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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

November 1, 1978

Docket No. 50-29

Yankee Atomic Electric Company
ATTN: Mr. Robert H. Groce
Licensing Engineer
20 Turnpike Road
Westboro, Massachusetts 01581

Gentlemen:

As a result of our evaluation of the Yankee-Rowe Fire Protection Program and our fire protection site visit of the facility from September 25 through September 28, 1978, we have developed positions on the outstanding issues. These positions were discussed in detail with Mr. L. H. Heider, Assistant Vice President, Engineering and Operations, on September 28, 1978. During this meeting representatives of Yankee Atomic Electric Company (YAEC) agreed with several of our positions.

Enclosure I lists each staff position and identifies your position on each, i.e. accepted, rejected or deferred for further study. Enclosure I also identifies by marginal notations the status of staff positions accepted by YAEC. The status is based on information your representative provided during a telephone discussion on October 2, 1978.

Yankee-Rowe was shutdown on October 21, 1978, for refueling with Core 14. We understand that you are scheduled to resume operations by December 1, 1978. Prior to the October 21, 1978, facility shutdown you had taken appropriate actions to improve your ability to mitigate the consequences of a fire under existing conditions, including the use of an increased number of fire brigade personnel. We found those actions acceptable for the short period of time until facility shutdown because of the low probability of a severe fire during this time period.

For the interim period following resumption of facility operations from the current refueling outage until the final fire protection modifications identified in Enclosure I are completed, we believe that the fire brigade should consist of seven trained members. The basis for this position is given in the draft report, Enclosure II, from our consultant on manual fire fighting. We have reviewed your basis for the adequacy of the existing three man fire brigade, provided in your letters dated December 14, 1977 and June 26, 1978. We have concluded that you had not adequately addressed the following items:

1. The operations which must be performed to control and extinguish potential fires.

2. The availability of equipment to control and extinguish potential fires.

3. The adequacy of the training for fire brigade members and backup support such as onsite security personnel and assistance from offsite groups.

Please be prepared to respond to the concerns, identified by our consultant in Enclosure II, during a meeting with the NRC in our offices on November 8, 1978. You should also be prepared to address the above three items and to provide the qualifications of those individuals who have established the size and training of the fire brigade. The purpose of the meeting is to resolve the open issues relating to the fire brigade and to the shutdown capability resulting from modifications being implemented during the current refueling outage.

Please confirm that: (1) Enclosure I correctly represents YAEC's responses to the NRC staff positions and (2) your responses to the unresolved NRC staff positions will be provided by December 1, 1978.

Sincerely,

Richard D Silver for

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Division of Operating Reactors

Enclosures:
As stated

cc:
See next page

cc
Mr. Lawrence E. Minnick, President
Yankee Atomic Electric Company
20 Turnpike Road
Westboro, Massachusetts 01581

Greefield Community College
1 College Drive
Greenfield, Massachusetts 01301

ENCLOSURE I

STAFF POSITIONS

YANKEE ROWE FIRE PROTECTION PROGRAM

The following staff positions were discussed with the licensee during the fire protection review site visit exit meeting on September 28, 1978. In the margin the licensee's response is noted as: A - Accepted, S - Will be given further study, or R - Rejected. Due to the staff's concern for present fire protection capabilities, the licensee has or will complete action on some of these positions at the earliest opportunity. The status of this effort was provided in a telecon with the licensee on October 2, 1978. The action on these items is noted in the margin as: C - Completed, I - Work initiated/components ordered for early delivery, E - Action taken to complete prior to the end of the refueling outage for which plant shutdown is scheduled for October 20, 1978.

A. PRIMARY AUXILIARY BUILDING

A 1. A hose station should be provided to reach all areas of the primary auxiliary building.

A 2. Early warning fire detection should be provided over each charging pump cubicle.

A 3. The wiring for the rollup door alarm for the H_2 storage room should be suitable for a H_2 gas atmosphere.

R 4. The H_2 storage room should have forced air venting with a low air flow alarm.

B. DIESEL GENERATOR ROOM

S 1. Fuel oil piping should be rerouted outside the safety injection pump area of D-G building.

S 2. An automatic suppression system should be provided to protect each diesel generator room with flame detector actuation.

A 3. A hose station should be provided to reach all areas of the diesel generator building.

R 4. The doors between the diesel generator rooms should be electrically supervised.

A 5. The CO_2 protection for Manhole #3 should be modified to provide automatic actuation.

R 6. The diesel fuel oil shutoff valve to the diesel generator rooms should be modified to actuate by an electro thermal link actuated by the automatic suppression system.

R 7. The diesel generator room should have a drain to outside the room as a backup to the existing limited capacity floor drain.

A-I 8. Combustible storage in the diesel generator building should be removed or suitably protected.

C. VAPOR CONTAINER

Deleted 1. Fire detection should be provided above cable risers in the steam generator/coolant pump compartments and major combustibles.

Resolved (see R.4.b. item H.1 below) 2. Hose stations should be provided to provide coverage of cable trays and stored combustible, and to cover the operating floor.

D. FUEL STORAGE VAULT

R 1. Wood storage boxes should be removed.

E. MECHANICAL EQUIPMENT ROOM #3

R 1. A fire hose station should be provided

F. SCREEN WELL PUMP HOUSE

A-E 1. Cables in the junction box should be coated with a flame-retardant coating.

G. HEATING BOILER ROOM

R 1. An automatic sprinkler system should be provided in the heating boiler room.

H. SWITCHGEAR ROOM

A-E 1. The top of switchgear and motor control centers should be sealed to prevent water damage.

A 2. An automatic total flooding Halon 1301 suppression system should be provided.

-E 3. Covers should be removed from cable risers on south wall and conduits below sealed to prevent water damage.

R 4. Air flow alarms should be provided for the battery room exhaust.

I. CONTROL ROOM

A-I 1. Two 17 lb Halon 1211 portable extinguishers should be provided.

