

August 4, 1977

Dockets Nos.: 50-31  
50-247  
and 50-286

Consolidated Edison Company  
of New York, Inc.  
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GL-77-2

Gentlemen:

RE: INDIAN POINT UNITS NOS. 1, 2, AND 3

We are enclosing for your information and use a copy of "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls and Quality Assurance." This document is presently being used by the NRC as supplemental guidance for the review of the organizational and administrative aspects of the fire protection evaluation of your facility.

By letter dated July 15, 1977, you indicated your intention to develop no fire protection Technical Specifications for Indian Point Unit No. 1 because it was shutdown and defueled. We, therefore, request that you propose fire protection Technical Specifications for Indian Point Unit No. 1 appropriate to its present shutdown defueled condition. A fire originating in Unit No. 1 could have serious consequences at the operating units because of their close proximity to Unit No. 1.

Sincerely,

~~Original signed by~~

Robert W. Reid, Chief  
Operating Reactors Branch #4  
Division of Operating Reactors

Enclosure:  
Nuclear Plant Fire Protection  
Functional Responsibilities,  
Administrative Controls  
and Quality Assurance

Misc  
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DATE	8/2/77	8/4/77	8/4/77		

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## NUCLEAR PLANT FIRE PROTECTION FUNCTIONAL RESPONSIBILITIES, ADMINISTRATIVE CONTROLS AND QUALITY ASSURANCE

The functional responsibilities, administrative controls, and quality assurance related to nuclear power plant fire protection programs have a significant role in preventing and fighting fires. Because these controls represent a significant portion of the licensee's fire protection program and are subject to periodic reviews by NRC inspectors, it is necessary to have a common understanding between applicant/licensees, NRC reviewers, and NRC inspectors as to what constitutes adequate delineation of responsibilities, administrative controls and quality assurance and how these responsibilities and activities should be conducted. Therefore, supplementary guidance on these controls is desirable.

Appendix A to Branch Technical Position 9.5-1 and Regulatory Guide 1.120 provide overall guidance related to functional responsibilities, administrative controls, and quality assurance. The discussion in the Attachments provides supplemental guidance on specific functional responsibilities, administrative controls, and quality assurance necessary to assure an effective fire protection program. The table below correlates each subject for which supplemental guidance is provided with the respective section(s) of Appendix A and Regulatory Guide 1.120.

SUBJECT	APPENDIX A	REGULATORY GUIDE 1.120
1. Fire Protection Organization	A.1, B, C	C.1, C.2, C.3
2. Fire Brigade Training	A.1(d), B.5	C.1(4), C.2e
3. Control of Combustibles	B.2, B.3(c)	C.2.b, C.2.c(3)
4. Control of Ignition Sources	B.3(a)	C.2.c(1)
5. Fire Fighting Procedures	A.1(d), B.1, 4, 5	C.1a(4), (5), C.2.a, d, e
6. Quality Assurance	C.	C.3

This supplementary guidance is to be given to utilities and is being distributed to NRC fire protection program reviewers and NRC Office of Inspection and Enforcement.

The licensee should provide the description of fire protection functional responsibilities and administrative controls in a fire protection plan which describes his organization and its qualifications, fire brigade training, the controls over combustibles and ignition sources, methods for assuring the availability of the fire protection systems and equipment; procedures for fighting fires, fire watch, and quality assurance provisions for the fire protection program. The plan should also identify the plant procedures that implement the plan. The plan will be filed with the Nuclear Regulatory Commission and the plant procedures should be available to NRC Inspectors and at the plant site.

