SALEM 98: A Post-Plume Phase, Federal Participation Exercise

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ABSTRACT

Salem 98 was the largest nuclear power plant post-plume phase exercise since the 1993 FRMAC-93 exercise at the Fort Calhoun Nuclear Power Plant in Nebraska. Salem 98 was a 3 Day exercise, held on May 5-7, 1998, involving participation by the States of New Jersey and Delaware and associated State and county agencies. Public Service Electric and Gas was the host utility and Salem County the host county. Federal participation included the Nuclear Regulatory Commission, Federal Emergency Management Agency, Department of Energy, Environmental Protection Agency, U.S. Department of Agriculture and Department of Health and Human Services. In addition, the American Nuclear Insurers participated, adding a dimension to the exercise not experienced often enough. This was a stand-alone post-plume phase exercise, which took place 2 months after the evaluated plume phase exercise held on March 3, 1998, also including participation by various Federal agencies. This exercise demonstrated the positive working relationship among utility, State, county, and Federal responders in response to a postulated major nuclear power plant emergency with significant offsite consequences.

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EXECUTIVE SUMMARY

Day 1, May 5, 1998

The first day of the exercise commenced 16 hours following the termination of a release from the Salem Nuclear Generating Station in Hancocks Bridge, New Jersey. The post-plume phase scenario, distinct from the plume phase exercise held on March 3, 1998, yielded a release that deposited radioactive material only within New Jersey in a North-Northeast direction within a radius of about 30 miles from the plant.

Facilities participating on this first day included the utility's Emergency Operations Facility (EOF), State Emergency Operations Centers (EOCs) in New Jersey and Delaware, the New Jersey Technical Assessment Center (TAC), the Delaware Accident Assessment Advisory Group (AAAG) and the Emergency News Center (ENC). The Governor of New Jersey, through the New Jersey Office of Emergency Management (NJOEM), made 14 Protective Action Decisions (PADs), ranging from relocation of population to restricting agricultural products. The PADs were based on Protective Action Recommendations (PARS) developed by the Bureau of Nuclear Engineering at the TAC. Day one activities culminated in a FRMAC and Federal Advance Team meeting and the development of a preliminary sampling plan. The Emergency News Center (ENC) comprised of representatives from most participating agencies was activated to conduct news conferences to communicate accident conditions to the public through the media.

Day 2, May 6, 1998

Day 2 began 40 hours following the termination of the release. Activities included integration of State technical teams into the FRMAC at the Salem County Emergency Operations Center (SCEOC). New Jersey, Delaware, Salem County, PSE&G and Federal responders formed integrated field monitoring teams at the Forward Command Post (FCP) and were dispatched to collect field samples. Following the declaration of a Presidential Declaration of a Major Disaster, FEMA established a Disaster Field Office (DFO) in the Salem County EOC. The American Nuclear Insurers (ANI) participated with FEMA and the States in communicating assistance programs and the process for evaluating and processing claims. The two States continued to review PARs and make PADs. The ENC participated as well.

Day 3, May 7, 1998

Day 3 began 7 days following termination of the release and focused on recovery issues. Principal activities took place at the FRMAC and DFO, with continued support from the New Jersey and Delaware EOCs. There was no ENC participation in Day 3 activities. Federal agencies were able to demonstrate support to the States in areas where State resources would be significantly stressed. Support included quantifying offsite deposition, developing strategies for reentry, return and recovery, assisting in developing return and recovery plans and providing assistance in PAR and PAD implementation.

 

PREFACE

This report records the lessons learned from activities associated with planning and conducting the Salem 98 Post-plume phase, Federal-participation exercise. This exercise took place at various facilities in the State of New Jersey on May 5-7, 1998. The report should be regarded only as a source for documenting what occurred, what lessons can be learned from the actions taken and as a tool for any organization contemplating an exercise of similar scope.

This document is a compilation of comments and recommendations solicited from exercise planners, controllers, and participants representing the utility, as well as local, State and Federal agencies. All of the comments and recommendations were reviewed and considered. Only those with broad application or major impact are included.

The Salem 98 exercise was designed to be separate and distinct from the Salem plume phase exercise conducted on March 3, 1998. According to a regulatory requirement, the plume phase exercise was evaluated by the NRC for onsite actions, and the Federal Emergency Management Agency (FEMA) for offsite actions during the biennial exercise. FEMA evaluated the State of New Jersey for the ingestion phase on the 6-year cycle required by regulation. The State of Delaware was not evaluated by FEMA but chose to participate in this exercise for the learning opportunity which lent a greater degree of realism to the exercise. **NOTE:** FEMA play in this exercise may not reflect FEMA policy for responding to radiological emergencies, currently in review.

Planning began sixteen months before the exercise was conducted. The three day time frame for the exercise was negotiated with FEMA in the "extent-of-play" agreement. From the outset, Salem 98 was designed to include a higher-than-usual degree of Federal participation. The major objective was to exercise Federal support to the States of New Jersey and Delaware in expediting radiological response through the NRC as the Lead Federal Agency supported by the Federal Radiological Monitoring and Assessment Center (FRMAC) and non-radiological support through FEMA supported by the Disaster Field Office (DFO). Both FRMAC and DFO facilities are an integral part of the Federal Radiological Emergency Response Plan (FRERP) implementation. All actions exercised in Salem 98 were designed to be consistent with that plan.

The potential for exposing flaws within plans and procedures is an inherent gamble in all exercises. The common goal of protecting the health and safety of the public far outweighs the risk of exposing flaws in any plan or procedure, and such exercises are not intended to place blame on any one individual, organization, or agency for actions that either did or did not take place. Rather, each responding organization must measure and assess the adequacy of its response and modify its plans and procedures accordingly. Moreover, the reader should note that the positive and negative findings of New Jersey and Delaware in this exercise may not be replicated at other locations.

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ACKNOWLEDGMENTS

The authors appreciate the efforts of Public Service Electric and Gas (PSE&G) and the Salem Nuclear Generating Station for hosting this event, as well as the efforts of New Jersey and Delaware in planning and conducting it.

In particular, the authors recognize the following individuals for their extraordinary efforts in planning and conducting this exercise:

- Mr. Nicholas DePierro, Mr. Patrick Mulligan, Mr. Jon Christiansen, Mr. John Freitas, Mr. Kent Tosch and Dr. Jill Lipoti from the State of New Jersey;
- Ms. Emily Falone and Mr. David Hake from the State of Delaware;
- Ms. Donna Miller, Mr. David Burgin, Mr. Craig Banner, Mr. Raymond Reece and Mr. William Weckstein from PSE&G;
- Mr. Forrest Eichmann, Mr. Carl Wentzell, and Mr. Mack Lake from the Salem County Department of Emergency Services;
- Mr. Bruce Hurley from Department of Energy (DOE/Las Vegas);
- Mr. Stanley McIntosh and Mr. Robert Acerno from FEMA Region II;
- Ms. Felicia Hinson, Mr. Robert Bores and Ms. Nancy McNamara from NRC Region I and;
- Mr. Eric Weinstein from the NRC Office of Analysis and Evaluation of Operational Data.

The authors also acknowledge the support of Salem County for use of its Emergency Operations Center (EOC) without which this exercise could not have taken place. In addition, the authors commend the coordinating efforts of the NRC as the Lead Federal Agency in assuring sufficient commitment of NRC and other Federal agencies' resources to allow this multi-organizational exercise to take place.

ABBREVIATIONS

AAAG	Accident Assessment Advisory Group (Delaware)
A-Team	Advisory Team on the Environment , Food, and Health
ACP	Access Control Point
AEOD	Analysis and Evaluation of Operational Data, Office for
AMS	Aerial Measuring System
ANI	American Nuclear Insurers
ARAC	Atmospheric Release Advisory Capability
BNE	Bureau of Nuclear Engineering (NJ)
BNL	Brookhaven National Lab
CRCPD	Conference of Radiation Control Program Directors
DDA	Department of Agriculture (DE)
DE	Delaware
DEMA	Delaware Emergency Management Agency
DEP	Department of Environmental Protection (NJ)
DFO	Disaster Field Office
DNG	Delaware National Guard
DOE	Department of Energy
DPH	Division of Public Health (DE)
DWR	Division of Water Resources (DE)
EAS	Emergency Alert System
ELF	Emergency Laboratory Facility (NJ)
EMITS	Emergency Information Tracking System
ENC	Emergency News Center
ENO	Extraordinary Nuclear Occurrence
EOC	Emergency Operations Center
EOF	Emergency Operations Facility
EPA	Environmental Protection Agency
EPZ	Emergency Planning Zone
ERPA	Emergency Response Planning Area
ERT-A	Emergency Response Team - Advance (FEMA)
FAA	Federal Aviation Administration
FCP	Forward Command Post
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
FFE	Federal Field Exercise

FMT	Field Monitoring Team
FRERP	Federal Radiological Emergency Response Plan
FRMAC	Federal Radiological Monitoring and Assessment Center
FRPCC	Federal Radiological Preparedness Coordinating Committee
FSA	Farm Service Agency
GIS	Geographic Information System
HHS	Health and Human Services
LFA	Lead Federal Agency
LOCA	Loss of Coolant Accident
NCS	National Communications System
NJ	New Jersey
NJDOH	New Jersey Department of Health
NJOEM	New Jersey Office of Emergency Management
NRC	Nuclear Regulatory Commission
OSC	Operations Support Center
PAD	Protective Action Decision
PAR	Protective Action Recommendation
PDA	Preliminary Disaster Assessment
PSE&G	Public Service Electric and Gas
RAP	Radiological Assistance Program
RCM	Response Coordination Manual, NUREG/BR-0230
REAC/TS	Radiation Emergency Assistance Center/Training Site
RTM	Response Technical Manual, NUREG/BR-0150
SBA	Small Business Administration
SCEOC	Salem County Emergency Operations Center
SRAO	State Radiological Assessment Officer
TAC	Technical Assessment Center (NJ)
TLD	Thermoluminescent Dosimeter
USDA	US Department of Agriculture
USPHS	US Public Health Service

I. BACKGROUND

A. Purpose

Salem 98 was a scheduled ingestion phase, six year cycle, FEMA evaluated exercise. The March 3, 1998, evaluated plume phase exercise was separated by design from the ingestion phase exercise. Early in the planning process, the NRC, who, under the Federal Radiological Emergency Response Plan (FRERP), would have lead responsibility for responding to a major emergency at a commercial, NRC-licensed facility, was contacted by the State of New Jersey to coordinate and facilitate participation by the other Federal agencies. Federal interest in participating in this post-plume phase exercise was primarily predicated on two objectives:

- 1) The first objective was to work with the States of New Jersey and Delaware in reviewing and modifying their State-specific plans to more efficiently incorporate the resources of the Federal government and to integrate the two State plans, particularly in making coordinated Protective Action Decisions (PADs). Other States could then use these revised plans as a template to incorporate the Federal resource commitment that, in most cases, is not adequately reflected in current State plans.
- 2) The second major objective was to conduct an exercise as a vehicle for FEMA to review their role in response to a major technological event that may invoke the provisions of the Robert T. Stafford Disaster Relief and Emergency Assistance Act.

B. Scope

While smaller in scale than a Federal Field Exercise (FFE) such as those conducted at St. Lucie in 1984 and Zion in 1987, Salem 98 also was designed to exercise all major participating facilities and associated staffs that would be employed in responding to a major accident at an NRC- licensed facility. In particular, Salem 98 exercised the coordination of State and Federal resources, with particular emphasis placed on the ingestion pathway, reentry, return, and recovery issues. Non-radiological issues included exercising the process required to obtain a Presidential Declaration under the Robert T. Stafford Act.

The exercise involved participation by Public Service Electric and Gas (PSE&G), the emergency services and radiological health organizations of the States of New Jersey and Delaware, Salem County, New Jersey; and representatives from the Nuclear Regulatory Commission (NRC), Department of Energy (DOE), Department of Agriculture (USDA), Environmental Protection Agency (EPA), Health and Human Services (HHS) and Federal Emergency Management Agency (FEMA). More than 300 people participated in this multi-organizational exercise.

C. State and Federal Objectives

The participating States had the following objectives for Salem 98:

- Test communication capabilities between State and Federal emergency facilities.
- Assess the integration of utility, State, and Federal field monitoring activities.
- Test capabilities to share data and establish protocols for efficient data flow among all emergency facilities.
- Establish protocols for an interstate cooperative response effort.
- Test the States' ability to command and control all available State, local, utility and Federal resources.
- Discuss and implement recovery and re-entry procedures.
- Establish protocols for the implementation of the Stafford Act in response to a major technological event.
- Establish the roles and responsibilities of the American Nuclear Insurers (ANI) in response to an accident at a fixed nuclear facility.