A-E 2. Two air masks and four spare air bottles should be provided at the control room.

A 3. Early warning detection should be provided in the D-G/SI control panel.

R 4. Cables above the false ceiling should be coated with a flame-retardant coating. (Above control board and in side wall risers.)

A-E 5. Vertical risers on south wall should have tray covers modified for quick removal or permanently removed.

A 6. Early warning fire detection should be provided in offices at east end of room, and in the kitchen area.

J. YARD LOOP AND HOSE HOUSES - PORTABLE EQUIPMENT

1. Each hose house should have the following additional equipment:

A-C (a) One 2-1/2 x 1-1/2 x 1-1/2 gated wye.

A-I (b) One 2-1/2 gate valve on hydrant.

A-I (c) Two 1-1/2 combination fog nozzles.

A-C (d) Two 1-1/2 hose spawner wrenches.

A-C (e) One portable hand light (7-1/2 volt).

R (f) One Halligan forceable entry tool.

A-C (g) Assortment of hose gaskets.

A-C (h) 200-foot 1-1/2 hose.

A 2. All post-indicator valves should be tagged indicating their service. (Licensee will number valves.)

R 3. Post-barricades should be provided for hydrants and PIV's which could be damaged by vehicles.

A 4. Hydrants should be checked for drainage in the fall, outlets lubricated, and pressurized in spring to check for winter damage.

R 5. Hose houses should have weather proof ventilators.

A-I 6. Hose house doors should be checked to insure clearance.

R 7. A foam cart should be provided for foam pickup tubes and ten containers (5 gallons each) of foam. Adapters should be provided so pickup tubes can be fitted to 1-1/2 inch hose.

8. Additional equipment should be provided at equipment storage location consisting of:

A-I (a) Three explosion proof fire service smoke ejectors (N15,000 to 20,000 cfm total capacity).

A-I (b) Two 2-1/2 inch double female adapters.

A-I (c) Ten portable hand lights.

R (d) Three portable radios dedicated to fire brigade and plant operations personnel emergency use should be provided.

S (e) Four air breathing apparatus, eight spare bottles should be provided.

A-C (f) Spare hose nozzles, hose, etc. should be stored at central location.

A 9. The three air packs and 12 spare bottles should be relocated to safe location away from a high fire hazard area.

R 10. A cooling tank should be provided at the air recharging station (compressor).

R 11. A cascade recharge system with the existing large air storage bottles should be provided.

K. FIRE DETECTION SYSTEMS

A 1. A battery backup emergency power source should be provided for fire alarm systems.

A 2. Remote indicating lights should be provided for out of sight fire detectors (above control room ceiling and manhole #3).

L. TURBINE BUILDING

S 1. An automatic foam deluge system should be provided for the following:

(a) Lube oil reservoir*.

(b) H_2 seal oil unit*.

(c) Transformer oil coolers*.

*The water supply feed should be independent of sprinklers and hose stations protecting the same area.

S 2. The turbine lube oil reservoir should be dyked to contain the contents of the lube oil reservior plus an allowance for suppression water.

Deleted (see S.2 item A.2 below) 3. The curb height for the transformer oil cooler should be increased to contain suppression agents with consideration of drainage capability.

S 4. An automatic sprinkler system should be provided throughout the turbine building with a 0.3 gpm/ft^2 density over the most hydraulically remote 3000 ft^2. The feed to the system should be independent of deluge systems and hose stations protecting the same area.

A-C 5. Waste oil and combustibles should be removed from electrical duct bank area at north end of the oil storage room.

S 6. The oil storage room doors should be curbed to contain normal oil storage plus an allowance for suppression water.

M. FIRE WATER SUPPLY

S 1. A automatic start diesel fire pump rated for at least 2000 gpm @ 125 psi should be provided with an independent feed to the yard loop underground system. Valving should be provided at the yard loop connection, independent of the existing loop feed, per NFPA 20.

A 2. Bleed and block connections should be provided for existing fire pump start pressure switches to permit full system testing.

S 3. Fire pumps should start at 110 and 100 psig.

N. YARD HAZARDS

A-I 1. The earthen berm around the fuel oil storage tank should be verified to be sufficient to hold the contents plus an allowance for suppression water. (The fuel oil volume will be reduced by normal use during the refueling outage

to limit the maximum volume to 26,000 gallons, which is the limit of existing containment capacity of the berm plus an allowance for suppression water. Permanent modifications to increase containment capacity will be made later).

S O. SHUTDOWN CONSIDERATIONS

1. A dedicated shutdown system should be provided which is independent of the turbine building, switchgear room, control room, manhole #3 and single cable run in PAB for charging and shutdown pumps.

S P. FIRE DAMPERS

1. Fire dampers with a rating equivalent to fire barrier penetrated should be provided to isolate the control room and switchgear room from the turbine building.

Q. FIRE BRIGADE

A-C 1. A procedure should be provided to recall fire brigade members.

A-C 2. Offsite fire assistance should be called on confirmation of a fire onsite.

A-C 3. The fire brigade should respond in force for any fire alarm.

R 4. Fire brigade members should have offsite hands on fire fighting training.

R. Steps should be taken to enhance manual fire fighting capability, including interim fire fighting actions, at the earliest possible time.

R-I 1. Increase fire brigade size to seven trained members. (Action has been initiated by the licensee to have five trained members on day shifts and an hourly fire watch of safety-related areas at all other times, until the unit is shut down for refueling.)

A-C 2. Additional hose should be provided at hose stations for which reach may be insufficient.

A-I 3. Additional foam agent should be provided onsite, 100 gallons minimum.

4. Fire protection staff positions and licensee proposed modifications should be implemented as follows:

(a) Staff positions to be implemented are noted in the margin above. (C or I items.)

(b) Licensee proposed modifications, indicated in the attachment titled Plant Responses to Recommendations Made in the Fire Hazards Analysis, submitted by the licensee's letter of January 31, 1977:

A. Turbine Building

A-I 1. Add a berm on south side of lube oil tank. (A sand bag berm will be used as a temporary measure now.)

