a.1)
- Transportation and Treatment of Contaminated Injured Individuals (6.d.1)

Actions will be taken in accordance with each organizations emergency plan and procedures unless specified under the specific extent of play.

EVALUATION AREA 1: EMERGENCY OPERATIONS MANAGEMENT

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

Criterion 1.e.1: Equipment, maps, displays, dosimetry, and other supplies are sufficient to support emergency operations. (NUREG-0654, H., J.10.a.b.e.f.j.k., 11, K.3.a.). No potassium iodide (KI) is expected to be issued.

INTENT

This sub-element is derived from NUREG-0654, which provides that OROs have emergency equipment and supplies adequate to support the emergency response.

EXTENT OF PLAY

Equipment within the facility(ies) should be sufficient and consistent with the role assigned to that facility in the ORO's plans and/or procedures in support of emergency operations. Use of maps and displays is encouraged.

All instruments, including air sampling flow meters (field teams only), should be inspected, inventoried, and operationally checked before each use. They should be calibrated in accordance with the manufacturer's recommendations (or at least annually for the unmodified CDV-700 series or if there are no manufacturer's recommendations for a specific instrument; modified CDV-700 instruments should be calibrated in accordance with the recommendation of the modification manufacturer.). A label indicating such calibration should be on each instrument or verifiable by other means. Note: Field team equipment is evaluated under 4.a.1; radiological laboratory equipment under 4.c.1; reception center and emergency worker facilities' equipment is evaluated under 6.a.1; and ambulance and medical facilities' equipment is evaluated under 6.d.1.

Sufficient quantities of appropriate direct-reading and permanent record dosimetry and dosimeter chargers should be available for issuance to all categories of emergency workers that could be deployed from that facility. Appropriate direct-reading dosimeters should allow individual(s) to read the administrative reporting limits and maximum exposure limits contained in the ORO's plans and procedures.

Dosimeters should be inspected for electrical leakage at least annually and replaced, if necessary. CDV-138s, due to their documented history of electrical leakage problems, should be inspected for electrical leakage at least quarterly and replaced if necessary. This leakage testing will be verified during the exercise, through documentation submitted in the Annual Letter of Certification, and/or through a staff assistance visit.

No distribution of KI is expected.

At locations where traffic and access control personnel are deployed, appropriate equipment (e.g., vehicles, barriers, traffic cones and signs, etc.) should be available or their availability described.

State of Maryland Extent of Play:

All activities will be based on the ORO's plans and procedures and completed as they would be in an actual emergency, unless noted above or otherwise indicated in this extent of play agreement. Calvert County emergency may substitute electronic personnel dosimetry for the self reading dosimeters. KI will not be issued to emergency workers for a contaminated injured response. Calibration and electrical leakage testing of dosimetry will be evaluated with the State of Maryland Annual Letter of Certification.

Locations evaluated;

Calvert Memorial Hospital
St Leonard Fire and Rescue Squad
Calvert County Health Department

Outstanding Issues

None

EVALUATION AREA 3: PROTECTIVE ACTION IMPLEMENTATION

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

Criterion 3.a.1: The OROs issue appropriate dosimetry and procedures, and manage radiological exposure to emergency workers in accordance with the plans and 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. (NUREG-0654, K.3.)

INTENT

This sub-element is derived from NUREG-0654, which provides that OROs should have the capability to provide for the following: distribution, use, collection, and processing of direct-reading dosimeters and permanent record dosimeters; provide for direct-reading dosimeters to be read at appropriate frequencies by emergency workers; maintain a radiation dose record for each emergency worker; and provide for establishing a decision chain or authorization procedure for emergency workers to incur radiation exposures in excess of protective action guides, always applying the ALARA (As Low As is Reasonably Achievable) principle as appropriate.

EXTENT OF PLAY

ORO's should demonstrate the capability to provide appropriate direct-reading and permanent record dosimetry, dosimetry chargers, and instructions on the use of dosimetry to emergency workers. **For evaluation purposes, appropriate direct-reading dosimetry is defined as dosimetry that allows individual(s) to read the administrative reporting limits (that are pre-established at a level low enough to consider subsequent calculation of Total Effective Dose Equivalent) and maximum exposure limits (for those emergency workers involved in life saving activities) contained in the ORO's plans and procedures.**

Each emergency worker should have the basic knowledge of radiation exposure limits as specified in the ORO's plan and/or procedures. Procedures to monitor and record dosimeter readings and to manage radiological exposure control should be demonstrated.

