

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-29/90-82

Docket No. 50-29

License No. DPR-3

Licensee: Yankee Atomic Electric Company
580 Main Street
Bolton, Massachusetts 01740-1398

Facility Name: Yankee Nuclear Power Station

Inspection At: Buckland and Rowe, Massachusetts

Inspection Conducted: September 24-28, 1990

Inspectors:

C. Amato
C. Amato, Regional Team Leader, RI

December 8, 1990
date

G. Bryan, COMEX Corporation
T. Koshy, SRI, Yankee Rowe
W. Lancaster, RI
M. Markley, RI, Yankee Rowe

Approved by: W. J. Lazarus
W. J. Lazarus, Chief, Emergency Preparedness
Section, Division of Radiation Safety and
Safeguards

December 10, 1990
date

Inspection Summary: Inspection on September 24-28, 1990 (Inspection Report
No. 50-29/90-82)

Areas Inspected: Routine, announced emergency preparedness inspection and observation of the licensee's annual emergency exercise on September 25, 1990 and routine safety inspection. The Commonwealth of Massachusetts and the State of Vermont participated. The Federal Emergency Management Agency (FEMA) observed offsite exercise activities. The licensee staff's strong, positive response actions during the exercise demonstrated their ability to provide timely and adequate protective measures for public health and safety.

Results: No violations, deviations, or exercise weaknesses were identified.

DETAILS

I. Persons Contacted

The following Yankee Atomic Electric Company personnel attended the exercise exit meeting on September 26, 1990.

- G. Babineau, Radiation Protection Manager
- J. Baupre, Nuclear Engineer/Shift Technical Advisor
- M. Gilmore, Technical Services Engineer
- T. Henderson, Acting Plant Superintendent
- K. Jackson, Emergency Planning Group
- J. Kay, Technical Services Manager
- R. Marcello, Manager, Emergency Planning Group
- D. Marsh, Security Administrator
- D. McDavitt, Engineer
- J. McDowell, Supervisory Control Room Operator
- R. Mellor, Technical Director
- J. Robinson, Director, Environmental Engineering
- E. Salomon, Emergency Planning Group
- S. Schultz, Vice President, Engineering Services
- N. St. Laurent, Plant Superintendent
- A. Tatro, Emergency Preparedness Coordinator

The following individuals attended the routine inspection exit meeting on September 28, 1990.

- G. Babineau, Radiation Protection Manager
- J. Baupre, Nuclear Engineer/Shift Technical Advisor
- T. Henderson, Acting Plant Superintendent
- J. Kay, Technical Services Manager
- R. Marcello, Manager, Emergency Planning Group
- D. McDavitt, Engineer
- R. Mellor, Technical Director
- J. Palmerieri, Security Supervisor
- A. Tatro, Emergency Preparedness Coordinator

Personnel of the Brookhaven National Laboratory attended the entrance meeting and observed portions of the exercise. The inspectors also observed the actions of, and interviewed other licensee personnel.

2. Licensee Action on Previously Identified Items

The following items were identified during a previous inspection. Based on observations made by the NRC inspector, review of the Emergency Plan and Implementing Procedures and interviews with licensee staff, these items were satisfactorily addressed by the licensee and are closed.

(CLOSED) 50-29/87-05-02 UNRESOLVED: Six plant parameters identified in NRC Regulatory Guide 1.97 were not displayed in the Technical Support Center (TSC) or Emergency Operations Facility (EOF). A Safety Parameter Display System (SPDS) has been installed. Four methods are available for providing the TSC with accident variable information. The Office of Nuclear Reactor Regulation, in a letter dated February 21, 1986, stated that with EOF completion, all licensing activities with respect to the TMI Action Plan elements III.A.1.2 and III.a.2.2 have been completed.

(CLOSED) 50-29/88-08-01 UNRESOLVED: Inadequate flow of information between the Emergency Response Facilities (ERFs) was identified during the 1989 exercise. During this exercise information was adequately communicated among the ERFs and appropriately displayed in the TSC and EOF. EOF status boards have been modified.

