



FEMA

March 18, 2008

Victor M. McCree
Regional Administrator - RII
Nuclear Regulatory Commission
61 Forsyth Street, SW, Suite 23T85
Atlanta, Georgia 30303

Dear Mr. McCree:

Enclosed is a copy of the final exercise report for the December 4, 2007, full participation, plume exposure pathway exercise of the offsite radiological emergency response plans site-specific to the H. B. Robinson Steam Electric Plant. This report addresses the evaluation of the plans and preparedness for the State of South Carolina and Chesterfield, Darlington, and Lee Counties within the 10-Mile Emergency Planning zone and Florence County, a host county. The Federal Emergency Management Agency Region IV staff prepared the final exercise report. Copies of this report will be forwarded to the State of South Carolina, FEMA Headquarters and NRC Headquarters by my staff.

State and County personnel, as well as, numerous volunteers and elected officials participated in this exercise. The State of South Carolina and the counties have dedicated emergency response staff who are serious and professional in executing their duties.

FEMA identified three Areas Requiring Corrective Actions (ARCAs) during this exercise. The ARCAs concerned: a misunderstanding of the agreed upon procedures for activating the EAS system between the State and the LP-1 Radio Station, procedural compliance at the Carolina Pines Regional Medical Center, and unilateral decision making in Lee County. FEMA has received South Carolina's schedule of corrective actions, and will continue to work with the State of South Carolina in assuring the correction of these ARCAs. One ARCA identified during the 2005 H.B. Robinson exercise concerning the mobile radiological laboratory was corrected during the 2006 Vogtle exercise.

Based on the results of the December 4, 2007, exercise and FEMA's review of the State's Annual Letters of Certification for 2005 and 2006, the offsite radiological emergency response plans for the State of South Carolina and the affected local jurisdictions, site-specific to the H. B. Robinson Steam Electric Plant can be implemented and are adequate to provide a reasonable assurance that appropriate measures can be taken offsite to protect the health and safety of the public in the event of

a radiological emergency at the site. The Title 44 CFR, Part 350, approval of the State of South Carolina's offsite radiological emergency response plans and preparedness site-specific to the H. B. Robinson Steam Electric Plant, granted on December 29, 1981, will remain in effect.

Should you have any questions, please contact Conrad Burnside at 770/220-5486.

Sincerely,


Major P. May
Regional Administrator

Enclosure

- cc: Ms. Vanessa E. Quinn, Acting Director
Federal Emergency Management Agency Headquarters
Radiological Emergency Preparedness Branch – PR-NC-RP
500 C Street, SW (Crystal City)
Washington, DC 20472
- ✓ Mr. Anthony C. McMurtray, Section Chief
Inspection and Communications Section (MS 0-6H2)
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555-0001
- Mr. Conrad S. Burnside, Chief
Technological Hazards Branch
Atlanta Regional Office



FEMA

March 18, 2008

Victor M. McCree
Regional Administrator - RII
Nuclear Regulatory Commission
61 Forsyth Street, SW, Suite 23T85
Atlanta, Georgia 30303

Dear Mr. McCree:

Enclosed is a copy of the final exercise report for the December 4, 2007, full participation, plume exposure pathway exercise of the offsite radiological emergency response plans site-specific to the H. B. Robinson Steam Electric Plant. This report addresses the evaluation of the plans and preparedness for the State of South Carolina and Chesterfield, Darlington, and Lee Counties within the 10-Mile Emergency Planning zone and Florence County, a host county. The Federal Emergency Management Agency Region IV staff prepared the final exercise report. Copies of this report will be forwarded to the State of South Carolina, FEMA Headquarters and NRC Headquarters by my staff.

State and County personnel, as well as, numerous volunteers and elected officials participated in this exercise. The State of South Carolina and the counties have dedicated emergency response staff who are serious and professional in executing their duties.

FEMA identified three Areas Requiring Corrective Actions (ARCAs) during this exercise. The ARCAs concerned: a misunderstanding of the agreed upon procedures for activating the EAS system between the State and the LP-1 Radio Station, procedural compliance at the Carolina Pines Regional Medical Center, and unilateral decision making in Lee County. FEMA has received South Carolina's schedule of corrective actions, and will continue to work with the State of South Carolina in assuring the correction of these ARCAs. One ARCA identified during the 2005 H.B. Robinson exercise concerning the mobile radiological laboratory was corrected during the 2006 Vogtle exercise.

Based on the results of the December 4, 2007, exercise and FEMA's review of the State's Annual Letters of Certification for 2005 and 2006, the offsite radiological emergency response plans for the State of South Carolina and the affected local jurisdictions, site-specific to the H. B. Robinson Steam Electric Plant can be implemented and are adequate to provide a reasonable assurance that appropriate measures can be taken offsite to protect the health and safety of the public in the event of

a radiological emergency at the site. The Title 44 CFR, Part 350, approval of the State of South Carolina's offsite radiological emergency response plans and preparedness site-specific to the H. B. Robinson Steam Electric Plant, granted on December 29, 1981, will remain in effect.

Should you have any questions, please contact Conrad Burnside at 770/220-5486.

Sincerely,


Major P. May
Regional Administrator

Enclosure

cc: Ms. Vanessa E. Quinn, Acting Director
Federal Emergency Management Agency Headquarters
Radiological Emergency Preparedness Branch – PR-NC-RP
500 C Street, SW (Crystal City)
Washington, DC 20472

✓ Mr. Anthony C. McMurtray, Section Chief
Inspection and Communications Section (MS 0-6H2)
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555-0001

Mr. Conrad S. Burnside, Chief
Technological Hazards Branch
Atlanta Regional Office



FEMA

Final Exercise Report

H. B. Robinson Steam Electric Plant

Licensee: **Progress Energy**

Exercise Date: **December 4, 2007**

Report Date: **March 18, 2008**

**U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY
REGION IV**

**3003 Chamblee Tucker Road
Atlanta, Georgia 30341**

Cover photograph accreditation: *H.B. Robinson Steam Electric Plant, 2005, courtesy of Progress Energy*

TABLE OF CONTENTS

	Page
TABLE OF CONTENTS.....	iii
I. EXECUTIVE SUMMARY	1
II. INTRODUCTION	2
III. EXERCISE OVERVIEW	4
A. Emergency Planning Zone Description	4
B. Exercise Participants	4
C. Exercise Timeline	5
IV. EXERCISE EVALUATION AND RESULTS	7
A. Table 2: Summary of Results of Exercise Evaluation	7
B. Status of Jurisdictions Evaluated	9
1. STATE OF SOUTH CAROLINA	10
1.1 State Emergency Operations Center	10
1.2 Dose Assessment	11
1.3 Emergency Operations Facility.....	11
1.4 Joint Information Center	12
1.5 LP-1 Radio Station - WJMX.....	13
1.6 State Traffic Control Point.....	13
2. RISK JURISDICTIONS	14
2.1 CHESTERFIELD COUNTY	14
2.1.1 Emergency Operations Center	14
2.1.2 Protective Actions for Schools.....	14
2.1.3 Traffic Control Points	15
2.1.4 Emergency Worker Decontamination.....	15
2.1.5 Reception and Congregate Care.....	16
2.2 DARLINGTON COUNTY	16
2.2.1 Emergency Operations Center	16
2.2.2 Protective Actions for Schools.....	17
2.2.3 Traffic Control Points	18
2.2.4 Emergency Worker Decontamination.....	18

2.2.5	Lake Warning.....	19
2.2.6	Medical Service Drill (MS-1).....	19
2.3	LEE COUNTY.....	21
2.3.1	Emergency Operations Center	21
2.3.2	Traffic Control Points	23
2.3.3	Emergency Worker Decontamination.....	24
2.3.4	Reception and Congregate Care Center	24
3.	HOST JURISDICTION	25
3.1	FLORENCE COUNTY	25
3.1.1	Reception and Congregate Care.....	25
3.1.2	Emergency Worker Decontamination.....	25
4.	SUMMARY OF AREAS REQUIRING CORRECTIVE ACTION	27
4.1	2005 ARCAs CORRECTED	27
4.1.1	54-05-4.c.1-A-01 VC Summer Mobile RAD Lab	27
4.2	2007 ARCAs.....	29
4.2.1	54-07-5.a.1-A-01 State of SC SEOC	29
4.2.2	54-07-6.d.1-A-02 Darlington Co MS-1	30
4.2.3	54-07-1.c.1-A-03 Lee County EOC.....	32

List of Appendices

APPENDIX 1 - ACRONYMS AND ABBREVIATIONS.....	37
APPENDIX 2 - EXERCISE EVALUATORS.....	39
APPENDIX 3 - EXERCISE CRITERIA AND EXTENT-OF-PLAY AGREEMENT	41
APPENDIX 4 - EXERCISE SCENARIO	53
APPENDIX 5 - MEDICAL SERVICES DRILL.....	57
APPENDIX 6 - RECOMMENDATIONS.....	62

List of Tables

Table 1 -	Exercise Timeline	6
Table 2 -	Summary of Exercise Evaluation.....	8

I. EXECUTIVE SUMMARY

On December 4, 2007, the Federal Emergency Management Agency (FEMA), Radiological Emergency Preparedness Program staff evaluated a plume exposure pathway exercise in the emergency planning zone around the H. B. Robinson Steam Electric Plant. As part of this exercise all activities were evaluated in-sequence with the exception of a Medical Drill. On December 5, 2007, a Medical Drill was evaluated at the Carolina Pines Regional Medical Center.

The purpose of the exercise was to assess the level of State and local preparedness in responding to a radiological emergency. This exercise was held in accordance with FEMA's policies and guidance concerning the exercise of State and local radiological emergency response plans and procedures. The previous federally evaluated exercise was conducted on May 4, 2005. The qualifying emergency preparedness exercise was conducted March 11-12, 1981.

FEMA would like to recognize the work and effort put into this exercise by the many individuals, agencies, and volunteers in the State of South Carolina, the Risk Counties of Chesterfield, Darlington, and Lee and the Host County of Florence. FEMA would also like to recognize NRC Region II personnel for their participation and ongoing efforts to coordinate their activities with the state and local agencies.

State and local organizations, except where noted demonstrated knowledge of their emergency response plans and procedures and successfully implemented them. No Deficiencies were identified; however, three Areas Requiring Corrective Actions (ARCAs) were identified. The ARCAs concerned: a misunderstanding of the agreed upon procedures for activating the EAS system between the State and the LP-1 Radio Station, procedural compliance at the Carolina Pines Regional Medical Center, and unilateral decision making in Lee County. One ARCA identified during the 2005 H.B. Robinson exercise concerning the mobile radiological laboratory was corrected during the 2006 Vogtle exercise. In addition, recommendations are provided in Appendix 6 which could further enhance the counties and State's abilities to respond.

II. INTRODUCTION

On December 7, 1979, the President directed the Federal Emergency Management Agency (FEMA) to assume the lead responsibility for all offsite nuclear planning and response. FEMA became a part of the Department of Homeland Security with its creation in 2002. The Radiological Emergency Preparedness (REP) Program conducts its activities pursuant to Title 44 Code of Federal Regulations (CFR) Parts 350, 351 and 352. These regulations are a key element in the REP Program that was established following the Three Mile Island Nuclear Station accident in March 1979.

Title 44 CFR 350 establishes the policies and procedures for the REP Program'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 (FNF) include the following:

- Taking the lead in offsite emergency planning and in the review and evaluation of radiological emergency response plans (RERP) 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 from the Nuclear Regulatory Commission (NRC) to the REP Program pursuant to the Memorandum of Understanding between the NRC and FEMA (Federal Register, Vol. 58, No. 176, September 14, 1993).
- Coordinating the activities of Federal agencies with responsibilities in the radiological emergency planning process:
 - Department of Agriculture
 - Department of Commerce
 - Department of Energy
 - Department of Health and Human Services
 - Department of Homeland Security
 - Department of the Interior
 - Department of Transportation
 - Environmental Protection Agency
 - Food and Drug Administration and
 - Nuclear Regulatory Commission.

Field representatives of these agencies serve on the FEMA Region IV Regional Assistance Committee (RAC), which is chaired by FEMA.

Formal submission of the RERPs for the H. B. Robinson Steam Electric Plant to FEMA by the State of South Carolina and involved local jurisdictions occurred on February 13, 1981. Formal approval of the RERP was granted by FEMA on December 29, 1981, under Title 44 CFR 350.

A REP exercise was evaluated on December 4, 2007, and a Medical Drill evaluated on December 5, 2007. FEMA assessed the capabilities of State and local emergency preparedness organizations to implement their RERPs and procedures to protect the public health and safety during a radiological emergency involving the H. B. Robinson Steam Electric Plant. This report presents the results of the exercise and findings on the performance by offsite response organizations (ORO) during a simulated radiological emergency.

The findings presented are based on the evaluations of the Federal evaluator team, with final determinations being made by the RAC Chair.

The criteria utilized in the 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 "Interim Radiological Emergency Preparedness Manual," dated August 2002.

Section III, entitled "Exercise Overview," presents basic information and data relevant to the exercise. This section contains a description of the plume pathway EPZ, a listing of all participating jurisdictions and functional entities, which were evaluated, and a table presentation of the time of actual occurrence of key exercise events and activities.