Although it is desirable for all emergency workers to each have a direct-reading dosimeter, there may be situations where team members will be in close proximity to each other during the entire mission and adequate control of exposure can be effected for all members of the team by one dosimeter worn by the team leader.

Emergency workers who are assigned to low exposure rate areas, e.g., at reception centers, counting laboratories, emergency operations centers, and communications centers, may have individual direct-reading dosimeters or they may be monitored by dosimeters strategically placed in the work area. It should be noted that, even in these situations, each team member must still have their own permanent record dosimeter.

State of Maryland Extent of Play:

All activities will be based on the ORO's plans and procedures and completed as they would be in an actual emergency, unless noted above or otherwise indicated in the extent of play agreement. Deleted portions of the extent of play will not be evaluated in the medical drill scenario.

Locations evaluated;

Calvert County Environmental Health
Calvert Memorial Hospital
Calvert County

Outstanding Issues:

None

EVALUATION AREA 6: SUPPORT OPERATION/FACILITIES

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

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, F.2, H.10., K.5.a.b., L.1., 4.)

INTENT

This sub-element is derived from NUREG-0654, which provides that OROs should have the capability to transport contaminated injured individuals to medical facilities with the capability to provide medical services.

EXTENT OF PLAY

Monitoring, decontamination, and contamination control efforts will not delay urgent medical care for the simulated victim.

ORO should demonstrate the capability to transport contaminated injured individuals to medical facilities. An ambulance should be used for the response to the victim. However, to avoid taking an ambulance out of service, any vehicle (e.g., car, truck, or ambulance) may be utilized to transport a simulated victim to the medical facility. Normal communications between the ambulance/ dispatcher and the receiving medical facility should be demonstrated. If a substitute vehicle is used for transport to the medical facility, this communication must occur prior to releasing the ambulance from the drill. This would include reporting radiation monitoring results, if available. Additionally, the ambulance crew should demonstrate, by interview, knowledge of where the ambulance and crew would be monitored and decontaminated, if required, or whom to contact for such information.

Monitoring of the simulated victim may be performed prior to transport, done enroute, or deferred to the medical facility. Prior to using a monitoring instrument(s), the monitor(s) should demonstrate the process of checking the instrument(s) for proper operation. All monitoring activities should be completed as they would be in an actual emergency. Appropriate contamination control measures should be demonstrated prior to and during transport and at the receiving medical facility.

The medical facility should demonstrate the capability to activate and set up a radiological emergency area for treatment. Equipment and supplies should be available for the treatment of contaminated injured individuals.

The medical facility should demonstrate the capability to make decisions on the need for decontamination of the individual, to follow appropriate decontamination procedures, and to maintain records of all survey measurements and samples taken. All procedures for the collection and analysis of samples and the decontamination of the individual should be demonstrated or described to the evaluator.

State of Maryland Extent of Play: All activities associated with this criterion will be based on the ORO's plans and procedures and completed, as they would be in an actual emergency, unless noted above or otherwise indicated in the extent of play agreement. Radiological monitoring of the victim will not be the responsibility of the responding rescue squad.

Locations evaluated;

St Leonard Fire and Rescue Squad
Calvert Memorial Hospital

Outstanding Issues

None

**Calvert Cliffs Nuclear Power Plant
Calvert County Fire and Rescue
Calvert Memorial Hospital
Contaminated / Injured Victim
Response Drill**

December 9, 2011

Initial Conditions:

- 0900
- CCNPP Radiation Protection Department staffing is normal
- CCNPP Site Medical is closed.

During loading of radioactive waste into a sealand cargo container in preparation for off-site shipment, a 55 gallon radioactive waste drum ruptured due to buildup of pressure inside the drum caused by a chemical reaction. The drum rupture caused radioactive waste to be expelled from the sealand. An employee using a forklift on the exterior of the sealand container lost their balance when the drum ruptured and fell approximately eight (8) feet sustaining a laceration from what appears to be a broken right leg. The injured employee was working in a clean area, not wearing protective clothing, and was able to exit the area through the radioactive waste spread on the ground.