FIRE PROTECTION ORGANIZATION

- 1.0 The organizational responsibilities and lines of communication pertaining to fire protection should be defined between the various positions through the use of organizational charts and functional descriptions of each position's responsibilities. As a minimum the positions/organizations responsible for the following should be designated:
- a. The upper level offsite management position which has management responsibility for the formulation, implementation, and assessment of the effectiveness of the nuclear plant fire protection program.
  - b. The offsite management position(s) directly responsible for
    - (1) formulating, implementing, and periodically assessing the effectiveness of the fire protection program for the licensee's nuclear power plant including fire drills and training conducted by the fire brigade and plant personnel. The results of these assessments should be reported to the upper level management position responsible for fire protection with recommendations for improvements or corrective actions as deemed necessary.
    - (2) Using the following NFPA Publications for guidance to develop the fire protection program:
      - No. 4 - "Organization for Fire Services"
      - No. 4A - "Organization of a Fire Department"
      - No. 6 - "Industrial Fire Loss Prevention"
      - No. 7 - "Management of Fire Emergencies"
      - No. 8 - "Management Responsibilities for Effects of Fire on Operations"
      - No. 27 - "Private Fire Brigades"
  - c. The onsite management position responsible for the overall administration of the plant operations and emergency plans which include the fire protection and prevention program and which provides a single point of control and contact for all contingencies.

d. The onsite position(s) which:

- (1) implements periodic inspections to: minimize the amount of combustibles in safety related areas; determine the effectiveness of housekeeping practices; assure the availability and acceptable condition of all fire protection systems/equipment, emergency breathing apparatus, emergency lighting, communication equipment, fire stops, penetration seals and fire retardant coatings; and assures prompt and effective corrective actions are taken to correct conditions adverse to fire protection and preclude their recurrence.
- (2) is responsible for the fire fighting training for operating plant personnel and the plant's fire brigade; design and selection of equipment; periodic inspection and testing of fire protection systems and equipment in accordance with established procedures and evaluate test results and determine the acceptability of the systems under test.
- (3) assists in the critique of all fire drills to determine how well the training objectives have been met.
- (4) reviews and evaluates proposed work activities to identify potential transient fire loads.
- (5) implements a program for indoctrination of all plant contractor personnel in appropriate administrative procedures which implement the fire protection program, and the emergency procedures relative to fire protection.
- (6) implements a program for instruction of personnel on the proper handling of accidental events such as leaks or spills of flammable materials that are related to fire protection.

e. The onsite position responsible for fire protection quality assurance.

This position should be responsible for assuring the effective implementation of the fire protection program by planned inspections and scheduled audits. He should assure and verify that results of these inspections or audits are promptly reported to cognizant management personnel.

- f. The positions which are part of the plant fire brigade
- (1) The plant fire brigade positions should be responsible for fighting fires. The authority and responsibility of each fire brigade position relative to fire protection should be clearly defined.
  - (2) The responsibilities of each fire brigade position should correspond with the actions required by the fire fighting procedures.
  - (3) The responsibilities of the fire brigade members under normal plant conditions, should not conflict with their responsibilities during a fire emergency.
  - (4) The minimum number of trained fire brigade members available onsite for each operating shift should be consistent with the activities required to combat the most significant fire. The size of the fire brigade should be based upon the functions required to fight fires with adequate allowance for injuries.
  - (5) The recommendations for organization, training, and equipment of "PRIVATE FIRE BRIGADES" as specified in NFPA No. 27-1975, including the applicable NFPA publications listed in the Appendix to NFPA No. 27, are considered appropriate criteria for organizing, training, and operating a plant fire brigade.

## 2.0 Qualifications

- a. The position responsible for formulation and implementation of the Fire Protection Program should have, within his organization, or as a consultant, a Fire Protection Engineer who is a graduate of an engineering curriculum of accepted standing and who shall have completed not less than six years of engineering attainment indicative of growth in engineering competency and achievement, three of which shall have been in responsible charge of fire protection engineering work. These requirements are the eligibility requirements as a Member in the Society of Fire Protection Engineers.

- b. The fire brigade members qualifications should include satisfactory completion of a physical examination for performing strenuous activity, and of the fire brigade training described in Attachment No. 2.
- c. The personnel responsible for the maintenance and testing of the Fire Protection Systems should be qualified by training and experience for such work.
- d. The personnel responsible for the training of the fire brigade should be qualified by training and experience for such work.