3. Emergency Exercise

The Yankee Nuclear Power Station (YNPS) full-participation exercise was conducted on September 25, 1990 from 8:00 a.m. to 3:15 p.m. The Commonwealth of Massachusetts and the State of Vermont participated. The U.S. Federal Emergency Management Agency, Region I observed the offsite activities.

3.1 Pre-Exercise Activities

The exercise objectives submitted to NRC Region I on June 25, 1990 were reviewed and determined to be adequate to test the licensee's Emergency Plan. The licensee subsequently submitted the complete scenario package for NRC review and evaluation. Following telephone conversations between NRC Region I and the licensee's emergency preparedness staff, minor revisions were made to the scenario which allowed adequate testing of the major portions of the YNPS Emergency Plan and Implementing Procedures and also provided the opportunity for the licensee to demonstrate those areas previously identified by the NRC as in need of corrective action. NRC observers attended a licensee briefing on September 24, 1990. Suggested NRC changes to the scenario made by the licensee were discussed during the briefing. The licensee stated that certain emergency response activities would be simulated and that controllers would intercede in exercise activities to prevent disruption to normal plant activities.

3.2 Exercise Scenario

The exercise scenario included the following events:

1. Declaration of an UNUSUAL EVENT based on main coolant system leak rate exceeding Technical Specification limits but less than the capacity of one charging pump.
2. Declaration of an ALERT when the leak rate exceeded the capacity of one charging pump. Eight control rods failed to insert causing damage to the fuel.
3. Protected area accountability was demonstrated.
4. Declaration of a SITE AREA EMERGENCY based on the initiation of emergency core cooling system and safety injection.
5. Failure of the safety injection systems.
6. Declaration of a GENERAL EMERGENCY based on loss of coolant accident with subsequent fuel failure.
7. Rupture of a component cooling line inside the vapor containment.
8. Release of radioactive material to the environment via the primary vent stack.
9. Recovery planning.

3.3 Activities Observed

During the conduct of the exercise, five NRC team members made observations of the activation and augmentation of the emergency organization, activation of emergency response facilities, and actions of emergency response personnel during the operations of the emergency response facilities. The following activities were observed:

1. Detection, classification, and assessment of scenario events;
2. Direction and coordination of the emergency response;
3. Augmentation of the emergency organization and response facility activation;

4. Notification of licensee personnel and offsite agencies of pertinent plant status information;
5. Communications, information flow, and recordkeeping;
6. Assessment and projection of offsite doses, consideration of protective actions, and recommendation of protective actions to Commonwealth of Massachusetts and State of Vermont officials at the EOF.
7. Accident mitigation; and,
8. Critique of the exercise.

4. Classification of Exercise Findings

Emergency Preparedness findings are classified as follows:

Exercise Strengths

Exercise strengths are actions taken by the licensee's emergency response organization which provide strong positive indication of their ability to cope with abnormal plant conditions and effectively implement the Emergency Plan.

Exercise Weaknesses

An exercise weakness is a finding that the licensee's demonstrated level of performance could have precluded effective implementation of the Emergency Plan in the event of an actual emergency in the area being observed. The existence of an exercise weakness does not, of itself, indicate that overall response was inadequate to protect the health and safety of the public.

Areas for Improvement

An area for improvement is a finding which does not have a significant negative impact on the ability of the licensee to implement the Emergency Plan. Although the emergency response related to a noted area for improvement is adequate, the licensee should still evaluate the finding to determine if corrective action could be taken to improve performance.

5. Exercise Observations

The inspectors observed the licensee's emergency response actions during the exercise as noted below for each emergency response facility. The NRC team noted that the licensee's activation and augmentation of the emergency organization, activation of the emergency response facilities, and use of the facilities were generally consistent with the Yankee Nuclear Power Station Emergency Plan and Implementing Procedures.

