



# **Final Exercise Report**

## **Oconee Nuclear Station**

Licensee: **Duke Power Company**

Exercise Date: **September 17,2002**

Report Date: **December 17,2002**

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**FEDERAL EMERGENCY MANAGEMENT AGENCY  
REGION IV  
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## I. EXECUTIVE SUMMARY

On September 17, **2002**, a full participation exercise was conducted in the plume exposure pathway emergency planning zone (EPZ) around the Oconee Nuclear Station. The purpose of the exercise **was** to assess the level of State and local preparedness in responding to a radiological emergency. This exercise was conducted in accordance with FEMA's policies and guidance concerning the exercise of State and local radiological emergency response plans (RERP) and procedures.

The previous exercise at this site was conducted on June **13, 2000**. The qualifying emergency preparedness exercise **was** conducted on March 10 and 11, **1982**.

FEMA wishes to acknowledge the efforts of the many individuals in South Carolina, and in Oconee, Pickens, Anderson, and Greenville Counties who participated in this exercise. Protecting the public health and safety is the full-time job of some of the exercise participants and an additional assigned responsibility for others. Still others have willingly sought this responsibility by volunteering to provide vital emergency services to their communities. Cooperation and teamwork of all the participants were evident during this exercise.

The State and local organizations demonstrated knowledge of their emergency response plans and procedures and implemented them. No Deficiencies and only five Areas Requiring Corrective Action (**ARCA**) were identified. Two of these ARCAs were corrected during the demonstrations. This is reflective of the preparation and commitment to public safety by Duke Power Company, the State of South Carolina's Emergency Management Division and Department of Health and Environmental Control, and the Emergency Managers in Oconee, Pickens, Anderson and Greenville Counties.

## II. INTRODUCTION

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

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

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

Taking the lead in 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 by the NRC pursuant to the Memorandum of Understanding between the NRC and FEMA dated June 17, 1993 (Federal Register, Vol. 58, No. 176, September 14, 1993).

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

- Department of Commerce,  
Nuclear Regulatory Commission,
- Environmental Protection Agency,
- Department of Energy,
- Department of Health and Human Services,
- Department of Transportation,
- Department of Agriculture,
- Department of the Interior, and
- Food and Drug Administration.

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 Qconee Nuclear Station to FEMA Region IV by the State of South Carolina and involved local jurisdictions occurred on May 7, 1982.

Formal approval of the RERP was granted by FEMA on February 23, 1983, under 44 CFR 350.

A full participation plume exposure pathway exercise was conducted on September 17, 2002. FEMA Region IV assessed the capabilities of State and local emergency preparedness organizations in implementing their RERPs and procedures to protect public health and safety during a radiological emergency involving the Oconee Nuclear Station. The purpose of this report is to present the results and findings on the performance of the 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 made by the Chief Evaluator and RAC Chairperson, and approved by the Regional Director.

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

NUREG-0654/FEMA-REP-1, Rev. 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," November 1980;

- FEMA- "Radiological Emergency Preparedness: Exercise Evaluation Methodology," April 25, 2002.

Section III of this report, 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 tabular presentation of the time of actual occurrence of key exercise events and activities.

Section IV of this report, entitled "Exercise Evaluation and Results," presents detailed information on the demonstration of applicable exercise objectives at each jurisdiction or functional entity. This section also contains: descriptions of five **ARCAs** assessed during this exercise, actions taken to correct **two** of the ARCAs on the spot, and recommended corrective action, and status of the OROs' efforts to resolve the remaining three ARCAs.

### **III. EXERCISE OVERVIEW**

This section contains data and basic information relevant to the September 17, 2002, exercise to test the offsite emergency response capabilities in the area surrounding the Oconee Nuclear Station.

#### **A. Plume EPZ Description**

The Oconee Nuclear Station is located in eastern Oconee County, South Carolina, approximately 8 miles northeast of Seneca, South Carolina, on the eastern shore of Lake Keowee. The Oconee Nuclear Station has three Babcock & Wilcox pressurized water nuclear reactors with a combined electric power generating capacity of approximately 2,658 megawatts. Unit 1 began commercial operation on July 15, 1973. Unit 2 began commercial operation on September 8, 1974 followed by Unit 3 on December 16, 1974.

The 10-mile plume exposure pathway EPZ encompasses Oconee and Pickens Counties in South Carolina, with the site being physically located in Oconee County. Land use is primarily agriculture and timber, with light industries scattered throughout both counties. The Oconee County Airport is located west of Clemson, South Carolina, inside the 10-mile EPZ. The Norfolk & Southern Railway passes within six miles of the plant. Railways connect the towns of Walhalla, Seneca, Clemson, and Norris.

The major population centers within the 10-mile EPZ include Walhalla, Seneca, and Clemson, including Clemson University. Total population for the 10-mile EPZ is 67,281.

Prevailing winds move generally from west to east over the facility, but due to foothill terrain, may not always follow this pattern. There are 13 emergency response planning areas.

#### **B. Exercise Participants**

In addition to the Oconee Nuclear Station, the following agencies, organizations, and units of government participated in the Oconee Nuclear Station exercise on September 17, 2002.

#### **STATE OF SOUTH CAROLINA**

Office of the Adjutant General, Emergency Management Division  
Department of Health & Environmental Control, Bureau of Land Waste  
Management  
Department of Social Services  
Department of Public Safety, Bureau of Protective Services, and Highway  
Patrol

**RISK JURISDICTIONS**

Oconee County  
Pickens County

**HOST JURISDICTIONS**

Anderson County  
Greenville County

**PRIVATE/VOLUNTEER ORGANIZATIONS**

American Red Cross  
Salvation Army  
Radio Amateur Civil Emergency Service

**C. Exercise Timeline**

Table 1, on the following page, presents the time of key events and activities during the Oconee Nuclear Station exercise on September 17, 2002.

Table 1. Exercise Timeline

DATE AND SITE: September 17, 2002 - Oconee Nuclear Station

Emergency Classification Level or Event	Time Utility Declared	Time That Notification Was Received or Action Was Taken					
		SEOC	DOSE-FEOC	LP-1 Radio Station	JIC	OCONEE CO	PICKENS CO
Alert	0819	0836	0843			0837	0835
Site Area Emergency	0937	0951	0945		0947	0953	0944
General Emergency	1048	1059	1114		1110	1103	1100
Simulated Rad. Release Started	0850	0924	0930		1018	0953	0935
Simulated Rad. Release Terminated							
Facility Declared Operational		0900	0917		0935	0900	0842
Declaration of State of Emergency		0915			0944	0943	0940
Exercise Terminated	1214	1200	1430		1214	1210	1143
Early Precautionary Actions: Schools evacuated/relocated and special needs notified and/or evacuated Lake clearing Agricultural advisory		0836			1055	1005 1007	1000
1st Protective Action Decision: Notify public, stay tuned		1007			1010	1007	1007
1st Siren Activation - Actual		1015			1015	1015	1015
1st EAS Message		1018		1020	1018	1018	1018
2nd Protective Action Decision Evacuate Zone(s): A0, A1, F1, F1, F2 Shelter-in-Place: A2, B1, C1, D1		1122			1125	1122	1122
2nd Siren Activation - Simulated		1130			1130	1130	1130
2nd EAS Message - Simulated		1133			1133	1133	1133
KI Administration Decision: <del>Distribute to EWs only</del> "Do not ingest."		1003 1138					1020

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#### IV. EXERCISE EVALUATION AND RESULTS

Contained in this section are the results and findings of the evaluation of all jurisdictions and functional entities which participated in the September 17, 2002 exercise to test the offsite emergency response capabilities of State and local governments in the 10-mile EPZ surrounding the Oconee Nuclear Station.

Each jurisdiction and functional entity was evaluated on the basis of its demonstration of criteria delineated in exercise evaluation areas contained in FEMA-Radiological Emergency Preparedness: Exercise Evaluation Methodology," April 25, 2002. Exercise objectives and the extent-of-play agreement used in this exercise, are listed in Appendix 3 of this report.