## FIRE BRIGADE TRAINING

The training program should assure that the capability to fight potential fires is established and maintained. The program should consist of an initial classroom instruction program followed by periodic classroom retraining, practice in fire fighting and fire drills:

1.0 Classroom Instruction

a. The initial classroom instruction should include:

- (1) Identification of the fire hazards and associated types of fires that could occur in the plant, and an identification of the location of such hazards.
- (2) Identification of the location of fire fighting equipment for each fire area, and familiarization with layout of the plant including access and egress routes to each area.
- (3) The proper use of available fire fighting equipment, and the correct method of fighting each type of fire. The types of fires covered should include electrical fires, fires in cables and cable trays, hydrogen fires, flammable liquid, waste/debris fires, and record file fires.
- (4) Indoctrination of the plant fire fighting plan with specific coverage of each individual's responsibilities.
- (5) The proper use of communication, lighting, ventilation and emergency breathing equipment.
- (6) The direction and coordination of the fire fighting activities (fire brigade leaders only).
- (7) The toxic characteristics of expected products of combustion.
- (8) The proper method for fighting fires inside buildings and tunnels.
- (9) Detailed review of fire fighting procedures and procedure changes.
- (10) Review of latest plant modifications and changes in fire fighting plans.

- b. The instruction should be provided by qualified individuals knowledgeable, experienced, and suitably trained in fighting the types of fires that could occur in the plant and in using the types of equipment available in the nuclear power plant.

Members of the "Fire Protection Staff" and Fire Brigade Leaders may conduct this training.

- c. Instruction should be provided to all fire brigade members and fire brigade leaders.
- d. Regular planned meetings held every 3 months should repeat the classroom instruction program over a two year period.

## 2.0 Practice

Practice sessions should be held for fire brigade members on the proper method of fighting various types of fires of similar magnitude, complexity, and difficulty as those which could occur in a nuclear power plant. These sessions should provide brigade members with experience in actual fire extinguishment and the use of emergency breathing apparatus under strenuous conditions. These practice sessions should be provided at regular intervals but not to exceed 1 year for each fire brigade member.

## 3.0 Drills

Fire brigade drills should be performed in the plant so that the fire brigade can practice as a team. Drills should include the following:

- a. Assessment of fire alarm effectiveness, time required to notify and assembly fire brigade, and selection, placement and use of equipment.
- b. Assess each brigade member's knowledge of his role in the fire fighting strategy for the area assumed to contain the fire. Assess the brigade members conformance with established plant fire fighting procedures and use of fire fighting equipment, including self-contained emergency breathing apparatus, communication equipment, and ventilation equipment, to the extent practicable.

- c. The simulated use of fire fighting equipment required to cope with the situation and type of fire selected for the drill. The area and type of fire chosen for the drill should be varied such that brigade members are trained in fighting fires in all safety related areas containing significant fire hazards. The situation selected should simulate the size and arrangement of a fire which could reasonably occur in the area selected, allowing for fire development due to the time required to respond, to obtain equipment, and organize for the fire, assuming loss of automatic suppression capability.
- d. Assessment of brigade leader's direction of the fire fighting effort, as to thoroughness, accuracy, and effectiveness.
- e. The drills should be performed at regular intervals but not to exceed 3 months for each fire brigade. At least one drill per year should be performed on a "back shift" for each fire brigade. A sufficient number of these drills, not less than one for each fire brigade per year, shall be unannounced, to determine the fire readiness of the plant fire brigade leader, brigade, fire protection systems and equipment.
- f. The drills should be pre-planned to establish the training objectives of the drill. The drills should be critiqued to determine how well the training objectives have been met. Unannounced drills should have their critiques performed by members of the management staff responsible for plant safety and security. At three year intervals, drills should be critiqued by qualified individuals independent of the utility's staff.

#### 4.0 Records

Records of training provided to each fire brigade member including drill critiques should be maintained to assure that each member receives training in all parts of the training program. These records of training should be available for review.

## CONTROL OF COMBUSTIBLES

Administrative controls should be established to minimize the amount of combustibles that a safety related area may be exposed to. These controls should be established to govern:

- a. the handling of and limitation on the use of combustibles, flammable and explosive hazards such as flammable gases and liquids, HEPA and charcoal filters, dry unused ion exchange resins or other combustible supplies in safety related areas, and to assure that these items are not stored in safety related areas.
- b. the transient fire loads during maintenance and modifications such as combustible and flammable liquids, wood and plastic products, spilled oil, oil drums, and other combustible materials in buildings containing safety related systems or equipment. This control should require an in-plant review of proposed work activities to identify potential transient fire loads. The onsite staff member designated the responsibility for reviewing work activities for potential transient fire loads should specify the required additional fire protection in the work activity procedure.