In addition to the two primary Federal objectives discussed in Section I.A., above, Federal agency participants had the following objectives for Salem 98:

- Support the States of New Jersey and Delaware in the post-plume phase exercise.
- Review coordination and communications aspects of Federal radiological support.
- Examine interface aspects of various response facilities in a major inter-agency and inter-organizational response.
- Review FRMAC Advance Party (first responders from FRMAC) interface with the States for determining initial priorities and developing a preliminary sampling plan.
- Examine the Federal Radiological Monitoring and Assessment Center (FRMAC) Phase I (response contingent following Advance Party) interface with State counterparts.

D. FEMA-Evaluated Objectives (New Jersey)

These objectives are derived from FEMA/REP-14 and were evaluated for the ingestion phase of this exercise:

1. *Objective 24: Post Emergency Sampling*

New Jersey will be supported by the FRMAC for the ingestion phase of the exercise. Three field monitoring teams from the State will be evaluated (milk, water, vegetation). Field monitoring teams will simulate dressing out in protective clothing. Field monitoring teams will pre-stage at the Bureau of Nuclear Engineering (BNE) / Forward Command Post (FCP).

2. *Objective 25: Laboratory Operations*

The Emergency Laboratory Facility (ELF) located on Arctic Parkway in Ewing Township, New Jersey, will be evaluated. The BNE Mobile Laboratory will not be evaluated. Holding tanks for water discharge will be simulated at the ELF. Transportation of samples will be simulated.

3. *Objective 26: Ingestion Exposure Pathway - Dose Projection*

Dose projection and protective action recommendation development will take place at the TAC which will co-locate with the FRMAC. Protective action decision making will take place at the State EOC.

4. *Objective 27: Ingestion exposure pathway protective action implementation*

Protective Action Decisions (PADs) will be implemented from the N.J. State EOC.

5. *Objective 28: Relocation, Reentry and Return Decision Making*

Relocation, reentry and return decision making will be formulated at the N.J. State EOC from PARs developed at the TAC, or later, at the FRMAC.

6. *Objective 29: Relocation, Reentry and Return implementation*

Implementation of relocation, reentry and return will take place at the N.J. State EOC.

E. Participants by Organization

The organizations from New Jersey, Delaware, PSE&G and various Federal agencies committed significant resources to carry out this exercise. These agencies are listed below:

- New Jersey
 - New Jersey State Police
 - Office of Emergency Management
 - New Jersey Department of Environmental Protection
 - Division of Environmental Health Safety and Analytical Programs
 - Radiation Protection Programs
 - Bureau of Nuclear Engineering
 - Bureau of Radiological Health
 - Bureau of Environmental Radiation
 - Division of Parks and Forestry
 - Division of Fish Game and Wildlife
 - Water Supply
 - Bureau of Emergency Response
 - Geographic Information and Analysis
 - New Jersey Dept of Health and Senior Services
 - New Jersey Dept of Agriculture
 - Salem County Office of Emergency Management
 - Salem County Agricultural Extension Service
- Delaware
 - Delaware Emergency Management Agency (DEMA)
 - Accident Assessment Advisory Group (AAAG)
 - Department of Health and Social Services
 - Division of Public Health
 - Department of Natural Resources and Environmental Control
 - Division of Water Resources
 - Delaware Department of Agriculture
 - Delaware National Guard
 - Delaware State Police
- Public Service Electric & Gas
 - Emergency Preparedness
 - Purchasing
 - Operations
- Federal
 - Nuclear Regulatory Commission
 - Region I
 - Headquarters, Office for Analysis and Evaluation of Operational Data
 - Federal Emergency Management Agency

- Region II
- Headquarters
- Department of Energy
 - Brookhaven National Lab Radiological Assistance Program (RAP)
 - Federal Radiological Monitoring Assessment Center (FRMAC)
- US Department of Agriculture (USDA)
- Environmental Protection Agency (EPA)
- Health and Human Services /Food and Drug Administration (HHS/FDA)

F. Observing Organizations

- Arizona Division of Emergency Management
- Arizona Radiation Regulatory Agency
- Bechtel, Nevada
- Michigan Department of Environmental Quality
- Minnesota Department of Health
- Minnesota Division of Emergency Management
- Mississippi Emergency Management Agency
- Mississippi Department of Health
- New Jersey Department of Environmental Protection
- New Jersey Division of State Police
- New York State Emergency Management Organization
- Ohio Department of Public Safety
- Ohio Emergency Management Agency
- Ohio Department of Health
- Pennsylvania Bureau of Radiation Protection
- Pennsylvania Emergency Management Agency
- Public Service Electric and Gas
- Salem County
- South Carolina Emergency Preparedness Division
- US Department of Energy
- Washington State Department of Health
- General Services Administration (GSA Headquarters)

II. Major Issues

Issue 1: *Both New Jersey and Delaware used the aircraft (fixed-wing and helicopter) to better define the deposition and the buffer zone. This approach allowed decision makers to more effectively deploy and use limited field teams, while covering a much wider area for consideration of further evacuation or other protective actions and, issues of return.*

- Recommended Action

State plans should incorporate the use of aircraft and other Federal resources.

- Responsibility

States

Issue 2: *States should consider developing a standard package of information and issues outlining the State priorities and the criteria used for making recommendations and decisions. This package should be presented at the Advance Party meeting to inform Federal agencies of the basis for the State preliminary sampling plan and the decisions that are important to each State.*

- Recommended Action

With Federal assistance, a working group of State responders should be convened (possibly under the auspices of the Conference of Radiation Control Program Directors (CRCPD)) or FRMAC working groups. The goal would be to develop a standard set of issues and goals that most States could adopt for use in future post-plume phase exercises or actual events.

- Responsibility

New Jersey and Delaware should suggest to CRCPD. Federal agencies will suggest to FRMAC working groups.

Issue 3: *Further communication improvements are needed among response facilities so that all facilities can share information easily and in a timely fashion. Some means to allow each facility to monitor major briefings would also be useful.*

- Recommended Action

Federal agencies that manage response facilities should explore ways to take advantage of current communications systems technologies and Communications

among response facilities using actual equipment should be a focus of future exercises.

- Responsibility

Federal agencies

Issue 4: States should consider developing generic protective actions and areas of consideration (such as food control areas, decontamination processes, return criteria and procedures for reducing exclusion zones for ingestion pathway issues).

- Recommended Action

New Jersey, Delaware, the NRC, DOE, and the Advisory Team responders should develop a generic document (for use by all States) to identify areas of consideration for post-emergency issues.

- Responsibility

The NRC will develop a draft

Issue 5: The Lead Federal Agency (LFA) should deploy sufficient staff to the FRMAC to ensure that Federal positions on protective actions are coordinated and technically defensible before they are communicated to the States in a timely fashion. The NRC's plan calls for sufficient supporting staff in the FRMAC to support the Protective Measures Coordinator (NRC lead in FRMAC). However, because of exercise resource constraints, these positions were not supported in the Salem 98 exercise. This did not enable the NRC, as LFA, to adequately support independent assessment capability.

- Recommended Action

Future exercise participation should include full NRC technical support staff within the FRMAC.

- Responsibility

NRC

Issue 6: States should ensure that the lead State radiological authority in the FRMAC has sufficient staff to support the ability to make PARs in a timely fashion based upon the available FRMAC technical data. This staff would be distinct from the State staff integrated within the FRMAC's organizational framework.

- Recommended Action

State plans should allocate sufficient State staff to develop State PARs at the FRMAC. FRMAC and Federal training should include a recommendation that States support both integrated FRMAC functional groups and provide independent State support for PAR development based upon FRMAC generated products.

- Responsibility

States should assign staff with Protective Action development expertise to support the State decision makers in the FRMAC. NRC outreach training and DOE FRMAC manual revision should incorporate this aspect.

Issue 7: The planning basis of 10 miles for plume exposure is time tested and mature. Areas beyond 10 miles are less prepared to respond to a major nuclear power plant incident. No revision of the planning basis is required; however, decision makers should consider major issues and the amount of time associated with preparing and implementing protective measures for the area beyond 10 miles..

- Recommended Action

Post-plume phase exercises need to stress that additional time may be required to inform the public, implement protective actions, and make long-term decisions regarding relocation, reentry, and return issues. State and Federal training for decision makers must include information on which to base these decisions. FEMA should review its evaluation criteria to reflect the above concerns.

- Responsibility

State, FEMA, and other Federal responders.

Issue 8: FRMAC leadership, command and control, and agency lead roles should be clearly defined and universally communicated. The FRMAC should consider developing a briefing schedule centered around a briefing checklist that includes an update from each functional area within the FRMAC.

- Recommended Action

FRMAC working groups should expedite updating existing documentation to reflect current FRMAC operations. In addition, States and other Federal agencies will benefit from understanding the criteria FRMAC uses to select specific staff positions.

- Responsibility

FRMAC working groups

Issue 9: The generation of data for an exercise depends upon the extent of play and level of participation.

- Recommended Action

Considerable staff time, effort and funds are expended to generate data to support post-plume phase exercises. For exercises orientated solely toward decision making, pictorial information displayed on deposition maps will suffice. However, exercises that include monitoring and assessment will require additional supporting data.

- Responsibility

The Federal Radiological Preparedness Coordinating Committee (FRPCC) Subcommittee on Exercises should review this approach.

Issue 10: The Advisory Team on the Environment, Food and Health (A-Team) will support State's PAR development through the LFA. It was anticipated that the Advisory Team would provide more independent analysis of issues and provide technical solutions without direct assignment from the Management Team. This did not occur to the degree anticipated.

- Recommended Action

The A-Team should provide independent, technical recommendations and solutions, through the LFA. Their goal should be to anticipate State needs and address technical issues with minimal guidance and without direct assignment from the Management Team.

- Responsibility

The FRPCC Working Group on the A-Team will work together to consider the above recommendation.

Issue 11: A greater level of technical and organizational detail needs to be addressed in pre-exercise training sessions for the States. In general, FRMAC training in preparation for Salem 98 was not sufficiently detailed to adequately prepare the States. Future training must allot more time for FRMAC operations.

- Recommended Action

FRMAC must modify its training program to provide more specific information regarding the internal FRMAC structure.

- Responsibility

FRMAC

Issue 12: States and other Federal agencies require a greater understanding of the criteria FEMA uses to grant a Presidential Declaration of a Major Disaster or Emergency for a nuclear power plant or other technological emergency.

- Recommended Action

The FEMA Response and Recovery Directorate must commit the necessary resources to better define these criteria in writing, and then work with the FRERP agencies to communicate that information to the States.

- Responsibility

FEMA

Issue 13: The American Nuclear Insurers must make every effort to define the extent and limits of ANI coverage, and must communicate that information to all interested nuclear power plant emergency responders. The effect of an Extraordinary Nuclear Occurrence determination by the NRC on available insurance coverage must be better defined.

- Recommended Action

The utilities should convene workshops with the ANI staff, NRC and States to address State concerns and communicate vehicles for change. All modifications should be reflected in NUREG/BR-0230, the Response Coordination Manual (RCM).

- Responsibility

ANI, the utilities (through PSE&G), States and the NRC

III. TOPICAL DISCUSSION

The following are areas of interest that took place during the course of exercise play but do not reach the level of Major Lessons Learned.

A. General

In exercises with the complexity of Salem 98, productivity improves when all emergency facilities are activated on each day of play. In addition, it is imperative to have all facilities play using the same time sequence, although this may be difficult during FEMA-graded exercises. Having all facilities participate at the same time significantly tests all aspects of a response operation (i.e., communications, data transfer, protective action recommendations and decisions, and dissemination of public information). Unless each facility participates fully, negative training could result. This includes all State (NJ and DE), county, and utility emergency facilities.

B. Planning Considerations

States should review their plans and procedures to ensure that they address Federal resources and integration. Federal and State commitments made during the planning process should be strictly adhered to, with as little disruption as possible resulting from budget and personnel issues. In addition, States should consider including FRMAC forms in their plans.

C. Exercise Control

The exercise control team should be thoroughly knowledgeable of the development and content of the scenario. All control team members must be familiar with the rules and procedures for conducting the exercise. Exercise controllers should be prepared to take aggressive action in order to control the pace of the exercise but must be sensitive to the normal operating procedures of participants. Play should be as realistic as possible. The control team also needs to adhere to a prearranged coordination meeting schedule. In addition control team members should document all exercise activities in order prepare break messages for players on the following day.