##### A. Summary Results of Exercise Evaluation - Table 2

The matrix presented in Table 2, on the following page(s), presents the status of all exercise evaluation areas from FEMA-Radiological Emergency Preparedness: Exercise Evaluation Methodology," April 25, 2002, which were scheduled for demonstration during this exercise, by all participating jurisdictions and functional entities. Exercise evaluation areas are listed and the demonstration status of those criteria is indicated by the use of the following letters:

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

**Table 2. Summary Results of Exercise Evaluation**

**DATE AND SITE: September 17, 2002 – Oconee Nuclear Station**

ELEMENT/Criterion	SEOC	DHEC	OCONEE COUNTY	PICKENS COUNTY	ANDERSON COUNTY	GREENVILLE COUNTY
<b>1. EMERGENCY OPERATIONS MANAGEMENT</b>						
1.a.1. Mobilization	M	M	M	M		
1.b.1. Direction and Control	M	M	M	M		
1.d.1. Communications Equipment	M	M	M	M	M	M
1.e.1. Equipment & Supplies to Support Operations	M	*A	M	M		
<b>2. PROTECTIVE ACTION DECISION MAKING</b>						
2.a.1. Emergency Worker Exposure Control		M				
2.b.1. Radiological Assessment & PARs Based on Available Information		M				
2.b.2. PADs for the General Public	M	M	M	M		
2.c.1. Protective Action Decisions for Special Populations						
2.d.1. Radiological Assessment & Decision Making for Ingestion Exposure						
2.e.1. Rad Assessment & Decision Making for Relocation, Re-entry & Return						
<b>3. PROTECTIVE ACTION IMPLEMENTATION</b>						
3.a.1. Implementation of Emergency Worker Control	M	M	M	M	*A	M
3.b.1. Implementation of KI Decisions	M	M	M	M		
3.c.1. Implementation of PADs for Special Populations			M	M		
3.c.2. Implementation of PADs for Schools			M	M		
3.d.1. Implementation of Traffic and Access Control	M					
3.d.2. Impediments to Evacuation and Traffic and Access Control	M					
3.e.1. Implementation of Ingestion Decisions Using Adequate Information						
3.e.2. Implementation of IP Decisions Showing Strategies and Instructional Materials						
3.f.1. Implementation of Relocation, Re-entry and Return Decisions						
<b>4. FIELD MEASUREMENT and ANALYSIS</b>						
4.a.1. Plume Phase Field Measurement & Analysis Equipment		A(2)				
4.a.2. Plume Phase Field Measurement & Analysis Management		M				
4.a.3. Plume Phase Field Measurements & Analysis Procedures		A				
4.b.1. Post Plume Field Measurement & Analysis						
4.b.2. Laboratory Operations		M				
<b>5. EMERGENCY NOTIFICATION &amp; PUBLIC INFORMATION</b>						
5.a.1. Activation of Prompt Alert and Notification	M		M	M		
5.a.2. Activation of Prompt Alert and Notification 15 Minute (Fast Breaker)	M					
5.a.3. Activation of Prompt Alert and Notification Backup Alert and Notification	M		M	M		
5.b.1. Emergency Information and Instructions for the Public and the Media	M		M	M		
<b>6. SUPPORT OPERATIONS/FACILITIES</b>						
6.a.1. Monitoring and Decontamination of Evacuees and EWs and Registration of Evacuees			M	M	M	M
6.b.1. Monitoring and Decontamination of Emergency Worker Equipment			M	M		
6.c.1. Temporary Care of Evacuees					M	M
6.d.1. Transportation and Treatment of Contaminated Injured Individuals						

**LEGEND: M = MET    A = ARCAs    D = Deficiency    (2) Two ARCAs**

\*ARCA corrected during demonstration

\*SEOC includes traffic control and lake clearing

## **B. Status of Jurisdictions Evaluated**

This subsection provides information on the evaluation of each participating jurisdiction and functional entity, in a jurisdiction based, issues only format. Presented below is a definition of the terms used in this subsection relative to objective 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 criteria 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 criteria 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 ARCAs assessed during this exercise and the corrective action demonstrated if ARCA was corrected on the spot or 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** - Descriptions of ARCAs assessed during a previous exercise, which were resolved in this exercise, or during a previous exercise, and the corrective actions demonstrated.
- **Prior ARCAs - Unresolved** - Descriptions of ARCAs assessed during a previous exercise, 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 only two types of exercise issues which may be discussed in an exercise report.

- A **Deficiency** is defined in FEMA- Radiological Emergency Preparedness: Exercise Evaluation Methodology," April 25, 2002 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 FEMA-Radiological Emergency Preparedness: Exercise Evaluation Methodology," April 25, 2002 as "...an observed or identified inadequacy of organizational performance in an exercise that is not considered, by itself, to adversely impact public health and safety."

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

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

- **Plant Site Identifier** - A two-digit number corresponding to the Utility Billable Plant Site Codes.
- **Exercise Year** - The last two digits **of** the year the exercise was conducted.
- **Exercise Evaluation Element** - A number, letter and number corresponding to the objective number used in FEMA Radiological Emergency Preparedness: Exercise Evaluation Methodology, dated April 25, 2002.
- **Issue Classification Identifier** - (D =Deficiency, **A** = ARCA). Only Deficiencies and ARCAs are included in exercise reports.
- **Exercise Issue Identification Number** - A separate two digit indexing number assigned to each issue identified in the exercise.

## **1. STATE OF SOUTH CAROLINA**

### **1.1 State Emergency Operations Center**

The State Emergency Operations Center (SEOC) is located in the Emergency Management Division's facility along with the State Warning Point and the South Carolina National **Guard** in Columbia, South Carolina. The facility **is** technologically advanced and spacious enough that it comfortably accommodates the staff and support personnel. The SEOC Director coordinated effectively with Oconee and Pickens Counties, and the Emergency Support Function (ESF) staff. The use of the Internet Routed Information System (IRIS) emergency management system, a system developed by the University of South Carolina for support coordination, allowed for rapid assessment and deployment of requested assets and kept personnel apprised of the situation within the affected area. Periodic briefings were conducted and the staff was informed of changes in plant conditions as they occurred. Recommendations for decisions affecting the public were made in conference with supporting ESF functions in an expedient manner. A true team concept was observed as the staff worked well together in the decision-making and displayed their commitment to doing an outstanding job.

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

### **1.2 Dose Assessment – EOC Liaison**

In accordance with the extent of play agreement, the Department of Health and Environmental Control (DHEC) liaison and staff were pre-positioned at the SEOC. The DHEC **liaison** demonstrated the ability **to** organize and coordinate DHEC's command **and** field operations. Protective action recommendations (PAR) were appropriate **and** timely. The DHEC liaison and staff were knowledgeable of the State plan and the agency specific standard operating procedures (SOP).

- a. **METEVALUATIONAWEAS:** 1.a.1., 1.b.1., 1.c.1., 1.d.1., 1.e.1., 2.b.1. and 2.b.2.

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

### 1.3 Dose Assessment – Mobile Laboratory

DHEC dose assessment staff and the Mobile Laboratory were pre-positioned at the National Guard Armory in Clemson. The DHEC Emergency Coordinator and his staff successfully demonstrated the capability to perform dose assessment and efficiently direct the radiological field monitoring teams (FMT). Similarly, the mobile laboratory demonstrated the ability to receive environmental samples from the FMTs, prepare them for analysis, and perform appropriate radiological analysis; although appropriate contamination control was not always followed.

- a. **MET EVALUATION AREAS:** 1.a.1., 1.b.1., 1.c.1., 1.d.1., 2.a.1., 2.b.1. and 4.a.2.
- b. **DEFICIENCY:** NONE
- e. **AREAS REQUIRING CORRECTIVE ACTION:**

**Issue No.:** 42-02-1.e.1-A-01

**Condition:** The Potassium Iodide (KI) located in the radiological field monitoring equipment kits had an expiration date of October 2001.

**Possible Cause:** The contents of the radiological field monitoring kits are not inventoried and checked for accuracy on a timely schedule. DHEC does not have an established periodic schedule to inventory the content of the radiological field monitoring team kits.

**Reference:** NUREG-0654. K.3.a

**Effect:** Field monitoring team personnel would not have protection for their possible exposure to radioactive iodine due to the expiration of the supply of KI.

**Recommendation:** Periodically inventory the KI in all field monitoring kits and replace any that is out of date.

**Corrective Action Demonstrated:** A field team member was able to obtain the

necessary supply of KI GOM the Emergency Operations Facility (EOF).

### **Mobile Laboratory**

**Issue No:** 42-02-4.a.3-12-02

**Condition:** Existing practices and procedures by both the field monitoring teams and mobile laboratory staff were inadequate to control and prevent cross-contamination of environmental samples. 1) The chain-of-custody **form** has spaces for recording multiple samples and if used for more than one sample could easily be separated from its associated samples during processing in the mobile lab. 2) A standardized method of labeling environmental samples was not used. 3) Environmental samples were not double-bagged to prevent cross-contamination. 4) At the mobile lab, the technician assigned to sample receipt used one pair of rubber gloves throughout the entire exercise. This same technician **also** performed vehicle and personnel radiation monitoring activities. There was no organization or segregation between potentially contaminated areas and the **known** clean area at the sample reception area. The sample receipt table was not dedicated **to** that task. Instruments, personnel dosimeter documents, various supplies and an empty soda can **were** all on the table at **one** time. Although a step off pad was established several individuals crossed the pad ignoring standard exit control practices.