When the transient fire load causes the total fire load to exceed the capabilities of existing suppression systems and equipment, additional portable suppression equipment should be brought into the area.

- c. the removal of all waste, debris, scrap, rags, oil spills, or other combustibles resulting from the work activity, in the area following completion of the activity, or at the end of each work shift, whichever is sooner.
- d. periodic inspection for accumulation of combustibles.
- e. all wood used in safety related areas to assure that it is treated with flame retardant.

## CONTROL OF IGNITION SOURCES

### 1.0 Administrative Controls

Administrative controls should be instituted to protect safety-related equipment from fire damage or loss resulting from work involving ignition sources, such as welding, cutting, grinding, or open flame work; administrative controls should prohibit the use of open flame or combustion smoke for leak testing and controls should prohibit smoking and other ignition sources in certain areas.

### 2.0 Control of Welding, Cutting, Grinding, and Open Flame Work

- a. All cutting, welding, grinding or open-flame work should be authorized by the responsible foreman or supervisor through a work permit. The responsible foreman or supervisor should have received a basic industrial fire fighting and fire prevention course covering anticipated fires, such as electrical fires, fires in cables and cable trays, hydrogen fires, hydrocarbon fires, solvent fires, waste/debris fires, and record file fires.
- b. Before issuing the permit, the responsible foreman or supervisor should physically survey the area where the work is to be performed and establish that the following precautions have been accomplished:
  - (1) All moveable combustible material below and within a 35 foot radius of the cutting, welding, grinding, or open flame work has been removed. (See NFPA 51B)
  - (2) All immovable combustible material below and within a 35 foot radius has been thoroughly protected by asbestos curtains, metal guards, or flameproof covers, and fire extinguishers, hose, or other firefighting equipment are provided at the work site. (See NFPA 51B)
  - (3) A fire watch trained and equipped to prevent and combat fires is present throughout any operations in which there is potential for fire that might damage safety related equipment. A fire watch should be provided where cutting, welding, grinding or open flame is performed above or within a radius of 35 feet of any open cables, flammable liquids, scaffold boards, paper, rags, or other objects on the same elevation of the work or if combustible materials are below the work area where openings exist. A fire watch should be provided for all

cutting, welding, grinding, and open flame work in the Control Room, Cable Spreading Room, Diesel Generator Rooms, and other safety related areas that contain significant amount of cable or flammable liquids. (See NFPA 51B)

The fire watch should remain on the work site while work is performed and remain in the area for at least 30 minutes after the work is completed to check for smoldering fires.

(4) All equipment to be used is in a safe, working condition. Oxyacetylene equipment is checked for leaks before being moved to the work area.

c. The signature concurrence of a member of the plant's management or a quality control inspector certified to make this concurrence should be obtained whenever the supervisor or foreman determines that a fire watch is not required.

### 3.0 Leak Testing

Administrative procedures should be established to prohibit the use of open flame or combustion smoke for leak testing. Work orders for leak testing should require the concurrence of the shift engineer to verify that the leak test method is acceptable and would not present a potential ignition source.

### 4.0 Smoking and Ignition Source Restriction

Smoking should be prohibited in safety related areas, except where "smoking permitted" areas have been specifically designated by a responsible member of plant management and in areas containing flammable or potentially explosive materials or atmospheres that present a hazard to safety related equipment. These areas should be identified with "No Smoking" signs.

## FIRE FIGHTING PROCEDURES

Fire fighting procedures should be established to cover such items as notification of a fire, fire emergency procedures, and coordination of fire fighting activities with offsite fire departments. The fire fighting procedures should identify:

- a. Actions to be taken by individual discovering the fire, such as, notification of control room, attempt to extinguish fire, and actuation of local fire suppression systems.
- b. Actions to be taken by the control room operator and the need for brigade assistance upon report of a fire or receipt of alarm on control room annunciator panel, such as: announcing location of fire over PA system, sounding fire alarms and notifying the shift supervisor and the fire brigade leader of the type, size, and location of the fire.
- c. Actions to be taken by the fire brigade after notification by the control room operator of a fire, including: location to assemble; directions given by fire brigade leader; and responsibilities of brigade members such as selection of fire fighting equipment and transportation to fire location, selection of protective equipment, use of fire suppression systems operating instructions, and use of preplanned strategies for fighting fires in specific areas.
- d. The strategies established for fighting fires in all safety-related areas and areas presenting a hazard to safety-related equipment. As a minimum the following subjects should be covered:
  - (1) Identification of combustibles in each plant zone covered by the specific fire fighting procedures.
  - (2) Fire extinguishants best suited for controlling the fires associated with the combustible loadings in that zone and the nearest location of these extinguishants.
  - (3) Most favorable direction from which to attack a fire in each area, in view of the ventilation direction, access hallways, stairs and doors which are most likely to be fire-free, and the best station or elevation for fighting the fire. A specific identification system shall designate all hallways, stairs, doors, fire equipment and system control locations, and other items described in the fire fighting procedures. This identification should be used

in the procedures and the corresponding plant items should be prominently marked so that they can be recognized in dim light. All access and egress routes that involve locked doors should be specifically identified in the procedure with the appropriate precautions and methods for access specified.

- (4) Designation of plant systems that should be managed to reduce the damage potential during a local fire; location of local and remote controls for such management (e.g., any hydraulic or electrical systems in the zone covered by the specific fire fighting procedure that could increase the hazards in the area because of overpressurization or electrical hazards).
  - (5) Designation of vital heat-sensitive system components that should be kept cool while fighting a local fire. Critical equipment which are particularly hazardous combustible sources should be designated to receive cooling.
  - (6) Organization of fire fighting brigades and the assignment of special duties according to job title so that all fire fighting functions are covered by any complete shift personnel complement. These duties should include command control of the brigade, fire hose laying, applying the extinguishant to the fire, advancing support supplies to the fire scene, communication with the control room, coordination with outside fire departments.
  - (7) Identification radiological and toxic hazards in fire zones.
  - (8) Ventilation system operation that assures desired plant pressure distribution when the ventilation flow is modified for fire containment or smoke clearing operations.
  - (9) Operations requiring control room and shift engineer coordination or authorization.
  - (10) Instructions for plant operators and general plant personnel during fire.
- e. The validity of the preplanning strategies should be tested by appropriate full-dress drills to check the logic of the strategy, the adequacy of the equipment, personnel understanding, and to uncover unforeseen problems.



- 2
- f. Actions to be taken by Plant Superintendent and his staff, and Security Guards after notification of a fire.
  - g. Actions to be taken that will coordinate fire fighting activities with offsite fire departments, including: identification of individual responsible for assessing situation and calling in outside fire department assistance when needed; identification of individual who will direct fire fighting activities when aided by offsite fire fighting assistance; provisions for including offsite fire fighting organizations in fire brigade drills at least once per year; and provisions for training offsite fire department personnel in basic radiation principles, typical radiation hazards, and precautions to be taken in a fire involving radioactive materials in the plant. The procedures should also describe the offsite fire department's resources and estimated response time by the offsite fire department to provide assistance to the station.

### QUALITY ASSURANCE

The quality assurance (QA) program should assure that the requirements for design, procurement, installation, testing, and administrative controls for the fire protection program for safety related areas approved by NRC are satisfied. The Quality Assurance provisions for fire protection should apply to activities performed after the effective date of the adoption of said provisions. The QA program should be under the management control of the QA organization. This control consists of (1) formulating and/or verifying that the fire protection QA program incorporates suitable requirements and is acceptable to the management responsible for fire protection and (2) verifying the effectiveness of the QA program for fire protection through review, surveillance, and audits. Performance of other QA program functions for meeting the fire protection program requirements may be performed by personnel outside of the QA organization. The QA program for fire protection should be part of the overall plant QA program. These QA criteria apply to those items within the scope of the fire protection program, such as fire protection systems, emergency lighting, communication and emergency breathing apparatus as well as the fire protection requirements of applicable safety related equipment.