D. Scenario Development

A multi-agency scenario development and planning team should be established well in advance of the scheduled exercise. The advance time may vary due to the nature of the exercise. For Salem 98, the States felt that 18 months was the right amount of lead time for planning. The team should include representatives from the host and supporting States (emergency management and radiation protection agencies), utility, counties, and

Federal lead and support agencies. Among its first and most important tasks, the planning team should develop and closely monitor a master schedule of all commitments and products. In developing the schedule, the team should consider allowing at least 6 months between the plume and post plume-phase exercises in order to facilitate exercise preparation. A core group from the planning team should also meet on a regular basis to assess the progress of the exercise product deadlines. In addition, because limited resources reduce the likelihood of Federal participation in practice drills and exercises, States need to be prepared to devote greater effort in preparing for practice exercises to simulate Federal play.

E. Logistics

A primary logistical support consideration of a major Federal participation exercise must be flexibility. Planning considerations for a Federal response must extend beyond facilities and communications to include accommodations, transportation, food, and a sufficient number of personnel knowledgeable about the affected area. Exercise planners should allow for a significant number of participants and observers in addition to anticipated attendees.

F. Training

The Salem 98 exercise demonstrated that it is useful to train State personnel in NRC and Federal technical and non-technical response plans and procedures. Such training should provide greater focus on specific State needs. In this case, the training was provided before the plume phase exercise, so it placed greater focus on that aspect of response. It would have been useful, for example, to have greater details on the information flow and priority development process within FRMAC. In addition, the training should provide an opportunity for State responders to train their Federal counterparts.

It is unlikely that Federal participants will be available to participate in pre-drills. This resource-dependent restriction may further complicate the preliminary working relationship between State and Federal counterparts who do not typically work together. Nonetheless, the need to conduct pre-drills for ingestion or post-plume phase exercises must be explored in the greater detail. By its nature, an exercise is designed to demonstrate capability, as well as to expose areas requiring further development. Even without the formal evaluation process, the prevailing attitude must move away from demonstrating proficiency to one of willingness to learn. Perhaps the results of the FEMA strategic program review will support this alternative approach.

IV. FACILITIES

The following are lessons learned specific to the various facilities and functions that were exercised during Salem 98:

A. Federal Radiological Monitoring and Assessment Center (FRMAC)

The FRMAC Advance Party briefing should include a plan for the initial FRMAC facility briefing, and include the intended time, place and content. In this exercise, the initial briefing appeared more an overview of FRMAC practices than specific actions required. Similarly, the initial FRMAC Director's briefing should include details of FRMAC data flow and forms. Many participants in the Salem 98 exercise found the "Action Request Form" confusing.

Federal and State decision makers had unrealistic expectations for obtaining sufficient data to develop PARs and PADs in a timely fashion. All responders need a better understanding of the time required to collect data and evaluate its quality.

The FRMAC should be viewed as a tool to collect and analyze data and should not independently recommend protective actions. The LFA is responsible for developing coordinated Federal positions regarding protective actions. This responsibility assures that such positions are take potentially competing issues into consideration before they are communicated to State decisionmakers. The LFA will use the information, data and perspectives of the FRMAC and the Advisory Team. States never relinquish responsibility for PAR development. States should consider having a State-staffed group at the FRMAC to develop PARs from the FRMAC data. This group should interact directly with the LFA and others to provide or obtain assistance in developing PARs. States should also plan to integrate State staff into each of the FRMAC functional entities to ensure that State priorities continue to be met.

Exercise preparations must include identifying logistical needs of the host organization(s) in order to allow ample time to procure supplies. FRMAC was a relatively small facility that placed great demands on the county to assure that all participants were adequately supported with space, food, drink and work supplies.

The utility's role at the FRMAC was not clearly defined during the exercise.

1. Management

The command structure and roles should be clearly defined in pre-exercise training. Federal participants should be briefed on the State concept of operations upon Advance Team arrival and before the activation of the FRMAC. The FRMAC Operations Manual

should include more specific language outlining the role of each organization at the FRMAC. The roles and responsibilities of the FRMAC Director should be better defined and communicated to others working in the FRMAC. From a logistical perspective, the FRMAC management area needs to be better insulated from the FRMAC to allow for quiet deliberation and conference calls. Managers' briefings should be held frequently. A checklist for briefings from each of the functional areas in the FRMAC should be developed and used. In addition, FRMAC management should participate in the development of a State Recovery Plan.

2. Monitoring Division

Overall, the coordination among State and Federal responders in the Monitoring Division worked well. Dispatch and tracking of individual monitoring teams were well-coordinated. Briefings by the Monitoring Division would have been of great benefit to other FRMAC participants.

3. Assessment Division

State personnel were well-integrated into the Assessment Division. FRMAC management must refrain from imparting PARs to State responders. Any potential PAR must be channelled through the LFA to ensure adequate coordination and avoid unduly influencing State decision makers on issues that are not within the FRMAC's responsibility.

4. Geographical Information System (GIS)/Data Center

Salem 98 demonstrated the positive integration of State and Federal GIS resources. However, GIS was not as useful in real time (during the course of exercise play) as had been anticipated due to time and staff limitations. A major FRMAC success was the integration of the GIS capabilities of New Jersey and Delaware.

GIS maps should be made available to all functional areas and should be date and time stamped. Assessed data should be returned to a central area for archiving into a traceable database. Improved graphic print capability and quality is also required.

5. Advisory Team on the Environment, Food and Health

The A-Team will support the State PAR development process through the LFA. In this capacity, the A-Team should provide independent, technical recommendations and solutions. They should attempt to anticipate State needs and address technical issues with minimal guidance and without direct assignment from the Management Team composed of the LFA, DOE and States. The A-Team should be forward-thinking, concentrating on issues that are not necessarily of immediate concern (i.e., return, recovery and cleanup).

The A-Team should consider developing generic plans for cleanup, recovery and return. In this exercise a significant time was spent on conceptualizing plans that could have been developed before hand.

6. Liaison Division

The FRMAC should clearly define the role of the Liaison Division. In Salem 98, this FRMAC Division was not adequately exercised.

7. Health and Safety Division

The FRMAC should clearly define the role of the Health and Safety Division. In Salem 98, this FRMAC Division was not adequately exercised.

8. Operations Division

The FRMAC Operations Division should develop tighter constraints on data flow so that tasks are not duplicated and conflicting conclusions are not drawn based on the same data. The Operations Division also should track and be accountable for the completion of tasks assigned by the FRMAC management team. While a system was in place to track issues during Salem 98, it was not always successfully employed.

B. Disaster Field Office (DFO)

1. Federal Emergency Management Agency (FEMA)

FEMA participation in a DFO was instructional. FEMA exercise participation by the Response and Recovery Division should be standardized throughout the FEMA regions to communicate their roles and responsibilities for responding to a technological event. FEMA's interaction with the ANI was enlightening on a variety of compensation issues. It identified those situations where funds from the Stafford Act would supplement those available under the Price Anderson Act. The FEMA process for evaluating the State of New Jersey's request for assistance and declaration of a Presidential Disaster was successfully demonstrated. A copy of the request and FEMA declaration is attached to this report (Appendix E). **NOTE:** FEMA play in this exercise may not reflect FEMA policy for responding to radiological emergencies, currently in review.

2. American Nuclear Insurers (ANI)

Participation by an ANI representative proved quite valuable in examining areas for further study regarding what coverage is available for a nuclear power plant accident. An issue requiring further discussion is the ANI position that environmental cleanup costs would only be covered if the NRC determines that the levels found in the environment

exceed those identified in the Response Technical Manual (RTM), Section K of NUREG/BR-0150 as an Extraordinary Nuclear Occurrence (ENO). In addition, it is not clear which areas, beyond those with ENO specified levels, qualify for reimbursement under the utility insurance plan. Other areas of interest will be explored at a follow up meeting on this issue to be scheduled by the PSE&G in 1999.

3. New Jersey Office of Emergency Management (NJOEM)

The NJOEM was an active participant in the exercise play at the DFO that led to a Presidential Declaration and a FEMA/State agreement outlining the assistance programs that would be available. Participation by FEMA, ANI, DEMA, NJOEM, and Salem County OEM revealed further areas for consideration (i.e., benefits provided under the Stafford Act for technological events versus benefits under the Price Anderson Act). Defining the Preliminary Disaster Assessment (PDA) was particularly useful. While many questions were answered regarding assistance, others were raised which will be explored at the follow up meeting mentioned above. Finally, NJOEM hosted approximately 20 observers from several States.

4. Delaware Emergency Management Agency (DEMA)

Two DEMA staff members participated in numerous discussions and observed the process for developing a Presidential Major Disaster Declaration on days 2 and 3 of the exercise. The roles and responsibilities of the participants in the DFO should be further examined, defined, and documented.

5. Lead Federal Agency (LFA)

The role of the LFA in the DFO must be clearly defined. If FEMA and the ANI are resolving issues in a systematic and collegial way, no LFA action should be necessary. However, if areas of conflict arise, the LFA should be prepared to provide a mechanism to resolve those issues. Often, that will involve working with the utility's insurance organizations, since the ANI is the utility's insurance carrier.

C. New Jersey State Emergency Operations Center (EOC)

The New Jersey EOC performed well during this exercise. The assembled staff, which was focused and systematic in its consideration of recommended protective actions, included representatives from the NJ Office of Emergency Management; NJ Department of Environmental Protection Radiation Protection Program; NJ Department of Agriculture; NJ Department of Health; and PSE&G.

The New Jersey Emergency Operations Center uses an emergency events tracking system known as the Emergency Information Tracking System (EMITS). This tracking system

kept all participants well informed of actions and requirements.

D. Delaware State Emergency Operations Center

The Delaware EOC was activated throughout Salem 98. The EOC staff provided command and control, operations management and implementation, public information and accident assessment. Representatives from DEMA, the Division of Public Health, the Division of Water Resources, the Delaware Department of Agriculture, the U.S. Department of Agriculture/Farm Service Agency, Public Service Electric and Gas and the NRC worked efficiently together to provide excellent support and coordination. The staff coordinated information flow and protective action decision making with appropriate State agencies, as well as with the EOF, ENC and New Jersey.

The DEMA Director's staff, acting on behalf of the Governor, made protective action decisions based upon this input. Key DEMA decision-makers, as well as the AAAG Chairperson and the NRC representative, participated in the FRMAC Advance Party meeting by conference call using the NRC communications bridge. The operations and public information staffs implemented the PADs and provided public information accordingly. The operations staff tracked exercise events using a computerized events log system.

E. New Jersey Technical Assessment Center (TAC)

The TAC consists of staff from a wide range of State and Federal agencies. The TAC Management and Assessment Team consists of staff from the DEP's Radiation Protection Program. The Management and Assessment Team is supported by the following DEP organizations, the Division of Fish, Game, and Wildlife; the Division of Parks and Forestry; the Bureau of Safe Drinking Water; and the Bureau of Marine Water Classification and Analysis. In addition, the TAC is supported by the New Jersey Department of Health and Senior Services and the New Jersey Department of Agriculture. The NRC, DOE's Radiological Assistance Program (RAP), and the USDA (through the Salem County Extension Service) also support the TAC staff during the initial post-emergency assessment.

The New Jersey TAC was activated on Day 1 of the exercise. The TAC assessed and evaluated post-emergency conditions following the accident scenario. These data included fixed-wing flyover data collected by the DOE's Aerial Measuring System, laboratory results from environmental samples collected during plume exposure and samples collected following the deposition of the radioactive plume. The field monitoring teams also provided deposition traversal data. The TAC Management and Assessment Team then used this information to begin to characterize the area affected by radiological deposition.

Given this assessment, the TAC developed an initial environmental monitoring plan to determine the extent of radiological contamination. This plan included radiation monitoring, agricultural, water, and dairy products sampling. The TAC staff worked effectively to identify priorities for the sampling teams. The environmental monitoring plan was discussed with staff from the State EOC and was approved for implementation (see appendix B). The TAC Management and Assessment Team requested and received sufficient environmental data during the morning to establish both the restricted area and the buffer zone. The TAC staff then used the environmental data to determine if additional protective actions were necessary to protect the public health and safety. The TAC staff also developed a variety of PARs and forwarded them to the State EOC for consideration by the Governor or authorized representative.