H. Vapor Container

A-I 1. Add two additional wheeled fire extinguishers. (A water hose connection to a demineralized water line will be provided as an alternative which would be available during refueling outages. The water supply line is blanked off with flanges during plant operation.)

A-I 2. Remove combustibles away from personnel hatch.

A-I 3. Reduce amount of combustibles by removing or replacing with fire retardant or noncombustible materials.

A-I 4. Store required combustibles in small, widely separated areas.

A-C 5. Inspect and insure piping vapor barrier tightness.

(c) Fire strategies should be implemented as noted in the licensee's letter of August 14, 1978. (Draft will be prepared and information will be discussed with the fire brigade. Document of strategies and incorporation into training program will follow prior to next cycle of brigade training.)

S. Fire protection modifications should be completed prior to the end of the forthcoming refueling outage as follows:

1. Staff Positions to be implemented as noted in the margin above. (E items).

2. Licensee proposed modifications, same reference as R.4(b), above:

A. Turbine Building

A-E 2. Add drain openings in west wall by transformer oil coolers. (Drain pipes to be provided extending into outside transformer drainage basin.)

D. Heating Boiler Room

A-E 1. Provide curb at entrance from turbine hall.

G. Diesel Generator Building

A-E .. Provide curbs at all doorways of Diesel Generator Rooms.

A-C 2. Reinforce mounting of diesel day tanks.

Fire Services Consultant

ENCLOSURE II

October 2, 1978

JOHN P. TOWNLEY
913 Southeast 15th Court
Deerfield Beach, Florida 33441
305/426-0335
DRAFT

Mr. Robert E. Hall, Group Leader
Reactor Engineering Analysis
Brookhaven National Laboratory
Upton, New York 11973

SUBJECT: FIRE PROTECTION SITE VISIT

LOCATION: YANKEE ATOMIC ELECTRIC COMPANY - YANKEE ROWE FACILITY, ROWE, MASSACHUSETTS

REVIEWERS: T. DUNNING, N.R.C. TEAM LEADER, L. DERDERIAN, N.R.C. M. ANTONETTI AND J. TOWNLEY, BNL CONSULTANTS

DATES: SEPTEMBER 25 - 28, 1978

1. INTRODUCTION

1.1 Yankee Atomic Electric Comp[illegible] hereafter referred to as YAEC, Yankee Rowe facility, hereafter referred to as YR, is located in the town of Rowe, Massachusetts on the east bank of the Deerfield River's Sherman Pond, approximately 20 miles north west of Greenfield, Massachusetts. Mailing address for YAEC is 20 Turnpike Road, Westborough, Ma. 01581.

1.2 Itinerary for the site visit to YR was to leave Deerfield Beach, Fl. at 0530 on September 25, 1978 proceeding to Fort Lauderdale International Airport for a flight to Hartford, Conn. via Atlanta, Georgia.

Due to a mechanical problem with the aircraft at Atlanta, the connecting flight was delayed for approximately 1 hour and 15 minutes, setting back my arrival in Hartford to approximately 1245.

On arrival at Hartford, I was met by L. Derderian, the other two members of the team had gone ahead to meet with the YAEC guide at the scheduled time. Under the circumstances it was necessary to rent a car for transportation from Hartford, Conn. to Rowe, Ma. which was used during the site visit for transportation to and from the plant.

I arrived at the plant site at approximately 1430 to begin the required processing for both security and health physics reasons.

Yankee Rowe's requirement that all visitors to the plant receive a total body count and complete the respirator test prior to entry into the controlled areas resulted in an entry meeting that was held by the N.R.C. team leader while other members of the team were being processed.

1.3 At the completion of the processing and entry meeting, the team began the site visit with a walk-through of the safety related areas of the plant as a form of introduction to the facility.

YAEC assigned Ed Sawyer, Fire Protection Coordinator for YAEC, Ed May, YR Fire Protection Coordinator, J. Staub, YA technical

advisor to the plant superintendent and other suitable personnel to serve as guides and resource persons.

1.4 On the days following our format was to arrive at the plant site at 0730, advise and discuss with the plant personnel any questions or positions developed as a result of our observations from the previous day, then continue with the site review throughout the day. Our site visit concluded each day at approximately 1630. On return to our motel, the team would meet to discuss and review the day's observations and develop positions to be presented the following day and at the exit meeting.

1.5 The exit meeting was held on September 28, 1978 beginning at approximately 0930 attended by 15 members of YAEC staff and 9 members of the N.R.C.

In addition to the N.R.C. team members previously listed, the exit meeting was attended by R. L. Ferguson, Section Leader, NRC-DOR-PSB, D. L. Ziemann, NRC-DOR-ORB2, A. Burger, DOR-ORB2, R. Paolino, NRC-I & E and W. Lazarus, NRC-I & E.

The expressed purpose for the attendance of R. Ferguson and D. Ziemann was to aid in obtaining commitments and to resolve scheduling problems wherever possible.

1.6 Ralph Paolino, NRC-I & E, accompanied the team throughout

as an observer primarily to prepare for his assignment as one of the NRC-I & E individuals who will be conducting the F.H.A. site reviews and who will be responsible for the administrative controls portion of the review at YR.

In this capacity he accompanied this consultant during my interviews with plant personnel regarding the fire protection organization, fire brigade training and administrative controls areas. He also accompanied me on my visits to the two (2) off-site fire suppression assistance forces at Rowe and Monroe Bridge. I made every attempt to keep Mr. Paolino advised of the data and information necessary to carry out these areas of the site visit and review.

Those members of YAEC staff that we had contact with during our site visit were cooperative and helpful in aiding us to complete our evaluation. In turn every effort was made to explain our concerns and positions as we conducted the visit.