The turn out gear and protective clothing of the first aid team who initially responded was found to be contaminated by the Radiation Protection Technician (RPT) at the scene. After removing the protective clothing and gear, all but one of responders will be surveyed and released by the RPT at the scene. Decontamination of the remaining responder is provided (discussed) by Radiation Protection at the scene.

-Note-

Location of accident scene will be at the ISFSI Maintenance Building or the Main Warehouse depending on Plant conditions for the day.

Victim # 1 initially suffered a fainting spell, and then a broken leg from his fall from the forklift. He suffered an open fracture of the right leg just below the knee. Radioactive liquid has contaminated the worker, the fork lift and general area. Radiation levels are 10 mrem/hr on contact with the liquid, and 5.0 mrem/hr at 12".

Drill Time 0000

Attending workers assess the accident scene and initiate a call to the Control Room using message #1.

Message #1: This is a drill. This is (name). There has been an accident on the at the ISFSI Maintenance Building (or warehouse loading dock) during unloading of radioactive liquid waste drums. One person is hurt – he is unconscious and looks like he has broken his leg. Two liquid waste drums have been broken open and spilled onto the ground. I think the area is contaminated.

Expected Actions; - Control room initiates ERPIP 3.0, "Immediate Actions", Attachment 15, "Personnel Emergency"

Drill Time 0010

Fire Safety and Health Physics respond. A controlled area is established by Radiation Protection and first aid is administered to the victim by the Fire and Safety Responders. Notification to transport victim to Calvert Memorial Hospital should be initiated.

Injuries and radiation levels at the accident scene are as follows:

Victim #1	
<u>Injuries</u>	<u>Radiation / Contamination Levels</u>
Open fracture of the right leg.	Radiation levels up to 10 mrem/hr (25,000 ccpm) on the victim, and surrounding area.
H/R 180, other vitals as read.	
Victim is diabetic and unconscious.	The victims EPD is not in alarm

Drill Time 0040

Offsite rescue squad arrives: (Note: actual response time may be longer due to security search)

First Responder Contamination:

One first responder that comes in contact with the patient area during the patient assessment becomes contaminated, by contaminated liquid permeating their clothing. The contamination levels are as follows:

Left Arm: 1000 ccpm

RP Technicians should describe required actions for decontamination of First Responder and Contamination Control.

Injuries and radiation levels during transportation from CCNPP and upon arrival at CMH are as follows:

Victim #1

Injuries

Open fracture of the right leg.

H/R 180, Other vitals as read.

Radiation / Contamination Levels

10 mrem/hr at the open fracture.

5.0 mrem/hr at contact with wound

The victims EPD reads 1 mrem

15,000 ccpm on both hands

(5mrem area extends length of wound, 10 mrem/hr "hot spot" at fracture site)

Drill Time 0115

Following initial decontamination:

Victim #1

Injuries

Open fracture of the right leg.

Some nausea

Vitals as read.

Radiation / Contamination Levels

Radiation levels are 1.0 mrem/hr at open fracture. (2,500 ccpm)

Both hands are background

Following second decontamination:

Victim #1

Injuries

Open fracture of the right leg.

Some nausea

Vitals as read.