Applicants/licensees can meet the fire protection quality assurance (QA) program criteria of Appendix A to BTP 9.5-1 or Regulatory Guide 1.120 by either:

- 1) implementing those fire protection QA criteria as part of their QA program under 10 CFR Part 50 Appendix B, where such a commitment is made, it is not necessary to submit a detailed description of the fire protection QA program or its implementation for NRC review; or
- 2) providing for NRC review a description of the fire protection QA program and the measures for implementing the program. Supplemental guidance is provided below on acceptable measures for implementing each of the fire protection QA program criteria of Appendix A to BTP 9.5-1 or Regulatory Guide 1.120.

1.0 Design Control and Procurement Document Control - Measures should be established to assure that the applicable guidelines of the Regulatory Guide 1.120 or approved NRC alternatives are included in design and procurement documents and that deviations therefrom are controlled. These measures should assure that:

- a. Design and procurement document changes, including field changes and design deviations are subject to the same level of controls, reviews, and approvals that were applicable to the original document.

- b. Quality standards are specified in the design documents such as appropriate fire-protection codes and standards, and deviations and changes from these quality standards are controlled.
- c. New designs and plant modifications, including fire protection systems, are reviewed by qualified personnel to assure inclusion of appropriate fire protection requirements. These reviews should include items such as:
  - (1) Design reviews to verify adequacy of wiring isolation and cable separation criteria.
  - (2) Design reviews to verify appropriate requirements for room isolation (sealing penetrations, floors, and other fire barriers).
- d. A review and concurrence of the adequacy of fire protection requirements and quality requirements stated in procurement documents are performed and documented by qualified personnel.

This review should determine that fire protection requirements and quality requirements are correctly stated, inspectable and controllable; there are adequate acceptance and rejection criteria; and the procurement document has been prepared, reviewed, and approved in accordance with QA program requirements.

- 2.0 Instructions, Procedures, and Drawing - Inspections, tests, administrative controls, fire drills, and training that govern the fire protection program should be prescribed by documented instructions, procedures or drawings and should be accomplished in accordance with these documents. The following provisions should be included.
  - a. Indoctrination and training programs for fire prevention and fire fighting are implemented in accordance with documented procedures.
  - b. Activities such as design, installation, inspection, test, maintenance, and modification of fire protection systems are prescribed and accomplished in accordance with documented instructions, procedures, and drawings.
  - c. Instructions and procedures for design installation, inspection, test, maintenance, modification and administrative controls are reviewed to assure that proper inclusion of fire protection requirements, such as precautions, control of ignition sources and combustibles, provisions for backup fire protection of the activity requires disabling a fire protection system, and restriction on material substitution unless specifically permitted by design and confirmed by design review.

d. The installation or application of penetration seals and fire retardant coatings is performed by trained personnel using approved procedures.

3.0 Control of Purchased Material, Equipment, and Services - Measures shall be established to assure that purchased material, equipment and services conform to the procurement documents. These measures should include:

- a. Provisions, as appropriate, for source evaluation and selection, objective evidence of quality furnished by the contractor, inspections at suppliers, or receiving inspections.
- b. Source or receiving inspection, as a minimum, for those items whose quality cannot be verified after installation.

4.0 Inspection - A program for independent inspection of activities affecting fire protection should be established and executed by, or for, the organization performing the activity to verify conformance to documented installation drawings and test procedures for accomplishing activities. This program should include:

- a. Inspections of (1) installation, maintenance and modification of fire protection systems; and (2) emergency lighting and communication equipment to assure conformance to design and installation requirements.
- b. Inspection of penetration seals and fire retardant coating installations to verify the activity is satisfactorily completed.
- c. Inspections of cable routing to verify conformance with design requirements.
- d. Inspections to verify that appropriate requirements for room isolation (sealing penetrations, floors, and other fire barriers) are accomplished during construction.
- e. Measures to assure that inspection personnel are independent from the individuals performing the activity being inspected and are knowledgeable in the design and installation requirements for fire protection.
- f. Inspection procedures, instructions, and check lists which provide for the following:
  - (1) Identification of characteristics and activities to be inspected
  - (2) Identification of the individuals or groups responsible for performing the inspection operation
  - (3) Acceptance and rejection criteria