This consultant worked closely with the team and other N.R.C. representatives making suggestions, giving advice and adding input to positions and concerns related to manual fire suppression.

2. FIRE PROTECTION ORGANIZATION

2.1 The fire protection organization for YR is established by the fire protection program developed by YAEC for all their

facilities and is well defined.

2.1.1 Organization charts provided as a part of the fire protection program clearly illustrate the management authority and responsibility for both the on-site and off-site organization.

2.1.2 Off-site organizational responsibility for fire protection is under the direct authority of the Assistant Vice President of Operations who in turn delegates this responsibility to the YAEC Fire Protection Coordinator.

The Fire Protection Coordinator meets all the requirements for his position with the exception of the number of years (3) in responsible charge of fire protection, having at present only two years in this capacity.

2.1.3 On-site the fire protection program is the responsibility of the Plant Superintendent who delegates the direct responsibility to TAPS and thereby to the plant fire protection coordinator in the TAPS department.

2.1.4 The plant fire protection coordinator can be considered the plant fire marshal being responsible for all fire protection except fire fighting. It is his responsibility to see that the required fire prevention and fire protection inspections are carried out by the responsible YR department or division.

While YR does not have a specific fire prevention committee as such, fire prevention and protection matters are covered as a required portion of the facility safety committee meetings.

2.1.5 Responsibility for inspection, testing and maintenance of fire protection equipment is clearly defined in the administrative procedure developed for specific areas of the plant. Coordination and follow up where necessary are under the YR Fire Protection Coordinator.

2.2 Adequacy of Fire Protection Organization

2.2.1 After careful review of the information contained in YAEC letter to V. Stello, dated May 10, 1978 and an evaluation of the administrative procedures related to the fire protection organization, it is the conclusion of this consultant that the fire protection organization for YR is fully adequate and meets the requirements of the N.R.C. guidelines and appendix A to BTP APCSB 9.5-1.

2.3 Modifications and Recommendations

2.3.1 None at this time.

3. FIRE BRIGADE

3.1 The fire brigade for YR is established under the plant emergency plan. While there is no organizational chart showing

the command structure AP-2001 establishes the Shift Supervisor as the brigade leader and assigns command responsibility to the remaining members in descending order matching their plant operations functions.

As stated in YAEC's response letter to D. L. Ziemann, Chief ORB-2 dated August 14, 1978, the fire brigade at YR will be made up of three fully trained fire fighting personnel, including the Shift Supervisor as the fire brigade leader and two additional support people whose primary responsibility will be to support the fire brigade.

YAEC has proposed the above for all shifts including back shifts and holidays. However during the normal day shift there will be additional trained personnel on duty who will assist the fire brigade when necessary.

3.1.1 The position of direct responsibility for the fire brigade operations during a fire emergency is the Shift Superintendent. Overall responsibility for any emergency rests with the YR Emergency Coordinator.

3.1.2 OP-3017 entitled Fire Emergency directs that control room personnel shall call for assistance from Rowe V.F.D. and Monroe V.F.D., based upon the estimated ability of personnel to extinguish the fire. The estimate is made by the fire brigade

leader following his arrival at the fire.

3.1.3 Under normal plant conditions the regular responsibilities of the fire brigade members do not conflict with their fire brigade assignment.

3.1.4 All fire brigade members qualifications include satisfactory completion of annual medical/physical examinations for performing strenuous activity. (Re: YAEC letter to USNRC dated May 10, 1978.)

3.1.5 It is the intent of YR to schedule fire brigade meetings as part of the required training and drill schedule for the fire brigade. These are intended to be held on each shift by the fire brigade leader.

3.2 Adequacy of Fire Brigade

3.2.1 The fire brigade organization as stipulated in YAEC letter to the N.R.C. dated August 14, 1978 is inadequate in three areas.

One concern is that YAEC states that the brigade will consist of "three fully trained fire fighting personnel" and "on each shift two (2) support personnel". "These support personnel will receive the training necessary to perform their support roles only."

Inasmuch as all members of a fire brigade should be fully trained as fire fighters, this position is unacceptable.

A second area of concern is that YAEC states that one of the three fully trained personnel will be the Shift Supervisor as brigade leader. In view of the need for the Shift Supervisor to be available to the control room for decisions relating to the conditions that may occur during a fire in the plant, the Shift Supervisor should not be assigned as brigade leader.

The third area of concern is that under present conditions at YR, in relation to the need for additional fire detection, automatic fire suppression, manual fire fighting equipment, fire brigade training and for the development of pre-fire strategies, the proposed strength of the fire brigade, even if all are fully trained, is not adequate at five (5) personnel.

3.2.2 At present there is no formal recall plan for fire brigade members.

3.2.3 The present annual medical/physical examination given to fire brigade members appears adequate.

3.3 Modifications and Recommendations

3.3.1 The fire brigade at YR should be comprised of fully trained personnel at all times. To indicate that some members will only receive support training is not acceptable for any fire brigade. In the opinion of this consultant the fire brigade at YR should be as self-sufficient as possible. This position

is taken in view of the physical location of the plant regarding access, and most importantly in relation to the inadequacy of the off-site fire suppression assistance available to the plant. (See 5.2.1)

(x) 3.3.2 The fire brigade strength for YR should be increased to seven fully trained members. This position is taken with due regard to the inadequacies mentioned in 3.2.1 and with consideration of the present dependence on yard hydrant hose lines for manual fire fighting in a number of safety related areas of the plant. This dependence would require additional assistance in connecting and advancing the hose into the buildings. Further at this time the yard hose houses are not provided with 1½" hose, fittings and appliances to facilitate adequate hose line operations by a five man brigade. Where 2½" hose lines are to be used, the number of personnel required to operate these lines is a minimum of three for each line. Assuming a one 2½" line operation, three would be required to operate the line and one is the brigade leader, leaving three to provide additional equipment, back up fire suppression, ventilation of the fire area, self-contained breathing apparatus, communications and to be available for rescue actions or to cover for injuries to other members of the brigade.