Control Room

The following exercise strengths were identified.

1. Operators displayed innovative approaches toward mitigation of plant damage when normal systems would not work. One example involved manually shifting containment sump suction to recirculation mode when the safety injection system failed.
2. Operators were knowledgeable of all needed control procedures.

No exercise weaknesses or areas for improvement were identified.

Operations Support Center (OSC)

No exercise strengths or weaknesses were identified.

The following areas for improvement were identified.

1. Repair teams status was not maintained up to date on the OSC status board. One returned team was not logged in and the return of another was entered belatedly.
2. One OSC kit lacked an air sampler.

Technical Support Center

The following exercise strengths were identified.

1. The staff did an excellent job and made effective use of limited space. They understood and tracked emergency operating procedures and the Critical Safety Function Status Tree.
2. There was good interaction with the Emergency Operations Facility as to diagnosis, corrective options, and repair.

No exercise weaknesses were identified.

The following areas for improvement were identified.

1. There was no follow-up on Post Accident Sampling System sample analysis to estimate the degree of core damage and define the source term.
2. Fire brigade dispatch time was a somewhat lengthy 23 minutes.
3. Erroneous hydrogen data was displayed when the hydrogen sampler was isolated.

Emergency Operations Facility (EOF)

The following exercise strengths were noted.

1. The EOF Coordinator maintained excellent liaison with Massachusetts and Vermont representatives at the EOF.
2. Protective Action Recommendations were conservatively based on plant conditions and feedback was received from governments as to the status of protective actions.

No exercise weaknesses were identified.

The following areas for improvement were identified.

1. Data that would have permitted a mass balance calculation was not displayed on status boards and organ dose rate units were used for dose commitment value instead of dose units.
2. There was no information available regarding core damage estimates.

6. Operational Status of the Emergency Preparedness Program

6.1 Emergency Response Facilities (ERFs)

Operation of the ERFs was observed during the exercise. Equipment, instrumentation, status boards, maps, diagrams and plant and safety system diagrams were available, placed in position for use and equipment operated satisfactorily. Plans, implementing procedures and other needed procedures were available and current.

The Emergency News Center (ENC) which is not classified an ERF, was inspected during the routine inspection. It is located in a restaurant near Buckland on route 2. Per contractual agreement, the licensee will have dedicated use of the restaurant for an ENC when needed. The operation of the ENC was observed in a previous exercise and the facility was determined to be acceptable. Adequate telephones, facsimile, and duplicating machines are available.

Based on the above, this portion of the licensee's emergency preparedness program is acceptable.

6.2 Organization and Management Control

The emergency preparedness program structure was reviewed, personnel were interviewed and activities evaluated to ascertain if the licensee is maintaining and controlling an emergency program required by 10 CFR 50.54(t), 50.47(b) and Section IV of Appendix E to 10 CFR 50.

The Yankee Atomic Power Company is divided into four divisions. One Division operates the Yankee Nuclear Power Station. Another division, the Nuclear Service Division (NSD), located at Yankee headquarters in Bolton, Massachusetts, provides services to the Station and the other Yankee reactors. One of these services is emergency preparedness. The site Emergency Preparedness Coordinator was, at the time of this inspection, supported by a full time consultant who provided administrative support. The eleven member emergency preparedness staff of the NSD at Bolton can augment the site staff during routine operations, exercises and emergencies. The NSD has the lead for preparing exercise scenarios. In response to findings of NRC inspection 89-15, Yankee developed a staff augmentation plan. This plan identifies 64 Emergency Response Organization (ERO) positions and those personnel qualified to fill the positions. These positions include ERO managerial and decision making positions. NSD also provides:

- 1) Quality Assurance staff to conduct audits/reviews
- 2) Off site activity support
- 3) Dose projection methodology development, and
- 4) Engineering support (thermal-hydraulics, core damage assessment).

These staff members are on-call, protected area cleared and subject to fitness-for-duty rules.