- (4) A description of the method of inspection
  - (5) Recording evidence of completing and verifying a manufacturing, inspection or test operation
  - (6) Recording inspector or data recorder and the results of the inspection operation
- g. Periodic inspections of fire protection systems, emergency breathing and auxiliary equipment, emergency lighting, and communication equipment to assure the acceptable condition of these items.
  - h. Periodic inspection of materials subject to degradation such as fire stops, seals, and fire retardant coatings to assure these items have not deteriorated or been damaged.
- 5.0 Test and Test Control - A test program should be established and implemented to ensure that testing is performed and verified by inspection and audit to demonstrate conformance with design and system readiness requirements. The tests should be performed in accordance with written test procedures; test results should be properly evaluated and acted on. The test program should include the following:
- a. Installation Testing - Following construction, modification, repair or replacement, sufficient testing is performed to demonstrate that fire protection systems, emergency lighting and communication equipment will perform satisfactorily in service and that design criteria are met. Written test procedures for installation tests incorporate the requirements and acceptance limits contained in applicable design documents.
  - b. Periodic testing - The schedules and methods for periodic testing are developed and documented. Fire protection equipment, emergency lighting, and communication equipment are tested periodically to assure that the equipment will properly function and continue to meet the design criteria.
  - c. Programs are established for QA/QC to verify testing of fire protection systems and to verify that test personnel are effectively trained.
  - d. Test results are documented, evaluated, and their acceptability determined by a qualified responsible individual or group.
- 6.0 Inspection, Test, and Operating Status - Measures should be established to provide for the identification of items that have satisfactorily passed required tests and inspections. These measures should include provisions for:
- a. Identification by means of tags, labels, or similar temporary markings to indicate completion of required inspections and tests, and operating status.

7.0 Nonconforming Items - Measures should be established to control items that do not conform to specified requirements to prevent inadvertent use of installation. These measures should include provisions to assure that:

- a. Nonconforming, inoperative, or malfunctioning fire protection systems, emergency lighting, and communication equipment are appropriately tagged or labelled.
- b. The identification, documentation, segregation, review disposition, and notification to the affected organization of nonconforming materials, parts, components, or services are procedurally controlled.
- c. Documentation identifies the nonconforming item, describes the nonconformance and the disposition of the nonconforming item and includes signature approval of the disposition.
- d. Provisions are established identifying those individuals or groups delegated the responsibility and authority for the disposition and approval of nonconforming items.

8.0 Corrective Action - Measures shall be established to ensure that conditions adverse to fire protection such as failures, malfunctions, deficiencies, deviations, defective components, uncontrolled combustible material and nonconformances are promptly identified, reported and corrected. These measures should assure:

- a. Procedures are established for evaluation of conditions adverse to fire protection (such as nonconformance, failures, malfunctions, deficiencies, deviations, and defective material and equipment) to determine the necessary corrective action.
- b. In the case of significant or repetitive conditions adverse to fire protection, including fire incidents, the cause of the conditions is determined and analyzed, and prompt corrective actions are taken to preclude recurrence. The cause of the condition and the corrective action taken are promptly reported to cognizant levels of management for review and assessment.

9.0 Records - Records should be prepared and maintained to furnish evidence that the criteria enumerated above are being met for activities affecting the fire protection program. The following provisions should be included:

- a. Records are identifiable and retrievable and should demonstrate conformance to fire protection requirements. The records should

include results of inspections, tests, reviews, and audits; non-conformance and corrective action reports; construction, maintenance and modification records; and certified manufacturers' data.

b. Record retention requirements are established.

10.0 Audits - Audits should be conducted and documented to verify compliance with the fire protection program, including design and procurement documents, instructions, procedures, and drawings, and inspection and test activities. The following provisions should be included:

- a. Audits are periodically performed to verify compliance with the administrative controls and implementation of quality assurance criteria including design and procurement, instructions, procedures and drawings and inspection and test activities. These audits are performed by QA personnel in accordance with preestablished written procedures or check lists and conducted by trained personnel not having direct responsibilities in the areas being audited.
- b. Audit results are documented and then reviewed with management having responsibility in the area audited.
- c. Followup action is taken by responsible management to correct the deficiencies revealed by the audit.
- d. Audits are annually performed to provide an overall assessment of conformance to fire protection requirements.