(x) indicates YAEC rejection of the position.

3.3.3 When the improvements in the fire detection, automatic fire suppression, manual fire fighting equipment, fire brigade training and the development of pre-fire strategies are completed, the fire brigade strength may be reduced to five fully trained personnel.

* 3.3.4 An administrative procedure should be instituted for the recall of off duty fire brigade members.

4. FIRE BRIGADE TRAINING

4.1 On site responsibility for the fire brigade training program has been assigned to the TAPS department under YAEC's fire protection program.

4.1.1 Off-site responsibility rests with the YAEC Fire Protection Coordinator who is directly responsible for the effectiveness of the fire protection program including fire drills and training conducted for the fire brigade and other plant personnel.

4.1.2 The actual training is conducted by the YR Training Coordinator and Assistant Training Coordinator. Their qualifications to conduct fire brigade training are minimal, primarily based upon qualification as an instructor, some training at the Niagra-Mohawk training site and service as a volunteer fire fighter.

* indicates YAEC commitment to the position or to the intent.

4.1.3 Training is scheduled on a quarterly basis and is designed to repeat the classroom sessions over a two year period.

Hands on type training is conducted on-site on an annual basis, consisting of the use of extinguishers, operating manual hose streams on oil fires and simulated fire fighting conditions that could occur in the plant.

The training tapes prepared by ITC are used as the basis for the fire brigade training along with personal instruction by the Training Coordinator.

4.1.4 Fire brigade leaders and other members of the fire brigade who may have to assume command of the brigade do not receive any specialized training in leadership and command tactics.

4.1.5 Records of training are kept both in the individuals' file and in the general training file showing all participants. Training records show the date, time allocated, subject covered and personnel attendance.

4.1.6 Fire brigade meetings are being scheduled for the future and are to be conducted by the fire brigade leader for each of the operating shifts.

4.1.7 Practice sessions will be held for fire brigade members at regular intervals not to exceed one calendar year for each fire brigade member.

4.1.8 Fire brigade drills will be performed at regular intervals with a minimum of two drills per calendar year so that each fire brigade member participates in at least one drill per calendar year.

All fire drills are pre-planned, some are unannounced from time to time, and all are critiqued by the Training Coordinator.

At least annually the off-site fire assistance forces are invited to participate in training/drills.

4.2 Adequacy of Fire Brigade Training

4.2.1 Fire brigade training is generally adequate in frequency and content with the exception of the lack of leadership training and the limited hands on training conducted onsite.

4.2.2 The fire drill frequency is not adequate to assure that the brigade members receive sufficient practice to assure that their fire fighting knowledge and skills will be kept at the proper level.

4.2.3 At this time the joint training with the off-site fire suppression forces appears to be inadequate, and there are indications that improved participation on the part of the off-site people may be difficult to achieve.

4.3 Modifications and Recommendations

4.3.1 The fire brigade leader and assistant leader should receive a special leadership training which includes at least (1) critical factor analysis, (2) fire action plans, (3) tactics for fire control, (4) command decision making, (5) coordination of fire control efforts.

(x) 4.3.2 Fire brigade members should have additional hands on training under live fire conditions either at a suitable off-site location or on site if suitable facilities can be provided.

4.3.3 Fire drills should be scheduled quarterly for each shift to assure that all members of the fire brigade receive adequate practice and to permit the evaluation of the adequacy of the training program. The position taken by YAEC in the letter to the N.R.C. dated May 10, 1978, "2. Drills" is not acceptable in relation to fire drill frequency.

4.3.4 The Training Coordinator should investigate the availability of fire fighting instructors from the Massachusetts fire academy for possible assistance in carrying out the fire brigade training.

4.3.5 A concerted effort should be made to involve the off-site fire forces in meaningful joint training and drills with the YR fire brigade. The involvement of the Massachusetts fire

(x) indicates YAEC rejection of the position.

academy might help to encourage participation by the off-site assistance forces. (See 5.1.3)

4.3.6 As pre-fire strategies are developed (See 7.3) these should be used as training aids and as part of the fire drill format. The purpose being to familiarize the fire brigade, and the off-site assistance, with those areas where special precautions must be taken and where fire fighting will be most difficult.

5. OFF-SITE FIRE SUPPRESSION ASSISTANCE

5.1 Yankee Rowe nuclear power plant is located in the town limits of the town of Rowe, Massachusetts and is entitled to fire protection from the Rowe Volunteer Fire Department.

Fire protection is also provided by the Monroe Volunteer Fire Department on an agreement basis and as part of the area fire mutual aid.

Both Rowe and Monroe are called any time that off-site assistance is deemed necessary by the fire brigade leader.

5.1.1 Both Rowe and Monroe are fully volunteer fire departments. The roster for Rowe totals approximately 40 members, of which 20 are considered active members.

The Monroe roster totals 7 members, all are considered active.

5.1.2 The qualifications of the fire chiefs of both Rowe and Monroe are limited to their personal experience as volunteer fire fighters with minimal formal training.

The Rowe chief has been a volunteer for 30 years and has a total of 10 yaars as chief over three broken terms. The Rowe chief is elected by the membership each year without limitation. He in turn selects his officers who serve at the pleasure of the chief. There are no specific qualifications or standards for becoming an officer of the RVFD.

The Monroe chief has been a volunteer for 10 years and has been chief for the past 2 years. He is appointed by the selectmen and serves at their pleasure. He in turn selects his officers much the same as Rowe. Fire fighters are elected by the fire companies following application and there are no specific requirements regarding training or other qualifications.

Consideration must be given to the fact that Rowe and Monroe are communities of approximately 300 individuals; therefore the volunteer fire companies are forced to take anyone who applies.

5.1.3 Rowe VFD does not have specific training requirements. Meetings and training are held whenever the chief decides to call one. Usually meetings are held monthly except during the summer.