**Possible Cause:** Inadequate procedural requirements and training.

**Reference:** NUREG-0654, Items I.8 and J.11

### **Effect:**

1. Samples and documentation could easily be separated during processing, compromising the chain of custody process.
2. The potential for cross contamination **of** field samples and the **mobile** lab was high. This would compromise the State's ability to effectively determine and quantify the areas affected by contamination GOM the radiological plume.

### **Recommendations:**

1. Revise the chain-of-custody procedure and form so that a single form is used for each sample.
2. Establish a standard sample identification numbering method; then apply that method to sample tagging, chain of custody, receipt and analysis documentation.

3. Provide additional instruction on contamination control of radiological materials to both field and laboratory staff. The instruction should include proper exit procedures for going from a hot zone to a cold zone.

Evaluate the logistical arrangement of current sample receipt methods and modify to provide a clear and maintainable separation between potentially contaminated and clean areas of the sample receipt area.

**Schedule of Corrective Actions:** Response not received by report date.

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

#### 1.4 Field Monitoring Teams

The State of South Carolina deployed two field monitoring teams from the Forward Emergency Operations Center (FEOC), located at the South Carolina National Guard Armory in Clemson. The teams used new sets of maps of the Emergency Planning Zone to locate the desired monitoring points and to clearly convey their location to the Field Director. The teams maintained good communication with the Field Director throughout the exercise, and were aware of and practiced good radiation exposure control. The teams were not called upon to ingest Potassium iodide during the exercise, though non-expired tablets were available to each team. All instruments that were sent with the field teams had been calibrated within the time period specified by the plan. Some problems were noted in field team equipment and procedures and are addressed below.

- a. **MET EVALUATION AREAS:** 1.d.1, 3.a.1., 3.b.1 and 4.a.3.
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUIRING CORRECTIVE ACTION:**

##### **FMT**

**Issue No.:** 42-02-4.a. 1-A-03

**Condition:** The material condition of the equipment and supplies in the field team monitoring kits increased the amount of time required to inventory and check prior to deployment. The inventory list attached to the inside of the supply kit did not specify quantities or provide an inventory control form to be used to verify contents and operability of equipment within the supply kit. Also the instruments and supplies did not have an order for packing in the kit. For example, the FMT spent approximately 5 minutes to determine that a pair of tweezers for air sample filter handling was not in the kit. They "borrowed" a pair after searching for one

in another kit. The replacement **pair** was not the type preferred for handling air sampler filter paper and no note was made to replace the borrowed equipment. Later a pair of the preferred tweezers was found in the bottom **of** the air sampler **box**. The inventory list for the air sampler box did not list a pair of tweezers. According to the **DHEC** staff **at** the FEOC the state does not have a procedure to verify equipment and supplies after being deployed for repair and re-supply as needed.

An old lantern mantle, no longer in production, was attached to the inside of the supply Kit #2 cover and marked "check source." Although a numerical value was written on the plastic bag holding the mantle, no instructions were included to say that the value was appropriate for a given type of radiation detection instrument. Three of the five instruments carried by the field team could have detected the radiation given off by that mantle. The radiation monitoring instruments did not have information on the calibration labels identifying the source used and expected response value for the calibration period of a given instrument. One hour and fifteen minutes was required to prepare FMT #2 for deployment.

**Possible Cause:** Procedures for inventorying and packing equipment in the kits were lacking, as were those to assure post-event re-supply and repair of instruments if needed. Positive checks for inventory and operational readiness were not provided. Lack of radiation instrument labels that included information covering the appropriate check source type and expected response value for the current calibration period and the existence of a non-standard check source in the kit.

**Reference:** NUREG-0654 element H.10

**Effect:** Although this exercise did not require the rapid deployment **of** field teams, the situation could have resulted in improperly equipped field teams or significant delays in their deployment.

**Recommendation:** Develop procedures for field team activation and deactivation that include the inventory and operational checks of all equipment in the **kits** and a method for repacking and re-supply of the inventory **and** repair of instruments if needed. Consider the use of sealed field kits that provide for the periodic inspection **of** supply conditions and replacement. Then, the prompt use of a supply kit could be implemented if verification of an un-broken seal was observed.

Consider compartmentalizing the kits. This will improve the ability to locate specific items, especially at night, and promote contamination control by clearly defining what materials **are** clean from those that may potentially be contaminated. Re-evaluate the methods used for radioactive source control and use. Add source type and response values for each instrument and for each calibration period.

Schedule of Corrective Actions: Response not received by report date

FMT

Issue No: 42-02-4.a.I-A-04

Condition: Without the knowledge of the Field Director, Field Monitoring Team #1 deployed to the field without a high-range gamma survey instrument. The RO-20 survey meter passed operability and battery checks as it was being prepared for issue by Mobile Laboratory personnel, but failed battery checks when being issued to FMT #1. Battery replacement did not resolve the instrument problem and the team decided to deploy without this instrument. Neither the Mobile Laboratory personnel nor FMT #1 informed the Field Director that this instrument was not deployed in the field.

Possible Cause: A spare high-range gamma survey instrument was not brought to the exercise.

Reference: NUREG-0654, Element I.8

Effect: The field monitoring team did not have the capability to monitor high range areas.

Recommendation: Provide backup instruments for field team kits so that a replacement is readily available if needed.

Schedule of Corrective Actions: Response not received by report date.

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

## 1.5 Lake Clearing

Three law enforcement officers from the Department of Natural Resources (DNR) successfully demonstrated their knowledge of lake warning procedures and individual radiological protection. They also assisted in an examination of signage at selected public boat landings (PBLs). Each PBL visited had a 3' x 3' (approximate) sign at the launch point that provided guidance and instructions to the public in the event sirens sounded. The signs were easily visible and generally well maintained. The DNR law enforcement personnel were professional and prepared to execute their assigned mission.

- a. METEVALUATIONAREAS: 1.d.1., 3.a.1., 3.b.1. and 5.a.3
- b. DEFICIENCY: NONE

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

## **1.6 LP-I Radio Station - WFBG**

WFBC (93.7). Greenville, South Carolina, is the local primary (LP-1) Emergency Alert System (EAS) radio station for the Oconee Nuclear Station. At 1018, the station received a request from the SEOC to broadcast a pre-approved exercise message for the Oconee Nuclear Station drill. The message was broadcast at 1020. The radio station and SEOC coordinated their activities and followed their procedures. The station's staff was knowledgeable and interested in their role in EAS.

- a. **MET EVALUATION AREA:** 5.a.1.

## **1.7 State Traffic Control Points**

A Lieutenant and two patrol officers of the South Carolina Highway Patrol (SCHP) demonstrated their knowledge of traffic control point (TCP) procedures during interviews at the Oconee County Emergency Operations Center (EOC) and at two designated TCPs. All three were knowledgeable of radiological exposure control procedures.

The Lieutenant has prepared TCP specific instructional packets for use by any trooper assigned to activate a TCP. The packets include the specific purpose for which the TCP was being established, standard operating procedures, maps, and information to impart to the public. Troopers interviewed at each of the TCPs were aware of how to obtain assistance from the Department of Transportation for establishment of barriers as well as assistance in the removal of impediments. The troopers were well prepared and highly professional in their performance and overall demeanor.

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

## **2 JOINT OPERATIONS**

### **2.1 Joint Information Center**

The Joint Information Center (JIC) fully demonstrated the capability to keep the public and media informed. Public Information Officers from the State of South Carolina, Pickens County, Oconee County, Anderson County, a host county, and personnel from Duke Power conducted four professional and well-managed media briefings. Pre-media briefings were well planned and coordinated and staff interacted and shared information. During the media briefings, relevant information was provided to the mock media, and questions from the media and public were answered promptly, clearly, and accurately. The JIC personnel and Public inquiry personnel were well trained and conducted an excellent operation.

- a. METEVAEG'ATIOKAREAS: 1.a.1., 1.b.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**

### **2.2 Emergency Operations Facility**

The utility operator's Emergency Operations Facility (EOF) is an excellent facility from which all participating response organizations can effectively manage ongoing emergency operations. Communications, coordination and the flow of technical information between the utility operator, representatives of the U. S. Nuclear Regulatory Commission, and the participating Off-site Response Organizations were outstanding. All of the State and local government officials who were deployed to the EOF were well trained, followed approved applicable procedures; and overall, they performed their respective responsibilities in an efficient and professional manner. All of the exercise criterion, as specified in the Extent of Play Agreement, were satisfactorily fulfilled.