Section IV, entitled "Exercise Evaluation and Results," presents summary information on the demonstration of applicable exercise criteria at each jurisdiction or functional entity evaluated in a results only format.

III. EXERCISE OVERVIEW

This section contains data and basic information relevant to the December 4, 2007 exercise and out-of-sequence activities that occurred during the exercise week. The purpose of the exercise was to test Federal, State and local response capabilities in the area surrounding the H. B. Robinson Steam Electric Plant.

A. Emergency Planning Zone Description

The H. B. Robinson Steam Electric Plant is located west of the Lake Robinson Dam in western Darlington County. The facility is owned and operated by Progress Energy.

In operation since March 1971, the H. B. Robinson Steam Electric Plant has one pressurized water reactor. The reactor, Unit No. 2, has an electric power generating capacity of approximately 700 megawatts.

Portions of Darlington, Lee and Chesterfield Counties are located in the plume exposure pathway. The land use within the Emergency Planning Zone (EPZ) is primarily agriculture. The City of Hartsville lies within the 10-mile EPZ. The total population for the EPZ is 32,550. There are eleven emergency response planning areas within the EPZ.

Major parks include portions of the Carolina Sand Hills National Wildlife Refuge and the Sand Hills State Forest. The Lynches and Pee Dee Rivers are fed from watersheds draining through the probable affected area.

Over the facility, the prevailing winds are from the southwest and shift primarily from southwest to northwest. The greatest probability for an accident with off-site implications would affect Darlington County.

CSX railway passes next to the plant. A spur is utilized for delivery of coal to an adjoining coal burning electrical generating plant.

B. Exercise Participants

The following agencies, organizations, and units of government participated in the H. B. Robinson Steam Electric Plant exercise on December 4, 2007.

STATE OF SOUTH CAROLINA

Department of Health and Environmental Control,
Bureau of Land Waste Management
Department of Natural Resources
Department of Social Services
Office of the Adjutant General,
Emergency Preparedness Division

South Carolina Highway Patrol

RISK JURISDICTIONS

Chesterfield County
Darlington County
Lee County

HOST JURISDICTION

Florence County

PRIVATE/VOLUNTEER ORGANIZATIONS

American Red Cross
Carolina Pines Regional Medical Center
Radio Amateur Civil Emergency Service (RACES)
WJMX Radio Station

C. Exercise Timeline

Table 1, on the following page, presents the time at which key events and activities occurred during the H. B. Robinson Steam Electric Plant exercise on December 4, 2007.

Table 1. Exercise Timeline

DATE AND SITE: December 4, 2007 – H. B. Robinson Steam Electric Plant

		Time That Notification Was Received or Action Was Taken							
Emergency Classification Level or Event	Time Utility Declared	SEOC	DHEC	JIC	CHESTERFIELD COUNTY	DARLINGTON COUNTY	LEE COUNTY		
Unusual Event	0859	0916	0914	0940	0912	0910	0909		
Alert	1015	1030	1029	1015	1028	1026	1025		
Site Area Emergency	1105	1113	1115	1105	1116	1112	1113		
General Emergency	1210	1226	1226	1213	1223	1215	1221		
Simulated Rad. Release Started	0845*	1029	1029	1107	1015	1026			
Simulated Rad. Release Terminated	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing			
Facility Declared Operational		0916	0843	1003	1020	1031	1040		
Declaration of State of Emergency		1115		1120		1131			
State:									
Local:					1045				
Exercise Terminated	1338	1323	1345	1340	1214	1230	1335		
Early Precautionary Actions:									
Evacuate Schools									
Lake Clearing, Ban on Hunting & Fishing		1113	1101		1034	1035			
Open Shelters & Evacuate Zone D2							1030		
1st Protective Action Decision									
Stay Tuned		1105	1101		1106	1104	1108		
1st Siren Activation									
1st EAS Message		1110			1110	1110	1110		
2nd Protective Action Decision:									
Evacuate: A0, B1, C1, B2, C2, D2		1306							
Shelter: All Remaining									
Place Livestock on Stored Feed and Water			1251	1315					
2nd Siren Activation									
2nd EAS Message		1310					1310		
KI: Distribute to Emergency Workers		1323		1315		1132	1315		
			1101						

* 1150 release exceeded technical specifications

IV. EXERCISE EVALUATION AND RESULTS

This section contains the results and preliminary findings of the evaluation for all jurisdictions and functional entities that participated in the exercise on December 4, 2007 and out of sequence activities during the exercise week. The exercise tested the offsite emergency response capabilities of State and local governments within the 10-mile EPZ around the H. B. Robinson Steam Electric Plant.

Each jurisdiction and functional entity was evaluated based on their demonstration of criteria as delineated in REP Exercise Evaluation Methodology, dated August 2002. Detailed information on the exercise criteria and the extent-of-play agreement used are found in Appendix 3 of this report.

A. Table 2: Summary of Results of Exercise Evaluation

The matrix presented in Table 2, on the following page, presents the status of all exercise criteria that were scheduled for demonstration during this exercise, by all participating jurisdictions and functional entities. Exercise criteria are listed by number. The demonstration status of those criteria is indicated by the use of the following letters:

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

Table 2. Summary of Exercise Evaluation

DATE AND SITE: December 4, 2007 – H. B. Robinson Steam Electric Plant

ELEMENT/Sub-Element	SEOC	DHEC	EOF	CHESTERFIELD COUNTY	DARLINGTON COUNTY	LEE COUNTY	FLORENCE COUNTY
1. EMERGENCY OPERATIONS MANAGEMENT							
1.a.1. Mobilization	M	M	M	M	M	M	
1.b.1. Facilities							
1.c.1. Direction and Control	M	M	M	M	M	A	
1.d.1. Communications Equipment	M	M	M	M	M	M	
1.e.1. Equipment & Supplies to Support Operations	M	M	M	M	M	M	M
2. PROTECTIVE ACTION DECISION MAKING							
2.a.1. Emergency Worker Exposure Control	M	M	M	M	M	M	
2.b.1. Rad Assessment & PARs and PADs Based on Available Info		M	M				
2.b.2. Rad Assessment and PARs and PADs for the General Public	M	M		M	M	M	
2.c.1. Protective Action Decisions for Special Populations		M		M	M		
2.d.1. Rad Assessment & Decision Making for Ingestion Exposure							
2.e.1. Rad Assessment & Decision Making for Relocation, Re-entry & Return							
3. PROTECTIVE ACTION IMPLEMENTATION							
3.a.1. Implementation of Emergency Worker Control	M			M	M	M	M
3.b.1. Implementation of KI Decisions	M			M	M	M	
3.c.1. Implementation of PADs for Special Populations				M	M	M	
3.c.2. Implementation of PADs for Schools				M	M	M	
3.d.1. Implementation of Traffic and Access Control	M			M	M	M	
3.d.2. Impediments to Evacuation and Traffic and Access Control	M			M	M	M	
3.e.1. Implementation of Ingestion Decisions Using Adequate Info							
3.e.2. Implementation of IP Decisions Showing Strategies & Instructional Materials							
3.f.1. Implementation of Relocation, Re-entry and Return Decisions							
4. FIELD MEASUREMENT and ANALYSIS							
4.a.1. Plume Phase Field Measurement & Analysis Equipment							
4.a.2. Plume Phase Field Measurement & Analysis Management		M					
4.a.3. Plume Phase Field Measurements & Analysis Procedures							
4.b.1. Post Plume Field Measurement & Analysis							
4.c.1. Laboratory Operations							
5. EMERGENCY NOTIFICATION & PUBLIC INFO							
5.a.1. Activation of Prompt Alert and Notification	A			M	M	M	
5.a.2. [Reserved]							
5.a.3. Activation of Prompt Alert & Notification Backup Alert & Notification				M	M	M	
5.b.1. Emergency Info and Instructions for the Public and the Media	M			M	M	M	
6. SUPPORT OPERATIONS/FACILITIES							
6.a.1. Monitoring and Decon of Evacuees and EWs & Registration of Evacuees				M	M	M	M
6.b.1. Monitoring and Decon of Emergency Worker Equipment				M	M	M	M
6.c.1. Temporary Care of Evacuees				M	M	M	M
6.d.1. Transport and Treatment of Contaminated Injured Individuals					A		

LEGEND: M = Met D = Deficiency A = ARCA N = Not Demonstrated

B. Status of Jurisdictions Evaluated

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

- **Met** - Listing of the demonstrated exercise criteria under which no Deficiencies or ARCAs were assessed during this exercise and under which no ARCAs assessed during prior exercises remain unresolved.
- **Deficiency** - Listing of the demonstrated exercise criterion under which one or more Deficiencies was assessed during this exercise. Included is a description of each Deficiency and recommended corrective actions.
- **Area Requiring Corrective Actions** - Listing of the demonstrated exercise criterion under which one or more ARCAs were assessed during the current exercise or ARCAs assessed during prior exercises that remain unresolved. Included is a description of the ARCA assessed during this exercise and the recommended corrective action to be demonstrated before or during the next biennial exercise.
- **Not Demonstrated** - Listing of the exercise criteria, which were not demonstrated as scheduled during this exercise and the reason, they were not demonstrated.
- **Prior ARCAs - Resolved** – Description(s) of ARCA(s) assessed during previous exercises, which were resolved in this exercise and the corrective actions demonstrated.
- **Prior ARCAs - Unresolved** – Description(s) of ARCA(s) assessed during prior exercises, which were not resolved in this exercise. Included is the reason the ARCA remains unresolved and recommended corrective actions to be demonstrated before or during the next biennial exercise.

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

- A **Deficiency** is defined in the FEMA Interim REP Manual as "...an observed or identified inadequacy of organizational performance in an exercise that could cause a finding that offsite 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 the Interim REP Manual 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."

1. STATE OF SOUTH CAROLINA

1.1 State Emergency Operations Center

State emergency operations were managed from the State Emergency Operations Center (SEOC) in Columbia. Effective discussions were held with the executive team and decisions/recommendations were made with all appropriate State agencies present. Results of the meeting were announced to the SEOC staff and communicated to the counties and JIC. Communications with the counties were effective but largely unidirectional. SEOC staff did not confirm that the emergency alert system (EAS) radio station broadcast the EAS message or that the EAS message was successfully broadcast to citizens in the affected areas.

- a. **MET:** Criteria 1.a.1, 1.c.1, 1.d.1, 1.e.1, 2.b.2 and 5.b.1
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:** 5.a.1

Issue No.: 54-07-5.a.1-A-01

Condition: Procedural misunderstanding between the SEOC and WJMX radio station and equipment setup problems at the radio station lead to a 22-minute delay in the attempted broadcast of the initial EAS message. Although the radio station completed their procedures the EAS message was never actually broadcast outside of the radio station broadcast booth.

Possible Cause: The radio station personnel were accustomed to a second telephone call from the SEOC to tell them to broadcast the EAS message. After the SEOC informed WJMX personnel to broadcast the EAS message at 1120, they waited for the SEOC to call back and direct them to start the EAS message as they have done in the past. The radio station and the SEOC did not have written procedures for an SEOC request for activation of the EAS system. In addition, the equipment manufacturer had installed upgrades to radio station equipment and the operators did not have the most recent technical manual which lead to the EAS message not being transmitted out of the station.

Reference: NUREG-0654, E. 5, 6, 7.

Effect: The initial delay of 22 minutes in sending out the EAS message to residents in the 10 mile EPZ could have resulted in residents having insufficient time to properly prepare for evacuation. Residents would not have had time to review evacuation literature and procedures provided by the utility. This could have a negative impact on their preparation and ability to evacuate the area in a timely and orderly manner. Further complicating the ability to evacuate was the inability of the radio station to actually broadcast the message content of the EAS

message. This could have resulted in a larger population group evacuating and overwhelming surrounding counties who were expecting a smaller specific group of residents at their facilities.

Recommendation: Review, rewrite and formalize the procedure for the activation of the EAS system, including verification that the EAS message was broadcast. Train both State and radio station employees on the written procedure and test the procedure once the training is completed. Ensure the procedure is followed for all EAS tests and activations.

Schedule of Corrective Action: Proper activation of the EAS system will be demonstrated at the Oconee Nuclear Plant exercise on April 1, 2008.

1.2 Dose Assessment

The State of South Carolina dose assessment staff routinely monitored and evaluated plant, radiological, and meteorological data. Dose projections were performed to determine worst case scenarios based on; reactor coolant system radiation levels, steam line monitor readings, steam relief valve release rates, and in collaboration with the utility liaison. The Emergency Response Coordinator (ERC) provided effective updates in frequent SEOC briefings, including timely precautionary actions as well as protective action recommendations (PAR). The ERC was proactive in requesting assistance through the Federal Radiological Monitoring and Assessment Center (FRMAC), and the State of North Carolina and the State of Georgia via the Southern Mutual Radiological Assistance Plan (SMRAP). Professional conduct, competence and dedication were apparent in the execution of dose assessment staff responsibilities.

- a. **MET:** 1.a.1, 1.c.1, 1.d.1, 1.e.1, 2.a.1, 2.b.1, 2.b.2 and 4.a.2
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:** NONE
- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCAs - RESOLVED:** NONE
- f. **PRIOR ARCAs - UNRESOLVED:** NONE

1.3 Emergency Operations Facility

The H. B. Robinson Steam Electric Plant (HBRSEP) Emergency Operations Facility (EOF), located on-site in the facility's training center, is an adequate facility from which all participating response organizations can effectively manage emergency operations.