Monroe VFD has required monthly meeting/training sessions year round.

Neither RVFD or MVFD have any kind of formal training requirements. Neither department requires its personnel to attend training schools and neither takes much advantage of the programs offered by the Massachusetts fire academy.

5.1.4 The Rowe V.F.D. has two pumper/tankers, one 750 GPM (1971) and one 500 GPM (1962) both of which are reasonably equipped for rural fire fighting.

Monroe has one pumper/tanker, a 750 GPM (1960) which is also reasonably equipped for rural fire fighting.

5.1.5 Special equipment that would be valuable to the plant consists of a large supply of fire fighting foams at the Rowe V.F.D., beyond this neither fire company has any special equipment.

5.1.6 Monroe V.F.D's fire station is located approximately 1.5 miles from the plant. Response is limited to one access road that is narrow and often congested at one point by industrial trucking operations.

Response time, without obstructions of any sort, is estimated to be 10 minutes. Personnel available during the work day may be limited to something less than the seven active men.

Rowe V.F.D. is located approximately 4 miles from the plant over very winding roads and steep hills. Response time under normal clear weather conditions is estimated at twenty minutes. Manpower available during the normal work day is estimated at ten men.

Rowe's active volunteers are each provided with a radio call system at their homes. Monroe V.F.D. depends on a factory steam whistle to alert its members.

5.1.7 Command authority for fire fighting at the plant site rests with the plant fire brigade leader. This is clearly understood by both Rowe and Monroe chiefs.

5.1.8 Joint training between the off-site fire companies and the plant fire brigade has been minimal, for the most part consisting of annual familiarization visits to the plant.

5.1.9 Both the Rowe and Monroe V.F.D.'s belong to the tri-state fire mutual aid system that encompasses a 25 mile radius. There is an automatic move up system employed which would provide additional apparatus and manpower if necessary.

5.2 Adequacy of Off-Site Fire Suppression Assistance

5.2.1 The Rowe and Monroe Volunteer Fire Departments are very typical of remote rural volunteer fire companies. They are minimally adequate to protect their communities; however they are considered inadequate as related to providing viable fire suppression assistance to the YR fire brigade.

It should be clearly understood that I do not intend to belittle the Rowe V.F.D. and the Monroe V.F.D. in any way; I merely want to make the limitations of these departments clearly known to the N.R.C. as related to a self-sufficient fire brigade at the plant.

5.3 Modifications and Recommendations

5.3.1 YAEC should encourage and support the training of the off-site suppression forces both in the areas of improved internal training, training by the Massachusetts fire academy and by providing training facilities at the plant site for the fire companies to use and where joint fire brigade/off-site suppression forces training can be conducted.

5.3.2 YR should make every possible effort to encourage the off-site fire suppression forces to participate in joint training and drills at the plant.

5.3.3 As soon as the pre-fire strategies are developed for the safety related areas of the plant, the off-site assistance forces should be advised of the strategies and invited to participate in test drills to check the validity of the strategies.

6. MANUAL FIRE SUPPRESSION EQUIPMENT

6.1 The manual fire suppression equipment and related facilities

were evaluated during the site visit and found to be generally lacking as to fixed manual fire suppression and in relation to the manual equipment available for fire fighting. Generally the equipment that is provided was found to be in good condition and properly maintained.

6.1.1 Water supply for the fire system is obtained from Sherman Pond, an unlimited supply, through two electric fire pumps located in the screen well house having a single 10" connection to the fire water loop.

Each of the fire pumps are rated at 1000 GPM at 125 psi.

There is no back-up supply for the fire water system other than having a fire pumper draft from the pond and pump directly into the system. Two pumpers could supply approximately 750 Gal. each for a total flow of about 1500 Gal.

6.1.2 The 8" yard fire water loop is sectionalized through the use of isolation valves located to protect the entire system from shut down in the event of a failure or need for repair of one portion of the system.

Connections to the interior fire protection systems is also through 8" pipe provided with isolation valves.

6.1.3 Hydrants are three way frost proof type connected to the fire water loop by 6" branch connections equipped with individual curb box valves. Hydrant outlets have national standard fire hose thread.

Hydrants are not provided with 2½" gate valves. Annually the hydrants are checked for flow and to see that standing water does not remain in the barrel of the hydrant during freezing weather. A manual pump is provided to remove water that does not drain out of the hydrant; however the winterization of the hydrants is not spelled out in administrative procedures covering inspection and maintenance.

With a few exceptions the hydrants are located so that they are not subject to impact damage.

6.1.4 Post indicator valves (PIVs) controlling sections of the fire water loop and interior fire suppression equipment are not labeled to indicate what each valve controls and all are not adequately barricaded to prevent impact damage.

6.1.5 Five exterior hose houses, of the type that enclose the hydrant, are located around the yard loop spaced approximately at 250' intervals. These hose houses are of wood construction and are ample in size to contain the required equipment. The hose houses are weatherproof, in good condition, but do not

have sufficient ventilation openings. Hose houses are not adequately secured.

Fire fighting equipment located in the exterior hose houses was found to be minimal. Four of the five did not contain any 1½" hose and the one that did only had 1 - 50' length of 1½" hose. Equipment provided included - 250' synthetic jacket, 600 lb. test 2½" fire hose - 2 hydrant wrenches - 1 axe - 1 crow bar - 2 - 30" underwriters playpipes (one equipped with a fog tip, the other with a 1 1/8" straight stream tip) and 2 hose holders. A curb box valve wrench is located at each hose house.

150' of 2½" hose and the single length of 1½" hose is stored on shelves in accordion folds with the 2½" hose pre-coupled to the hydrant. 100' of 2½" hose is donut rolled.

6.1.6 There are ten interior fire hose stations located in safety related areas of the plant. Additionally there are standpipe hose stations in non-safety related areas that could be used in safety related areas under some circumstances.

Piping to the interior fire hose standpipe system is generally of small diameter with the connection to the hose valves often of 1½" diameter.