- a. MET EVALUATION AREAS: 1.a.1., 1.b.1., 1.d.1. and 1.e.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. RISK JURISDICTIONS**

#### **3.1 OCONEE COUNTY**

##### **3.1.1 Emergency Operations Center**

The Emergency Operations Center (EOC) was filled with a staff of experienced, well trained, and dedicated volunteer and permanent personnel. Representatives **from** the State Senate, the Oconee County Council, and the County Supervisor were present to support or observe the exercise. Direction and control was excellent and briefings were interactive with EOC **staff** reporting on their activities during each briefing. **All** of the EOC members were pro-active and **planned** for future actions. Precautionary actions **and** protective action decisions (PAD) were timely and the decision for Alert and Notification of the public was coordinated with the state and Pickens County. Back-up route alerting was simulated when two of the sirens failed to sound. Future plans to expand the EOC **will** enhance this excellent operation.

- a. **METEVALUATIONS AREAS: 1.a.1., 1.b.1., 1.c.1., 1.d.1., 1.e.1., 2.b.2. 3.c.1., 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**

##### **3.13 Protective Actions for Schools**

Five principals, one assistant principal and the Supervisor of Schools and Safety for the Oconee County Department of Transportation were interviewed **on** September 18,2002. **All** individuals were knowledgeable of their procedures for protection and evacuation of their students and staff. Copies of the evacuation plans were obtained from each of the schools. **Bus** drivers are not considered emergency workers; therefore a law enforcement officer, who would have appropriate dosimetry, Thermoluminescent dosimeters (TLD) and KI would escort the buses to the pick-up points. Any student remaining at the pick-up points after five hours would be transported **to** the appropriate reception center under control of the school staff until picked **up** or met **by** family members. See Appendix 5,

page 37 for a listing of the schools.

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

### **3.1.3 Emergency Worker Decontamination**

The emergency worker and vehicle decontamination demonstration was conducted ~~at~~ Westminster Middle School. Two emergency workers ~~and~~ one vehicle were used to demonstrate this activity. The facility setup provided a smooth flow for personnel through monitoring, decontamination and exit from the decontamination area. The contaminated vehicle **was** properly monitored **and** decontaminated by five members of the Walhalla Fire Department. The Walhalla Fire Department **also** provided communications to the EOC. **All** participants should be commended for their performance in this exercise.

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

## **3.2 PICKENS COUNTY**

### **3.2.1 Emergency Operations Center**

The EOC Director and his **staff** effectively managed **the** emergency response. The EOC staff **was** well trained and dedicated to protecting the residents and students of Pickens County. The staff included representatives from County, State and volunteer agencies and **Clemson** University. The staff effectively responded to siren failures by quickly identifying and deploying resources to notify the public in those areas covered by the

inoperative sirens. The staff identified and requested State assistance as needed.

- a. **METEVALUATIONAREAS:** 1.a.1., 1.b.1., 1.c.1., 1.d.1., 1.e.1., 2.b.2. 3.c.1., 5.a.1., 5.a.3. and 5.b.1.
- b. **DEFICIENCY:** NONE
- c. **AREAS REQUKRHNC CORRECTIVE ACTION:** NONE
- d. **NOT DEMONSTRATED:** NONE
- e. **PRIOR ARCA<sub>s</sub> - RESOLVED:** NONE
- f. **PRIOR ARCA<sub>s</sub> - UNRESOLVED:** NONE

### **3.2.2 Protective Actions for Schools**

Interviews were conducted with the principals and assistant principals at both schools and with the transportation coordinator. The principals were conscientious and very knowledgeable of their procedures for emergency preparedness and relocation. Both schools have safety teams, two-way radios, and facsimile machines. Buses are also equipped with radios. Both schools have volunteers to assist with their protective action response. See Appendix 5, page 37 for a listing of the schools.

- a. **METEVALUATION AREAS:** 1.d.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 ARCA<sub>s</sub> - RESOLVED:** NONE
- f. **PRIOR ARCA<sub>s</sub> - UNRESOLVED:** NONE

### **33.3 Emergency Worker Decontamination**

The emergency worker decontamination demonstration was conducted at the Pickens County Prison Farm. Two emergency workers and one vehicle were monitored. The staff properly provided contamination control, monitored and decontaminated of the emergency workers. The contaminated vehicle was properly monitored and decontaminated by five members of the Pickens County HAZMAT Response Unit. The Pickens County Mobile Command Unit provided excellent communications. All participants should be commended for their performance in this exercise.

- a. **MET EVALUATION AREAS:** 1.d.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. **HOST JURISDICTIONS**

##### 4.1 **ANDERSON COUNTY**

###### 4.1.1 **Reception and Congregate Care**

This demonstration was conducted on August 29, 2002 at the McCants Middle School on March Banks Road. The reception center and congregate care facilities are co-located at the school. The American Red Cross directed the congregate care operation and the staff was extremely knowledgeable of shelter management practices. They were well organized and enthusiastic about the job at hand. The decontamination staff was knowledgeable of radiation detection equipment and decontamination procedures and established an effective decontamination h e . They were able to identify all simulated contamination and ensure the proper decontamination procedures were performed.

- a. **MET:** Criteria 1.d.1., 6.a.1. and 6.c.1.
- b. **DEFICIENCY:** NQNE
- c. **AREA REQUIRING CORRECTIVE ACTION:**

**Issue No.:** 42-02-3.a.1-A-05

**Condition:** Self-reading dosimeters (**SRD**) and TLDs were not issued to the emergency workers conducting outside monitoring and decontamination of vehicles.

**Possible Cause:** Several other school related activities were ongoing when the decontamination team arrived at the school. As a result the demonstration was late starting and the decontamination staff was rushing and failed to adhere to their checklist.

**Reference:** NUREG-0654, K.3, the extent-of-play agreement, and sub-clement

3.a.1.

**Effect:** Emergency workers could not determine the amount of their exposure and any actions they would need to take in response.

**Recommendation:** Follow procedures **and** always issue dosimeters and TLDs to emergency workers that may be exposed to radiation.

**Corrective Action Demonstrated:** This **ARCA** was corrected during the demonstration and emergency **workers** were familiar with the purpose and use of dosimetry.

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

## 4.2 GREENVILLE COUNTY

### 4.2.1 Reception and Congregate Care

The reception and congregate care center was demonstrated out-of- sequence on September 16,2002, at the Northwest Middle School. The Greenville County Sheriffs Department, Slater Volunteer Fire Department, Greenville Department of Social Services (DSS), and the Upstate Chapter of the American Red Cross (ARC) participated in the demonstration. The **ARC** Upstate Chapter supported by **DSS** effectively managed temporary care. The Greenville Sheriffs Department had several deputies who directed evacuees into the reception center. managed traffic, and provided security. The Slater Volunteer Fire Department successfully set up the reception **center** to survey evacuees and vehicles. Evacuees were directed into the reception center where they were monitored. Clean evacuees were registered into the congregate care center and contaminated evacuees were decontaminated. Emergency workers had a working knowledge of dosimetry **and** radiological exposure control.

- a. **MET EVALUATION AREAS:** 1.d.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**

## 5. SUMMARY OF AREAS REQUIRING CORRECTIVE ACTION

### 5.1 2002 ARCAs

#### 5.1.1 42-02-1.e.I-A-Q1

**State of South Carolina  
Dose Assessment – Mobile  
Laboratory**

**Condition:** The Potassium Iodide (KI) located in the radiological field monitoring equipment kits had an expiration date of October 2001.

**Possible Cause:** The contents of the radiological field monitoring kits are not inventoried and checked for accuracy on a timely schedule. DHEC does not have an established periodic schedule to inventory the content of the radiological field monitoring team kits.

Reference: NUREG-0654, K.3.a

Effect: Field monitoring team personnel would not have protection for their possible exposure to radioactive iodine due to the expiration of the supply of KI.

Recommendation: Periodically inventory the KI in all field monitoring kits and replace any that is out of date.

Corrective Action Demonstrated: A field team member was able to obtain the necessary supply of KI from the Emergency Operations Facility (EOF).

#### 5.1.2 42-02-4.a.3-A-02 **Mobile Laboratory**

**Condition:** Existing practices and procedures by both the field monitoring teams and mobile laboratory staff were inadequate to control and prevent cross-contamination of environmental samples. 1) The chain-of-custody form has spaces for recording multiple samples and if used for more than one sample could easily be separated from its associated samples during processing in the mobile lab. 2) A standardized method of labeling environmental samples was not used. 3)

Environmental samples were not double-hagged to prevent cross-contamination. 4) At the mobile lab, the technician assigned to sample receipt used one pair of rubber gloves throughout the entire exercise. This same technician also performed vehicle and personnel radiation monitoring activities. There was no organization or segregation between potentially contaminated areas and the known clean area at the sample reception area. The sample receipt table was not dedicated to that task. Instruments, personnel dosimeter documents, various supplies and an empty soda can were all on the table at one time. Although a step off pad **was** established several individuals crossed the pad ignoring standard exit control practices.