Communication and coordination, among the State officials deployed to the EOF, as well as with the utility operator were outstanding. The flow of technical information within the facility was timely and accurate, thereby enhancing the ability of all responding organizations to effectively perform an independent accident analysis.

All State officials deployed to the EOF were well trained, knowledgeable, followed applicable procedures, and overall, performed their respective responsibilities in an efficient and professional manner.

- a. **MET:** Criteria 1.a.1, 1.c.1, 1.d.1, 1.e.1, 2.b.1, 3.a.1 and 3.b.1
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:** NONE
- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCAs - RESOLVED:** NONE
- f. **PRIOR ARCAs - UNRESOLVED:** NONE

1.4 Joint Information Center

The Joint Information Center (JIC) staff included a utility spokesperson, a JIC director, and a State spokesperson, as well as spokespersons from Darlington, Chesterfield, Lee, and Florence Counties and representatives from the S.C. Department of Health and Environmental Control (DHEC). A rumor control and public inquiry team was composed of utility and State personnel. State rumor control personnel handled 10 rumor calls and one request for media interview. Three news briefings were presented, and the pre-briefing coordination among all the staff was conducted smoothly. Timely and accurate information was presented, and mock media inquiries were answered effectively. Operation of the JIC was very efficient with strong leadership demonstrated by all participants.

- a. **MET:** Criteria 1.a.1, 1.d.1, 1.e.1 and 5.b.1
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:** NONE
- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCAs - RESOLVED:** NONE
- f. **PRIOR ARCAs - UNRESOLVED:** NONE

1.5 LP-1 Radio Station - WJMX

Radio Station WJMX is situated in a building with six other radio stations. The station engineer and the disk jockey (DJ) were knowledgeable of the process and equipment and regularly conducted EAS broadcast tests. The station broadcast booth had multiple phone lines and a hotline number that is not published. Previous activation of the EAS system from the SEOC used 2 telephone calls, one to place the station on standby and the second to tell them to activate the EAS system. The station engineer followed his procedure to activate the EAS system when directed a second time; however the Encoder-Decoder receiver would not allow them to interrupt the pre-programmed feed to the radio station (it was later learned that the EAS system technical manual, which the station engineer was using, had been revised). The station engineer was able to stop the pre-programmed signal to run the EAS message at 1142, however, locations outside the radio station only picked up the alerting tones and no message was received over any outside radios.

- a. **MET:** Criteria 1.d.1, 1.e.1 and 5.a.1
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:** See SEOC
- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCAs - RESOLVED:** NONE
- f. **PRIOR ARCAs - UNRESOLVED:** NONE

1.6 State Traffic Control Point

A South Carolina Highway Patrol Trooper demonstrated traffic control points (TCP) at TCP 16E. Other troopers and assistance would be obtained by request through the SEOC if necessary. The trooper obtained a pre-assembled TCP kit with instructions, dosimetry and potassium iodide (KI) at the Darlington County Emergency Operations Centers (EOC) from the special programs coordinator. Upon arrival at the TCP, the trooper would use his vehicle initially as a barricade while he contacted the EOC and requested an initial supply of equipment to assist in traffic control. The trooper was knowledgeable of procedures and prepared to implement actions to clear impediments, including contacting the EOC for tow trucks and other non-law enforcement material.

- a. **MET:** Criteria 1.d.1, 1.e.1, 3.a.1, 3.b.1, 3.d.1 and 3.d.2
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:** NONE

- d. **NOT DEMONSTRATED: NONE**
- e. **PRIOR ARCAs - RESOLVED: NONE**
- f. **PRIOR ARCAs - UNRESOLVED: NONE**

2. RISK JURISDICTIONS

2.1 CHESTERFIELD COUNTY

2.1.1 Emergency Operations Center

The Emergency Management Director (EMD) demonstrated good direction and control at all times. The Director briefed the staff every time there was a change in plant status or new information was received. The EMD and staff of the EOC successfully demonstrated the ability to protect the public and emergency workers. Early termination of the exercise at the county level precluded in-depth evaluations of all aspects of direction and control related to evacuations and their long term ramifications. All participants displayed positive attitudes as they carried out their functions and sought improvements to their processes.

- a. **MET:** Criteria 1.a.1, 1.c.1, 1.d.1, 1.e.1, 2.a.1, 2.b.2, 2.c.1, 3.a.1, 3.b.1, 3.c.1, 3.c.2, 3.d.1, 3.d.2, 5.a.1, 5.a.3 and 5.b.1
- b. **DEFICIENCY: NONE**
- c. **AREAS REQUIRING CORRECTIVE ACTION: NONE**
- d. **NOT DEMONSTRATED: NONE**
- e. **PRIOR ARCAs - RESOLVED: NONE**
- f. **PRIOR ARCAs - UNRESOLVED: NONE**

2.1.2 Protective Actions for Schools

The Assistant Superintendent of Schools was interviewed on December 4, 2007 regarding the school system's radiological emergency preparedness plan and school personnel's ability to implement the plan, if necessary. The Assistant Superintendent was very knowledgeable of the plan and was well prepared to shelter or evacuate the three schools that were located in the EPZ. Appropriate bus transportation was available, a host school identified and available, and parents informed in advance of the school's actions in case of an emergency. During the exercise, school principals and transportation providers were contacted in an efficient and timely manner; at 1034 they were directed to prepare for an evacuation (simulated), to the Chesterfield County High School.

- a. **MET:** Criteria 1.a.1, 3.a.1, 3.b.1 and 3.c.2
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:** NONE
- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCAs - RESOLVED:** NONE
- f. **PRIOR ARCAs - UNRESOLVED:** NONE

2.1.3 Traffic Control Points

A County Sheriff's Department Deputy demonstrated TCP set-up and operation at SC Hwy 151 and US Hwy 1. He arrived with all required dosimetry which was within current calibration. He was very familiar with his mission and possessed all equipment necessary to successfully complete it. He was well versed in the radiological response plan as it applied to him and his agency; was enthusiastic about doing his job in a safe and professional manner. He was aware of the hazards associated with radiation; his limits for exposure and was able to demonstrate the use of his dosimeters and KI to limit his personal exposure. He was cognizant of the need for proper documentation and completed all necessary forms and logs. He made proper notifications as needed and maintained constant communications links with his agency.

- a. **MET:** Criteria 1.d.1, 1.e.1, 3.a.1, 3.b.1, 3.d.1 and 3.d.2
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:** NONE
- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCAs - RESOLVED:** NONE
- f. **PRIOR ARCAs - UNRESOLVED:** NONE

2.1.4 Emergency Worker Decontamination

First Health of the Carolinas Emergency Medical Services (EMS) was contracted by Chesterfield County to staff the emergency worker monitoring and decontamination center located at Chesterfield High School. Personnel were knowledgeable of dosimetry, survey equipment, and decontamination processes. They monitored individuals and vehicles effectively and expeditiously. Personnel displayed teamwork and enthusiasm for their participation in this exercise.

- a. **MET:** Criteria 1.e.1, 3.a.1, 6.a.1 and 6.b.1
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:** NONE
- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCAs - RESOLVED:** NONE
- f. **PRIOR ARCAs - UNRESOLVED:** NONE

2.1.5 Reception and Congregate Care

Reception, monitoring, decontamination and registering of evacuees were successfully demonstrated at the Chesterfield High School. First Health of the Carolinas EMS professionally established and managed the monitoring and decontamination site and representatives of the Central South Carolina Chapter of the American Red Cross (ARC) effectively managed congregate care activities. All fulltime and volunteer personnel participating in the demonstration were knowledgeable and professional in their performance.

- a. **MET:** Criteria 1.e.1, 3.a.1, 6.a.1 and 6.c.1
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:** NONE
- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCAs - RESOLVED:** NONE
- f. **PRIOR ARCAs - UNRESOLVED:** NONE

2.2 DARLINGTON COUNTY

2.2.1 Emergency Operations Center

The EOC was effectively and efficiently managed by the County Emergency Management Director with full staffing by all required agencies. Briefings were frequent and informative with agency input requested to keep everyone up to speed on actions being taken. Early termination of the exercise at the county level precluded in-depth evaluations of all aspects of direction and control related to evacuations and their long term ramifications.

Noteworthy was the county's outreach for foreign speaking residents even though the population had not reached the level that requires such measures. The county provided a Spanish speaking individual for rumor control questions and provided all messages in a bi-lingual format to provide for better protection of the public.

- a. **MET:** Criteria 1.a.1, 1.c.1, 1.d.1, 1.e.1, 2.a.1, 2.b.2, 2.c.1, 3.a.1, 3.b.1, 3.c.1, 3.c.2, 3.d.1, 3.d.2, 5.a.1, 5.a.3 and 5.b.1
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:** NONE
- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCAS-RESOLVED:** NONE
- f. **PRIOR ARCAS-UNRESOLVED:** NONE

2.2.2 Protective Actions for Schools

The County Public School District successfully demonstrated its ability to execute protective measures for schools during an interview at the County EOC. Participants in the interview included the school superintendent, principals and other school representatives from Southside Early Childhood Center, Washington Elementary School, Hartsville Middle School, and the transportation coordinator. All personnel interviewed were knowledgeable of school district procedures, had individual school policies in place, and took actions to maintain staff, faculty, and parental awareness of evacuation policies and procedures. Procedures included actions to ensure that students with special needs were accommodated. Noteworthy was the district's Crisis Management Manual covering different emergencies administrators could face.

- a. **MET:** Criteria 1.a.1, 3.a.1, 3.b.1 and 3.c.2
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:** NONE
- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCAs - RESOLVED:** NONE
- f. **PRIOR ARCAs - UNRESOLVED:** NONE

2.2.3 Traffic Control Points

County Sheriff's Officers demonstrated traffic control points at TCPs 16B and 16D. Six vehicles and six officers were available for these operations. Officers at both locations were prepared to implement actions to clear impediments, including contacting the EOC for tow trucks and other non-law enforcement material. Officers had appropriate dosimetry and supplies which were contained in kits issued by County EOC management. Communication equipment was redundant and capable of interfacing with the county as well as state personnel. Officers were aware of the KI and dosimetry requirements and processes to be followed. All aspects of the demonstration were handled professionally and efficiently.

- a. **MET:** Criteria 1.d.1, 1.e.1, 3.a.1, 3.b.1, 3.d.1 and 3.d.2
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:** NONE
- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCAs - RESOLVED:** NONE
- f. **PRIOR ARCAs - UNRESOLVED:** NONE

2.2.4 Emergency Worker Decontamination

Monitoring and decontamination of emergency workers and their vehicles/equipment were successfully demonstrated at the Swift Creek Fire Station by a 15-person team comprised of personnel from County Fire Department, EMS and HazMat with security provided by the South Carolina State Guard. The facility used for this demonstration was extensive, complete, set up in a manner to enable effective contamination control and professionally managed. The portable decontamination structure efficiently accommodated female and male personnel as well as non-ambulatory individuals. The areas established for vehicle monitoring and decontamination were quite ample, with room for any needed storage of clean and/or contaminated vehicles. The staff made effective use of procedures, checklists, and forms in the accomplishment of their duties.

- a. **MET:** Criteria 1.e.1, 3.a.1, 6.a.1 and 6.b.1
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:** NONE
- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCAs - RESOLVED:** NONE

- f. **PRIOR ARCAs - UNRESOLVED: NONE**

2.2.5 Lake Warning

Department of Natural Resources (DNR) officers deployed a boat from Johnson's Landing for the purpose of clearing the lake of boats and people. Sirens and speakers were tested and would be used to alert all persons to clear the lake promptly. Lake Robinson was traversed in less than 25 minutes with one boat from Johnson's Landing to the far end at Morrison's Landing. All officers knew to report to the emergency worker monitoring and decontamination center for processing. The DNR personnel were well trained and very knowledgeable about the requirements of lake warning.

- a. **MET: Criteria 1.a.1, 1.d.1, 1.e.1, 3.a.1, 3.b.1 and 5.a.3**
- b. **DEFICIENCY: NONE**
- c. **AREAS REQUIRING CORRECTIVE ACTION: NONE**
- d. **NOT DEMONSTRATED: NONE**
- e. **PRIOR ARCAs - RESOLVED: NONE**
- f. **PRIOR ARCAs - UNRESOLVED: NONE**

2.2.6 Medical Service Drill (MS-1)

The HBRSEP Medical Services (MS-1) Drill was conducted on December 5, 2007. Participants included personnel from the County EMS, the Carolina Pines Regional Medical Center (CPRMC), SCEMD, and the HBRSEP. EMS personnel performed in a professional manner and worked well as a team. CPRMC personnel are capable and conducted themselves in a professional manner, but were hindered by a lack of procedural specificity in effectively addressing Radiological Emergency Area (REA) preparation and medical treatment of a contaminated/injured person.

- a. **MET: Criteria 1.e.1 and 3.a.1**
- b. **DEFICIENCY: NONE**
- c. **AREAS REQUIRING CORRECTIVE ACTION: 6.d.1**

Issue No: 54-07-6.d.1-A-02

Condition: The Carolina Pines Regional Medical Center (CPRMC) Radiological Response Team (RRT) did not effectively establish an REA, nor receive and decontaminate a contaminated injured patient. Following training and a re-demonstration, the patient was fully decontaminated prior to proceeding to the

emergency room (ER). A dedicated/equipped room for treating a contaminated injured person was not established for treating a contaminated/injured person.