Hose stations in safety related areas are reel type equipped

with 50' of 1½" rubber jacket rubber lined booster type hose having N.H. hose thread and a 1½" fog-straight stream nozzle with ball type shut off. 1½" hose located in the cabinets in non-safety related areas is single jacket, synthetic, rubber lined with N.H. coupling thread.

All fire hose, both interior and exterior, 2½" and 1½", is tested annually at 250 psi using a fire pumper from the Rowe VFD.

6.1.7 Six self-contained breathing apparatus, pressure demand type, each provided with two spare air cylinders are provided for emergency use in the plant. All are rated for ½ hour and are manufactured by Scott.

Air packs are stored in wall mounted walk-away cases, three at the controlled access point and three in the stairwell adjacent to the switchgear room.

Yankee Rowe has two large air compressors for recharging of SCBA equipment. The compressors are provided with excellent filtering equipment. As presently set up, it is possible to refill two cylinders at a time off the compressor, no cascade system is available nor is the compressor equipped with a cooling tank for cylinder refill.

There is no air system provided to the control room nor does the control room have portable SCBA.

6.1.8 Approximately 92 fire extinguishers are suitably located throughout the plant, ranging in size from 2 3/4 lb. to 150 lb. units. Extinguishers are predominately dry chemical type with some CO^2 and pressure water types.

Extinguishers are generally suitable for the area to be protected and appear to be spaced according to NFPA #10.

6.1.9 Each member presently assigned to the fire brigade is provided with a complete set of protective clothing consisting of helmet, turnout coat, boots and gloves. This equipment is all stored in cabinets at a central location in the H.P. area. Each brigade member is responsible for his personal protective clothing.

6.1.10 Two portable foam applicator playpipes with 35 gallons of 3% foam is provided to assist in fighting flammable liquid fires. One is designed for use on 2½" hose, the other for 1½" hose. These items are stored at opposite points in the plant.

6.2 Adequacy of Manual Fire Suppression Equipment

6.2.1 The inspection, maintenance and testing program for manual fire suppression equipment is clearly defined and adequately carried out through administrative orders and procedu

6.2.2 Fire fighting equipment located in exterior hose houses

is inadequate.

6.2.3 Self-contained breathing equipment is not adequate to meet the N.R.C. requirement. The refilling system now is use does not meet normal safety standards for recharging SCBA air cylinders.

6.2.4 The number and location of interior hose stations is not adequate to provide effective manual fire suppression hose streams to all safety related areas.

6.2.5 The question of the adequacy of the existing fire pumps to meet the system demand has not been resolved; however it appears that the fire pumps are inadequate.

6.3 Modifications and Recommendations

6.3.1 Hose stations

* Hose station should be provided to reach all areas of the primary auxiliary building.

* A hose station should be provided to reach all areas of the diesel generator building.

NOTE:
* indicates YAEC commitment to the position or to the intent
(x) indicates YAEC rejection of the position
E indicates YAEC will evaluate the position and respond

* Hose stations should be provided to provide coverage of cable trays and stored combustibles and to cover operations floor.

(x) A fire hose station should be provided in mechanical equipment room #3.

E Additional hose should be provided at hose stations for which reach may be insufficient.

* 6.3.2 Provide two 17 lb. Halon 1211 portable extinguishers for the control room.

* 6.3.3 Two air masks and four spare bottles should be at the control room.

6.3.4 Yard loop and hose houses - portable equipment

* 1. Each hose house should have the following additional equipment:

a. one 2½" x 1½" x 1½" gated wye
b. one 2½" gate valve on hydrant
c. two 1½" combination fog nozzles
d. 1½" hose spanner wrenches
e. one portable hand light (7½ volt)
(x) f. one Halligan forcible entry tool
g. assortment of hose gaskets
h. 200 ft. 1½" hose

* 2. All post indicator valves should be tagged indicating service

(x)3. Post barricades should be provided for hydrants and PIVs which could be damaged by vehicles.

* 4. Hydrants should be checked for drainage in the fall, outlets lubricated and pressurized in spring to check for winter damage.

(x)5. Hose houses should have weather proof ventilators.

* 6. Hose house doors should be checked to insure clearance.

(x)7. A foam cart should be provided for foam pick up tubes and ten containers (5 gal. each) of foam. Adapters should be provided so pick up tubes can be fitted to 2½" hose.

* 8. Additional equipment should be provided at equipment storage location consisting of:

a. 3 explosion proof fire service smoke ejectors (15,000 to 20,000 CFM total capacity)

b. two 2½" double female adapters

c. ten portable hand lights

(x) d. three portable radios dedicated to fire brigade and plant operations personnel emergency use.

E e. four air breathing apparatus, eight spare bottles.

* f. spare hose nozzles, hose, etc. should be stored at a central location.

* 9. Three air packs and twelve spare bottles should be relocated to a safe location away from high fire hazard area.

(x)10. A cooling tank should be provided at air recharging station (compressor).

(x)11. A cascade recharge system with existing large air storage bottles should be provided.

6.3.5 Fire water supply

E 1. An automatic start diesel fire pump rated at least 2000 GPM at 125 psi should be provided with an independent feed to the yard loop underground system. Valving should be provided at yard loop connection independent for existing loop feed, per NFPA 20.

* 2. Bleed and block connections should be provided for existing fire pump start pressure switches to permit full system testing.

* 3. Fire pumps should start at 110 and 100 psig.

* 6.3.6 Additional foam agents should be provided on site, 100 gallons minimum.

7. FIRE FIGHTING PROCEDURES

7.1 As part of the overall emergency plan for YR, a fire emergency is covered under OP-3017 which details the action to be taken to control any fire that occurs.

7.1.1 OP-3017 defines the basic action to be taken by the individual who discovers a fire and the actions to be taken by the control room personnel, office personnel and visitors.

Further specific responsibilities as related to a fire emergency are contained in AP-2001 which defines the responsibilities of operations department personnel.