**Possible Cause:** Inadequate procedural requirements and training.

**Reference:** NUREG-0654, Items I.8 and J.11.

**Effect:**

1. Samples and documentation could easily be separated during processing, compromising the chain of custody process.
2. The potential for cross contamination of field samples and the mobile lab was high. This would compromise the State's ability to effectively determine and quantify the areas affected by contamination from the radiological plume.

**Recommendations:**

1. Revise the chain-of-custody procedure and form so that a single form is used for each sample.

2. Establish a standard sample identification numbering method; then apply that method to sample tagging, chain of custody, receipt and analysis documentation.
3. Provide additional instruction on contamination control of radiological materials to both field and laboratory staff. The instruction should include proper exit procedures for going from a hot zone to a cold zone.

Evaluate the logistical arrangement of current sample receipt methods and modify to provide a clear and maintainable separation between potentially contaminated and clean areas of the sample receipt area.

**Schedule of Corrective Actions:** Response not received by report date.

**5.1.3 42-02-4.a.1-A-03  
FMT**

**Condition:** The material condition of the equipment and supplies in the field team monitoring kits increased the amount of time required to inventory and check prior to deployment. The inventory list attached to the inside of the supply kit did not specify quantities or provide an inventory control form to be used to verify contents and operability of equipment within the supply kit. **Also** the instruments and supplies did not have an order for packing in the kit. For example, the FMT spent approximately 5 minutes to determine that a pair of tweezers for air sample filter handling was not in the kit. They "borrowed" a pair after searching for one in another kit. The replacement pair was not the type preferred for handling air sampler filter paper and no note was made to replace the borrowed equipment. Later a pair of the preferred tweezers was found in the bottom of the air sampler box. The inventory list for the air sampler box did not list a pair of tweezers. According to the

DHEC staff at the FEOC the state does not have a procedure to verify equipment and supplies after being deployed for repair and re-supply as needed.

**An** old lantern mantle, no longer in production, was attached to the inside of the supply Kit #2 cover and marked "check source." Although a numerical value was written on the plastic bag holding the mantle, no instructions were included to say that the value was appropriate for a given type of radiation detection instrument. Three of the five instruments carried by the field team could have detected the radiation given off by that mantle. The radiation monitoring instruments did not have information on the calibration labels identifying the source used and expected response value for the calibration period of a given instrument. One hour and fifteen minutes was required to prepare FMT #2 for deployment,

**Possible Cause:** Procedures for inventorying and packing equipment in the kits were lacking, as were those to assure post-event re-supply and repair of instruments if needed. Positive checks for inventory and operational readiness were not provided. Lack of radiation instrument labels that included information covering the appropriate check source type and expected response value for the current calibration period and the existence of a non-standard check source in the kit.

**Reference:** NUREG-0654 clement H.10

**Effect:** Although this exercise did not require the rapid deployment of field teams, the situation could have resulted in improperly equipped field team or significant delays in their deployment.

**Recommendation:** Develop procedures for

field team activation and deactivation that include the inventory and operational checks of all equipment in the kits and a method for repacking and re-supply of the inventory and repair of instruments if needed. Consider the use of sealed field kits that provide for the periodic inspection of supply conditions and replacement. Then, the prompt use of a supply kit could be implemented if verification of an un-broken seal was observed.

Consider compartmentalizing the kits. This will improve the ability to locate specific items, especially at night, and promote Contamination control by clearly defining what materials are clean from those that may potentially be contaminated. Re-evaluate the methods used for radioactive source control and use. Add source type and response values for each instrument and for each calibration period.

**Schedule of Corrective Actions:** Response not received by report date.

**5.1.4 42-02-4.a.I-A-04  
FMT**

**Condition:** Without the knowledge of the Field Director, Field Monitoring Team #1 deployed to the field without a high-range gamma survey instrument. The RO-20 survey meter passed operability and battery checks as it **was** being prepared for issue by Mobile Laboratory personnel, but failed battery checks when being issued to FMT ~~#1~~. Battery replacement did not resolve the instrument problem and the team decided to deploy without this instrument. Neither the Mobile Laboratory personnel nor FMT #1 informed the Field Director that this instrument was not deployed in the field.

**Possible Cause:** A spare high-range gamma survey instrument was **not** brought to the exercise.

**5.1.5 42-02-3.a.1-A-05  
Anderson County  
Reception and  
Congregate Care**

**Reference:** NUREG-0654, Element I.8

**Effect:** The field monitoring team did not have the capability to monitor high range areas.

**Recommendation:** Provide backup instruments for field team kits so that a replacement is readily available if needed.

**Schedule of Corrective Actions:** Response not received by report date.

**Condition:** Self Reading Dosimeters (SRD) and Thermoluminescent Dosimeters (TLD) were not issued to the emergency workers conducting outside monitoring and decontamination of vehicles.

**Possible Cause:** Several other school related activities were ongoing when the decontamination team arrived at the school.

**As a** result the demonstration was late starting and the decontamination staff was rushing and failed to adhere to their checklist.

**Reference:** NUREG-0653, K.3, the extent-of-play agreement, and sub-element 3.a.1.

**Effect:** Emergency workers could not determine the amount of their exposure and any actions they would need to take in response.

**Recommendation:** Follow procedures and always issue dosimeters and TLDs to emergency workers that may be exposed to radiation.

**Corrective Action Demonstrated:** This ARCA was corrected during the demonstration and emergency workers were familiar with the purpose and use of dosimetry.

## APPENDIX 1

### ACRONYMS AND ABBREVIATIONS

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

ACP	Access Control Point
ARC	American Red <b>Cross</b>
ARCA	<b>Area</b> Requiring Corrective Action
ARES	Amateur Radio Emergency Service
CDV	Civil Defense - Victoreen
CFR	Code of Federal Regulations
DHEC	South Carolina 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
DNR	Department of Natural Resources
DRD	Direct Reading Dosimeter
EAL	Emergency Action Level
EA§	Emergency Alert System
EEM	Exercise Evaluation Methodology
EMS	Emergency Medical Services
ENC	Emergency News Center
ENN	Emergency News Network
EOC	Emergency Operations Center
EOF	Emergency Operations Facility
EOP	Extent of Play
EPA	Environmental Protection Agency
EPZ	Emergency Planning Zone
EWD	Emergency Worker Decontamination
FAA	Federal Aviation Administration
FDA	Food and <b>D</b> rug Administration
<b>FEMA</b>	Federal Emergency Management Agency
FEOC	Forward Emergency Operations Center
FTC	Field Team Coordinator
GE	General Emergency
GM	Guidance Memorandum
IRIS	Internet Routed Information System

JIC	Joint Information Center
KI	Potassium Iodide
mR	milliroentgen
mR/h	milliroentgen <b>per</b> hour
NOAA	National Oceanic and Atmospheric Administration
NRC	Nuclear Regulatory Commission
NUREG-0654	NUREG-0654/FEMA-REP-1, Rev. 1, " <i>Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants, November 1980</i> "
ORO	Offsite Response Organization
PAD	Protective Action Decision
PAG	Protective Action Guide
PAR	Protective Action Recommendation
PIO	Public Information Officer
R	Roentgen
RAC	Regional Assistance Committee
RACES	Radio Amateur Civil Emergency Service
RC	Reception Center
REM	Roentgen Equivalent <b>Man</b>
REP	Radiological Emergency Preparedness
RERP	Radiological Emergency Response Plan
R/h	Roentgen(s) per hour
RQ	Radiological Officer
SAE	Site Area Emergency
SCARNG	South Carolina Army Reserve National Guard
SCEMD	South Carolina Emergency Management Division
SEOC	State Emergency Operations Center
SOP	Standard Operating Procedure
TCP	Traffic Control Point
TLD	Thermoluminescent Dosimeter
USDA	U.S. Department of Agriculture

## APPENDIX 2

### EXERCISE EVALUATORS

The following is a list of the personnel who evaluated the Oconee Nuclear Station exercise on September 17, 2002. The organization represented by each evaluator is indicated by the following abbreviations:

DOT	- Department of Transportation
FEMA	- Federal Emergency Management Agency
ICF	- ICF Incorporated
NRC	- Nuclear Regulatory Commission
USDA	- U. S. Department of Agriculture

**Lawrence A. Robertson**  
**Stephanie Puckett**

**Co-RAC Chairman**  
**Administrative Support**

<u>EVALUATION SITE</u>	<u>EVALUATOR</u>	<u>ORGANIZATION</u>
Chief Evaluator	Joseph Canoies	FEMA
<b>STATE OF SOUTH CAROLINA</b>		
State Emergency Operations Center	Tom Reynolds John Grijak	FEMA FEMA
DHEC Liaison	Thomas Brown	ICF
Emergency Operations Facility	Robert Trojanowski	NRC
Joint Information Center	Walter Gawlak Robert Perdue	ICF FEMA
Dose Assessment	Bernie Hannah	ICF
Mobile Lab Clemson Ang Armory	Bernie Hannah	ICF
Field Team - 1	Jim Willison	ICF
Field Team - 2	David Seebart	ICF
State TGP (Pickens County)	Rill Larrabee	ICF
LP-I Radio Station WFBC - Greenville 501 Rutherford Street	Josh Moore	ICF