Possible Cause: The CPRMC procedure, Nuclear Radiation Release Concept of Operation, and checklist, Incident Command: Radiological Incident, was used for the first time in this MS-1 Drill. Due to the CPRMC procedure's focus on complete decontamination of an ambulatory patient prior to entering the emergency room hospital personnel emphasized decontamination over providing medical care. Although fundamental concepts of receiving, treating, and decontaminating a contaminated/injured individual were included in the procedure, specific details on how to set up the REA, utilize the decontamination showers, and position-specific responsibilities were not provided. Additionally, the contamination limit was not specifically identified, stating that the contamination threshold is "two or three times background." This lack of specificity negatively impacted the CPRMC RRTs ability to respond effectively.

Reference: NUREG 0654 F.2; H.10; K.5.a,b; L.1; L.4.

Effect: The lack of specificity in the procedure for detailing the setup of the REA and decontamination limits could allow contaminated patients into unrestricted areas of the hospital, thereby potentially contaminating other areas of the hospital and/or other personnel. In addition, the excessive focus on decontamination could hinder the timely application of appropriate and/or critical medical care.

Recommendation: A collaboration of CPRMC, SCEMD, Darlington County, and HB Robinson personnel should evaluate the new CPRMC procedure to ensure:

1. Description of how to establish an REA and control ingress and egress.
2. Description of how to use the decontamination shower room and steps or references for performing different levels of personnel decontamination.
3. Description of RRT members' responsibilities and duties.

In addition, hospital personnel should receive training on their equipment and decontamination methods, with emphasis on the need for medical assessment to take precedence over contamination concerns.

Schedule of Corrective Actions: Carolina Pines will participate in an evaluated drill in September 2008.

- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCAs - RESOLVED:** NONE

- f. **PRIOR ARCAs - UNRESOLVED: NONE**

2.3 LEE COUNTY

2.3.1 Emergency Operations Center

The Lee County emergency coordinator took actions to ensure his staff was current with plant status and possible implications. Actions were taken within the EOC to initiate an evacuation without ensuring the shelter had opened and without proper coordination with the State and adjoining counties.

- a. **MET:** Criteria 1.a.1, 1.d.1, 1.e.1, 2.a.1, 2.b.2, 2.c.1, 3.a.1, 3.b.1, 3.c.1, 3.c.2, 3.d.1, 3.d.2, 5.a.1, 5.a.3 and 5.b.1
- b. **DEFICIENCY: NONE**
- c. **AREAS REQUIRING CORRECTIVE ACTION: 1.c.1**

Issue No.: 54-07-1.c.1-A-03

Condition: At 1026, after receiving notification at 1025 that the HBRSEP had declared an ECL Alert as of 1015, the Lee County emergency coordinator briefed the EOC staff on the plant status described in the utility's emergency notification form. No protective actions were recommended by the utility. At 1030, without coordination with the SEOC or adjacent jurisdictions, the emergency coordinator decided to initiate a voluntary evacuation of Zone D-2, the only area within Lee County inside the EPZ. The coordinator based his decision on the direction of the wind (330 at 3 mph) which placed Zone D-2 in a projected plume path. He indicated that notification to the 1,297 citizens in Zone D-2 was accomplished by a Reverse 911 telephone calling system – SC Reach; this simulated action was completed by 1045. As a precautionary action at 1030 the Director decided to evacuate those special needs individuals who required transportation. The Department of Social Services (DSS) representative was able to move (simulated) special needs individuals by 1120 to the appropriate shelter where they received any necessary medical assistance.

At the time the simulated evacuation was ordered, traffic control points had not been established, personnel necessary to activate and staff shelters had not been contacted by the ARC, and Red Cross personnel had not arrived at the EOC to draw materials to support the evacuating citizens. The emergency coordinator did not coordinate this action with either Chesterfield or Darlington Counties or the SEOC; he only used SC Reach to alert and notify the populace; no county news releases were prepared or information pertaining to the evacuation shared with the JIC, and this action was not addressed in any of the three media briefings at the JIC.

Possible Cause(s):

- County procedures do not discuss an evacuation being directed until a General Emergency at the county level. The State could recommend evacuation at a Site Area or as conditions necessitate. Since this was the emergency coordinator's first exercise as the EOC Director he was overtly concerned with taking appropriate actions to insure the safety and well being of the citizens of the county.
- Exercise Control:
- The extent of play authorized pre-positioning the EOC staff at 0815. This was prior to receipt of a notification of unusual event (NOUE) at 0909 and declaration of Alert at 1025. This left the emergency coordinator with a full staff which had no mission. Routinely the staff would not be notified of the possibility of EOC activation until Alert.
- It is possible that after having key personnel spend almost two hours without meaningful work, and this was the emergency coordinator's first exercise as the Director, he took an action that would necessitate the staff initiate support operations. With better exercise control the controller assigned to this EOC could have made exercise injections that would have provided the Director with conditions that either would have precluded him having the ability to order the evacuation or directed him in a manner to make contact with the SEOC.
- Precautionary Action/ Procedural Knowledge:
- The Lee County emergency coordinator placed a very high priority on the safety of the general population in Zone D-2, and made a very conservative "worst case" scenario decision based upon a possible change of wind affected the area. Therefore, he decided to initiate a voluntary evacuation of Zone D-2. However, he did not coordinate the action with the SEOC or EOCs of the adjoining counties. These actions or lack of action may have been a result of unfamiliarity with procedures or lack of experience.

Reference: NUREG-0654/FEMA-REP-1, Rev. 1: A.1.d; A.2.a, b

Effect: The lack of familiarity and adherence to procedures resulted in the following major problems:

- By not considering the impact of the Lee County action upon the general population of adjoining counties it could have caused confusion on the part of citizens in other zones in the EPZ, and question why Lee County was evacuating but zones closer to the plant were not.
- Use of the SC Reach only and failure to sound sirens and use the EAS system to alert the public to a protective action/major precautionary decision precludes assuredness of widespread notification of the public.

- The media representatives at the JIC were not provided copies of the evacuation by Lee County, which precluded the media from providing a valuable service in the transfer of information to the public.
- The lack of sharing of inter-jurisdictional government and utility information precluded an effective review of coordinated actions by the EOCs in the affected counties.
- Rumor control personnel were not provided sufficient information to enable them to effectively and accurately respond to queries from the public.

Recommendation(s):

- Provide training for key County decision makers on their responsibilities and coordination needed in deciding to evacuate the public within the EPZ. Especially for actions taken prior to recommendations for protective actions.
- The county should revise its procedures to require communication with other risk and host counties and the State anytime they make any protective action decisions.

Schedule of Corrective Action: SCEMD will provide training and a tabletop exercise with Lee County personnel during H. B. Robinson drill in the second quarter of 2008.

- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCAs RESOLVED:** NONE
- f. **PRIOR ARCAs - UNRESOLVED:** NONE

2.3.2 Traffic Control Points

A County Deputy Sheriff and a Bishopville Police Sergeant demonstrated the ability to establish and maintain a TCP. The individuals were familiar with personal dosimetry and the use of KI; thoroughly conversant with procedures for the establishment of a TCP and assist evacuees from the endangered zone, and understood how to obtain assistance in the removal of impediments that may be encountered at the TCP.

- a. **MET:** Criteria 1.d.1, 1.e.1, 3.a.1, 3.b.1, 3.d.1 and 3.d.2
- b. **DEFICIENCY:** NONE

- c. **AREAS REQUIRING CORRECTIVE ACTION: NONE**
- d. **NOT DEMONSTRATED: NONE**
- e. **PRIOR ARCAs - RESOLVED: NONE**
- f. **PRIOR ARCAs - UNRESOLVED: NONE**

2.3.3 Emergency Worker Decontamination

The County Fire Department and EMS demonstrated the ability to monitor and decontaminate emergency workers and vehicles at the County Fire Department at Bishopville Fire Station #1. Personnel were knowledgeable in contamination limits and control, instrumentation and monitoring techniques, and exposure control. Under the direction of their supervisor the fire department full-time staff and volunteers successfully assembled portable decontamination tents, set up operations and monitored and decontaminated emergency workers and vehicles.

- a. **MET: Criteria 1.e.1, 3.a.1, 6.a.1 and 6.b.1**
- b. **DEFICIENCY: NONE**
- c. **AREAS REQUIRING CORRECTIVE ACTION: NONE**
- d. **NOT DEMONSTRATED: NONE**
- e. **PRIOR ARCAs - RESOLVED: NONE**
- f. **PRIOR ARCAs - UNRESOLVED: NONE**

2.3.4 Reception and Congregate Care Center

Members of the County Fire Department successfully demonstrated reception center monitoring, decontamination, and registration of evacuees at Lee Central High School. Vehicles and evacuees arriving at the reception center were registered and monitored for contamination and were decontaminated, if needed. The monitoring and decontamination staff was knowledgeable in the use of their dosimetry, their protective action limits, and procedures for vehicles and evacuee decontamination. Congregate care registration and support of evacuees was successfully accomplished through demonstration and interview. The shelter staff was comprised of members of the ARC, Department of Social Services (DSS), and DHEC. Shelter rules and regulations, food supplies, lodging requirements, and medical needs were sufficient.

- a. **MET: Criteria 1.e.1, 3.a.1, 6.a.1 and 6.c.1**
- b. **DEFICIENCY: NONE**

- c. **AREAS REQUIRING CORRECTIVE ACTION: NONE**
- d. **NOT DEMONSTRATED: NONE**
- e. **PRIOR ARCAs - RESOLVED: NONE**
- f. **PRIOR ARCAs - UNRESOLVED: NONE**

3. HOST JURISDICTION

3.1 FLORENCE COUNTY

3.1.1 Reception and Congregate Care

The County monitoring and decontamination / reception and congregate care center demonstration occurred at the Florence City-County Civic Center. The facility is approximately 23.5 miles from the HBRSEP site. The staff was well trained, organized and knowledgeable with regard to their duties. The facility was well laid out to accomplish the intended use for both the monitoring and decontamination functions and its use as an ARC shelter. There was a clear delineation between contaminated and non-contaminated individuals. They successfully demonstrated their ability to perform their assigned activities for an incident at the HBRSEP. Additionally, all personnel were well informed about their responsibilities and implemented them effectively in the protection of the public.

- a. **MET: Criteria 1.e.1, 3.a.1, 6.a.1 and 6.c.1**
- b. **DEFICIENCY: NONE**
- c. **AREAS REQUIRING CORRECTIVE ACTION: NONE**
- d. **NOT DEMONSTRATED: NONE**
- e. **PRIOR ARCAs - RESOLVED: NONE**
- f. **PRIOR ARCAs - UNRESOLVED: NONE**

3.1.2 Emergency Worker Decontamination

Participants from various emergency management organizations in Florence County were pre-positioned at the Florence City/County Civic Center to demonstrate emergency worker monitoring and decontamination. The layout of this facility allowed for effective monitoring and decontamination as well as convenient segregation of male and female emergency workers by providing both male and female shower tents. Personnel were knowledgeable of contamination action levels, understood their responsibilities, followed plans, and successfully demonstrated their ability to monitor for contamination and

effectively decontaminate emergency workers and vehicles. Appropriate records were completed and exercise participants were well equipped, well organized, and displayed a positive attitude throughout the exercise.

- a. **MET:** Criteria 1.e.1, 3.a.1, 6.a.1 and 6.b.1
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:** NONE
- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCAs - RESOLVED:** NONE
- f. **PRIOR ARCAs - UNRESOLVED:** NONE

4. SUMMARY OF AREAS REQUIRING CORRECTIVE ACTION

4.1 2005 ARCAs CORRECTED

4.1.1 54-05-4.c.1-A-01 V. C. Summer Mobile Radiological Laboratory

Description: During the 2005, H. B. Robinson Steam Electric Plant exercise the Mobile Radiological Laboratory (MRL) gamma spectroscopy equipment did not function properly. They were unable to perform gamma isotopic analysis of field samples.

Laboratory personnel indicated that after the H. B. Robinson exercise the equipment vendor had made several trips to the laboratory and worked with MRL personnel to rectify software issues that caused the equipment to fail.

Prior to moving the equipment into the MRL, laboratory personnel performed a quality check of the equipment and the results indicated printing problems. After two hours of troubleshooting, the system was declared to be printing acceptably, and was moved to the MRL. However, before a sample could be analyzed and the results printed the detector's temperature increased to the point where the "detector inhibit light" came on, which prevents unacceptable detector "noise" from being introduced into an analysis. Staff initially believed that the liquid nitrogen supply was inadequate. The equipment was moved back into the fixed laboratory to fill the nitrogen storage unit and verify proper detector operation.

After the equipment was returned to the MRL the required quality checks were performed successfully. However, when they attempted to print the quality check report and a sample analysis report, the printer printed multiple copies of various reports, none of which had the sample analysis results that needed to be communicated to the SEOC.

A call was made to the vendor representative and after more troubleshooting efforts the desired sample analysis report was printed (approximately 4.5 hours after the start of the demonstration). Immediately after printing the sample analysis report, the detector temperature “detector inhibit light” came on again.