Management uses a number of different tools to track the status of the emergency preparedness program at the site and at Bolton. The tools are: a weekly Status Summary developed by Bolton which includes on and off site items, an Action Plan listing drill and exercise items, a Technical Services Department list updated every two weeks and a Commitment Tracking List on the Plant Manager's level a copy of which goes to the Yankee Electric president. This list includes NRC report items. Following the 1989 exercise, Yankee developed an Action Plan to correct NRC and licensee areas of concern. A schedule was developed and resources allocated to this plan. A Gantt Chart with milestone dates was developed and progress checked against this chart. At the time of this inspection, the Action Plan was substantially completed.

Managers at the site and at Bolton review and approve plans and procedures, participate in drills and exercises and maintain ERO qualification.

Based on the above, this portion of the licensee's emergency preparedness program is acceptable.

6.4 The Emergency Plan (EP) and Implementing Procedures (EPIPS)

The EP and EPIPs are required to meet the standards of 10 CFR 50.47(b)(16), the requirements of Section G of Appendix E to 10 CFR 50 and 10 CFR 50.54(q). The inspector reviewed EP and EPIP control and distribution procedures to determine if standards and requirements were met.

Revision, review and approval of Emergency Plans (EPs) are a responsibility shared by Bolton and the site. Emergency Plan Implementing Procedures (EPIPs) are reviewed and approved by the Plant Operating Review Committee. All EPIPs have been rewritten in the last twelve months. Procedures are in place for the distribution and control of EPs and EPIPs. Yankee headquarters controls EP distribution and the Station controls EPIP distribution.

The revised EPIPs will be reviewed and the review documented in a subsequent report.

Based on the above, this portion of the licensee's emergency preparedness program is acceptable.

6.5 Knowledge and Performance of Duties (Training)

Emergency preparedness training (EPT) activities were reviewed to determine if the standard of 10 CFR 50.47(b)(15) and the requirement of Section IV.F of Appendix E to 10 CFR 50 were met.

EPT is based on an emergency preparedness task analysis which identified needed skills and knowledge. Objectives were listed for each Emergency Response Organization position. The Task Analysis served as the basis for the training matrix and lesson plans. Initial requalification training is scheduled twice a year and requalification training annually with a schedule which will permit this to be done uniformly over the year. Drills are a part of training. Mini drills are developed for each emergency response facility in addition to those for health physics, medical, radiation monitoring, communication and staff augmentation. Two station drills are held each year. The number of station staff is not adequate to provide a full complement of Emergency Response Organization personnel. To obtain this number Yankee developed the Augmentation plan noted in Section 6.2 above. Training of the augmentation staff is a Yankee headquarters responsibility.

Reactor operators are trained to classify operating events and senior operators are trained to develop protective action recommendations. EPT is given in each of the six to seven training cycles per year. Senior reactor operators receive four hours of practice for emergencies. They are taught to classify by going from the most significant classification of General Emergency to the least significant classification of Unusual Event, to avoid stopping at a lesser classification which may fit the situation. Operator training appears to be effective based on NRC observation of their exercise response and their response to two actual conditions requiring classification. Classification was correct and off site notifications were timely. Both classifications were Technical Specification based (reactor coolant system leakage).

Emergency Planning Zone emergency workers are trained by the Commonwealth of Massachusetts and the State of Vermont. Yankee provides support as needed. Massachusetts is introducing a Certification Program for Continuing Education Units in five areas. The areas are: radiation; emergency responder dosimetry; survey instruments; decontamination; and Emergency Operation Center table top drills.

Based on the above, this portion of the licensee's emergency preparedness program is acceptable.

6.6 Off Site Activities

Documentation was checked and personnel interviewed to ascertain if the standards of 10 CFR 50.47(b)(5) and (b)(6) were met as well as the requirements of Sections IV.D.3 and IV.F of Appendix E to 10 CFR 50.

Public Information Material in the form of calendars was distributed to all households, institutions and commercial establishments in the Emergency Planning Zone. About 25,000 calendars were distributed. Additional material in the form of posters was sent to recreational areas.