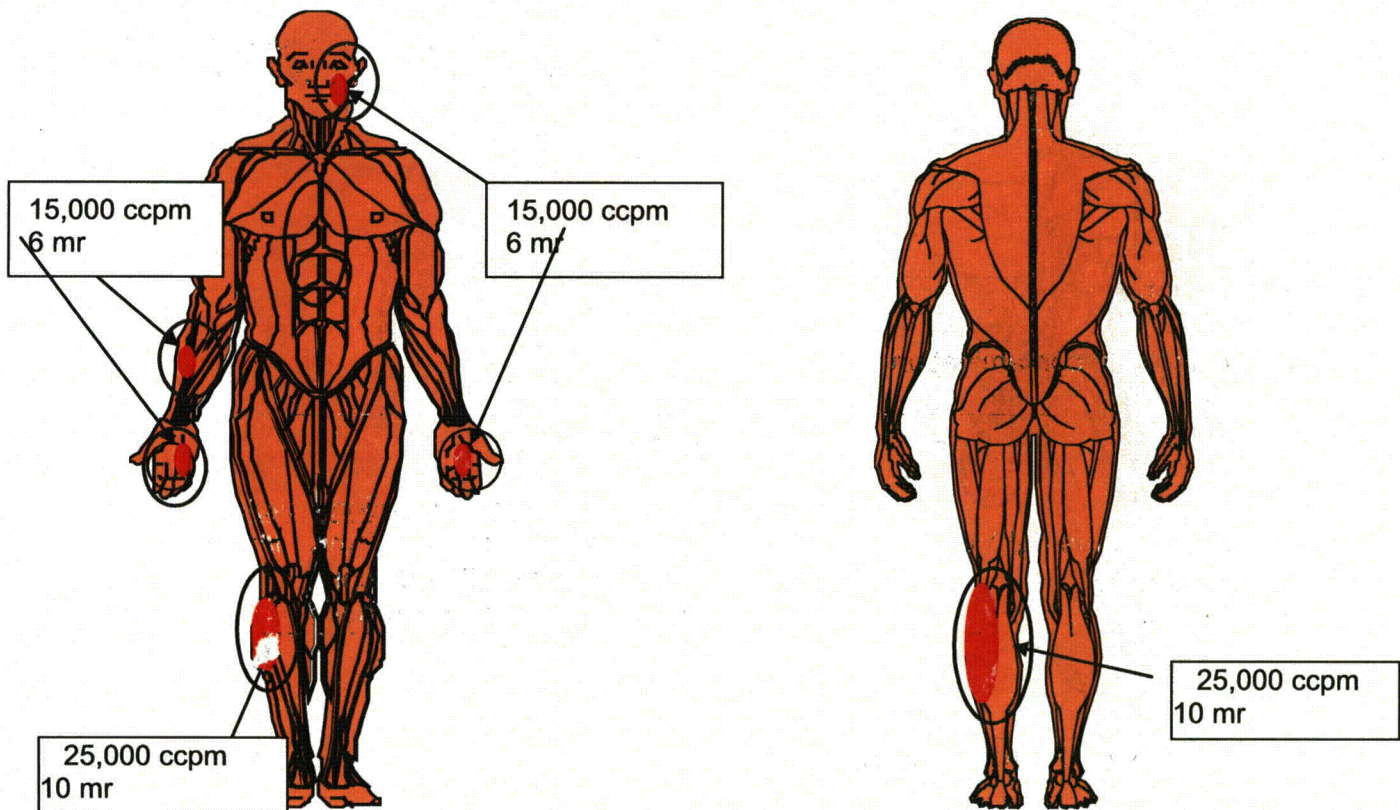
Radiation / Contamination Levels

Radiation levels are bkg at

open fracture and surrounding skin on the rt leg.

Initial Conditions
(After outer clothing removed)