The activities at the TAC on Day 1 of the exercise culminated with the FRMAC Advance Party meeting. Staff from the FRMAC Assessment and Monitoring Teams met with New Jersey and Delaware assessment staffs to discuss a preliminary environmental monitoring plan to be used by the FRMAC. Each State discussed its priorities for radiation monitoring and sampling. The FRMAC Advance Party had developed an initial plan, which was presented at the meeting and revised following discussions with the representatives from New Jersey and Delaware. Through teleconferencing with the N.J. State EOC, the FRMAC Advance Team, and the States of New Jersey and Delaware were able to develop and approve an initial environmental monitoring plan for implementation by the FRMAC.

Overall, the TAC functioned well throughout Salem 98, including the FRMAC Advance Party meeting. Response command and control were clearly defined. PARs were developed based upon field data and were promptly forwarded to State decision makers. The development of the initial environmental sampling plan was well coordinated between the various agencies represented.

F. Delaware Accident Assessment Advisory Group (AAAG)

The AAAG staff consisted of representatives from DEMA, the Delaware Division of Public Health (DPH), Division of Water Resources (DWR), Delaware Department of Agriculture (DDA), U.S. Department of Agriculture Farm Service Agency and PSE&G. AAAG staff provided an initial accident assessment and developed PARs which were relayed to the State decision makers, operations, and public information staff.

The AAAG functions as the lead State accident assessment staff for radiological incidents involving nuclear power plants. The AAAG provided initial and post-accident assessment of technical data, plant and radiological conditions, and developed PARs. The AAAG Chairperson provided accident assessment and PARs to the State EOC Director and key staff during the exercise. The AAAG requested and used DOE monitoring data to assess possible radiological ground deposition, and developed an

initial sampling plan in conjunction with the DDA and USDA representatives. Post-emergency PARs were developed and provided to the decision making staff, which acted in conjunction with the Governor's office.

During the first day of the exercise, the AAAG was activated and functioned at the State EOC in New Castle, Delaware. The AAAG staff reviewed the initial plant and radiological information for the emergency phase of the exercise and validated the pre-existing PARs and PADs in conjunction with DEMA decision makers. Data was posted on maps and reviewed.

The AAAG staff developed an initial environmental monitoring plan (see Appendix B) and developed additional post-plume phase PARs, which were later presented to the State EOC decision makers.

The initial sampling plan included ambient radiation monitoring, as well as milk, water, and agricultural sampling. Sampling priorities were established. The DDA and USDA/FSA agricultural representatives, used a computerized State-wide database of agricultural growers and producers to assist with establishing the sample priorities. Environmental sampling teams from the Delaware National Guard (DNG) participated with DOE, New Jersey, and PSE&G teams on Day 2 of the exercise and were controlled from the BNE FCP.

The additional post-plume phase PARs developed by the AAAG were presented to the State EOC decision-making staff, acting in conjunction with the Governor's staff. The decision making staff participated in the FRMAC Advance Party meeting with representatives from New Jersey and the Assessment and Monitoring Teams by tele-conference through the NRC's Operations Center communications bridge. Delaware decision makers presented the State-developed PADs and initial sampling plan. Following a thorough discussion, an integrated environmental monitoring plan was developed and approved. This plan was later used by the FRMAC.

During Days 2 and 3 of the exercise, the entire Delaware AAAG relocated to the FRMAC in Woodstown, New Jersey. In this manner the AAAG staff fully integrated with the FRMAC in all functional areas.

The team performed accident assessment efficiently and effectively and worked well with their New Jersey and Federal counterparts at the FRMAC.

G. Emergency News Center (ENC)

Although communication and information flow are best demonstrated in a full participation exercise, the ENC was not scheduled as a full participation facility. The ENC was activated on two of the three days of the exercise and included briefings for the

press. Federal, State, and local organizations participated in the ENC. If a full-participation news center cannot be arranged during the exercise, it is recommended that an out-of-sequence "full participation" news center demonstration be conducted to address ingestion concerns.

In all likelihood, there may be coverage of the exercise by the real media. This can be a positive experience for all involved but adequate plans to accommodate media interest must be taken into consideration during the exercise planning process.

H. Emergency Operations Facility (EOF)

Because this exercise concentrated on the period following termination of the release, the EOF concentrated on site recovery issues. The licensee team tried to anticipate problems and concerns that might occur, and developed appropriate contingency plans. However, the EOF's lead emergency response personnel may have been too aggressive and should exercise a more graduated approach in developing and communicating an effective recovery plan. The lead utility, State, and Federal emergency response personnel spent too much time in isolated briefings. As a result, they did not keep the rest of the EOF apprized of the current status and decisions.

I. Forward Command Post (FCP) and Field Monitoring Teams (FMT)

Three fundamental goals were identified for the Day 1 operation of the FCP and the dispatch of the FMTs:

- (1) Integrate the representatives of the EPA, the DOE, the Salem County Office of Emergency Services, the Delaware National Guard, and the New Jersey Department of Environmental Protection to create as many FMTs as possible. Integrate State and Federal personnel sharing lead responsibility within the FCP.
- (2) Successfully dispatch the integrated FMTs to collect ingestion pathway samples.
- (3) Achieve effective communication between the FCP and each of the FMTs to ensure that the FCP has complete command and control of the FMTs at all times in order to protect the health and safety of the team members and to collect the necessary samples to accurately characterize the deposition.

As measured against these goals, the operation of the FCP and the FMTs was highly successful.

Day 2 of the exercise began with a briefing for all participants, followed by training on the procedures for using the EPA's field sampling equipment. Concurrent with the training, the FCP leads met and agreed upon a shared leadership role between the EPA

and the State of New Jersey. The leads then assigned staff to create nine FMTs, and paired each team with an available vehicle. Each FMT consisted of at least one Federal, one Delaware, and one New Jersey representative. Three FMTs also included a representative from Salem County. A Federal representative was designated as the lead for each FMT. After the FMT training was completed, the roster assignments were announced. Thirty-four participants were assigned to staff the FCP and 9 FMTs. Each FMT was assigned a field vehicle, EPA field sampling equipment, and a portable radio transmitter/receiver.

Each team was individually briefed by the FCP leads and dispatched to an assigned sampling site. After all nine teams were dispatched, completed their sampling assignments, and returned to the FCP, second sampling assignments were made. Consequently, each FMT was dispatched twice to collect samples at two different locations. Samples and chain-of-custody forms were transferred to the DOE's mobile laboratory when the FMTs returned to the FCP. All teams were successful in maintaining communication with the FCP via portable two-way radios.

The exercise demonstrated that integrated teams can and did successfully work together during the post-plume phase of an event with minimal organizational startup time. Unfamiliarity with the FRMAC's standard sampling procedures was the most significant difficulty to overcome; therefore, other States may want to review the Federal procedures before post-plume exercises which involve integrated Federal/State FMTs.

V. Summary

Salem 98 was the largest nuclear power plant post-plume phase exercise since the 1993 exercise at Fort Calhoun in Nebraska. Salem 98 was a 3 Day exercise involving participation by the States of New Jersey and Delaware and associated State agencies. PSE&G was the hosting utility, and Salem County the host county. Federal participation included the NRC, FEMA, DOE (RAP, BNL, and FRMAC), EPA, USDA, and HHS. In addition, the ANI participated, adding a dimension to the exercise not experienced often enough. This was a stand-alone post-plume exercise, which took place 2 months after the evaluated plume phase exercise held on March 3, 1998. The State of New Jersey was evaluated by FEMA Region II for ingestion decisionmaking. Delaware fully participated in this exercise even though it's 6-year ingestion exercise took place in 1997.

This exercise focused on the integration of State and Federal resources in response to a major event at a nuclear power plant. In that light, it was a success. State and Federal responders worked within multiple facilities including the FRMAC and DFO¹, to assess data and ultimately develop PARs. These PARs were then communicated to decisionmakers who, in turn, made PADs. Two States were involved in the decision-making process which can add a complicating dimension to that process. These States worked well together with the common goal of protecting the health and safety of the public, regardless of the State in which the event occurred. This is of particular importance, since there are 19 sites in which multiple States share the 10-mile emergency planning zone (EPZ) and must coordinate decisions on protective actions. The Federal effort, coordinated by the NRC as LFA, ensured that State needs were augmented and assistance was provided by a number of Federal agencies.

Salem 98 proved that integration of State and Federal resources can and should take place in plume and post-plume phase events to allow for necessary actions by State and local authorities to adequately protect the public from offsite consequences as a result of a nuclear power plant incident of great magnitude. It is no secret that most State and local resources will quickly be overwhelmed in an event such as the one postulated for Salem with a deposition beyond 30 miles.

The States of New Jersey and Delaware, along with PSE&G and Salem County are to be commended for embarking upon this effort in order to learn by the experience and solidify relationships among the many Federal, State, and local government entities. Should an event of any magnitude occur at a nuclear power plant in New Jersey or Delaware, those States will be better prepared to respond.

¹NOTE: FEMA play in this exercise may not reflect FEMA policy for responding to radiological emergencies, currently in review.

Appendix A Map

Salem IPX **Exercise Date May 12, 1998** **Deposition**

Map produced by Bechtel Nevada
 using DOE FASER GIS. Base data
 is 1:100K ESRI StreetMap Data.

Bechtel Nevada

Appendix B

Initial Sampling Plans

New Jersey Department of Environmental Protection

Post Emergency Initial Sampling Plan

- ◆ State field monitoring team is traveling Interstate Route 295 South. The team's mission is to identify the location where radiological deposition begins and where background radiation levels reach 50 uR/hour and 230 uR/hour.
- ◆ The TAC has requested that a State field monitoring team also travel the New Jersey Turnpike to identify the location where radiological deposition begins and where background radiation levels reach 50 uR/hour and 230 uR/hour.
- ◆ The BNE Forward Command Post (FCP) was directed to dispatch field monitoring teams to take milk samples in Stow Creek, Greenwich, South Harrison, and Upper Pittsgrove Townships (Highest Priority).
- ◆ The FCP was directed to dispatch field monitoring teams to take asparagus, spinach, strawberry, lettuce, and green pepper samples.
- ◆ The BNE Technical Assessment Center (TAC) requested the FCP to set up air monitoring stations at locations where background radiation levels were twice normal background. These air monitoring stations should be located around the perimeter of the buffer/restricted zones.
- ◆ The FCP was directed to dispatch field monitoring teams to collect water samples from the Woodstown Water Department, Wenonah Water Department, West Deptford Water Department and the Washington Township Municipal Utility Authority.
- ◆ The BNE TAC requested that all air samples taken at fixed monitoring locations be collected and sampling media be replaced.
- ◆ The BNE TAC directed the FCP to collect honey samples.

Delaware Emergency Management
Post Emergency Sampling Plan Outline
Reference: REP SOP 303, Attachment E4.

Plan for May 5, 1998:

Data Needs and Rationale.

1. Determine the radioactivity levels in the 0-5 mile Evacuation Zone, and the 5-10 mile range of the N and NNW sectors.
2. Identify any "hot spots" encountered.
3. Determine if re-entry is appropriate for the General Population and Special Populations.
4. Determine if and when to release farm animals from the stored feed and water requirement.
5. Determine when to allow farmers re-entry (temporary) or return (permanent) to their farms for feeding, milking and other maintenance.
6. Sample agriculture products to determine if and when they should re-enter the market.

Available Resources:

1. 2 Field Monitoring Teams: Delaware National Guard (DNG) Field Team #1, and Field Team #2. Three to four persons per team, with vehicle, communications, complete kit and instrumentation per team.
2. 3 Fixed-site HPIC real-time monitors situated within the 10-mile EPZ. Each monitors gamma radiation at 10 feet above ground level, and transmits readings to the AAAG.
3. Fixed site TLD network in Delaware maintained and read by both NRC and PSE&G.

Description and Assignments:

DNG Field Team #1:

1. Beginning at Checkpoint Y-7 (Rte 9 and Rte 72), proceed south taking closed-window readings at each checkpoint (south to checkpoint Y-15 at Rte 9 and Thomas Corners). On

roads leading east to the river, take readings as far east as possible.

2. Y-8 (Delaware City): Sample air, soil, and water from the canal.
3. Y-9 (Reedy Point Bridge): Sample air, soil, and water.
4. Meck Farm (town of St. George): Sample soil, vegetation, milk and stored feed.
5. Y-10 (Port Penn): Sample air and soil.
6. Emerson Farm: Sample air, soil and vegetation.
7. Y-11 (Augustine Beach): Sample air, soil and water.
8. Y-12 (Bay View Beach): Sample air, soil and water.
9. Y-13 (Rte 9 and Silver Run): Sample air , soil and water.
10. Y-14 (Rte 9 and Appoquinimick River): Sample air, soil and water.
11. On all roads running east of Route 9, travel as far east as possible, then sample soil and vegetation.
12. Beach locations: Sample sediment and water.