The “detector inhibit light” came on twice during this demonstration between 36 and 50 minutes of placing the equipment in the MRL. The two air conditioning units in the MRL were struggling to lower the MRL’s temperature. The MRL may be deployed to any of the five nuclear power plants affecting the State. Staff stated that drive times to set up locations were approximately one to two hours depending on the plant. The “detector inhibit light” coming on was a new problem for this equipment. Although the proper report was finally printed, printing problems have not been completely resolved. The new problem with the “detector inhibit light” coming on prevents the mobile laboratory from performing its function.

Corrective Action Demonstrated: The State of South Carolina successfully demonstrated analysis capabilities of the MRL. The current MRL is comprised of a new vehicle with a new heating/air conditioning system allowing for temperature control of analysis equipment. The lab has a new high efficiency gamma spectroscopy system, new sample acquisition and analysis software and a new printer. Procedures were available for use by laboratory personnel. During the demonstration, all daily background and quality control checks were satisfactorily performed and reports printed for review. A sample containing a Cesium -137 source was counted and analyzed using appropriate geometries. The analysis software correctly identified the isotope in the sample. A

complete sample analysis report was printed for review by the laboratory manager. Reference material was available for use in determining isotopes associated with unidentified energy peaks.

4.2 2007 ARCAs

4.2.1 54-07-5.a.1-A-01 State of South Carolina SEOC

Condition: Procedural misunderstanding between the SEOC and WJMX radio station and equipment setup problems at the radio station lead to a 22-minute delay in the attempted broadcast of the initial EAS message. Although the radio station completed their procedures the EAS message was never actually broadcast outside of the radio station broadcast booth.

Possible Cause: The radio station personnel were accustomed to a second telephone call from the SEOC to tell them to broadcast the EAS message. After the SEOC informed WJMX personnel to broadcast the EAS message at 1120, they waited for the SEOC to call back and direct them to start the EAS message as they have done in the past. The radio station and the SEOC did not have written procedures for an SEOC request for activation of the EAS system. In addition, the equipment manufacturer had installed upgrades to radio station equipment and the operators did not have the most recent technical manual which lead to the EAS message not being transmitted out of the station.

Reference: NUREG-0654, E. 5, 6, 7.

Effect: The initial delay of 22 minutes in sending out the EAS message to residents in the 10 mile EPZ could have resulted in residents having insufficient time to properly prepare for evacuation. Residents would not have had time to review evacuation literature and procedures provided by the utility. This could have a

negative impact on their preparation and ability to evacuate the area in a timely and orderly manner. Further complicating the ability to evacuate was the inability of the radio station to actually broadcast the message content of the EAS message. This could have resulted in a larger population group evacuating and overwhelming surrounding counties who were expecting a smaller specific group of residents at their facilities.

Recommendation: Develop a specific procedure for the activation of the EAS system and verification of EAS message transmittal between the SEOC and WJMX. Train both State and radio station employees on the written procedure and test the procedure once the training is completed.

Schedule of Corrective Actions: Proper activation of the EAS system will be demonstrated at the Oconee Nuclear Plant exercise on April 1, 2008.

**4.2.2 54-07-6.d.1-A-02
Darlington County
Medical Services Drill
(MS-1)**

Condition: The Carolina Pines Regional Medical Center (CPRMC) Radiological Response Team (RRT) did not effectively establish a Radiological Emergency Area (REA), nor receive and decontaminate a contaminated injured patient. Following training and a re-demonstration, the patient was fully decontaminated prior to proceeding to the emergency room (ER). A dedicated/equipped room for treating a contaminated injured person was not established for treating a contaminated/injured person.

Possible Cause: The CPRMC procedure, Nuclear Radiation Release Concept of Operation, and checklist, Incident Command: Radiological Incident, was used for the first time in this MS-1 Drill. Due to the CPRMC procedure's focus on complete decontamination of an ambulatory patient

prior to entering the emergency room hospital personnel emphasized decontamination over providing medical care. Although fundamental concepts of receiving, treating, and decontaminating a contaminated/injured individual were included in the procedure, specific details on how to set up the REA, utilize the decontamination showers, and position-specific responsibilities were not provided. Additionally, the contamination limit was not specifically identified, stating that the contamination threshold is “two or three times background.” This lack of specificity negatively impacted the CPRMC RRTs ability to respond effectively.

Reference: NUREG 0654 F.2; H.10; K.5.a,b; L.1; L.4.

Effect: The lack of specificity in the procedure for detailing the setup of the REA and decontamination limits could allow contaminated patients into unrestricted areas of the hospital, thereby potentially contaminating other areas of the hospital and/or other personnel. In addition, the excessive focus on decontamination could hinder the timely application of appropriate and/or critical medical care.

Recommendation: A collaboration of CPRMC, SCEMD, Darlington County, and HB Robinson personnel should evaluate the new CPRMC procedure to ensure:

1. Description of how to establish an REA and control ingress and egress.
2. Description of how to use the decontamination shower room and steps or references for performing different levels of personnel decontamination.
3. Description of RRT

members' responsibilities and duties.

In addition, hospital personnel should receive training on their equipment and decontamination methods, with emphasis on the need for any medical treatment to take precedence over contamination concerns.

Schedule of Corrective Actions: Carolina Pines will participate in an evaluated drill in September 2008.

**4.2.3 54-07-1.c.1-A-03
Lee County
EOC**

Condition: At 1026, after receiving notification at 1025 that the HBRSEP had declared an ECL Alert as of 1015, the Lee County emergency coordinator briefed the EOC staff on the plant status described in the utility's emergency notification form. No protective actions were recommended by the utility. At 1030, without coordination with the SEOC or adjacent jurisdictions, the emergency coordinator decided to initiate a voluntary evacuation of Zone D-2, the only area within Lee County inside the EPZ. The coordinator based his decision on the direction of the wind (330 at 3 mph) which placed Zone D-2 in a projected plume path. He indicated that notification to the 1,297 citizens in Zone D-2 was accomplished by a Reverse 911 telephone calling system – SC Reach; this simulated action was completed by 1045. As a precautionary action at 1030 the Director decided to evacuate those special needs individuals who required transportation. The Department of Social Services (DSS) representative was able to move (simulated) special needs individuals by 1120 to the appropriate shelter where they received any necessary medical assistance.

At the time the simulated evacuation was ordered, traffic control points had not been established, personnel necessary to activate and staff shelters had not been contacted by the American Red Cross, and Red Cross

personnel had not arrived at the EOC to draw materials to support the evacuating citizens. The emergency coordinator did not coordinate this action with either Chesterfield or Darlington Counties or the SEOC; he only used SC Reach to alert and notify the populace; no county news releases were prepared or information pertaining to the evacuation shared with the Joint Information Center (JIC), and this action was not addressed in any of the three media briefings at the JIC.

Possible Cause(s):

- County procedures do not discuss an evacuation being directed until a General Emergency at the county level. The state could recommend evacuation at a Site Area or as conditions necessitate. Since this was the emergency coordinator's first exercise as the EOC Director he was overtly concerned with taking appropriate actions to insure the safety and well being of the citizens of the county.
- Exercise Control:
- The extent of play authorized pre-positioning the EOC staff at 0815. This was prior to receipt of a notification of unusual event (NOUE) at 0909 and declaration of Alert at 1025. This left the emergency coordinator with a full staff which had no mission. Routinely the staff would not be notified of the possibility of EOC activation until Alert.
- It is possible that after having key personnel spend almost two hours without meaningful work, and this was the emergency coordinator's first exercise as the Director, he took an action that

would necessitate the staff initiate support operations. With better exercise control the controller assigned to this EOC could have made exercise injections that would have provided the Director with conditions that either would have precluded him having the ability to order the evacuation or directed him in a manner to make contact with the SEOC.

- Precautionary Action/ Procedural Knowledge:
- The Lee County emergency coordinator placed a very high priority on the safety of the general population in Zone D-2, and made a very conservative “worst case” scenario decision based upon a possible change of wind affected the area. Therefore, he decided to initiate a voluntary evacuation of Zone D-2. However, he did not coordinate the action with the SEOC or EOCs of the adjoining counties. These actions or lack of action may have been a result of unfamiliarity with procedures or lack of experience.

Reference: NUREG-0654/FEMA-REP-1, Rev. 1: A.1.d; A.2.a, b

Effect: The lack of familiarity and adherence to procedures resulted in the following major problems:

- By not considering the impact of the Lee County action upon the general population of adjoining counties it could have caused confusion on the part of citizens in other zones in the EPZ, and question why Lee County was

evacuating but zones closer to the plant were not.

- Use of the SC Reach only and failure to sound sirens and use the EAS system to alert the public to a protective action/major precautionary decision precludes assuredness of widespread notification of the public.
- The media representatives at the JIC were not provided copies of the evacuation by Lee County, which precluded the media from providing a valuable service in the transfer of information to the public.
- The lack of sharing of inter-jurisdictional government and utility information precluded an effective review of coordinated actions by the EOCs in the affected counties.
- Rumor control personnel were not provided sufficient information to enable them to effectively and accurately respond to queries from the public.

Recommendation(s):

- Provide training for key County decision makers on their responsibilities and coordination needed in deciding to evacuate the public within the EPZ. Especially for actions taken prior to recommendations for protective actions.
- The county should revise its procedures to require

communication with other risk and host counties and the State anytime they make any protective action decisions.

Schedule of Corrective Action:

SCEMD will provide training and a tabletop exercise with Lee County personnel during H. B. Robinson drill in the second quarter of 2008.

APPENDIX 1

ACRONYMS AND ABBREVIATIONS

The following is a list of the acronyms and abbreviations may have been used in this report.

ARC	American Red Cross
ARCA	Area Requiring Corrective Action
CFR	Code of Federal Regulations
DHEC	Department of Health and Environmental Control
DHHS	Department of Health and Human Services
DOC	Department of Commerce
DOE	Department of Energy
DOI	Department of the Interior
DOT	Department of Transportation
DRD	Direct-Reading Dosimeter
DSS	Department of Social Services
EAL	Emergency Action Level
EAS	Emergency Alert System
ECL	Emergency Classification Level
EEM	Exercise Evaluation Methodology
EMA	Emergency Management Agency
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EOF	Emergency Operations Facility
EOP	Extent of Play
EPA	Environmental Protection Agency
EPD	Emergency Preparedness Division
EPZ	Emergency Planning Zone
FAA	Federal Aviation Agency
FEMA	Federal Emergency Management Agency
FR	Federal Register
FMT	Field Monitoring Teams
GE	General Emergency
IRIS	Internet Routed Information System
JIC	Joint Information Center
KI	Potassium Iodide

NRC NUREG-0654	U.S. Nuclear Regulatory Commission 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>
ORO	Offsite response organizations
PAD	Protective Action Decision
PAR	Protective Action Recommendation
PIO	Public Information Officer
RAC	Regional Assistance Committee
RACES	Radio Amateur Civil Emergency Service
RDO	Radiological Defense Officer
REP	Radiological Emergency Preparedness
RERP	Radiological Emergency Response Plan
SAE	Site Area Emergency
SCHP	South Carolina Highway Patrol
SEOC	State Emergency Operations Center
TCP	Traffic Control Point
USDA	U.S. Department of Agriculture

APPENDIX 2

EXERCISE EVALUATORS

The following is a list of the personnel who evaluated the H. B. Robinson Steam Electric Plant exercise on December 4, 2007. The organization which each evaluator represents is indicated by the following abbreviations:

FEMA - Federal Emergency Management Agency
ICF - ICF Incorporated
NRC - Nuclear Regulatory Commission

Conrad Burnside

Chairman, RAC IV

EVALUATION SITE

EVALUATOR

ORGANIZATION

Chief Evaluator

Joe Harworth

FEMA

STATE OF SOUTH CAROLINA

State Emergency Operations Center

Lawrence Robertson
Obhie Robinson
Roy Smith

FEMA
FEMA
ICF

Dose Assessment

Brad McRee

ICF

Emergency Operations Facility

Robert Trojanowski

NRC

JIC

Dave White
Bob Gant

ICF
ICF

LP-1 Radio Station WJMX

Kevin Keyes
Gerald McLemore

FEMA
FEMA

State TCP

Paul Ringheiser

ICF

CHESTERFIELD COUNTY

Emergency Operations Center	Joe Harworth Marcy Campbell	FEMA ICF
Protective Actions for Schools	Marcy Campbell	ICF
Traffic Control Points	Mark Dalton	ICF
Emergency Worker Decontamination	Jill Leatherman	ICF
Reception and Congregate Care	Samuel Nelson	ICF

DARLINGTON COUNTY

Emergency Operations Center	Helen Wilgus Deborah Bell	FEMA ICF
Protective Actions for Schools	Deborah Bell	ICF
County Traffic Control Points	Paul Ringheiser	ICF
Emergency Worker Decontamination	Henry Christiansen	ICF
Lake Warning	Paul Ringheiser	ICF
Medical Service Drill	Brad McRee Henry Christiansen	ICF ICF

LEE COUNTY

Emergency Operations Center	Mike Dolder Bill Larrabee	FEMA ICF
Traffic Control Points	Bill Larrabee	ICF
Reception & Congregate Care	Louis Sosler	ICF
Emergency Worker Decontamination	Terry Blackmon	ICF

FLORENCE COUNTY

Reception Center & Congregate Care	Gary Bolender	ICF
Emergency Worker Decontamination	Keith Earnshaw	ICF

APPENDIX 3

EXERCISE CRITERIA AND EXTENT-OF-PLAY AGREEMENT

This appendix lists the exercise criteria, which were scheduled for demonstration in the H. B. Robinson Steam Electric Plant exercise on December 4, 2007 and were submitted with the extent-of-play agreement submitted by the State of South Carolina and approved by FEMA.