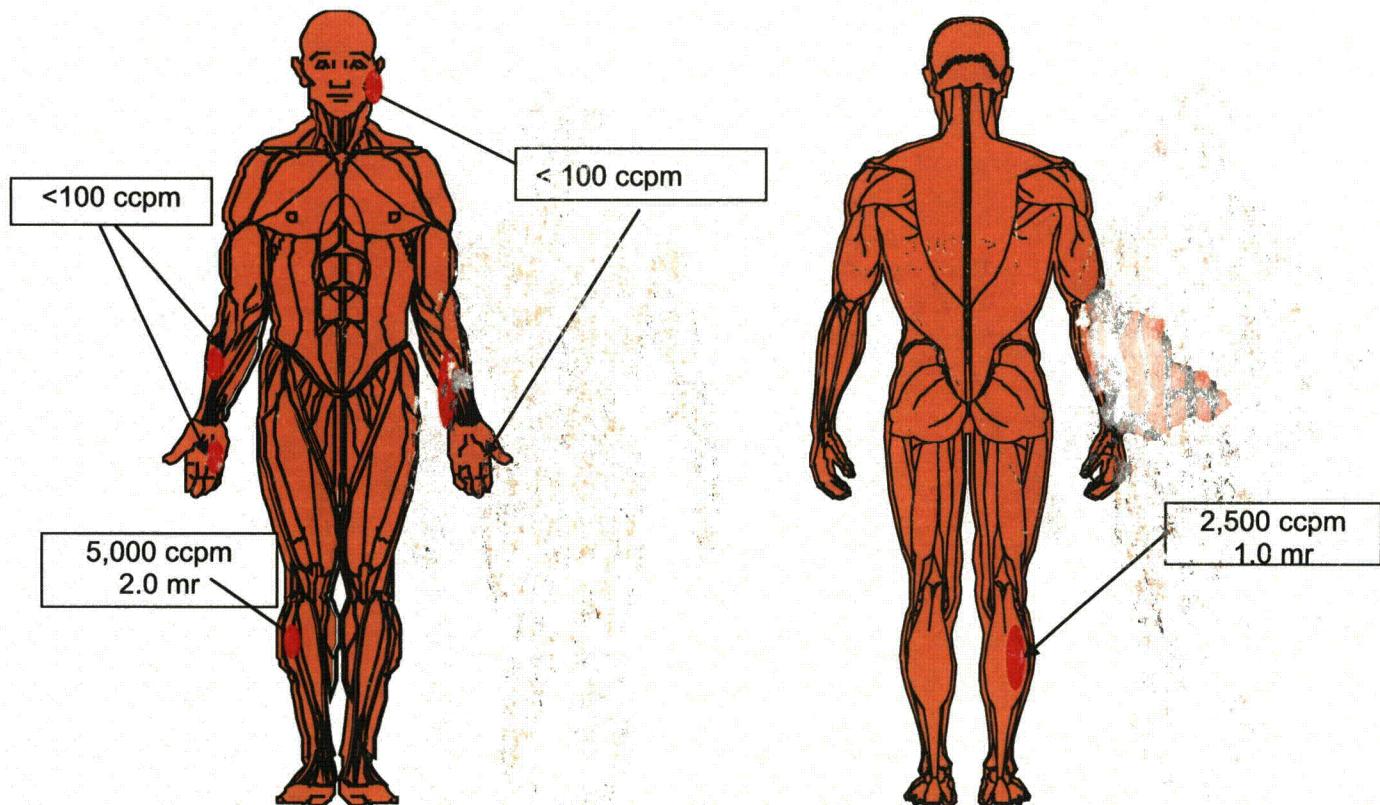
Patient Radiological Data



Patient

Radiological Data - First survey (post-decontamination at Hospital)

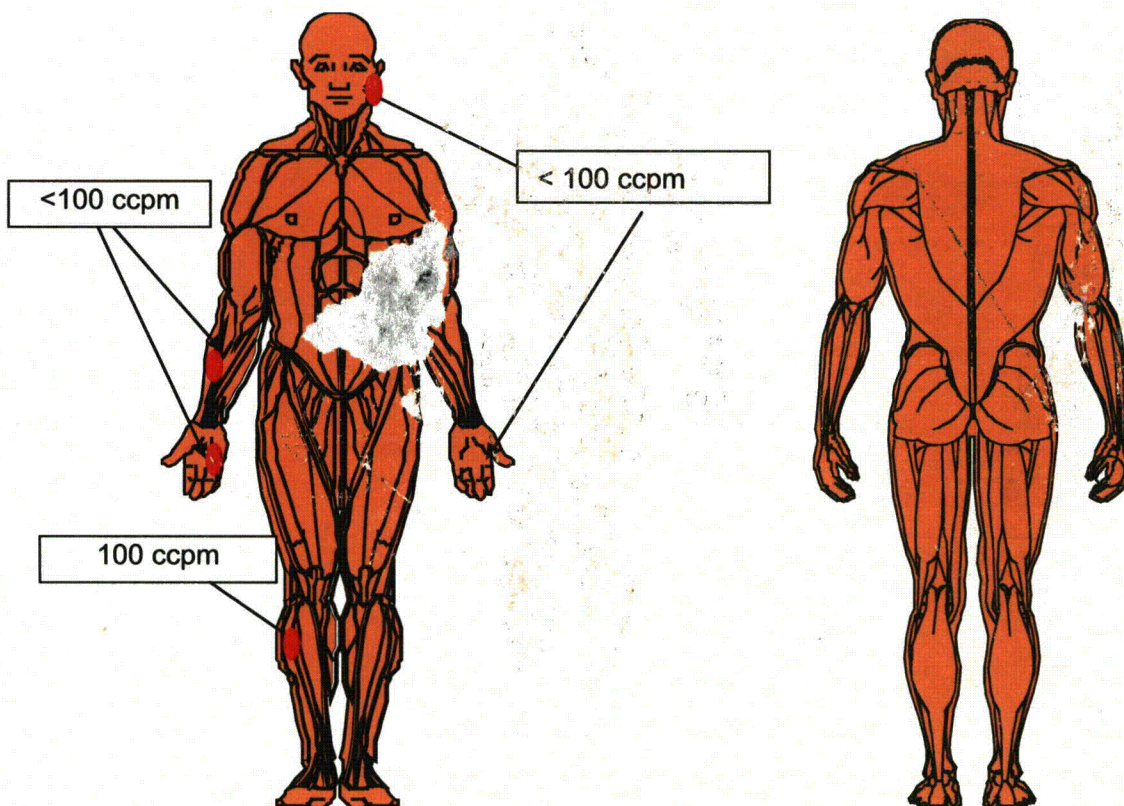
(Note - Other decon attempts may lower contamination, but the contamination cannot be <100ccpm until deconned at the Hospital.)



