5.0 TMI-1 COMPARISON TO THE REQUIREMENTS OF NRC BRANCH TECHNICAL POSITION APCSB 9.5-1

A. Overall Requirements of Nuclear Plant Fire Protection Program

1. Personnel

APPENDIX A POSITION

A.1 Responsibility for the overall fire protection program should be assigned to a designated person in the upper level of management. This person should retain ultimate responsibility even though formulation and assurance of program implementation is delegated. Such delegation authority should be to staff personnel prepared by training and experience in fire protection and nuclear plant safety to provide a balanced approach in direction of the fire protection program for nuclear power plants. The qualifications requirements for the fire protection engineer or consultant who will assist in the design and selection of equipment, inspect and test the completed physical aspects of the system, develop the fire protection program, and assist in the fire-fighting training for the operating plant should be stated. Subsequently, the FSAR should discuss the training and the updating provisions such as fire drills provided for maintaining the competence of the station fire-fighting and operating crew, including personnel responsible for maintaining and inspecting the fire protection equipment.

The fire protection staff should be responsible for:

(a) coordination of building layout and systems design with fire area requirements, including consideration of potential hazards associated with postulated design basis fires,

(b) design and maintenance of fire detection, suppression, and extinguishing systems,

(c) fire prevention activities,

(d) training and manual fire-fighting activities of plant personnel and the fire brigade.

NOTE: (NFPA 6 - Recommendations for Organization of Industrial Fire Loss Prevention, contains useful guidance for organization and operation of the entire fire loss prevention program).

TMI-1 CONFORMANCE

A.1 The overall fire protection program for TMI-1 is described in Three Mile Island Unit No. 1 administrative procedure AP-1038 entitled "Administrative Controls - Fire Protection Program. AP-1038 is incorporated as part of the UFSAR by reference. AP-1038 outlines authorities and responsibility and training. AP-1038 contains a listing of all implementing documents, which control activities discussed above.

2. Design Bases

APPENDIX A POSITION

A.2 The overall fire protection program should be based upon evaluation of potential fire hazards throughout the plant and the effect of postulated design basis fires relative to maintaining ability to perform safety shutdown functions and minimize radioactive releases to the environment.

TMI-1 CONFORMANCE

A.2 The Fire Hazards Analysis Report provides an evaluation of potential fire hazards and the effect of postulated fires through the plant on the ability to retain safe shutdown capability of the reactor. The FHAR is incorporated in the UFSAR by reference and that analysis and AP-1038 are used to implement and maintain compliance with license condition 2.c.(4) on fire protection.

3. Backup

APPENDIX A POSITION

A.3 Total reliance should not be placed on a single automatic fire suppression system. Appropriate backup fire suppression capability should be provided.

TMI-1 CONFORMANCE

A.3 In all areas where automatic suppression systems are provided, adequate manual suppression equipment including fire hose stations and/or portable fire extinguishers are available as discussed in Section 4.0.

4. Single Failure Criterion

APPENDIX A POSITION

A.4 A single failure in the fire suppression system should not impair both the primary and backup fire suppression capability. For example, redundant fire water pumps with independent power supplies and controls should be provided. Postulated fire or fire protection system failures need not be considered concurrent with other plant accidents or the most severe natural phenomena. The effects of lightning strikes should be included in the overall plant fire protection program.

TMI-1 CONFORMANCE

A.4 Redundant fire water pumps with independent power supplies and controls are provided as described in "TMI-1 Conformance" Section E.2c of this section.

In areas where both primary and backup fire suppression can be impaired by a single failure in the fire main header, back-up suppression can be routed to the area from an unaffected location. This action is controlled by AP-1038 for areas important to post fire shutdown capability and time clocks for accomplishment apply.

The effects of lightning strikes are included in the overall plant fire protection program.