A. Exercise Criteria

Attached are the specific radiological emergency preparedness criteria scheduled for demonstration during this exercise

B. Extent-of-Play Agreement

The extent-of-play agreement on the following pages was submitted by the State of South Carolina, and was approved by FEMA Atlanta Field Office in preparation for the HBRSEP exercise on December 4, 2007. The extent-of-play agreement includes any significant modification or change in the level of demonstration of each exercise criterion listed in Subsection A of this appendix.

EXTENT OF PLAY AGREEMENT

1. Emergency Operations Management

Sub-element 1.a, Mobilization

Criterion 1.a.1: ORO's use effective procedures to alert, notify, and mobilize emergency personnel and activate facilities in a timely manner. (NUREG-0654, A.4. D.3, 4, E.1, 2, H.4)

All state and local government personnel will be pre-positioned. Activation of facilities should be completed in accordance with state and local plans and/or procedures. These will be discussed in the applicable EOCs.

Sub-element 1.b, Facilities

Criterion 1.b.1: Facilities are sufficient to support the emergency response. (NUREG-0654, H)

N/A

Sub-element 1.c.1, Direction and Control

Criterion 1.c.1: Key personnel with leadership roles for the ORO provide direction and control to that part of the overall response effort for which they are responsible. (NUREG-0654, A.1.d, 2.a.b.)

Direction and Control will be at the State Emergency Operations Center (SEOC). County Direction and Control will take place at the Chesterfield, Darlington, and Lee County Emergency Operations Centers (EOC). Florence County EOC will be located in their mobile command vehicle at the Florence City/ County Civic Center. State Emergency Response Team (SERT) participants include the Emergency Management Division (EMD); ESF 5, Information and Planning, ESF 6; Mass Care (Department of Social Services); ESF 8, Health and Medical Services (Department of Health and Environmental Control); ESF 10, Hazardous Materials (Department of Health and Environmental Control); and ESF 16, Emergency Traffic Management (Department of Public Safety and Department of Natural Resource). A simulation cell will represent the Office of the Governor, Office of the Adjutant General, FEMA Region IV, North Carolina, Georgia, and non-playing South Carolina state agencies. All simulated telephone calls will be made by calling the simulation cell.

Sub element 1.d, Communications

Criterion 1.d.1: At least two communications systems are available, at least one operates properly, and communication links are established and maintained with appropriate locations. Communications capabilities are managed in support of emergency operations. (NUREG-0654, F.1., 2.)

The Selective Signaling System (SSS) is the primary means of communication to notify off-site response forces. Backup to the SSS are commercial telephone lines, and the Local Government Radio (LGR).

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

Criterion 1.e.1: Equipment, maps, displays, dosimeters, potassium iodide (KI), other supplies are sufficient to support emergency operations. (NUREG-0654, H., J.10.a.b.e.f.j.k, 11, K.3.a).

Potassium Iodide for emergency workers will be simulated by candy or other means (empty envelope marked KI). A 14-day supply of KI for 7,000 emergency workers and institutionalized individuals is stored at the Region 4 Health Departments and at DHEC headquarters in Columbia, S.C.

Quantities of KI for emergency workers, institutionalized individuals, and general public will be confirmed at SEOC by documentation of the current inventory.

All state/county radiation detection equipment will be inspected, inventoried, and operationally checked before each use. State/county radiation detection equipment will be calibrated or leak tested in accordance with existing plans by the South Carolina Emergency Management Division Radiological Lab.

At locations where traffic and access control personnel are deployed, the availability of appropriate equipment (e.g. vehicles, barriers, traffic cones and signs, etc.) will be described by law enforcement personnel.

Emergency Traffic Management will be discussed at the Darlington County EOC on December 4, 2007.

FEMA will conduct a Staff Assistance Visit to all counties on November 1, 2007. The purpose of this visit is to inspect all radiological equipment, TCP supplies, KI stockpiles for number and expiration dates, and training records. A summary of training activities will be presented to the FEMA evaluator.

2. Protective Action Decision Making.

Sub-element 2.a., Emergency Worker Exposure Control

Criterion 2.a.1: OROs use a decision-making process, considering relevant factors and appropriate coordination, to insure that an exposure control system, including the use of KI, is in place for emergency workers including provisions to authorize radiation exposure in excess of administrative limits or protective action guides. (NUREG-0654, K.4.)

Dose limits for emergency workers are pre-determined. Emergency workers may voluntarily exceed dose limits only after being fully informed by DHEC

and Local Emergency Management Directors, and in accordance with state and county plans, of the biological effects of radiation and possible consequences of excessive exposure.

Sub-element 2.b, Radiological Assessment and Protective Action Recommendations and Decisions for the Plume Phase of the Emergency.

Criterion 2.b.1: Appropriate protective action recommendations are based on available information including: plant conditions, field monitoring data, and licensee and ORO dose projections, as well as knowledge of on-site and off-site environmental conditions. (NUREG-0654, I.8., 10, and Supplement 3.)

Protective action recommendations by DHEC will be based on an evaluation of information received from the licensee, independent dose assessments and simulated field monitoring data input. Dose assessment will take place at the South Carolina State Emergency Operations Center.

Criterion 2.b.2: A decision-making process involved consideration of appropriate factors and necessary coordination is used to make protective action decisions (PADs) for the general public (including the recommendation for the use of KI, if ORO policy). (NUREG, J.9, 10.M.)

The Governor, or his designee, will demonstrate the ability to make appropriate Protective Action Decisions (PADs) based on recommendations from DHEC and SCEMD. PADs that require sheltering or evacuation of residents or transients in the 10-mile EPZ will be coordinated with the chief county elected official or designee.

Sub-element 2.c, Protective Action Decisions Consideration for the Protection of Special Populations.

Criterion 2.c.1: Protective action decisions are made, as appropriate, for special population groups. (NUREG-0654, J.9, 10.c.d.e.g).

There are a variety of Special Population groups within HBRSEP's 10-mile EPZ including one hospital, one college, nine public and ten private schools, and ten to twelve institutions categorized as assisted care facilities. Darlington and Lee County representatives will be prepared to discuss their plans and procedures to satisfy this criterion at their respective EOCs. A list

of potential special population citizens will be provided to the FEMA evaluators.

3. Protective Action Implementation.

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

Criterion 3.a.1: The OROs issue appropriate dosimeters 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).

Emergency workers or emergency worker teams will use Self Reading Dosimeters (SRDs) and simulated Permanent Record Dosimeters (PRDs) to monitor and control radiation exposure. Emergency workers in low exposure rate areas will use PRDs and may use direct reading dosimeters or place them in centralized areas.

Dosimeters are distributed through county emergency operations centers. Each county has an adequate inventory to support first-shift personnel. Supplemental dosimeters will be provided in accordance with the South Carolina Dosimeter Redistribution Standard Operating Procedures, after discussion and consideration at the SEOC. Department of Health and Environmental Control and the South Carolina Highway Patrol maintain and distribute their own SRDs.

Emergency workers will be interviewed to determine their knowledge of radiation exposure limits.

Sub-element 3.b, Implementation of KI Decision

Criterion 3.b.1: KI and appropriate instructions are available should a decision to recommend use of KI be made. Appropriate record keeping of the administration of KI for emergency workers and institutionalized individuals (not general public) is maintained. (NUREG-0654, E.7., J., 10.e.f.).

KI is distributed to emergency workers prior to their being dispatched, per county EOPs. KI will be ingested by emergency workers, on direction of the State Health Officer. Record keeping will be discussed at Chesterfield, Darlington and Lee County EOCs.

The procedures for post-event distribution of KI to the public will be demonstrated by discussion at the SEOC, county EOC's and Florence Civic Center.

Sub-element 3.c, Implementation of Protective Actions for Special Populations

Criterion 3.c.1: Protective action decisions are implemented for special populations other than schools within areas subject to protective actions (NUREG-0654, E.7., J.9., 10.c.d.e.g.)

Chesterfield, Darlington, and Lee Counties will demonstrate the ability and resources to implement appropriate protective actions for special population needs. A list of people/facilities with special transportation needs will be provided to evaluators. Evacuation assistance will not be demonstrated.

Criterion 3.c.2: OROs/School officials decide upon and implement protective actions for schools. (NUREG-0654, J.10., d., g.)

Chesterfield County will simulate school evacuation by interviews with key school staff members.

McBee High School

McBee Elementary

Plain View Elementary

To be evaluated at the Chesterfield County EOC on December 4th at 10:00AM.

Darlington County will simulate school evacuation by interviews with key school staff members.

Southside Early Childhood Center

Washington Street Elementary

Hartsville Middle School

To be evaluated at the Darlington County EOC on December 4th at 9:00 AM.

Sub-element 3.d, Implementation of Traffic and Access Control

Criterion 3.d.1: Appropriate traffic and access control is established. Accurate instructions are provided to traffic and access control personnel. (NUREG-0654, J.10.g, j., k.).

Traffic and Access Control Points (TACPs) are predetermined. The South Carolina Highway Patrol, Darlington and Chesterfield Counties will demonstrate TACPs via discussion on-scene. At a time to be determined, the two Counties will provide escorts for the evaluators at the County EOCs and transport them to and from each of the TACPs to be evaluated. Lee County will demonstrate TACPs via discussion at the county EOC.

State TACP:

Hartsville Hwy US 15 and Governor Williams Hwy US 52/401 by State Highway Patrol at 9:30 AM on December 4th 2007.

Chesterfield County:

US 1 & SC 151 by Chesterfield County Deputy Sheriff on December 4th 2007.

Darlington County:

TACP 16B: West Old Camden Road (S16-23) and New Market Road (S 16-39) by the Darlington County Sheriff on December 4th 2007.

TACP 16-D: Intersection S. 5th St (SC-Business 15) and West Bobo Newsome Highway (SC-151) by the Darlington County Sheriff on December 4th 2007.

Lee County at:

TACP 31B US 15 and SR 341 by Deputy Sheriff at the Lee County EOC at 10:30AM on December 4th 2007.

Criterion 3.d.2: Impediments to evacuation are identified and resolved. (NUREG-0654, J.10.k)

Actions to identify and remove impediments to evacuation will be demonstrated by discussion with the Highway Patrol supervisor at the Darlington and Lee Counties EOC. Chesterfield County Deputy Sheriff will demonstrate criterion by discussion on scene.

5. Emergency Notification and Public Information

Sub-element 5.a, Activation of the Prompt Alert and Notification System

Criterion 5.a.1: Activities associated with primary alerting and notification of the public are completed in a timely manner following the initial decision by authorized off-site emergency officials to notify the public of an emergency situation. The initial instructional message to the public must include as a minimum the elements required by FEMA REP guidance. (10 CFR Part 50, Appendix E & NUREG-0654, E.1., 4., 5., 6., 7.)

The State will coordinate Protective Action Decisions (PADs) with Chesterfield, Darlington and Lee Counties Chief elected officials or designees. A “Stay Tuned” EAS message will be transmitted to the Local Primary (LP-1) EAS station (WJMX Florence S.C.) At Site Area Emergency, sirens will sound and the Emergency Alert system (EAS) will be activated. Copies of the simulated EAS message and news release will be provided to the FEMA evaluator at the SEOC.

Criterion 5.a.3: Activities associated with FEMA-approved exception areas (where applicable) are completed within 45 minutes following the initial decision by authorized off-site emergency officials to notify the public of an emergency situation. Backup alert and notification of the public is completed within 45 minutes following the detection by HBR SEP of a failure of the primary alert and notification system. (NUREG-0654, E.6, Appendix 3.B.2.c)

In the event of siren failure, Chesterfield, Darlington and Lee Counties will describe the back-up alerting system.

Lake Clearing will be demonstrated by the Department of Natural Resources at Lake Robinson in Darlington County. A DNR representative will meet the evaluator on December 4th at 0900 hrs at the 16B TACP. At the conclusion of the TACP evaluation, the DNR representative will transport the evaluator to

Johnson's Landing and return him/her to Darlington EOC at the completion of the lake clearing evaluation.

Lake Clearing (Lake Robinson)

DPBL 1, Johnson's Landing, Darlington County

Sub-element 5.b, Emergency Information and Instructions for the Public and the Media.

Criterion 5.b.1: OROs provide accurate emergency information and instructions to the public and the news media. (NUREG-0654, E.5, 7, G.3.a, G.4, a., b., c.)

The State, Chesterfield, Darlington, and Lee counties will demonstrate the ability to coordinate the formulation and dissemination of accurate information and instructions to the news media at the Joint Information Center (JIC). Rumor control for the State, Chesterfield, Darlington and Lee counties will be demonstrated at the JIC and appropriate county EOCs. Rumor control personnel will provide the FEMA Evaluator a rumor calls log.