Patient

Radiological Data - Final survey (post-decontamination at Hospital)

(Note - Other decon attempts may lower contamination, but the contamination cannot be <100 ccpm until deconned at the Hospital.)



PULSE: 90-100
RESPIRATION: 16 normal
BP: 180/80
SKIN: warm/dry
PUPILS: Equal reactive
INJURY: Bleeding from leg laceration
Deformities none
Contusions none
Abrasions none
Puncture/Penetrations none
Burns none
Tenderness Area around the wound on the leg
Lacerations 5 inch X 2" laceration to right thigh
Swelling In area of laceration
Signs and symptoms bleeding from wound
Allergies none
Medications none
Pertinent past history none
Last oral intake Breakfast, eggs, bacon, coffee
Events leading to the injury Injured leg when stepping off a fork lift
after suffering a heart attack.

AMBULANCE ARRIVAL AT PLANT

PULSE: 110
RESPIRATION: 16
BP: 115/70
SKIN: Clammy/pale
PUPILS: Equal and slow to react
CONTAMINATION: Shown above

ENROUTE TO HOSPITAL

PULSE: 95
RESPIRATION: 14
BP: 125/75
SKIN: Clammy/pale, improving with treatment
PUPILS: Equal and reactive
CONTAMINATION: Same as above

EXPECTED ACTIONS:

Attending physician should treat the **medical problem first** and take care of the radioactive contamination when the patient's condition is stable.

Expected Response Actions:

Complete physical exam, treat wound, decon patient, as required. Initial attempts to decontaminate the patient will reduce contamination levels on both hands to background levels but injured leg is still reading 1.0 mr/hr. A second decon effort will be required on the leg at the hospital to reduce contamination levels to <100 ccpm. At the conclusion of the treatment the patient will be conscious and alert, all vital signs will have returned to normal.

Hospital Worker Contamination:

Hospital worker that comes in contact with the patient's leg area during the decon process becomes contaminated by contaminated liquid on their scrubs. The contamination levels are as follows:

Left Arm: 800 ccpm

RP Technicians should describe required actions for decontamination of Hospital Worker and contamination Control. Removing the scrubs will remove the contamination.

Upon completion of the patient treatment, monitoring of personnel and the ambulance, a critique of the drill shall be performed.

ERONS Drill Adjustments

The following actions are to be taken one hour prior to the scheduled start time of the December 9, 2011 Medical drill

-Note-

In the event of an actual emergency - Return all saved messages to original condition.

_____ ACCESS EROns and ADJUST saved event message for RP supervision to include "This is a Drill" at the beginning and end of the EROn message

_____ VERIFY by peer that EROn message indicates "This is a Drill" for this saved event.

_____ WHEN the Control Room is notified of the simulated accident THEN OBSERVE the control room communicator activates the appropriate EROns in accordance with ERPIP 3.0, Immediate Actions, Attachment 15, Personnel Emergency, Steps 5. c, (2).