DNG Field Team 2:

1. Beginning at checkpoint Y-22 (Rte 9 and Rte 6), proceed north to Y-15 (Thomas Corners), taking closed window readings at each checkpoint.
2. Collins Beach: Take ambient readings, sample vegetation, sediment and water.
3. Y-19 (Rte 9 and Rte 454): Sample air and soil.
4. The Unruh Farm (near Taylors Bridge): sample air, soil, vegetation, stored feed, and milk.
5. At Rte 9 and Taylors Bridge: Sample Air and water from Blackbird Creek.
6. Y-16 (Rte 9 near Stave Landing): Sample air and water.
7. Liston Point: Sample soil and vegetation.

8. Fenimore Landing: Sample soil, vegetation and water.
9. Jester Farm: Sample air, soil, vegetation.
10. Thomas Landing: sample soil, vegetation and water from Appoquinimick River.

TOTAL SITES: 18 (14 pre-designated, 4 additional).

TOTAL SAMPLES: AIR: 21 SOIL: 20 WATER: 13 MILK: 2 VEGETATION: 4.

SAMPLE PRIORITY: Milk, vegetation (wheat, alfalfa, barley, pasture grass), water (standing water, fishing areas, flowing water), soil.

Plan for May 6, 1998.

Delaware Field Teams will link up with NJ and FRMAC Field Monitoring Teams at the Salem County Forward Command Post, and conduct assigned missions.

FLYOVERS.

Flyovers covering the State of Delaware within the 10-mile EPZ are requested to detect any windborne contamination, or to confirm that these areas are uncontaminated.

ENVIRONMENTAL RADIATION MONITORING SYSTEM.

Three fixed-site HPIC gamma radiation monitors provide continuous real-time ambient radiation readings which are transmitted to the AAAG at DEMA. One monitor also provides real-time wind speed and direction.

Federal Radiological Monitoring and Assessment Center

Advance Team Initial Monitoring and Assessment Plan

- ◆ Team 1: Characterize the edge of the deposition area in Emergency Response Planning Area 2.
- ◆ Team 2: Characterize the area of deposition along a ten mile arc using the following roads; Fort Mott Road to Lighthouse Road, Lighthouse Road to State Highway 49, State Highway 49 to Toll Road and then characterize Pennsville to include Penns Grove.
- ◆ Team 3: Characterize the area of deposition along a ten mile arc using the following roads; Jericho Road northwest from Macanippuck Road, to Quinton-Marlboro Road, to North Bunden Hill Road, to Quinton-Elmer Road, to Welchville-Alloway Road, to State Highway 540, to Salem-Woodstown Road north on Sharptown Road, to Pointers-Swedesboro Road and then to the New Jersey Turnpike.
- ◆ Team 4: Characterize the deposition within the buffer zone defined by the BNE TAC.
- ◆ Team 5: Characterize the area of deposition using the following roads; US Highway 130 from US Highway 40 north, to State Highway 44, to Broadway Street, to Crown Point Road then to Interstate Highway 295.
- ◆ Team 6: Characterize the area of deposition using the following roads; Pedricktown Road from US Highway 130, to Auburn Woodstown Road, to State Highway 45, to Mariton Road, to Pointers-Swedesboro Road, to US Highway 40, to Harding Road, to Pennsville-Auburn Road, to Pointers-Auburn Road, to Haines Neck Road, to Cheney Road, to Mannington-Yorktown road then to Yorktown Road.
- ◆ Team 7: Characterize the area of deposition using the following roads; State Highway 322 east from Conchester Highway (Delaware), to Main Street, to State Highway 45, to Salem-Woodstown Road then to State Highway 540.
- ◆ Team 8: Characterize the area of deposition using the following roads in Delaware; New Castle Avenue from US Highway 40 to Interstate 495, to Post Road, to West Second Street, to East Fourth Street, to Industrial Highway then to Philadelphia International Airport.

- ◆ Team 9: Characterize the area of deposition using the following roads in Delaware; New Castle Avenue from US Highway 40 south to Wilmington Road, to West Seventh Street, to River Road, to State Highway 9, to Saint Augustine Road, to Silver Run Road, to Taylors Bridge Road, to Fleming Landing Road and then to Road 317.
- ◆ Team 10: Characterize the area of deposition using the following roads; the New Jersey Turnpike from State Highway 322 to Camden. Characterize the Camden area.
- ◆ In-Situ Team: Characterize the area of deposition using the following roads; south on the New Jersey Turnpike from State Highway 322 to Deepwater-Slopes Corner Road, to State Highway 540, to Salem-Woodstown Road, to Walnut Street. Continue south on Walnut Street until administrative turnback values are reached (20 mR/hour or 100 mRem on self reading dosimetry).
- ◆ Helicopter: Perform a thirty mile transit of the deposition area with 250 foot line spacing.
- ◆ Helicopter: Perform a radial transit away from and then toward the plant on a 11.25 degree radial to a thirty mile arc then radial away from and toward the plant from Oyster Cove to Woodbury City.

Monitoring and Sampling: Monitoring locations should include pre-established State, local, and utility fixed monitoring sites. Soil and vegetation samples should be collected upon contact with deposition (twice background) and then every order of magnitude change in exposure level unless instructed otherwise.

Appendix C

FRMAC Advance Party Checklist

FRMAC Advance Party Meeting Checklist

o INTRODUCTIONS

[Identify State, LFA, tribal, and local response leaders, and introduce FRMAC leaders]

o STATUS OF EMERGENCY ON-SITE (LFA and/or facility owner/operator)

- Status of Release

Has release terminated? _____

How many releases have occurred? _____

What is estimated source term(s)? _____

What are dominant isotopes? _____

What was wind direction during release(s)? _____

What on-site monitoring/sampling results are available? _____

- What actions have been taken to stop and/or mitigate the release(s)? _____

- Is situation stable? _____

o STATUS OF EMERGENCY OFF-SITE (State and/or local response organizations)

- What protective actions have been taken and/or are pending? _____

- Who has the responsibility for initiating /amending public protective actions? _____
_____ [i.e., State, tribal, county, local authorities]

- Are the protective action guides in use the same as those for EPA/USDA/FDA? _____

- Are atmospheric prediction plots available? _____ Types? _____

- What significant response actions have been taken since release? _____

- What major activities are planned within the next twelve hours? _____

- Are there significant confounding conditions which could impact field operations? _____

[i.e., other hazardous materials associated with release(s), flood or earthquake
damage, major road work, personnel security concerns]

- Significant problems encountered during response. _____

o AREAS OF CONCERN

- State (tribal) concerns: _____

- LFA concerns: _____

- Local concerns: _____

o RESPONSE PRIORITIES

- State (tribal) priorities: _____

- LFA priorities: _____

- Local priorities: _____

**o FRMAC ORGANIZATION, CAPABILITIES, AND OPERATIONS BRIEFING
(FRMAC Director)**

- Identify DOE Senior Energy Official: _____

- Identify DOE response groups present: _____

- Explain DOE command structure:

- Provide brief overview of FRMAC operations:

Organization chart/functional areas

Timing for resource arrival and operational status

Field capabilities, including support from other DOE response assets;

[i.e., ARAC, RAP, AMS, REAC/TS]

Data flow and management

Expected products

- Relationship with Advisory Team on Environment, Food, and Health

o ESTABLISHMENT OF COMMUNICATIONS AND LIAISONS (FRMAC Director)

- Identify primary State radiological decision-maker: _____

- Identify lead State representative to FRMAC: _____

- Identify lead LFA representative to FRMAC: _____

- Identify lead tribal/local representatives to FRMAC: _____

- Identify other Federal agency representatives, as appropriate: _____

- Determine placement needs for liaison personnel for State, LFA, local, and FRMAC: _____

- Identify State and local contacts to assist FRMAC in locating facilities for FRMAC operations center, air cargo delivery, field staging areas, etc.: _____

- Identify State/local contact to assist AMS flight operations, for landing sites, fuel availability, radio frequencies, etc.: _____
- Identification of State and local contacts to assist FRMAC in obtaining transportation, lodging, subsistence, and other logistical support for FRMAC personnel: _____

o **INTEGRATION OF TECHNICAL RESPONSE (FRMAC Director)**

- Determine intent of State/local response groups regarding integration of their technical efforts into FRMAC: _____
- Identify State, LFA, and local personnel to work with FRMAC in developing an initial FRMAC Monitoring and Sampling Plan, to include definition of the initial AMS survey mission: _____

- Identify State/local and LFA personnel to work with FRMAC dose Assessment: _____

- Summary of FRMAC activities planned within the next 12 hours: _____

- Time and location of next meeting: _____

Appendix D

FEMA/State Agreement (New Jersey/Delaware)

Exercise

Exercise

Salem/Hope Creek Ingestion '98
Federal Emergency Management Agency
Disaster Field Office
Industrial Park
Building 128
Bellmawr, New Jersey

Telephone: (609)769-2900 Ext. 22 Fax: (609)769-4229

FEMA-DR-Salem/Hope Creek Ingestion NJ
Situation Report #1

Reporting Period: 9:00am 5/5/98 to 4:00pm 5/6/1998

Operational Priorities:

- FEMA and the State are meeting with the utility's insurer, ANI, to determine what assistance ANI can provide. It appears that beyond reimbursement for out of pocket expenses, ANI assistance may be restricted.
- Coordination with Delaware is ongoing; A Delaware Emergency Management Agency official is co-located with FEMA and the State.

Plant Status:

The General Emergency at Salem Unit 2 was terminated and PSE&G entered into recovery status at 6:00 am, Wednesday, May 6, 1998. The plant is stable and no radiological release is in progress, however, the plant will not operate for a considerable period of time. The area affected includes ERPAs 1, 2, 3, 4, 5, 6, and 7 and areas north-northeast of the EPZ.

Impact:

The State has indicated over 15,000 persons are housed in Congregate Care Centers. FEMA estimates between 14,000 to 17,000 evacuated and sheltered, and it is estimated that some evacuees will be out of their homes for weeks/months before the possibility of returning home.

Within the affected area, farmers cannot sell milk. Vegetation cannot be eaten and must

Salem/Hope Creek Ingestion '98

be disposed of in sanitation waste sites. Surface water within the affected area cannot be consumed. Businesses in the affected area are closed.

The State estimates \$2.6 Billion in public damages and approximately \$2.5 million in Individual Assistance. The Disaster Unemployment Assistance estimate is currently being completed.

The State also requested activation of the Hazard Mitigation Grant Program, Crisis Counseling and the SBA.

Status of Declaration:

The Governor's request for a declaration of a major disaster was received May 6, 1998. After careful review by FEMA personnel, it was determined that effective response was beyond the capability of the State of New Jersey and local governments. Therefore, the President declared a major disaster and Marianne C. Jackson was named the Federal Coordinating Officer.

Potential Federal Assistance:

Based on our discussion with State and Federal officials, the following are the types of State and Federal assistance, which may be applicable for this event:

- American Nuclear Insurance--they represent PSE&G and will pay for immediate out-of-pocket expenses. Claims for housing or business damage may have to go through a claims process. PSE&G first layer of coverage is \$200 million. Additional coverage up to \$8 billion kicks in when \$200 million is exceeded. ANI/PSE&G will establish a local claims office and an 800 number.

Additional Federal assistance for non-radiological support may be available through FEMA and other Federal agencies. They may include the following:

- Temporary Housing---transient accommodations, rental checks, mortgage assistance, trailers, HUD programs.
- DUA and job training
- Crisis Counseling
- Individual and Family Grant program--personal property losses.
- Legal Aid
- IRS Assistance (casualty loss)
- VA/SSA counseling/checks.
- Sheltering
- Donations (clothing)

Exercise**Exercise****Salem/Hope Creek Ingestion '98**

- Food supplies/food stamps
- Water
- Debris Removal (contaminated soil)/Trash
- Emergency Protective Measures (decontamination)
- Establish detours.
- Public infrastructure (clean/replace).
- Impact on public utilities.
- Hazard Mitigation (HMGP) assistance to purchase /demolish contaminated houses.
- Loans (SBA,USDA) to purchase other homes, economic injury.
- Crop Loss.
- Impact on cows, loss of milk.
- Commerce EDA-economic dislocations.
- HUD-CDBG- purchase houses/ construct facilities.
- USACE contaminated flood control projects.
- USDA/FDA- assess food quality.
- Community Relations/State Community Affairs.
- State Banking Department.
- State Insurance Department
- State Health and Senior Services

Other:

- SBA considers contaminated structures eligible for loans.
- USPHS reported they had portable clinics and inflatable hospitals but will not be needed in this event.
- EPA ruled that nuclear power plant damage is not eligible for reimbursement under the Superfund.
- Homeowners' Insurance does not cover nuclear power plant damage.