**OCONEE COUNTY**

Emergency operations Center	Joseph Canoies Harold Dorminey	FEMA DOT/FAA
Protective Actions <b>for</b> Schools 09-18-02 @ 0900	Helen Wilgus Obhie Robinson	FEMA FEMA
Emergency Worker Decontamination 09-16-02 @ 1600	Eddie Hickman	FEMA

**PPCKENS COUNTY**

Emergency Operations Center	Lawence Robertson Helen Wilgus Obhie Robinson	FEMA FEMA FEMA
Protective Actions for <b>Schools</b> 9-17-02 @ 0900	Eddie Hickman	FEMA
Emergency Worker Decontamination 9-16-02 @ 1330 Pickens County Prison Farm	Eddie Hickman	FEMA
Lake Clearing (Pickens County)	Bill Larrabee	ICF

**ANDERSON COUNTY**

Reception/Congregate <i>Care</i> 8/29/02 @ 1800	Lawrence Robertson Joseph Canoles	FEMA FEMA
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**GREENVILLE COUNTY**

Reception/Congregate <b>Care</b> 9/16/02 @ 1800	Robert Perdue	FEMA
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## APPENDIX 3

### EXERCISE CRITERIA ANQ EXTENT-OF-PLAY AGREEMENT

This appendix contains the exercise criteria and the extent-of-play agreement which were scheduled for demonstration during the Oconee Nuclear Station exercise on September 17, 2002.

**A. Exercise Objectives**

**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 Region IV. The extent-of-play agreement includes any significant modification or change in the level of demonstration of each criterion listed.

Attachment A: SELECTED EVALUATION AREAS

SITE: <u>Oconee</u>						
STATE: <u>SOUTH CAROLINA</u>						
EX DATE: <u>9/17/02</u>						
TYPE: <u>FULL</u>		STATE	Oconee	Pickens	Anderson	Greenville
<b>1. EMERGENCY OPERATIONS MANAGEMENT</b>						
1.a	Mobilization	✓	✓	✓		
1.b	Facilities	✓	✓	✓		
1.c	Direction and Control	✓	✓	✓		
1.d	Communications	✓	✓	✓		
1.e	Equipment/Supplies	✓	✓	✓		
<b>2. PROTECTIVE ACTION DECISIONS</b>						
2.a	Emergency Worker Exposure Control	✓	✓	✓	✓	✓
2.b	Dose Assessment /PAR/PAD	✓				
2.c	PAD-Special Populations	✓				
2.d	RAD Assessment- IPZ					
2.e	RAD Assessment - RRR					
<b>3. PROTECTIVE ACTION IMPLEMENTATION</b>						
3.a	Emergency Worker Exposure Control	✓	✓	✓	✓	✓
3.b	Potassium Iodide (KI)	✓	✓	✓		
3.c	Special Populations		✓	✓		
3.d	Traffic/Access Control	✓				
3.e	Ingestion Pathway					
3.f	RPR					
<b>4. FIELD MEASUREMENT AND ANALYSIS</b>						
4.a	Plume Phase	✓				
4.b	Post Plume					
4.c	Lab Operations	✓				
<b>5. EMERGENCY NOTIFICATION/PUBLIC INFO.</b>						
5.a	PNS Activation	✓	✓	✓		
5.a	Emergency Information/Instructions	✓	✓	✓		
<b>6. SUPPORT OPERATIONS/FACILITIES</b>						
6.a	Monitoring/Decontamination of EWs & Evacuees		✓	✓	✓	✓
6.b	EW Equipment Decontamination		✓			
6.c	Congregate Care			✓	✓	
6.d	Medical Services					

Extent of Play Agreement  
Oconee Nuclear Site Exercise  
September 17, 2002

1. Emergency Operations Management

Sub-element **1.a**, Mobilization

Criterion 1.a.1: OROs 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. Alert rosters will be provided to FEMA evaluators and a discussion of call-down procedures will be conducted.

Sub-element **1.b**, Facilities

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

Counties will be evaluated to establish a baseline for exercise evaluation criteria. Some of the areas to be considered are: adequate space, furnishings, lighting, restrooms, ventilation, backup power and/or alternate facility (if required to support operations).

Sub-element **1.c**, 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 Oconee County and Pickens County Emergency Operations Centers (EOC's). State Emergency Response Team (SERT) participants include the Emergency Management Division (EMD); ESF 6, Mass Care (Department of Social Services); ESF 8, Health and Medical Services (Department of Health & Environmental Control); ESF 10, Hazardous Materials, (Department of Health and Environmental Control); ESF 13, Law Enforcement (State Law Enforcement Division); and ESF 16, Evacuation Traffic Management, (Department of Public Safety). A simulation cell will represent the Office of the Governor, Office of the Adjutant General, FEMA Region IV, and North

Carolina. All simulated telephone calls will be made by calling the simulation cell.

#### **Subelement 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, dosimetry, potassium iodide (KI), and 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 7000 Emergency Workers and Institutionalized Individuals is stored at FNF County EOCs, and Health Departments and at DHEC headquarters in Columbia, SC. Advance rosters of emergency workers are not maintained. KI is not stockpiled for members of the general public.

All radiation detection equipment will be inspected, inventoried, and operationally checked before each use. 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.

## **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 of the biological effects of radiation and possible consequences of excessive exposure.

**Subelement 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 on 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, 1.8., 10., 11. and Supplement 3.)

Protective action recommendations by BHEC will be based on an evaluation of information received from the licensee, independent dose assessments and simulated field monitoring data input.

Criterion 2.b.2: A decision-making process involving 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-0654, 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. 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.)

**Subelement 2.d., Radiological Assessment and Decision-Making for the Ingestion Exposure Pathway**

Criterion 2.d.1: Radiological consequences for the ingestion pathway are assessed and appropriate protective action decisions are made based on the ORO planning criteria. (NUREG-0654, I.8., J.11)

This Evaluation Area will not be demonstrated.

Sub-element **2.e.**, Radiological Assessment and Decision-Making Concerning Relocation, Re-entry, and Return

Criterion 2.e.1: Timely relocation, re-entry, and return decisions are made and coordinated as appropriate. based on assessments of the radiological conditions and criteria in the ORO's plan and/or procedures. (NUREG-0654, A.1.b., I.10., M)

This Evaluation Area will not be demonstrated.

**3. Protective Action Implementation.**

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

Criterion 3.a.I: The OROs issue appropriate dosimetry and procedures, and manage radiological exposure to emergency workers in accordance with the plans and procedures. Emergency workers periodically and at the end of each mission read their dosimeters and record the readings on the appropriate exposure record or chart. (NUREG-0654, K.3.)

Emergency Workers or Emergency Worker Teams will use Self Reading Dosimeters (SRDs) and simulated Permanent Record Dosimeters (PRDs) to monitor and control their 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 Dosimetry Redistribution Standing Operating Procedures, and will be discussed at the State Emergency Operations Center (SEOC). Department of Public Safety, Highway Patrol maintains and distributes 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.I: 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. KI is taken by Emergency Workers on order by the State Health Officer or designee. Record keeping will be discussed at risk county EOCs.

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.)

Oconee and Pickens counties will demonstrate the ability and resources to implement appropriate protective actions for special population groups. A list of people with special transportation needs will be provided to evaluators. Evacuation assistance will not take place.

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

Oconee County will simulate school evacuations by out-of-sequence interviews with key school staff members on September 18, 2002, at 9:00 **A.M.**

Oconee County schools to be evaluated are:

J. N. Kellett Elementary	Northside Elementary
Seneca Middle School	Walhalla Elementary
Walhalla Middle School	

Pickens County will simulate school evacuations by out-of-sequence interviews with key school staff. Evaluator will meet escort on September 17, 2002, at 9:00 A.M. at the Pickens County EOC.

Pickens County schools to be evaluated are:

Lewis Elementary  
*Six Mile* Elementary

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 (TCP's) are pre-determined. The South Carolina Highway Patrol will demonstrate Traffic and Access Control. Evaluator will meet escorts at 8:00 **A.M.** at the Pickens County EOC.

Traffic Control Points to be evaluated are:  
A-1, AC 183 and Gap Hill Wood  
B-1, Ban Ross Road and Ridgedale Road  
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 officers manning TCPs.

Criterion 3.e.Z: The ORQ demonstrates the availability and appropriate use of adequate information regarding water, food supplies, milk, and agricultural production within the ingestion exposure pathway emergency planning zone for implementation of protective actions. (NUREG-0654, J.9., 11.)