6. Support Operations/Facilities

Sub-element 6.a, Monitoring and Decontamination of Evacuees and Emergency Workers and Registration of Evacuees.

Criterion 6.a.1: The reception center/emergency worker facility has appropriate space, adequate resources, and trained personnel to provide monitoring, decontamination and registration of evacuees and/or emergency workers. (NUREG-0654, J.10.h: K.5.b.)

At least six people will be monitored and registered. Personnel decontamination will be demonstrated via walk-thru and discussion. All necessary supplies will be on-hand. Walkways will be covered with barrier material (simulated). The FEMA evaluator will develop a monitoring productivity rate. Demonstration will include the necessary portable portal monitors and monitoring teams required to monitor 20% of the population allocated to the facility within 12 hours. At least two vehicles will be monitored and one vehicle decontaminated in accordance with local SOPs. Water will be used to demonstrate vehicle decontamination procedures.

The General Population Decontamination Points being evaluated on December 4, 2007 are:

**Chesterfield County at 9:30 AM
Chesterfield Senior High School**

**Florence County at 10:00 AM
Florence City/County Civic Center**

**Lee County at 9:30 AM
Lee Central High School**

Sub-element 6.b, Monitoring and Decontamination of Emergency Worker Equipment.

Criterion 6.b.1: The facility/ORO has adequate procedures and resources for the accomplishment of monitoring and decontamination of emergency worker equipment including vehicles (NUREG-0654, K.5.b)

All necessary supplies will be displayed in accordance with local SOPs. Walkways will be covered with barrier material (simulated). Two emergency workers will be monitored via walk-thru and discussion. One emergency worker will be monitored and decontaminated (simulated) in accordance with local SOPs. Lee County and Florence County emergency worker decontamination will be demonstrated concurrently with 6.a., above. Water will not be used on personnel for decontamination in the exercise.

Emergency Worker Equipment Decontamination Points will be evaluated on December 4, 2007

**Chesterfield County at 10:00 AM
Chesterfield High School**

**Darlington County at 9:00AM
Darlington County Fire Station # 2**

Florence County at 9:30AM
Florence City/County Civic Center

Lee County at 10:00 AM
Bishopville Fire Station #1.

Sub-element 6.c, Temporary Care of Evacuees

Criterion 6.c.1: Managers of congregate care facilities demonstrate that the centers have the resources to provide services and accommodations consistent with American Red Cross planning guidelines (found in MASS CARE Preparedness Operations, ARC 3031). Managers demonstrate the procedures to assure that evacuees have been monitored for contamination and have been decontaminated as appropriate prior to entering congregate care facilities. (NUREG-0654, J.10.h., 12.).

Procedures that assure that only non-contaminated persons enter shelters will be demonstrated. All necessary supplies will be displayed in accordance with local SOPs. Walkways will be covered with barrier material (simulated). Six personnel will be monitored and registered in accordance with local SOPs. Two vehicles will be monitored and decontaminated (simulated) in accordance with local SOPs.

Reception Centers/Shelters to be evaluated:

Chesterfield County at 10:00 AM
Chesterfield High School

Florence County at 10:30AM
Florence City/County Civic Center

Lee County at 9:30AM
Lee Central High School

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.

Facility to be evaluated:

Darlington County: Carolina Pines RMC, 5 December 2007 at 9:00 AM.

APPENDIX 4

EXERCISE SCENARIO

This appendix contains a summary of the simulated sequence of events, Exercise Scenario, which was used as the basis for invoking emergency response actions by OROs in the H. B. Robinson exercise on December 4, 2007.

This exercise scenario was submitted by the State of South Carolina and approved by FEMA.

Scenario

Initial Conditions

H.B. Robinson Steam Electric plant (HBRSEP) Unit No. 2 is operating at 100 percent power and has been in continuous operation for 300 days, end of core life (EOL). Unit 2 has identified a small fuel leak and continues to monitor through daily sampling. The Liquid Nitrogen (LN2) shipment has arrived, been receipt inspected, and searched by Security. HBR Unit 1 fire pump is out of service (OOS) and Unit 1 and Unit 2 fire water systems have been cross-connected.

The weather over the last week has been influenced by high pressure in the area. Day time temperatures will be in the mid-fifties through Friday; night time temperatures are expected to be in the lower-thirties. Winds are expected to be out of the Northwest.

The ten day forecast for the region is clear skies with day time temperatures in the middle fifties, night time temperatures in the lower thirties, and light winds.

Exercise Timeline

0600 Controller and Evaluator Final Meeting

0700 Simulator TAP-411 verification and completion

0730 Main Control Room and Simulator Staff Briefings

~0800 The Operations Simulator Crew assumes the watch taking control of the plant.

~0805 EVENT 1 – As the LN2 tractor-trailer enters the Protected Area and proceeds down the north driveway. As it passes the E&RC Building, the driver is distracted and the tractor-trailer drives through the interior fences into the edge of the Radiologically Controlled Area (RCA). There is no contact with any Systems, Structures, or Components and damage is limited to the fences and tractor-trailer. [Message/Mission Card – Security Controller]

~0810 EVENT 2 – “A” Heater Drain Pump will experience a packing leak that cannot be stopped with the pump running. [The leak will increase over a course of ~20 minutes.] [Message/Mission Card – Security Controller] [The decision should be made to shut-down the pump and reduce plant power.] [A mock-up clearance package must be provided once actions are taken.]

~0830 EVENT 3 – During the down-power (~90%), “A” Heater Drain Pump will trip due to a 4Kv Buss ground caused by steam/moisture entering the electrical components of the motor. [Message/Mission Card – AO Controller] [Operations personnel will isolate the pump in accordance with OP-407]

~0840 EVENT 4 – Loose Parts Monitoring System (LPMS) alarm received on Simulator Control Room Annunciator Panel. [LPMS monitor and recorder shows multiple events on Channels 756 and 752, “B” Steam Generator (S/G) Primary Side and Lower Reactor Vessel, respectively.]

~0845 EVENT 5 – Once the plant is stable at ~85% power, then a tube leak of ~35 gpm initiates from the RCS into “B” S/G. [Personnel should recognize the need to monitor the secondary side of the plant for potential contamination. If not, then the Radiation Control (RC) Controller will provide contamination levels for personnel entering the area and equipment, once monitoring occurs.] [Operations will enter AOP-035 and begin plan shutdown in accordance with GP-006]

[Conditions will be met for the declaration of an **UE** due to EAL Matrix SU6.1, “Unidentified or pressure boundary leakage >10 gpm OR Identified leakage >25 gpm” [Activation of the ERO will be at the discretion of the SSO/SEC, if not he will be prompted to do so.]

[**~0845 UE** must be declared no later than this time (within 15 minutes of exceeding the EAL initiating condition). If not, then prompt the classification using the contingency message card.]

[**~0845 - 0900 UE** Notifications to the State and County Emergency Management Divisions must be completed during this time (within 15 minutes of the declaration)]

~0945 EVENT 6 – [After completion of RNP Emergency Facility Turnover] The RCS to Steam Generator “B” leak will increase to a tube rupture (~385 gpm) resulting in a manual plant trip and Safety Injection (SI).

[Conditions will be met for the declaration of an **ALERT** due to EAL Matrix FA1.1, “Any loss of any potential loss of either Fuel Clad or RCS (Table F-1)” resulting from Table F-1 Reactor Coolant System Barrier Loss 3, “SGTR that results in an ECCS (SI) actuation”]

[**~1000 ALERT** must be declared no later than this time (within 15 minutes of exceeding the EAL initiating condition). If not, then prompt the classification using the contingency message card.]

[**~1000 - 1015 ALERT** Notifications to the State and County Emergency Management Divisions must be completed during this time (within 15 minutes of the declaration)]

~0950 EVENT 7 – The Steam Driven Auxiliary Feedwater (SDAFW) Pump trips. [The failure is due to a failed sensing line.]

~1000 EVENT 8 – “B” Emergency Diesel Generator starts, but does not “Field Flash”.

~1015 EVENT 9 – During the start-up of the Auxiliary Boilers the following conditions will apply:

- “B” Boiler chimney damper cannot be verified opened or opened (OP-401 Step 8.1.6). [Message/Mission Card – AO Controller]
- “A” Boiler will start in accordance with OP-401.
- “C” Boiler will start and shut-down [The failure is due to a low atomizing air pressure caused by failure of the Quincy Air Compressor used to atomize the fuel oil.] [Message/Mission Card – AO Controller]

~1100 EVENT 10 – While performing Path-2 the “B” S/G Safeties will open, one at 30% and the other at 60%. [Message/Mission Card – Any Controller with personnel in the area] [The safety open at 30% may be successfully closed, if actions are taken to do so. All attempts to close the safety open at 60% will be unsuccessful.]

[Conditions will be met for the declaration of a **Site Area Emergency** due to EAL Matrix FS1.1, “Loss or potential loss of any two barriers (Table F-1)” resulting from Table F-1 Reactor Coolant System Barrier Loss 3, “SGTR that results in an ECCS (SI) actuation. **AND** Containment Barrier Loss 4, Primary-to-secondary leakage > 10 gpm with non-isolable steam release from affected S/G to the environment”]

[**~1115 SAE** must be declared no later than this time (within 15 minutes of exceeding the EAL entry conditions). If not, then prompt the classification using the contingency message card.]

[**~1115 - 1130 SAE** Notifications to the State and County Emergency Management Divisions must be completed during this time (within 15 minutes of the declaration)]

~1135 EVENT 11 – [If LPMS is reset] LPMS alarm is received on the Simulator Control Room Annunciator Panel. [LPMS monitor and recorder shows multiple events on Channels 752, Lower Reactor Vessel.]

~1150 **EVENT 12** – RCS sampling should indicate an increase in the RCS activity. Activities on the secondary side of the plant or RCS sampling will indicate that the fuel leak has increased. R-31 B will increase to $\geq 2.2E+3$ mRem/hr (2200 mRem/hr or 2.2 Rem/hr).

[~1235 Once RCS activity results are back, then conditions will be met for the declaration of a **General Emergency** due to EAL Matrix RG1.1 “Valid reading on any radiation monitor that exceeds or is expected to exceed Table R-1 column “GE” for ≥ 15 min. (NOTE 1)” **OR** FG1.1, “Loss of any two barriers **AND** Loss or potential loss of third barrier (Table F-1)” resulting from Table F-1 Reactor Coolant System Barrier Loss 3, “SGTR that results in an ECCS (SI) actuation”. **AND** Containment Barrier Loss 4, “Primary-to-secondary leakage > 10 gpm with non-isolable steam release from affected S/G to the environment” **AND** Coolant activity > 300 μ Ci/gm I-131 Dose Equivalent”]

[~1250 **GE** must be declared no later than this time (within 15 minutes of exceeding the EAL entry conditions). If not, then prompt the classification using the contingency message card.]

[~1250 - 1305 **GE** Notifications to the State and County Emergency Management Divisions must be completed during this time (within 15 minutes of the declaration)]

~1300 **EVENT 13** – If fire water is used to scrub the steam plume, then once the fire pumps are started there will be a fire system break at FP-5, near the Unit 1 Engineering Building east of the Unit 2 Protected Area fence. [Message/Mission Card – Security Controller]

~1400 **TERMINATION** [Review of all facility objectives to ensure that opportunity was given to complete the objectives and they have been met or have been noted as unable to be met.] Once objective review is completed by all facilities, then the EOF Lead Controller will issue the message card to the ERM to initiate the state and county exercise termination notification. Once the notification has been completed then all facilities can terminate and prepare for the critique.]

~1415 Controller and Evaluator quick critique

~1430 Facility Critiques Begin

APPENDIX 5

MEDICAL SERVICES DRILL

Darlington County Emergency Medical Services (EMS) and Carolina Pines Regional Medical Center (CPRMC)

Participating agencies at or supporting the medical drill were:

1. Darlington County Emergency Medical Services for emergency treatment and medical transport.
2. Carolina Pines Regional Medical Center for emergency room treatment.
3. South Carolina Emergency Management Division for coordination and Controller support.
4. H.B. Robinson Steam Electric Plant for radiological assistance.

The H.B. Robinson Steam Electric Plant (HBRSEP) Medical Services (MS-1) Drill was conducted on December 5, 2007. At 0845, Darlington County Emergency Medical Services (EMS) was notified to pick up an injured and potentially contaminated individual at County Fire Station 12. Ambulance 4436 was dispatched. The Darlington County EMS had sufficient equipment and supplies in their ambulance to support all emergency operations. The interior of the ambulance was not covered with Herculite/paper, since their policy is that upon the conclusion of the mission, they will be assumed to be contaminated and they will report to the County decontamination station (Swift Creek Fire Station). This policy was based on advice/training from Oak Ridge authorities. The ambulance team was fully dressed out in Tyvek suits/coveralls containing hoods and foot covers, rubber boots, double rubber gloves, face shields, surgical masks, and dosimetry. Immediately upon dispatch, the driver called Carolina Pines Regional Medical Center (CPRMC) at 0847 to advise them of the mission and to enable the hospital's preparation of a Radiological Emergency Area (REA).