_____ WHEN the communicator has completed these steps THEN return EROns message to original condition.

CENG PERFORMANCE OBJECTIVES AND DEMONSTRATION CRITERIA

EP PERFORMANCE OBJECTIVES AND DEMONSTRATION
CRITERIA

CNG-EP-1.01-1005

Revision 00100

Page 22 of 78

Page 11 of 67

Attachment 2, Drill and Exercise Objectives (Continued)

Planning Standard:	B	On-Site Emergency Organization
Objective Number:	OBJ-B-09	Emergency Services Support Organization

Description

Demonstrate the ability to use on-site first aid/fire brigade personnel and to coordinate with required off-site emergency services (police, fire, ambulance, medical, hospital).

Frequency

Annual

Reference

NUREG-0654, B-9

Applicable EMERGENCY RESPONSE FACILITIES

Control Room, TSC, OSC and EOF

Scenario Requirements

Applicable Medical Drill, Fire Drill or Emergency Plan Drill calls for off-site services

Demonstration Criteria

1. Contact appropriate off-site emergency services (circle appropriate) (police, fire, ambulance, medical, hospital) per appropriate site procedures.
2. Points of contact are appropriate for the support requested.
3. Security response was prompt in providing site access to the responding agency and in security related scenarios.
4. Fire Brigade coordination and communications were appropriate for fire scenarios.
5. Coordination and communications were appropriate for medical scenarios.
6. RP/HP support was contacted promptly for scenarios involving radiological controls.

Key Data

Time fire reported to CR

Time Fire Brigade dispatched

Time of arrival at protected Area

Time of entry into Protected Area

Time injury reported

Time of ambulance arrival at Protected Area

Time CR advised of contamination

Time of victim transfer to ambulance

Time ambulance exited Protected Area

EP PERFORMANCE OBJECTIVES AND DEMONSTRATION CRITERIA
CNG-EP-1.01-1005
Revision 00100
Page 34 of 78

Page 23 of 67

Attachment 2: Drill and Exercise Objectives (Continued)

Planning Standard: F	Emergency Communications
Objective Number: OBJ-F-03	Medical Support Communications

Description

Demonstrate the ability to perform communications with both fixed and mobile medical support unit.

Frequency

Annual

Reference

NUREG-0654, F.2 & N.2

Applicable EMERGENCY RESPONSE FACILITIES

Control Room, Hospital and /or Ambulance Service

Scenario Requirements

A medical event or injury has occurred requiring off-site assistance.

Demonstration Criteria

1. The Control Room was promptly notified of the injury.
2. Communications between the accident scenes Control Room and RP/HP Supervisor were timely and accurate.
3. The capability to request ambulance support through 911 is demonstrated.
4. The capability to effectively communicate with the designated receiving hospital is demonstrated.
5. Site Procedures and Hospital Plan followed by responders.

Key Data

Time Injury scenario initiated: _____
Time Control Room Notified: _____
Time RP/HP Notified: _____
Time Fire Brigade mobilized: _____
Time Ambulance Requested: _____
Time Hospital Contacted: _____
Time RP/HP arrives at scene: _____
Time FB arrives at scene: _____
Time Ambulance arrives at PA: _____
Time Ambulance arrives at transfer location: _____

EP PERFORMANCE OBJECTIVES AND DEMONSTRATION CRITERIA

G-EP-1.01-1005

Revision 00100

Page 68 of 78

Page 57 of 67

Attachment 2, Drill and Exercise Objectives (Continued)

Planning Standard: L	Medical and Public Health Support
Objective Number: OBJ-L-01	Hospital Response

Description

Demonstrate the radiological capabilities of local and backup hospitals.