Marianne C. Jackson
Federal Coordinating Officer

Lt. Lou Mascioli
State Coordinating Officer

Appendix E
Request for Assistance and Declaration of a Presidential
Disaster

THIS IS A D R I L L

May 6, 1998

The President
The White House
1600 Pennsylvania Avenue, NW
Washington, D.C. 20500

Through: Ms. Lynn Gilmore Canton
Regional Director
FEMA Region II
26 Federal Plaza, Room 1337
New York, New York 10278

Dear Mr. President:

It is with utmost urgency that I request that you expedite a declaration of a major disaster for Salem, Cumberland and Gloucester Counties in the State of New Jersey under the provisions of Section 401 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288, as amended and implemented by 44 CFR Part 206.36. The nuclear emergency at the Salem/Hope Creek Nuclear Generating Station has caused unprecedented disruption of State, county and local infrastructure since the period of the radiation release on May 4, 1998. More than fourteen thousand persons from six municipalities in Salem County have been evacuated. Approximately eleven hundred persons in Cumberland County were sheltered at their residence. Over 15,000 persons are housed in Congregate Care Shelters. Salem County and the governments of 20 evacuated municipalities have been temporarily relocated to Rowan University. The evacuations mandated by this nuclear emergency have exhausted the resources of both Salem, Gloucester and Cumberland Counties.

To address the anticipated demands for assistance, the State Emergency Operating Center was activated on May 4, 1998, and the provisions of the State's Emergency Operations Plan were implemented. The New Jersey National Guard and the emergency mechanisms of all State agencies were activated and assistance packages pre-positioned in the three affected counties.

THIS IS A D R I L L

The President

Page 2

May 5, 1998

Evacuation and sheltering decisions were implemented and liaison established with our counterparts in FEMA Region II. Compacts with Delaware and Pennsylvania were reviewed and potential areas of support coordinated.

At 1200 hours on May 4, 1998, I issued Executive Order No. 90, declaring a State of Emergency for this event. The State of Emergency was limited to Salem, Cumberland and Gloucester Counties.

Given the magnitude of this radiological emergency, I believe that the State, county and local government's ability to protect the lives and property of our citizens has been compromised. I am convinced that only massive amounts of Federal assistance can avert a catastrophe developing from the effects of this serious nuclear emergency. I am increasingly concerned with the immediate response needs of the citizens in the affected and adjacent areas and request the immediate deployment of a Rapid Needs Assessment Team to work with my Emergency Management Staff.

The following information is furnished on the nature and amount of State and local resources that have been or will be used to alleviate the conditions of this disaster:

New Jersey State Police: Provided troopers for implementation of access control plans and to coordinate traffic diversion plans and to provide highway safety.

NJ Office of Emergency Management: Activated the Radiological Emergency Response Plan and the Emergency Operations Center to provide and coordinate State response and recovery assistance to the affected area. Personnel from several bureaus were assigned to the Emergency Operations Centers in Salem, Cumberland and Gloucester Counties.

NJ Department of Environmental Protection: Dispatched radiation monitoring teams to conduct surveys to determine full parameters of the affected area, as well as to determine extent of contamination to the vegetables, milk, water and other products in the affected area.

NJ National Guard: Provided water buffaloes to Salem, Cumberland and Gloucester Counties for distribution of potable water to residents. National Guard personnel were used to provide security in the affected area as well as assisting in access control and traffic control.

THIS IS A D R I L L

The President
Page 3
May 5, 1998

NJ Department of Transportation: Activated its Traffic Operations Center South to coordinate resources, requests and functions and provided traffic control devices (signs, arrow boards, barricades and barrels) to the affected areas.

NJ Department of Banking and Insurance: Provided personnel to both Salem, Cumberland and Gloucester Counties to handle inquiries concerning insurance coverage.

NJ Department of Community Affairs: Provided personnel to the county EOCs to assist residents in obtaining information concerning housing assistance programs.

NJ Department of Health: Provided technical assistance in the evaluation of radiation levels in family dwellings and provided consultation and guidance related to consumption of food products.

Based on the initial unsubstantiated damage assessment results from county and local governments, I conservatively estimate damage to the public sector to be in excess of \$ 4.6 billion. The human needs toll of this disaster is still being evaluated but has already severely taxed our response capabilities. Available data on the public and private sector impact of this emergency are included as attachments to this letter. These figures are expected to rise dramatically as our emergency response staff continue their monitoring.

I am preparing letters of intent to the Federal Department of Agriculture to seek assistance with damages sustained to the State's farming industry. Similarly, I have prepared a letter to the PSE&G, owner of the Salem plant, to request that representatives from the American Nuclear Insurers respond immediately to the NJ State EOC to provide assistance. Additionally, I have determined this incident is of such severity that effective response is beyond the capabilities of the State and the affected local governments and that supplementary Federal assistance is essential. I am specifically requesting assistance pursuant to the Public Assistance Grant Program, the Hazard Mitigation Grant Program, and all sub-programs of the Individual Assistance Program to include the Disaster Housing Program, Individual and Family Grant Program, Crisis Counseling Program, Small Business Administration Disaster Loan Program, and the Disaster Unemployment Assistance Program.

I certify that, for this major disaster, the State and local governments will assume all applicable non-Federal share of costs required by Public Law 93-288, as amended. I respectfully request that in light of the devastation inflicted upon Salem, Cumberland and

THIS IS A DRILL

The President

Page 4

May 5, 1998

Gloucester Counties in the State of New Jersey by this nuclear emergency, consideration be given to establish the Federal share for the disaster grant programs for this disaster at 90% instead of the 75% statutory rate. Total expenditures for the non-Federal share are expected to exceed \$100,000,000.00 in accordance with Attachment D.

I have designated Major Thomas P. Davies of the New Jersey Office of Emergency Management, as the Governor's Authorized Representative for this request. He will work with the Federal Emergency Management Agency to develop the damage assessments and may provide further information or justification on my behalf.

Sincerely,

Christine Todd Whitman
Governor

Enclosures

THIS IS A D R I L L

Enclosure A

Estimated Requirements for Individual Assistance

County	Individual & Family Grants (Number and Amount)
Salem	5,500 @ \$16, 500,000
Cumberland	263 @ 789,000
Gloucester	2400 @ 7,200,000
TOTAL	8163 @ \$24, 489,000

THIS IS A DRILL

Enclosure B

Estimated Requirements for Public Assistance

Classification	Salem	Cumberland	Gloucester	State Agencies	TOTAL
Category A	0	0		0	0
Category B	\$500,000,000	\$200,000,000	\$400,000,000	\$200,000,000	\$1,300,000,000
Category C	\$	\$			
Category D	0	\$			
Category E	\$150,000,000	\$90,000,000	\$100,000,000	\$130,000,000	\$470,000,000
Category F	0	\$			
Category G	\$300,000,000	\$100,000,000	\$200,000,000	200000000	\$800,000,000
TOTAL	\$950,000,000	\$390,000,000	700000000	\$530,000,000	\$2,570,000,000

Estimates reflect total eligible costs before any cost sharing.

THIS IS A DRILL

Enclosure C

Estimated Requirements for Other Federal Agency Programs

County	SBA Loans	Department of Agriculture	FHWA	ED School Grants	COE
Salem	\$	\$0		\$0	\$0
Cumberland	\$	0	*	0	\$0
TOTAL	\$	\$0	\$*	\$0	\$

*Estimates pending.

THIS IS A DRILL

Enclosure D

Governor's Certification

I certify that for this current disaster, State and local government expenditures and obligations will include the non-Federal share of costs required by PL 93-288, as amended. As Stated in my basic letter, and based on information available at this time, tabulation of these estimated expenditures and obligations are as follows:

<u>Category</u>	<u>Amount</u>
<u>Individual Assistance:</u>	
Individual and Family Grants	\$5,088,000
<u>Public Assistance:</u>	
Category A - Debris Clearance	\$0
Category B - Protective Measures	\$1,300,000,000
Category C - Road Systems	0
Category D - Water Control Facilities	0
Category E - Public Buildings and Equipment	\$470,000,000
Category F - Public Utilities	0
Category G - Other (not above)	\$800,000,000
TOTAL:	\$2,570,000,000
GRAND TOTAL:	\$37,515,000

THIS IS A DRILL

Appendix F

Exercise Break Messages

III. Scenario Summary (New Jersey/Delaware/PSE&G)

A. Day 1 (break message)

NEW JERSEY/DELAWARE FEDERAL INGESTION

EXERCISE

BREAK MESSAGE'#1

The following information describes the activities and events which have occurred from 0900 on May 4, 1998, until 0800 on May 5, 1998. This information may be used by exercise participants as reference materials concerning events leading to the start of the New Jersey /Delaware Federal Ingestion Exercise.

SALEM UNIT 2 PLANT CONDITIONS

At 08:25 an ALERT was declared based on high winds (tornado) damaging the Reactor Water Storage Tank and the Auxiliary Feedwater Storage Tank (EAL 9 6.2).

At 10:45 a small break LOCA occurred, resulting in a manual Reactor Trip and Safety Injection. Loose parts were detected in the core and the High Range Containment Radiation Monitoring indicated that the fuel cladding barrier was damaged.

At 11:00 a Site Area Emergency was declared based on the loss of the fuel and RCS Boundaries.

At 11:55 a design basis loss of coolant accident (LOCA) occurred, uncovering the core momentarily increasing containment dose rates to $> 10,000$ R/hr.

At 11:56 a containment pressure relief isolation valve located outside containment, failed open creating a radiological release path to the atmosphere.

At 12:05 a General Emergency was declared based on the loss of Fuel Cladding, Reactor Coolant System, and Containment Boundaries (EALs 3.1.5, 3.2.4, and 3.3.3.b).

At 14:45 the radiological release path was isolated terminating the release. A radiological release continued due to a cleanup of the Auxiliary Building until 16:00.

At 16:00 the effluent monitors indicated the radiological release values dropped below technical specifications.

PROTECTIVE ACTION RECOMMENDATIONS (PARs)

Public Service Electric and Gas (PSE&G) issued a PAR at 12:05 on May 4th, to evacuate all sectors 0 - 5 miles, evacuate downwind sectors N, NNE, NE, 5 - 10 miles, and shelter all remaining sectors 5 - 10 miles.

The New Jersey Bureau of Nuclear Engineering (BNE) issued a PAR at 12:10 on May 4th, to evacuate all sectors 0 - 5 miles, downwind sectors N, NNE, NE, 5 - 10 miles, and shelter all remaining sectors 5 - 10 miles.

The Extension Service Agent in Salem County, with support from the New Jersey Department of Agriculture, advised farmers located in the 10-mile EPZ, via telephone, to place lactating animals on stored feed and covered water upon declaration of the Site Area Emergency.

The Delaware Accident Assessment Advisory Group (AAAG) issued a PAR at 12:11 on May 4th, to the Director of the Delaware Emergency Management Agency (DEMA) to evacuate all sectors 0 - 5 miles, evacuate downwind NNW, N, 5 - 10 miles, shelter all remaining sectors in the Delaware 10-mile EPZ, and place all animals in the EPZ on stored feed and covered water.

PROTECTIVE ACTION DECISIONS (PADs)

The Governor of New Jersey made a PAD at 12:15 calling for the evacuation of Emergency Response Planning Areas (ERPAs) 1, 2, 3, 4, 5, 8 and sheltering ERPAs 6 and 7.

The New Jersey Evacuation was completed in approximately 110 minutes, from the airing of the evacuation message and was completed before any exposures to the public. No major impediments or police actions took place during the evacuation.

The Governor of Delaware made a PAD at 12:20 calling for the evacuation of all sectors 0 - 5 miles and the N, NNW sectors 5 - 10 miles. Evacuate all schools and special populations in the 10-mile EPZ. Shelter all remaining sectors in the 10-mile EPZ. He asked the State Department of Agriculture to notify all farmers in the 10-mile EPZ to place all animals on stored feed and covered water.