A biweekly meeting is held with Massachusetts to discuss emergency preparedness matters. A similar meeting is held with Vermont State officials quarterly. One Yankee staff member based at the Emergency Operations Facility in Buckland meets Town officials on an almost daily basis.

The public notification system consists of 11 sirens in Massachusetts and 2,600 Tone Alert Radios (TARs). The towns hold the Federal Communication Commission license to transmit the radio signal which activates the sirens. Sirens are tested at different intervals by each Town. Volunteer firemen are used to monitor the growl tests of sirens which are sounded at frequencies from daily to monthly. Siren availability was 99.23% during 1989. This availability exceeds US FEMA standards. TARs are NOAA Weather Radios. They are AC powered with battery back-up. Replacement batteries are mailed annually.

Based on the above, this portion of the licensee's emergency preparedness program is acceptable.

6.7 Dose Projection

Dose assessment requirements are stated in 10 CFR 50.47(b) and Section IV, B and E of Appendix E to 10 CFR 50. The inspector reviewed projected dose methodology to determine if the standard and requirements are met.

One manual and two software dose projection methodologies are available. The manual method is to be used by the control room. The software systems are METPAC and ODPS (Off Site Dose Projection System). METPAC is a segmented plume meteorological model modified to reflect the river valley topography of the site. METPAC meets the Class A and B model definitions of NUREG-0654. ODPS is a straight line meteorological model and run on a personal computer. ODPS lacks the graphic capability of METPAC and calculates doses at fewer locations than METPAC. Both models use a default iodine to noble gas ratio of 0.0001. This value is in agreement with theoretical consideration and values for wet loss of coolant accidents. The default release duration chosen by the licensee is eight hours. The licensee could not justify this value except to note it may come from an almost 15 year old EPA document. The inspector suggested that the licensee re-evaluate the default release duration to determine if a shorter time may be more appropriate. The licensee agreed to do so. METPAC (METeorological PACkage) and the NRC's RASCAL (Radiological Assessment System for Consequence Analysis) were compared using common input data. Comparison methodology and result were

reported in a Yankee report dated May 25, 1990. The inspector reviewed the report. The number of differences between the two models which would affect results was identified and discussed. The inspector concluded that the results were in reasonable agreement.

Surveillance record checks by the inspector indicated that containment high range monitors were calibrated during the 1990 outage. Records also indicated that meteorological tower (MET TOWER) instrumentation was also in calibration. THE MET TOWER is located just outside the protected area. A shack containing supporting instrumentation was located next to the tower. The shack door was unlocked and opened at the time of this inspection. The inspector called this to the licensee's attention with the suggestion they secure the door. The licensee agreed to secure the door.

Based on the above, this portion of the licensee's emergency preparedness program is acceptable.

7. Licensee Critique

The NRC team attended the licensee's exercise critique on September 26, 1990 during which the lead controllers and observers discussed their observations of the exercise. The licensee's critique was adequate and detailed.

8. Exit Meetings

Following the licensee's self-critique, the NRC met with the licensee's representatives listed in Section 1 of this report on September 26, 1990 to discuss findings as detailed in this report. The NRC team leader summarized the observations made during the exercise inspection. The licensee was advised no exercise weaknesses were identified. The NRC team also determined that within the scope and limitations of the scenario, the licensee's staff performance demonstrated the capability to implement their Emergency Plan and Emergency Plan Implementing Procedures in a manner that would adequately provide protective measures for the health and safety of the public. Licensee management acknowledged these findings, indicated they would evaluate the areas for improvement identified and take appropriate corrective action.

During the second exit meeting held on September 28, 1990, with the licensee representatives listed in Section 1 of this report, the inspector discussed the results of the routine safety inspection. The licensee was advised that two previously identified unresolved items were closed and that no violations, deviations, unresolved items were identified. Licensee management acknowledged these findings.