Frequency

Annual

Reference

NUREG-0654, L.1

Applicable EMERGENCY RESPONSE FACILITIES

Hospital

CRITICAL CARE UNIT, YOU BET AND MEDICAL

Scenario Requirements

A simulated Medical Emergency has occurred

Demonstration Criteria

1. Appropriate in-house notifications, including medical and radiological conditions of the victim(s), and staff assignments to support the emergency were made.
2. Required protective clothing was properly donned.
3. The Radiological Emergency Area (REA) is properly set up at the hospital.
4. The REA Staff interfaces with the ambulance crew and RP/HP Technicians in performing a clean transfer of the victim(s), and documenting radiological and medical conditions.
5. Ambulance crew and vehicle were properly monitored for contamination, and decontaminated if necessary, prior to being release.
6. Proper triage and medical treatment was performed according to the victim's conditions (without unnecessary delay due to patient contamination).
7. The radiological condition of the victim(s) and dosimetry records of the REA staff were properly documented by the Buffer Zone Nurse.
8. Necessary samples from the victim(s) were obtained and properly labels.
9. Proper techniques were used to decontaminate victims without compromising their medical conditions.
10. Proper contamination control practices were demonstrated in transferring decontaminated victim(s) from the REA following contamination control procedures.
11. Proper exit procedures were demonstrated by hospital staff entering and leaving the REA.
12. Hospital staff and REA were properly monitored for contamination, and decontaminated if necessary, prior to being released.

EMERGENCY PERFORMANCE OBJECTIVES AND DEMONSTRATION CRITERIA
CNG-EP-1.01-1005
Revision 00100
Page 69 of 78

Page 58 of 67

Attachment 2, Drill and Exercise Objectives (Continued)

Planning Consideration: L	Medical and Public Health Support
Objective Number: OBU-L-02	First Aid

Description

Demonstrate the ability to provide first aid treatment on-site.

Frequency

Annual

Reference

NUREG-0654, K.1, L.2

Applicable EMERGENCY RESPONSE FACILITIES

Control Room and TSC

Local Site Requirements

A Medical Emergency has occurred

A patient with simulated or actual injuries and detectable contamination is required.

Demonstration Criteria

1. Fire Brigade / First Aid Team was promptly dispatched after notification received in the CR.
2. Life threatening medical conditions were addressed as a priority over contamination issues.
3. Fire Brigade / First Aid Team exposure was considered and not permitted to exceed pre-established values.
4. Appropriate contamination controls and/or decontamination practices were employed.
5. Communications between the injury scene and Control Room were maintained.
6. Team Leader demonstrated effective command and control of the accident scene.
7. Fire Brigade / First Aid Team personnel demonstrated proficiency in the use of protective and first aid equipment.
8. The condition and radiological status of the victim was properly documented, and communicated.

**EP PERFORMANCE OBJECTIVES AND DEMONSTRATION
CRITERIA**

CNG-EP-1.01-1005

Revision 00100

Page 70 of 78

Page 59 of 67

Attachment 2, Drill and Exercise Objectives (Continued)

Planning Standard: L	Medical and Public Health Support
Objective Number: OBJ-L-03	Transportation of Contaminated Injured Person

Description

Demonstrate the capability to transport a contaminated injured person off-site.

Frequency

Annual

Reference

NUREG-0654, L.4

Applicable EMERGENCY RESPONSE FACILITIES

Control Room and Shift Personnel

Scenario Requirements

A Medical Emergency has occurred

A patient with simulated or actual injuries and detectable contamination is required. Must require contaminated patient be transported off-site

Demonstration Criteria

1. Prompt access is gained by ambulance into the Protected Area (simulated in drills).
2. Appropriate dosimetry was issued to ambulance personnel, and was donned and read appropriately.
3. Ambulance personnel received patient, also received a turnover of injuries/status and verified medical condition of patient.
4. Ambulance personnel received turnover of radiological condition on the patient.
5. Contamination control methods were effectively used (wrapped patient and/or draped interior of vehicle, gloves, segregation of used materials, and so forth).
6. An RP/HP Tech with a survey meter accompanied patient off-site.

Key Data

Time 911 notified:

Time ambulance arrived at Vehicle Access to Protected Area:

Time ambulance gained access to Protected Area:

Time Ambulance personnel arrived at Patient transfer location:

Time Victim transferred to ambulance personnel (Subtract time-out for actual patient surveys):

Time ambulance exited Protected Area:

Unclassified
Radiological Emergency Preparedness Program (REP)

After Action Report/Improvement Plan

Calvert Cliffs Nuclear Power Plant

This page is intentionally blank.