The Delaware Evacuation was completed in approximately 100 minutes from the airing of the Emergency Alert System (EAS) message. No exposures to the public occurred. No major impediments or police actions took place during the evacuation.

NEW JERSEY OFFSITE CONDITIONS

Salem County evacuated more than 14,000 persons from six municipalities. Cumberland County has approximately 1,100 persons remaining in place at their residence. Congregate Care Shelters are housing 1,500 persons. The State Police initiated Access Control at 5 and 10 mile posts upon declaration of the General Emergency, thereby closing the evacuated area to the public.

Access Control on the Delaware Bay and River was initiated upon declaration of the Site Area Emergency. Troop "F" of the New Jersey State Police is assisting the U. S. Coast Guard and Delaware Marine Police in restricting use of the Bay and River.

A Declared State of Emergency was declared to exist by the Governor of New Jersey in Cumberland and Salem Counties at noon on May 4th. The State of Emergency continues to remain in effect, and will remain in effect, until conditions offsite and at the Unit 2 Salem Nuclear Generating Station warrant termination of the declaration.

Salem County Government Offices and four of the evacuated municipalities (Lower Alloways Creek Twp., Elsinboro Twp., Quinton Twp., and Salem City) have been temporarily relocated to the Salem County College in Penns Grove. These offices will be opened for business at 08:00 on the next business day.

Dosimeter readings reported by the New Jersey State Trooper at Access Control Point (ACP) 3B were noticed to be elevated at 15:00. The State Trooper reported an increased reading at 15:30. The post was relocated to Route 45 and Welchville Rd. based on advice from the BNE and NJDOH.

The State OEM requested that the BNE monitor the area from the edge of the EPZ to the ACP, due to the dosimetry readings provided by the State Trooper.

The EOC Staff was directed to have resources available to implement additional protective actions based on relocation PAGs. The resources used for initial PAD were supplemented from various State Government Departments.

The State EOC remained activated overnight. Access Control continued to remain in place. No additional protective actions were taken by the State during the night. The BNE and RAP Teams continued monitoring throughout the night.

DELAWARE OFFSITE CONDITIONS

Approximately 5,950 persons were evacuated from the 0 - 5 mile and NNW sector 5 -10 mile areas. The North sector does not contain a permanent population and was evacuated during river alerting. All access control points remain active (A1 through A10). Access is also being controlled into the NNW sector with the Delaware State Police adjusting the 10-mile access control point to allow access to all areas except the NNW sector.

The Delaware Governor declared a State of Emergency at 12:20 on May 4th.

The Emergency Worker Decontamination Facility (Middletown) was opened on May 4th and remains open.

The Registration Centers at the Colonel Haslet National Guard Armory (Dover) and the National

Guard Armory (Marshallton) were opened on May 4th. The two registration centers are now closed with 5,458 people registered.

Shelters were opened on May 4th at the following High Schools and remain open:

Caesar Rodney High School
Brandywine High School
Mount Pleasant High School
Dover High School

DELAWARE RADIOLOGICAL ACTIVITIES

Two field monitoring teams, made up of members from the Delaware National Guard (DNG), were deployed on May 4th to monitor the ambient radiological conditions and perform air sampling in Delaware. All samples and radiological readings indicate normal background values. The field teams remain on standby.

Three field radiological monitoring sites were also monitored. All of the monitoring readings indicated normal background values.

A sampling plan is being developed by the AAAG at the State EOC. Field sampling teams are being formed from the DNG to confirm no radiological contamination has occurred in the State of Delaware from the Salem Unit 2 radiological release.

FEDERAL ASSISTANCE

THE U.S. DOE

At 11:30 the DOE places the WAMO B-200 Crew on standby for possible deployment to Southern New Jersey.

At 12:20 The State of New Jersey requests a flyover of the areas affected by the radiological release, when radiological and weather conditions permit.

At 13:00 the DOE WAMO B-200 fixed-winged aircraft and Crew are asked to deploy to Wilmington, Delaware by the DOE.

At 14:00 the WAMO B-200 lands at Wilmington Airport. Any flights over the affected area are delayed due to weather conditions.

At 17:00 the WAMO B-200 serpentine flyover of the affected area begins.

At 19:45 the data collection is completed and the WAMO B-200 aircraft lands at Trenton Airport.

At 20:45 the data analysis is completed. 8.5" x 11" maps of the serpentine flyover are available.

The State OEM, the Salem County OEM, and the Cumberland OEM have initiated Preliminary Disaster Analysis in support of a request to the Federal Emergency Management Agency (FEMA) for a declaration of an Emergency.

The State OEM reviewed long term needs in several operational areas to determine the ability of the State to meet the possible needs. Supplemental support from FEMA was requested. FEMA Region II in New York was contacted at 18:00 and an Emergency Response Team "A" (ERT-A) was dispatched. ERT-A arrive at the State EOC at 22:00 and were briefed by the Deputy State Director.

The Chief State Radiological Assessment Officer (SRAO), located at the BNE, advised the OEM that a monitoring plan to determine the edge of the plume will be initiated. RAP Teams and U. S. DOE aerial monitoring will be used to assist in the formulation of the monitoring plan.

The BNE and RAP Teams have completed an initial ground survey of areas suspected to be contaminated. Field Monitoring Teams have completed collection of TLDs, silver zeolite air samples and transported them to the laboratory for analysis. The results should be available in the morning of May 5th.

The FAA has restricted the air space over the Hope Creek, Salem Unit I and Unit 2 Nuclear Generating Stations, except approved emergency aircraft.

PUBLIC INFORMATION

The ENC was activated at the declaration of the Site Area Emergency on May 4th. It remained in operation until the Governor directed the evacuation of ERPA 3. The ENC was relocated to the alternate ENC site at the PSE&G Complex in Moorestown, New Jersey. The ENC in Salem will serve as the focal point for Public Information for this exercise. The relocation to Moorestown will be simulated for this exercise. The NRC, as the LFA will represent the Federal Government at the ENC.

METEOROLOGICAL CONDITIONS

May 4th (08:00 to 19:00)

A low pressure area in the Delaware Valley caused rain, heavy at times, throughout the Delaware Valley.

Winds were from the South South West to the North North East 5 to 10 mph.

Temperatures were in the low 70's.

A Tornado Warning for Salem and Cumberland Counties was in effect from 08:30 until

10:30.

A Tornado Watch for Salem and Cumberland Counties was in effect from 10:30 until 16:00.

A Severe Thunderstorms Warning for Salem and Cumberland Counties was in effect from 08:30 until 16:00.

Severe thunderstorms occurred in Salem and Cumberland Counties from 2:30 until 15:30.

May 4th to May 5th (19:00 to 08:00)

A high pressure area moved into the Delaware Valley.

Winds were from the South South West to the North North East 5 to 10 mph from 19:00 Until 04:00. From 04:00 until 08:00 winds shifted from the West to the East 0 to 5 mph.

Temperatures were in the low 80's.

Refer to pages 7 and 8 for PSE&G's MET Tower printouts for 12:00 and 16:00 meteorological conditions on May 4th.

Refer to page 9 for PSE&G's May 5th MET Tower printout of current meteorological conditions

Refer to page 10 for the May 5th meteorological forecast and the 5-day extended forecast for the Delaware Valley.

B. Day 2 (break message)

NEW JERSEY/DELAWARE FEDERAL INGESTION

EXERCISE

BREAK MESSAGE #2

The following information describes the activities and events which have occurred from 16:00 on May 5, 1998 until 0800 on May 6, 1998. This information may be used by exercise participants as reference materials during the New Jersey/Delaware Federal Ingestion Exercise.

SALEM UNIT 2 PLANT CONDITIONS

The General Emergency at Salem Unit 2 was terminated and PSE&G entered into a recovery status at 06:00. The Plant is stable and no radiological releases are in progress.

PSE&G's Emergency Operation Facility (EOF) remains partially staffed and is the Lead Facility for the Utilities Recovery Management Organization. Jerry McMahon is the Recovery Manager.

PSE&G Recovery Operations are in progress with assistance of outside organizations, which include other utility personnel. The EOF, ENC, and OSC remain partially staffed as part of the PSE&G Recovery Organization. The EOF is no longer participating in this exercise, but a Control Cell is in place at the FRMAC to provide information, if necessary.

A 12-hour shift relief plan has been implemented with a 3 team rotational schedule.

A Protected Area Decon Plan has been created and is in the process of being implemented

A Decon Plan for inside the Salem Unit 1 and Unit 2 Plants was formulated on May 5th and is currently being implemented.

The Reactor Coolant Samples indicate 100% cladding failure and 20% fuel melt. Core thermal hydraulic analysis indicates that a coolable geometry is being maintained and further degradation of the fuel is considered unlikely.

Emergency Core Cooling pumps are in operation maintaining adequate core cooling. The RWST puncture was repaired and the tank has been refilled as a backup source of cooling water.

Salem Unit 1 and Hope Creek Nuclear Generating Stations are being maintained in cold shutdown condition.

Oyster Creek is providing assistance processing contractors for badging and site access requirements.

The person injured on May 4th was released from Christiana Hospital at 07:00 after overnight observation showed only a mild concussion.

PROTECTIVE ACTION RECOMMENDATIONS (PARs)

PSE&G has not issued any additional PARs since the original PARs were issued on May 4th.

The New Jersey Bureau of Nuclear Engineering (BNE) issued the following PARs:
Fort Mott State Park should remain closed. It is within evacuation area (ERPAs).

Establish Restricted Zones and relocate residents in the following areas:

Upper Penns Neck

Mannington

Swedesboro

Oldsman

Woolwich

Logan

Pilesgrove

Woodstown

Sections of Harrison and South Harrison bounded by South of Rt. 322 West of Rt. 45 in Woodstown.
From Woodstown south to Alloway on Alloway-Woodstown Road. From Alloway to Quinton west of Alloway Rd.

From Quinton south to Pine Island

Consider placing a hold on foodstuffs, milk, and dairy products in Salem and Gloucester Counties, due to initial degree of contamination found. Expected time of hold should not exceed 72 hours.

Close turkey hunting in Salem and Gloucester Counties.

Close all fishing from Commodore Barry Bridge to Stow Creek. Also include Raccoon Creek, Ohinan's Creek, Salem River, Mannington Meadow, Alloway Creek, Madhorse Creek and inland lakes and parks within the restricted area.

Establish a Buffer Zone. Relocate residents in Greenwich, East Greenwich, Sections of Mantua Twps west of Rt 45, Sections of Harrison Twps. west of Rt. 45 and also Paulsboro

Consider placing a hold on all nursery products from all restricted areas.

Place all livestock on stored feed and covered water out to 30 miles in Salem and Gloucester Counties. Do not use any surface water sources for drinking water use in restricted area.

Close Cowtown Auction Market and place a hold on all agricultural products at the market.

Discontinue export of sand, top soil, mulch, trash, as well as manufacturing products. Track shipments occurring prior to closures.

ERPAs 6 and 7 were verified by the field teams and CREST data to be background. Consider lifting the PAD.

Hold all honey in the restricted area that has not yet been harvested, until it is sampled. Stop all farm to farm bee transport within the restricted areas from the restricted areas.

The Delaware AAAG recommended relaxing all sheltering protective actions taken in Delaware's 10-mile EPZ on May 4th. Recommendations are pending on all other PARs.

PROTECTIVE ACTION DECISIONS (PADs)

The Governor of New Jersey made the following PADs:

Establish restricted zone and relocate residents in the following areas:

Carney's Point
Mannington
Swedesboro
Oldsman
Woolwich
Logan
Pilesgrove
Woodstown
Pennsville
Pennsgrove
Greenwich
East Greenwich
Harrison
Paulsboro
Mantua
South Harrison

Sections of Harrison and South Harrison as bounded by South of Rt 322 West of Rt. 45 in Woodstown. From Woodstown south to Alloway on Alloway-Woodstown Road. From Alloway to Quinton west of Alloway Rd. From Quinton south to Pine Island. Residents of those areas were requested to relocate to Rowan University.

Hold all foodstuffs, milk, and dairy products in Salem and Gloucester Counties, until degree of contamination is known. Expected hold time will not exceed 72 hours

Close all fishing from Delaware River from Commodore Barry Bridge to Stow Creek, including

Raccoon Creek, Salem River, Mannington Meadow, Alloway Creek, Mad Horse Creek, Stow Creek, and all inland lakes and parks located in the restricted area.

Close all turkey hunting in Salem and Gloucester Counties.

Hold all nursery products from all restricted areas.