Regarding emergency worker exposure control, Darlington County EMS utilized dosimeter kits distributed to the three person ambulance team. The kit consisted of a DRD, 0-5R, a TLD-simulated, KI-simulated, and an exposure record card. Three emergency workers were interviewed and the team was well trained and briefed on exposure control prior to the mission. They zeroed their DRDs, checked and recorded the DRD values every five minutes during the drill, knew the administrative reporting limit of 0.1R and the turn back value of 1.0R, knew the proper use of PRDs, and knew where and to whom to return their dosimetry at the conclusion of the mission.

At 0906, the ambulance arrived at the pickup site (County Fire Station 12). They were immediately advised (by the controller) that their Ludlum Model 3 survey meter was reading 1700 cpm everywhere (ground, patient, etc.). The team was aware of the level to determine contamination (two times background or 330 cpm, whichever is lower). Urgent medical care took first priority. Information was obtained by questioning the patient, by taking vital signs, and by physical examination. By applying first aid, the patient was stabilized.

The patient's outer clothing was removed and he was wrapped in a blanket, placed on a body board, and loaded in the ambulance using a stretcher. At 0916, CPRMC was advised that Unit 4436 was en route, and was provided with the patient's vital signs, injuries, and estimated time of arrival at the hospital.

The ambulance arrived at the CPRMC Emergency/Trauma Department (ED) at 0938 and backed into the designated area demarcated with stanchions and red tape on the concrete to identify the boundary between potentially contaminated and non-contaminated areas. Red tape was not used between the stanchions to indicate the barrier line. No paper or other covering, such as Herculite or plastic, was used as a contamination control barrier. Additionally, no signage was used to indicate the potential for a contaminated or a radiation area.

The ambulance team practiced effective contamination control when removing their personal protective equipment (Tyvek suits, rubber gloves and boots, face shields, surgical masks, etc.). The ambulance was then monitored and found to be contaminated. The driver, who had not exited the vehicle since arrival at the hospital, was advised to take the vehicle to the County decontamination site (Swift Creek Fire Station).

Within CPRMC, the RRT dressed out in two pairs of booties, a paper gown, inside gloves taped to the gown, hoods, outer gloves, and a face shield. The TLDs were initially placed outside the gowns, and the evaluator informed them that TLDs should be inside their gowns. A 0-200 mR DRD was attached to the outside of the gowns for easy access. Dose record cards were completed for each RRT member, although the only entries were for initial and final readings, which is not consistent with guidance on the Radiation Exposure Record to check and record readings every 15 – 30 minutes. Two RRT members were quizzed on administrative limits, and correctly referred to the Radiation Exposure Record, which lists the Call Back Value of 0.1 R, the Turn Back Value of 1 R, Protecting Valuable Property at 2 R, and Life Saving as 5 R.

The patient was removed from the ambulance at 0940 and remained on the gurney on the "hot" side of the receiving area. The ambulance team provided vitals to the CPRMC Radiological Response Team (RRT), at which time the hospital assumed responsibility for the radiological and medical condition of the patient. The RRT consisted of a Team Coordinator, three nurses, a recorder, and security. The RRT was assisted by three HBRSEP radiation control technicians (RCT) for radiological support.

The cocoon surrounding the patient was rolled back, and an RCT monitored the patient. Head to toe levels provided by the controller was 1,700 cpm. Ear and nasal swabs were taken, and transferred across the "hot" line into plastic bags being held by RRT nurses. The swabs were then monitored for contamination and found to be at 300 cpm. An initial decision was made to decontaminate the patient while in the receiving area by using Epi-cleanse sponges to clean the wounds, and Ready Bath Wipes to decontaminate the remainder of the body. The cart with these materials was rolled into the "hot" side, potentially contaminating the cart. The controller and evaluators later advised the RRT to keep the cart on the "cold" side and hand materials to personnel on the "hot" side, as needed. Since the ambulance was contaminated and had not yet been moved, the contaminated vehicle effectively increased the background in the area. As such, when the patient was re-monitored, the levels were not significantly reduced.

As the ambient temperature was rather cold, the RRT decided to move the patient to the decontamination shower. A wheelchair was rolled into the “hot” side (as with the rolling cart prior) and became potentially contaminated. The controller and evaluators later advised the RRT to keep the wheelchair on the “cold side” and have the patient to enter the device at the demarcation line. Additionally, paper or other covering was recommended to be placed on the area where the wheelchair would be rolled to the decontamination shower or, as needed, to the emergency room (ER). The patient was wheeled to the decontamination shower at 0956 and the patient was directed to take a shower in the “hot” shower stall using mild soap and warm water.

After the shower, the patient was moved to the “cold” shower stall and monitored again for contamination by an RCT. Monitoring results indicated 450 cpm on the arm wound, 450 cpm on the head (hair), and 200 cpm on the face. All other areas were at or near background levels. Monitoring techniques were according to procedure, at one inch from the surface and moving the probe at two inches per second. On a few occasions, the probe did touch the patient and, after monitoring was complete, the RCT was advised that his reading was 100 cpm. He recognized he had contaminated the probe and proceeded to change the plastic on the pancake probe. During the entire monitoring time, the door to the decontamination shower was left open to communicate monitoring results to the recorder, but this also allowed cold air to come into the shower area. As such, the RRT noticed that the patient was cold, and chose to relocate the patient to the ER for further decontamination.

At 1003, the patient was placed on a wheelchair, covered with a blanket, and moved to a treatment room in the ER. This was not a dedicated room for treating a contaminated injured person. As such, no radwaste receptacles or decontamination supplies were readily available. Staff was not completely dressed in protective clothing, and the attendant RRT staff did not remember the remaining contamination levels. As the intent of the CPRMC procedure is to completely decontaminate ambulatory patients prior to moving them to ER, play was stopped at this point, and the controller and evaluators convened to determine how to proceed. It was decided that the controller and the RSEP trainer would provide training to the RRT, and a re-demonstration would begin with the patient starting in the decontamination shower. Regarding the procedure, note that although the procedure directs complete decontamination of ambulatory patients prior to moving them to the ER, this mode of operation could potentially have a negative impact on the medical care of the patient.

The controller and RSEP trainer, along with recommendations from evaluators, re-trained the RRT on procedure guidance with regard to monitoring and decontamination, how to effectively utilize the shower space and adjacent room, and where to relocate specific RRT functions to support operations in this area. For example, the decontamination shower area and adjacent room could be demarcated and used as “hot”, “warm” and “cold” zones. The monitor could operate from the “warm” zone to survey the patient located in the “hot” zone. A nurse could be positioned in the “warm” zone to use sponges and wipes to decontaminate wounds or to take nasal/ear swabs. The recorder and runner could be positioned in the “cold” zone to record operations and provide materials to the nurse in the “warm” zone, as needed.

At 1040, the re-demonstration was initiated from the “hot” zone shower. The head (hair) was monitored and found to be 450 cpm. The nurse directed the patient to wash his hair, taking care to tilt his head back and let the water run away from the face. After the patient washed his hair (simulated), the head (hair) was found to be at background level. The RCT then monitored as the patient exhaled through the nose. A level of 100 cpm was indicated. This prompted the nurse to take a nasal swab, which was monitored at 200 cpm. The nurse provided gauze to the patient and directed him to blow his nose into the gauze. The gauze was monitored at 200 cpm. A second nasal swab was taken and monitored at background level. Monitoring was then turned over to the CPRMC Nuclear Medical Technician (NMT) to provide experience for the hospital staff. The NMT monitored the remainder of the body, using good monitoring technique. All levels were at or slightly above background except for the leg wound, which read 450 cpm. The patient was asked to shower again, paying particular attention to the leg wound. The controller and evaluator stopped play and recommended that the nurse use an Epi-cleanse sponge or wipes to clean the wound area. After cleansing, the wound read 200 cpm. After a second cleansing, the wound was at background level. With a whole body frisk of the patient completed and at background levels, the patient was released to the ER at 1101, ending the drill.

Following release of the patient, the controller and evaluators discussed exit procedures, using a monitor and step off pads, to properly release the patient as well as RRT members from the “warm” zone to the “cold” zone. Additional discussion within the debriefing included utilization of paper or Herculite to cover the receiving area (to avoid potential fixed contamination in the concrete pad), checking and recording dosimeter readings on a set frequency (not currently indicated in the CPRMC procedure, but listed on the Radiation Exposure Record as every 15-30 minutes), and consideration of how a non-ambulatory patient, particularly with severe injuries, would be handled within the ER. The latter is of particular concern since there is no designated treatment room specifically designed and equipped to handle a contaminated injured person. Following the debriefing, the RSEP trainer, the controller, and SC EMD and Darlington County personnel met with hospital staff to address concerns. In support of the CPRMC RRT, they are clearly capable and their desire to learn this aspect of patient care in order to better support their community is readily apparent. Additionally, the willingness of SC EMD, Darlington County, and RSEP to support CPRMC in this effort enhances the opportunity and likelihood for success.

The new CPRMC procedure was referenced on several occasions in the above report. The procedure, Nuclear Radiation Release Concept of Operation, and checklist, Incident Command: Radiological Incident, were used for the first time in this MS-1 Drill. Although fundamental concepts of receiving, treating, and decontaminating a contaminated/injured individual were included in the procedure, specific details on how to set up the REA, utilize the decontamination showers, and position-specific responsibilities were not provided. Additionally, the contamination limit was not specifically identified, stating that the contamination threshold is “two or three times background.” This lack of specificity negatively impacted the CPRMC RRTs ability to respond effectively. Additionally, the focus on complete decontamination of an ambulatory patient prior to entering the emergency room could have a negative impact on medical care for the patient. Excessive focus on decontamination could hinder appropriate medical care.

At the CPRMC ED, two rolling carts and one metal cabinet contained all of the supplies necessary to establish a REA and support decontamination, radiological monitoring, and medical triage operations. The calibration due date on all DRDs was 04/30/08. The replacement date for the potassium iodide was July 2013. The replacement date for the TLDs was 2/12/08. The calibration due date was 2/9/08 for the Eberline instrument, and 9/19/08 and 9/20/08 on the Ludlum instruments. The cabinet was inventoried and re-stocked by the RSEP RCTs, and a tamper seal was affixed after the inventory and re-stock was completed. The RCTs also performed the response and operability checks on the radiological instrumentation.

A decontamination shower room was available immediately adjacent to the ambulance drop-off point. The shower room consisted of two adjacent tiled shower stalls. The first, at the entrance door, was designated as the "hot" or contaminated shower, and the second as the "cold" or non-contaminated shower. There was no demarcation or signage to indicate the boundary or purpose of these two areas.

In conclusion, the EMS staff did an excellent job surveying and caring for the patient during the Medical Drill. Excellent contamination and exposure control practices were observed throughout the demonstration, with medical care always taking priority. The CPRMC RRT was hindered by limited specificity within their procedure, although their desire to learn and to serve was apparent. It is recommended that the CPRMC procedure be revised to specify setup and utilization of facilities and equipment, and provide job-specific responsibilities for each RRT member, for ambulatory and non-ambulatory contaminated injured persons. The overarching concern is the ability of CPRMC to effectively address non-ambulatory contaminated injuries when a dedicated/equipped room is not established for this purpose.

- a. **MET:** Criteria 1.e.1 and 3.a.1
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:** 6.d.1
- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCAs - RESOLVED:** NONE

APPENDIX 6

RECOMMENDATIONS

Exercise Design and Control

- FEMA and the State agreed in the extent-of-play agreement to allow the pre-positioning of EOC staff. The scenario design did not take into account the pre-positioning of staff so that the EOC staffs sat with virtually nothing to do for several hours. When conditions at the plant warranted action by the counties two counties had stopped playing and the other had already evacuated its zone without informing anyone. The control staff began asking the counties shortly after the declaration of the General Emergency if they had completed the demonstration of their objectives (evaluation areas). The counties then terminated exercise play. FEMA recommends that 1) The control staff be sufficiently trained so that unilateral actions are brought to the attention of the lead controller for resolution of problems created by the action; and 2) The Lead controller be aware of the exercise cadence and not allow actions of the control staff to interfere with the exercise timeline.

Back-up Route Alerting

Siren control issues raised concerns about the currency of back-up route alerting plans and procedures. Current plans may not have kept pace with new development within the EPZ. Notification of the affected population using back-up route alerting must be completed within 45 minutes of the time the county is aware of a failed siren(s). FEMA recommends that each county review its procedures for back-up route alerting to ensure that sufficient resources are allocated to complete back-up route alerting within the 45-minute time limit. Each county should confirm the length of time it takes to notify the population along each route and revise their plans and procedures as necessary.

Joint Information Center

- The WebEOC version that the State and counties had access to at the JIC was running off the plant server. The configuration caused problems with the availability of data from State and county EOCs. FEMA recommends that protocols be developed so that the use of WebEOC at the JIC to exchange information between the various EOCs and the JIC will be transparent to the State and county users.

LP-1 Radio Station:

The EAS test message that was to be broadcast was not heard outside of the radio station. FEMA recommends that procedures for the activation of the EAS equipment at the radio station be reviewed and tested and that the equipment problems encountered during the exercise be fixed. This review and test should also be performed at other LP-1 radio stations throughout the state.

Chesterfield County

- Modify the Radiation Exposure Record form to include a date and time for KI ingestion.

Lee County

Review and revise plans and procedures as necessary to ensure that all protective action decisions made by the county are properly coordinated with the other counties and the State.