7.1.2 The Shift Supervisor is designated as the fire brigade leader and in his capacity as shift supervisor has the authority and responsibility for all emergencies at the plant including fires until such time as relieved by the plant emergency coordinator.

The Shift Supervisor is responsible for calling for off-site assistance depending upon the severity of the fire. Normal process is for the Shift Supervisor to investigate the severity

of the fire before calling for off-site assistance.

7.1.3 Pre-fire plans have not been developed for safety related areas or for other plant areas where fire suppression may be difficult.

7.1.4 The present procedure for response to a fire alarm received from an automatic detection and/or suppression system is to wait for investigation before calling out the fire brigade.

7.2 Adequacy of Fire Fighting Procedures

7.2.1 At the time of the site visit, the fire fighting procedures in effect at YR were inadequate in the areas listed under 7.3.

7.3 Modifications and Recommendations

7.3.1 Fire Fighting Procedures - Fire fighting strategies should be established and documented for fighting fires in all safety related areas and areas presenting a hazard to safety related equipment, in accordance with the guidance contained in Attachment No. 5 sub-sections d and e, "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls and Quality Assurance". These plans should be simple and straight-forward and may be documented as brigade training aids; but should be available for quick reference in a fire situation.

* 7.3.2 Off-site fire assistance should be called immediately for all confirmed fires that can not be extinguished by the person discovering the fire.

* 7.3.3 A specific procedure should be developed for the recall of off duty fire brigade members for all fires where immediate control cannot be achieved.

7.3.4 Procedures should be developed to provide direction to all plant personnel as to actions to be taken on discovery of a fire. Visitors and contractor personnel should be included in these procedures.

8. AUTOMATIC FIRE DETECTION AND SUPPRESSION SYSTEMS

8.1 Generally YR does not have extensive automatic detection and suppression systems, although some safety related areas are covered. There are a number of areas that need additional detection and/or suppression systems.

8.1.1 At the time of the site visit the automatic fire detection systems consisted of ionization detectors. The automatic suppression systems consisted of sprinkler/deluge systems that are interconnected.

8.2 Adequacy of Automatic Fire Detection and Suppression Systems

8.2.1 In the opinion of this consultant very careful con-

sideration must be given to the consequences of a fire in any area of the plant regardless of the safety relation of the specific area. A fire of any seriousness can drastically alter the normal conditions and in many instances can result in conditions that are not being controlled by the expected means.

The build-up of smoke and heat in a confined area also builds pressure. The deteriorating effect of the fire coupled with the pressure build-up often results in smoke and heat passing into other areas, even though the fire area is sealed off for all intens and purposes. Fire doors, fire dampers and other seal-off methods do not always perform as expected.

One of the results of situations enumerated above is that a fire in a non-safety related area may have a serious effect on safety related areas considered to be remote from the fire area.

8.2.2 The automatic fire detection and suppression systems at YR are considered to be inadequate as presently in operation.

8.3 Modifications and Recommendations

* 8.3.1 Fire detection (early warning) should be provided over each charging pump cubicle.

* 8.3.2 An automatic suppression system should be provided to protect each diesel generator room, flame detector actuation.

* Man hole #3 should be modified to make CO^2 protection automatic actuation.

(x) 8.3.3 Vapor Container - fire detection should be provided above cable risers in steam generator/coolant pump compartments and major combustibles.

(x) 8.3.4 An automatic sprinkler system should be provided in the heating boiler room.

E 8.315 Switchgear Room - an automatic total flooding Halon 1301 suppression system should be provided.

* 8.3.6 Control Room - early warning detection should be provided in the D-G/SI control panel.

Early warning fire detection should be provided in offices at east end of room and in the kitchen area.

* 8.3.7 A battery back up emergency power source should be provided for fire alarm systems.

Remote indicating lights should be provided for out of sight fire detectors. (above control room ceiling, man hole #3)

E 8.3.8 An automatic foam deluge system should be provided for the following:

a. lube oil reservoir
b. H_2 seal oil unit
c. transformer oil coolers

(The water supply feed should be independent of sprinklers and hose stations protecting the same area.)

E An automatic sprinkler system should be provided throughout the turbine building with a 0.3 gpm/ft^2 density over the most hydraulically remote 3000 ft^2. The feed to the system should be independent of deluge systems and hose stations protecting the same area.

9. GENERAL OBSERVATIONS AND RECOMMENDATIONS

9.1 The overall condition of the plant in relation to housekeeping, general cleanliness, control of combustibles and control of ignition sources was outstanding. As always there are areas where improvement can be achieved and where the result would be an even better general safety condition throughout the plant site.

9.2 In relation to control of combustibles, the following staff positions should be complied with:

* 9.2.1 Combustible storage in diesel generator buildings should be removed or suitably protected.

(x) 9.2.2 Wood storage boxes should be removed, fuel storage vault.

E 9.2.3 The turbine lube oil reservoir should be dyked to contain the contents of the lube oil reservoir plus an allowance for suppression water.

E 9.2.4 The curb height for the transformer oil cooler should be increased to contain suppression agents with consideration of drainage capability.

* 9.2.5 Waste oil and combustibles should be removed from electrical duct bank area at north end of oil storage room.

E 9.2.6 The oil storage room doors should be curbed to contain normal oil storage plus an allowance for suppression water.

* 9.2.7 The earthen dike around fuel oil storage tank should be verified to be sufficient to hold the contents plus suppression water.

9.3 In relation to control of ignition sources, the procedures for controls of cutting and welding are adequate.

It was noted that smoking is adequately controlled throughout the plant. No violations of no smoking rules were noted.

9.4 In general the cooperation received from the utility personnel with whom we had contact was good. It appeared that the YR and YAEC people did everything they could to assist the team in its evaluation. This consultant attempted to offer valuable advice to the N.R.C. team and suggestions for improved fire safety to YR staff.

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