Place all livestock on stored feed and covered water in the restricted area and buffer zone in Salem and Gloucester Counties.

Do not use any surface water from Salem City and Dupont Industrial Facility.

The Supawna Meadows Wildlife Refuge and the Dept. of Defense Reserves at Carney's Point Twps. will be closed until further notice.

Hold all honey in the restricted area that has not yet been harvested, until it is sampled. Stop all farm to farm bee transport within the restricted areas from the restricted areas.

The 380 people located at the Memorial Hospital of Salem County, Salem County Nursing Home, and the South Gate Nursing Home, which were included in the areas of the PAD, were relocated to similar facilities throughout the State. The State Department of Health notified the families of the people relocated.

The PAD also closed the following roads:

New Jersey Turnpike from Exit 1 to Exit 3.

Interstate Highway 295 from the Delaware Memorial Bridge to Exit 21.

State Rt. 40 from mile marker 0 to 25.

Route 45 from mile marker 0 to 35.

Rt. 49 from Deepwater to Quinton.

The New Jersey OEM expressed a desire to relax the Protective Actions and requested that the BNE review the effects of the incident for the following areas:

Sheltered Areas

ERPA 6 (Stow Creek Twp.)

ERPA 7 (Greenwich Twp.)

The BNE conducted sampling in ERPAs 6 and 7. The analysis of the samples caused the BNE to recommend to the OEM that Protective Actions may be lifted from the municipalities located in ERPAs 6 and 7.

The Governor of Delaware agrees with the AAAG's recommendation relaxing all sheltering protective actions taken in Delaware's 10-mile EPZ on May 4th.

NEW JERSEY OFFSITE CONDITIONS

The N.J. State Police, in conjunction with the police departments in the relocated municipalities identified Access Control Posts that were established, to close the areas the Governor added with her new PAD. Access Control remains in place for those areas where Protective Actions were initially taken, except Stow Creek and Greenwich Twps. The Delaware River remains closed to river traffic.

The Salem County Extension Service and State Department of Agriculture identified an area where movement of agricultural products is restricted. They directed farmers to place livestock on stored feed and covered water out to 30 miles in Salem and Gloucester Counties.

Each of the municipalities in the Relocated Area have established offices at Rowan University.

RADIOLOGICAL CONDITIONS

Requested a DOE Helicopter Flyover to define the edge of the restricted area and buffer area zone.

All field samples requested by the TAC from May 5th at 1400 until 00:00 on May 6th were carried out, with one exception, and found to be background. The one exception was the request for air monitoring which is still in process.

An overnight shift collected samples. The results of these samples will be available on May 6th at 09:00.

The DOE Field Monitoring Teams completed traversals of the deposition area. The directives of the FRMAC Advance Team meeting were slightly modified due to unforeseeable travel restrictions. That data is available.

The DOE Helicopter Flyover was completed. That data will be made available.

Additional samples are being collected by field sampling teams and analysis will be made available throughout the day of May 6th.

No State Forests or Forest Fire Service Areas are in the Relocation Zone and the threat of forest fires are low.

FEDERAL ASSISTANCE

The US Department of Energy and the U.S. NRC met with representatives of the Delaware Emergency Management Agency, New Jersey OEM and BNE concerning the location of the Federal Radiological

Monitoring and Assessment Center. It was decided to locate the Center at the Salem County Fire Training Center located in Mannington.

PUBLIC INFORMATION

The ENC was activated at the declaration of the Site Area Emergency on May 4th. It remained in operation until the Governor directed the evacuation of ERPA 3. The ENC was relocated to the alternate ENC site at the PSE&G Complex in Moorestown, New Jersey. The ENC in Salem will serve as the focal point for public information for this exercise. The relocation of the ENC to Moorestown will be simulated for this exercise. The NRC, as the LFA will represent the Federal Government at the ENC.

NEW JERSEY/DELAWARE FEDERAL INGESTION EXERCISE

BREAK MESSAGE #3

May 7th will be considered to be May 12th for this exercise. The following information describes the activities and events which have occurred from 16:00 on May 6th, 1998 until 08:00 on May 12th, 1998 (Break Message #3 will be given out on May 7th). This information may be used by exercise participants as reference materials during the New Jersey/Delaware Federal Ingestion Exercise.

SALEM UNIT 2 PLANT CONDITIONS

Salem Unit 2 is in recovery status. No radiological releases are in progress. The recovery management organization is now located at the TSC, with Chris Bakken as the Recovery Manager. The OSC is still manned as part of the recovery organization.

Core thermal hydraulic analysis indicates that a coolable geometry is still being maintained and further degradation of the fuel is considered unlikely.

Emergency Core Cooling pumps are in operation. The Plant is in a safe and stable condition. The decon of the Site is approximately 35% complete. Salem Unit 1 and Unit 2 Plants, excluding Salem Unit 2's Containment, are 45% deconned.

The fuel is subcritical according to a heat balance that was performed.

NBU Utility personnel not directly involved in the Plant Recovery are located at the Moorestown T&D Facilities.

PSE&G has received a Confirmatory Action Letter from the NRC. which requires NRC prior approval before start up of the Salem Unit 1, Salem Unit 2, and Hope Creek Nuclear Generating Stations.

The Main Guard House and associated parking lot has been decontaminated and is being used for normal access and egress.

Salem Unit 1 and Hope Creek Nuclear Generating Stations are being maintained in cold shutdown condition.

PROTECTIVE ACTION RECOMMENDATIONS (PARS) for New Jersey

PSE&G has not issued any additional PARs since the original PARs were issued on May 4th.

The New Jersey Bureau of Nuclear Engineering (BNE) recommended allowing people to return to

their homes and businesses in ERPA 2.

The BNE recommended the ban on navigation on the Delaware Bay and River be lifted.

The BNE recommended destroying strawberries in Mannington Twp.

The BNE has recommended all milk produced in Mannington Twp. be made into cheese and other dairy products and be held for decay.

The BNE has recommended the embargo of all spinach and asparagus grown in Mannington Twp. and Pennsville Twp. Consider conserving versus destroying the crops.

PROTECTIVE ACTION DECISIONS (PADs) for New Jersey

Officials from the State of New Jersey are allowing those residents relocated from certain areas following the accident, which took place on May 4th to re-enter and conduct vital functions, especially dairy farms.

The Governor has allowed persons living and working in ERPA 2 to return to their homes and businesses.

All strawberries in Mannington Twp. have been destroyed.

The ban on navigation on the Delaware Bay and River was lifted.

The bans on the New Jersey Turnpike, Route 295 and Route 130 were lifted on May 8th after decontaminating and re-surveying the road, for through traffic only. Ingress and egress on all exits below Route 322 is still prohibited.

The Governor has ordered all milk produced in Mannington Twp. be made into cheese and other dairy products for decay.

The Governor has ordered the embargo of all spinach and asparagus grown in Mannington Twp. and Pennsville Twp. and the crops were destroyed.

PROTECTIVE ACTION RECOMMENDATIONS (PARS) for Delaware

On May 6th the Delaware Accident Assessment Advisory Group (AAAG) made the following recommendations to the Governor for consideration:

Allow Delaware citizens to return to all areas that were evacuated on May 4th.

Do not consume fresh fruit or vegetables from gardens and orchards.

Do not consume drinking water from open sources (lakes, streams, etc).

Do not consume farm products such as milk and eggs from within the areas the were evacuated.

Do not consume fish or other aquatic life caught in previously evacuated areas.

Continue keeping livestock on stored feed and covered water.

Canned or bottled products may be consumed without restriction.

PROTECTIVE ACTION DECISIONS (PADs) for Delaware

On May 6th the Governor of Delaware made a PAD to allow Delaware citizens to return to all areas that were evacuated on May 4th with the following precautionary measures recommended for all returning Delaware persons:

Do not consume fresh fruit or vegetables from gardens and orchards.

Do not consume drinking water from open sources (lakes, streams, etc).

Do not consume farm products such as milk and eggs from within the areas the were evacuated.

Do not consume fish or other aquatic life caught in previously evacuated areas.

Continue keeping livestock on stored feed and covered water.

Canned or bottled products may be consumed without restriction.

JOINT PROTECTIVE ACTION DECISIONS (PADs) for New Jersey and Delaware

The Governors of New Jersey and Delaware have opened all shipping ports in New Jersey and Delaware with the exception of the Salem City Port Terminal.

NEW JERSEY OFFSITE CONDITIONS

The Governor of New Jersey requested a Major Disaster Declaration under the Robert T. Stafford Disaster Relief and Emergency Assistance Act for Salem, Cumberland, and Gloucester Counties.

Salem County College decided to cancel the summer semester.

The Governor's Office and NJOEM have requested return of persons to in the northern-most area of the relocated area to the New Jersey Turnpike. This should be a high priority.

Approximately 11,000 jobs, it is estimated, have been impacted by the evacuation and subsequent relocation.

The N.J. State Police continue to staff Access Control Posts identified for the relocation and buffer zones.

The N.J. State OEM developed and implemented a plan for training these persons in radiological protection, in support of the protective action decision to allow reentry into the affected area by persons who perform vital functions. This program involves the use of 250 volunteers from organizations in Ocean County, who will serve as escorts to those returning to the affected area. The training will be provided by the NJOEM, with support from the Ocean County OEM. Applications for reentry and training were provided at the Gloucester County Training Center in Clarksboro, N.J. A total of 400 applicants have been processed and are returning on a shift basis.

RADIOLOGICAL ACTIVITIES

Emergency medical services were advised that accident victims in the restricted and buffer zone areas should be wrapped and transported to Elmer Hospital.

FRMAC took samples and performed analysis on fresh fruits, vegetables, from gardens and orchards and found to be at background radiation levels. Drinking water from open sources was found to be at background radiation levels. Farm products were sampled and found to be at background radiation levels. Live stock does not have to remain on stored feed and covered water. Consumption of fish and aquatic life is still restricted.

The FRMAC has expanded the State of Delaware and New Jersey's capabilities with additional field monitoring teams and assessment personnel. Monitoring personnel from the FRMAC have been reentering the EPZ and relocated areas on a regular basis taking samples and performing surveys.

A cross section of water, soil, milk and swipe samples in evacuated and relocated areas indicates no alpha values above normal background readings.

All direct field team dose rates given out on May 6th may be reduced by a factor of 5 during today's play, except where noted in this break message.

FEDERAL ASSISTANCE

President William Jefferson Clinton has declared a Major Disaster Declaration under the Robert T. Stafford Disaster Relief and Emergency Assistance Act for Salem, Cumberland and Gloucester Counties. This authorizes individual and public assistance, and hazard mitigation for Salem, Cumberland, and Gloucester Counties.

FEMA has located the DFO at Industrial Park, Building 128, Bellmawr, New Jersey. FEMA's teleregistration has received an additional 4,000 persons applying for assistance since May 6th.

PUBLIC INFORMATION

The ENC was activated at the declaration of the Site Area Emergency on May 4th. It remained in operation until the Governor directed the evacuation of ERPA 3. The ENC was relocated to the alternate ENC site at the PSE&G Complex in Moorestown, New Jersey. The ENC remains operational with minimum staffing, at the backup ENC in Moorestown. Press conferences are being conducted twice-a-day. The relocation to Moorestown was simulated for this exercise. The ENC is no longer participating in this exercise, but a Control Cell is in place at the FRMAC to provide information, as necessary.

THE END

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(See instructions on the reverse)

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10. SUPPLEMENTARY NOTES

11. ABSTRACT (200 words or less)

Salem 98 was the largest nuclear power plant post-plume phase exercise since the 1993 FRMAC-93 exercise at the Fort Calhoun Nuclear Power Plant in Nebraska. Salem 98 was a 3 day exercise, held on May 5-7, 1998, involving participation by the States of New Jersey and Delaware and associated state and County agencies. Public Service Electric and Gas was the host utility and Salem County the host County. Federal participation included the Nuclear Regulatory Commission, Federal Emergency Management Agency, Department of Energy, Environmental Protection Agency, U.S. Department of Agriculture and Health and Human Services. In addition, the American Nuclear Insurers participated, adding a dimension to the exercise not experienced often enough. This was a stand-alone post-plume exercise, which took place 2 months after the evaluated plume phase exercise held on March 3, 1998, also including participation by various Federal agencies. This exercise demonstrated the positive working relationship among utility, State, County, and Federal responders in response to a postulated major nuclear power plant event with significant offsite consequences.

12. KEY WORDS/DESCRIPTORS (List words or phrases that will assist researchers in locating the report.)

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