This Evaluation Area will not be demonstrated.

Criterion 3.e.2: Appropriate measures, strategies, and pre-printed instructional material are developed for implementing protective action decisions for contaminated water, food products, milk, and agricultural production. (NUREG-0654, E.5., 7., J.9., 11.)

This Evaluation Area will not be demonstrated.

Criterion 3.f.1: Decisions regarding controlled re-entry of emergency workers and relocation and return of the public are coordinated with appropriate organizations and implemented. (NUREG-0654, M.1., 3.)

This Evaluation Area will not be demonstrated.

#### **4. Field Measurement and Analysis.**

##### **Sub-element 4.a, Plume Phase Field Measurements and Analyses**

Criterion 4.a.1: The field teams are equipped to perform field measurements of direct radiation exposure (cloud and ground shine) and to sample airborne radioiodine and particulates. (NUREG-0654, H.10., I.8., 9., 11.)

Zeolite filters will be simulated with charcoal filters.

Criterion 4.a.2: Field teams are managed to obtain sufficient information to help characterize the release and to control radiation exposure. (NUREG-0654, I.8., 11., J.10.a.)

Command and Control of DHEC Field Teams will take place at the South Carolina Army National Guard (SCARNG) Armory in Clemson, South Carolina.

Criterion 4.a.3: Ambient radiation measurements are made and recorded at appropriate locations, and radioiodine and particulate samples are collected. Teams will move to an appropriate low background location to determine whether any significant (as specified by the plan and/or procedures) amount of radioactivity has been collected on the sampling media. (NUREG-0654, 1.8., 9., 11.)

Dose Assessment will take place at the SCARNG Armory located in Clemson, South Carolina.

Criterion 4.b.1: The field teams demonstrate the capability to make appropriate measurements and to collect appropriate samples (e.g., food, crops, milk, water, vegetation, and soil) to support adequate assessments and protective action decision-making. (NUREG-0654, 1.8., J.11.)

Criterion 4.c.1: The laboratory is capable of performing required radiological analyses to support protective action decisions. (NUREG-0654, C.3., 1.8., 9., J.11.)

The DHEC Mobile Lab will be located at the SCARNG Armory located in Clemson, South Carolina.

## **5. Emergency Notification and Public Information**

### **Subelement 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 current FEMA REP guidance. (10 CFR Part 50, Appendix E & NUREG-0654, E.1., 4., 5., 6., 7.)

The State will coordinate Protective Action Decisions (PAB) with the Chief South Carolina county elected officials or designees. At Site Area Emergency, the siren system and the Emergency Alert System will be activated. A pre-scripted "Stay Tuned" EAS message and follow-on news release will be transmitted from the SEOC to the Local Primary (LP-1) EAS station WFBC, Greenville, S.C. A "test" EAS message will be simulated and an appropriate EAS message will be transmitted to the LP-1 station. The LP-1 station will

have staff available for interview during the demonstration. At General Emergency, the sirens will not be sounded and EAS will be simulated.

Criterion 5.a.2: Resewed

This Evaluation Area will not be demonstrated.

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 the ORO of a failure of the primary alert and notification system. (NUREG-0654, E.6., Appendix 3.B.2.c)

This Evaluation Area will not be demonstrated.

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 in a timely manner. (NUREG-0654. E.5., 7. G.3.a., G.4, a., b., c.)

The State, Oconee County, and Pickens County 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 will be demonstrated at the JIC. Rumor control for Oconee and Pickens counties will be demonstrated at the appropriate county EOC. Rumor control personnel will provide a log of rumor calls to the FEMA Evaluator.

## **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-8654, J.10.h.; K.5.b.)

Host county Reception Centers will be demonstrated out-of-sequence. At least six people will be monitored and registered. Personnel decontamination will be demonstrated via walk-through and discussion. All necessary supplies

will be on-hand. Walkways will not be covered with barrier material. A monitoring productivity rate will not be developed. State and local plans require the monitoring of evacuees only when there has been an actual release. Once the determination has been made to initiate evacuee monitoring, Offsite Response Organizations (ORO's) are prepared to monitor 100% of the evacuated population who may have been exposed to radiation as rapidly as possible. 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.

Reception Centers to be evaluated are:

Anderson County: McCants Middle School at a time to be determined.  
Greenville County: Northwest Middle School at 6:00 P.M., September 16, 2002.

#### **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)

Emergency Worker Monitoring and Decontamination will be demonstrated out of sequence. One emergency worker will be monitored. Personnel decontamination will be demonstrated via walk-thru and discussion. One emergency vehicle will be monitored and decontaminated in accordance with local SOPs.

Worker Decontamination Points to be evaluated are:

Oconee County: Westminster Middle School at 4:00 P.M., September 16, 2002.

Pickens County: Pickens County Prison Farm at 1:30 P.M., September 16, 2002.

Evaluators will meet at the appropriate County EOC for escort to demonstration location.

#### **Sub-element 6.c, Temporary Care of Evacuees**

Criterion 6.c.1: Managers of congregate care facilities demonstrate that the centers have 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.)

Host County Shelters will be demonstrated out-of-sequence and concurrently with Evaluation Area 6.a, above. Procedures that assure that only non-contaminated persons enter shelters will be demonstrated.

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

Criterion 6.d.1: The facility/ORO has the appropriate space, adequate resources, and trained personnel to provide transport, monitoring, decontamination, and medical services to contaminated injured individuals. (NUREG-(3654, F.2, H.10., K.5.a., b., L.1., 4.)

This Evaluation Area will not be demonstrated.

V. **ONS** REP Evaluation Area Summary of Outside Activities

SITE: ONS EXERCISE DATE: September 17, 2002

TYPE OF EXERCISE: Full Participation

<b>Evaluation Area</b>	<b>STATE</b>	<b>OCONEE</b>	<b>PICKENS</b>	<b>ANDERSON</b>	<b>GREENVILLE</b>
3.c.2 OROs/School officials implement protective actions for schools		<b>September 18th 9:00 A.M. County EOC J.N. Kellett Elem. Northside Elem. Seneca M.S. Walhalla Elem. Walhalla M.S.</b>	<b>September 17th 9:00 A.M. County EOC Lewis Elem. Six Mile Elem.</b>		
3.d.1 Appropriate traffic and access control is established.  3.d.2 impediments to evacuation are identified and resolved.	8:00 A.M. Pickens County EOC TCPs: A-1, SC 183 and Gap Hill Rd B-1, Dan Ross Rd and Ridgedale Rd PBLs: Gap Hill Public Boat Landing				
6.a Monitoring and Decontamination of Evacuees and Registration of Evacuees				<b>August 29th 6:00 P.M. McCants Middle School</b>	<b>September 16th 6:00 P.M. Northwest Middle School</b>
6.a Monitoring and Decontamination of Emergency Workers		<b>September 16th 4:00 P.M. County EOC Westminster Middle School</b>	<b>September 16th 1:30 p.m. County EOC Pickens County Prison Farm</b>		

## **APPENDIX 4.**

### **EXERCISE SCENARIO**

This appendix ~~contains~~ a summary of the simulated sequence of events, which ~~was~~ used as the basis for invoking emergency response actions by OROs in the Oconee Nuclear Station exercise on September 17, 2002.

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

The exercise begins with Oconee Unit 1 at 0% power,  $\approx 552$  °F and 2155 psi, following a manual reactor shutdown at 0424 due to a loss of power to a control room instrumentation and controls panelboard. Prior to the shutdown the Unit had an operating core life of  $\approx 440$  Effective Full Power Days (end of core life). Oconee Unit 2 is shutdown for a refueling outage with core loading in progress. Keowee Hydro Unit #2 is available as an emergency power supply through an underground path to the emergency power transformer. The Keowee Hydro overhead emergency power path is not available for emergency power since it was declared inoperable at 0900 on 09/16/02. This situation places both Units 1 and 3 in a limiting condition for operation. All three combustion turbines at Lee Steam Station are also available to supply emergency power.

The weather forecast for Tuesday, September 17<sup>th</sup>, has winds from the SSE (165") with a wind speed of 10 - 20 mph. A low temperature of 60 °F is expected with a high temperature of 95 °F. Severe thunderstorms with heavy rain and lightning are expected in the area later during the evening.

At 0800 Unit 1 remains in a shutdown condition with reactor coolant system (RCS) temperature and pressure at  $\approx 552$  °F and 2155 psi. Personnel are currently inside the reactor building performing miscellaneous inspections and post-shutdown maintenance. At 0805, an operator checking for inputs into the reactor building normal sump reports leakage from a valve connected to the reactor coolant system piping. Maintenance personnel in the area are inspecting/evaluating the valve with additional support from a Radiation Protection technician. At 0810 leakage from this valve increases to  $\approx 10$  gallons per minute (gpm); however, since this is identified leakage no emergency classification is applicable at this time.

At 0815, the leaking valve's valve stem ejects due to defective/damaged valve components. The ejected valve stem injures the two maintenance personnel working on the valve. RCS leakage increases to  $\geq 160$  gpm and numerous stat alarms, indicative of increased RCS leakage in the reactor building, are received in Unit 1 Control Room. This leak rate satisfies the conditions for an **Alert** classification. Control Room operators enter applicable sections of the Emergency Operating Procedure to mitigate the impact of the increased RCS leakage.

The injured maintenance personnel and an RP technician evacuate the reactor building through the personnel hatch; however they are trapped between the inner and outer personnel hatch doors due to malfunctioning interlocks. A call is made to the control room on the emergency line requesting help and the site's Medical Emergency Response Team (MERT) is activated. Additional personnel evacuate the reactor building through the emergency personnel hatch. The emergency personnel hatch inner door is slightly ajar and the outer door seal has been damaged but currently appears to be secured and maintaining the containment barrier. This condition is unknown to plant personnel at this time. With containment secured, no offsite releases are occurring at this time.

After reviewing the Emergency Classification Procedure, the Operations Shift Manager (OSM) declares an **Alert** at  $\approx 0830$  based on **RCS Leakage > Makeup Capacity of One HPI Pump In Normal Mode ( $\approx 160$  gpm) With Letdown Isolated**. Procedure actions are initiated to: notify offsite agencies (SC State, Oconee County, Pickens County, and the NRC); activate the site's Emergency Response Organization (ERO); initiate Site Assembly; and, activate the Emergency Response Data System (ERDS). The SC State Warning Point, Oconee County LEC, Oconee County EMD, Pickens County LEC, and Pickens County EMD are notified of the Alert at 0845 (or within 15 minutes after the declaration).

Site Assembly is completed at 0900 (or within 30 minutes after initiation) and the TSC and OSC are staffed and *Operational*. Also at approximately 0900, the 1B2 Reactor Coolant Pump (RCP) Middle Seal fails, increasing RCS leakage. Control Room Operators secure the faulted pump and start the 1B1 Reactor Coolant Pump to maintain RCS flow through the 'B' steam generator.

At approximately 0910 (no later than 75 minutes of the **Alert** declaration), after the TSC Emergency Coordinator has completed turnover with the QSM, the TSC is *Activated*. The TSC is now responsible for Emergency Classification, Offsite Notifications, and Protective Action Recommendations. Site emergency response personnel are monitoring plant conditions and implementing appropriate response actions. Field Monitoring Teams are surveying the site and downwind environs to determine if there is any radioactivity being released as a result of this event. No increase in radioactivity above background is detected at this time.

At 0920, a loss of the emergency power path from the gas combustion turbines at Lee Steam Station is indicated in the Control Room. This problem is a result of damage from logging operations to the 100 kV lines between the Central Switchyard and Oconee.

At 0925, a 230 kV switchyard isolation occurs due to a truck boom coming into contact with one of the transmission lines. Both Keowee Hydro Units emergency start with power being supplied to Oconee Unit 1 and 2 from Keowee Hydro Unit #2 via the underground power path. Oconee Unit 3 is unaffected by this event. This event does not result in an upgrade in emergency classification.

At 0930, an increase in RCS leakage due to further failure of the valve involved in the initiating event and further failure of 1B2RCP seals. These failures result in a loss of the reactor coolant system boundary as indicated by the inability to maintain a temperature differential between the hot and cold legs of the RCS (RCS Subcooling Margin = 0 °F). A failure of the Outer Door Seal also occurs at this time. Emergency response personnel also report observations of steam releasing from the Emergency Personnel Hatch. On site survey teams report an increase in radioactivity at the Protected Area Fence. This failure is indicative of a loss of the containment barrier. Conditions exist for a **Site Area Emergency** classification at this time.

At 0940, the TSC Emergency Coordinator declares a **Site Area Emergency** based on *Loss Of Any Two Barriers – Loss Of Containment Barrier and Loss Of RCS Barrier*. No Protective Action Recommendations are required at this time. Notification of the Site Area Emergency classification is provided to SC State EOC, Oconee County EOC, and Pickens County EOC by 0955 (or within 15 minutes after the event is classified). Oconee and Pickens County coordinate activation of the **Alert** and Notification System (EAS and Sirens) with SC State. EAS and Sirens are activated at 1010 (or within 15 minutes of the decision by State and County Emergency Management Directors to activate the Alert and Notification System). The NRC informs the TSC NRC Communicator that a Site Team has been dispatched and is enroute to Oconee. **NOTE: If EOF activation has occurred faster than anticipated and turnover has been completed between the TSC and EOF prior to this time, then the event classification and notification will originate from the EOF.**

Minimum staffing at the EOF is completed by 0945 (within 75 minutes of the **Alert** declaration) and the EOF is declared *Operational* at this time. Turnover process between TSC and EOF positions is initiated. Shortly after the EOF is declared *Operational*, turnover is initiated between the TSC Emergency Coordinator and EOF Director. At 0950, (or after turnover is completed) the EOF is *Activated*. The EOF is now responsible for Emergency Classification, Offsite Notifications, and Protective Action

Recommendations.

**A**t 1000, the 1A High Pressure Injection (HPI) Pump Breaker trips open and the pump fails. Smoke detectors in the Unit 1 HPI Pump Room alarm in the control room. **An** operator is dispatched from the OSC to investigate. Shortly after arriving at the HPI Pump room, the operator observes smoke and requests activation of the Fire Brigade. The Fire Brigade is activated at approximately 1005 and responds to the scene. The fire is a result of a short at the motor contacts for the 1A HPI Pump. By 1030 the fire is extinguished and OSC personnel have started the process for powering this pump from an alternate source. The NRC Site Team arrives at the EOF and begins to provide support to Duke Power and SC State personnel.

**D**ue to earlier failure of the 1B2 RCP seals, debris has entered the reactor core. This debris has resulted in severe cladding damage. Indications of cladding damage are seen on high range radiation detectors located inside the reactor building (**RIA-57** and **58**) at 1030 when their readings increase from background to 2.0 and 1.0 R/hr respectively. Radiation levels inside containment, indicated by these high range detectors continue to increase until the threshold for indication of a loss of the fuel clad barrier is reached at 1100 (**36.0** and 18.0 R/hr respectively). At this time conditions exist for a General Emergency classification. At 1110, containment radiation levels stabilize at detector readings of 38.75 and 19.2 R/hr.

**A**fter reviewing the Emergency Classification procedure the EOF Director declares a General Emergency at 1110 based on a *Loss of All Three Barriers – Loss of Fuel Clad, RCS, and Containment Barriers*. A Protective Action Recommendation to evacuate two miles radius, five miles downwind, and shelter all remaining sectors is provided to SC State by the EOF Director (this is the minimum PAR required by plant conditions). The PAR is as follows:

Evacuate: Oconee County - A0; E1; F1  
Pickens County - A0; A1

Shelter: Oconee County - D1; D2; E2; F2  
Pickens County - A2; B1; B2; C1; C2

**T**he SC State EOC, Oconee County EOC, and Pickens County EOC are notified of the General Emergency classification and Protective Action Recommendations at 1125 (or within 15 minutes of the event classification). After reviewing the site's Protective Action Recommendations and current plant conditions, SC State along with Oconee and Pickens Counties determine the Protective Action Recommendations that will be issued. Within 15 minutes of this determination, state and county personnel begin to implement the agreed on Protective Actions. The Alert and Notification System is activated (simulated unless required due to problems at the Site Area Emergency classification).

**S**ite Evacuation of non-essential personnel is initiated by 1125 if it was not performed earlier. RP personnel prepare an evacuation plan that sends personnel to Daniel High School due to the fact that a radiological release is in progress. Pickens County personnel may be requested to support the site evacuation. With the radiological release in progress, vehicles located in the parking lots West of the plant would be unavailable for use. The OSC may be required to arrange for transportation of affected personnel. **NOTE: If Site Evacuation is initiated prior to the radiological release start, then affected personnel may be evacuated to their personnel residence.**

The exercise is terminated no later than 1300 once the state and counties complete demonstration of applicable objectives.

## **APPENDIX 5**

### **EVALUATED SCHOOLS**

On September 18, 2002 evaluations were done, for objective 16, in Oconee and Pickens Counties.

The following is a complete listing of the evaluated schools:

#### **OCONEE COUNTY SCHOOLS:**

J. N. Kellett Elementary

Northside Elementary

Seneca Middle School

Walhalla Elementary

Walhalla Middle School

#### **PICKENS COUNTY SCHOOLS:**

Lewis Elementary

Six Mile Elementary