5. Fire Suppression Systems

APPENDIX A POSITION

A.5 Failure or inadvertent operation of the fire suppression system should not incapacitate safety related systems or components. Fire suppression systems that are pressurized during normal plant operation should meet the guidelines specified in APCSB Branch Technical Position 3-1, "Protection Against Postulated Piping Failures in Fluid Systems Outside Containment."

TMI-1 CONFORMANCE

A.5 Fire suppression systems that are pressurized during normal operation meet the guidelines specified in APCSB Branch Technical Position 3-1.

6. Fuel Storage Areas

APPENDIX A POSITION

A.6 Schedule for implementation of modifications, if any, will be established on a case-by-case basis.

TMI-1 CONFORMANCE

A.6 This requirement is no longer applicable to TMI-1. TMI License Amendment 44 closed out this position and describes modifications and studies completed.

7. Fuel Loading

APPENDIX A POSITION

A.7 Schedule for implementation of modifications, if any, will be established on a case-by-case basis.

TMI-1 CONFORMANCE

A.7 This requirement is no longer applicable to TMI-1. TMI License Amendment 44 closed out this position and describes modifications and studies completed.

8. Multiple-Reactor Sites

APPENDIX A POSITION

A.8 On multiple-reactor sites where there are operating reactors and construction of remaining units is being completed, the fire protection program should provide continuing evaluation and include additional fire barriers, fire protection capability, and administrative controls necessary to protect the operating units from construction fire hazards. The superintendent of the operating plant should have the lead responsibility for site fire protection.

TMI-1 CONFORMANCE

A.8 TMI-1 is completely isolated from TMI-2 except for the common connection between the fuel handling buildings. An environmental barrier between the fuel handling buildings, except for the operating floors prevents communication between TMI-2 and TMI-1. The fire protection provided in the TMI-1 fuel handling building provides adequate protection. Also, the

spatial separation, in conjunction with three hour fire barriers between structures housing equipment required for hot and cold shutdown of TMI-1 precludes the need for any additional evaluation for potential fire hazards. Administrative controls are described in AP1038 and apply to both TMI-1 and TMI-2.

9. Simultaneous Fires

APPENDIX A POSITION

A.9 Simultaneous fires in more than one reactor need not be postulated, where separation requirements are met. A fire involving more than one reactor unit need not be postulated except for facilities shared between units.

TMI-1 CONFORMANCE

A.9 As discussed in "TMI-1 CONFORMANCE" Section A.8, fires occurring in the common areas of the fuel handling facilities shared between TMI-1 and TMI-2 are adequately addressed.

B. Administrative Procedures, Controls and Fire Brigade

APPENDIX A POSITION

B.1 Administrative procedures consistent with the need for maintaining the performance of the fire protection system and personnel in nuclear power plants should be provided.

Guidance is contained in the following publications:

NFPA 4 - Organization for Fire Services
NFPA 4A - Organization for Fire Department
NFPA 6 - Industrial Fire Loss Prevention
NFPA 7 - Management Responsibility for Effects of Fire on Operations
NFPA 27 - Private Fire Brigades

TMI-1 CONFORMANCE

B.1 Complies. Procedures governing these subjects are in effect as defined by Procedure AP1038. NFPA-600 of 1996 applies to control of fire brigade training since NFPA 27 has been withdrawn by the NFPA.

An exception was taken to NFPA 600-1996 in that individuals other than a medical doctor may perform the required medical exam and evaluation. Procedure HR-AA-07-107 describes that a licensed physician or other

licensed health care professional such as a nurse practitioner or physician assistant may perform the exam and evaluation. The technical background and justification for this exemption to the code is found in IR 781315.

APPENDIX A POSITION

B.2 Effective administrative measures should be implemented to prohibit bulk storage of combustible materials inside or adjacent to safety related buildings or systems during operation or maintenance periods. Regulatory Guide 1.39, "Housekeeping Requirements for Water-Cooled Nuclear Power Plants", provides guidance on housekeeping, including the disposal of combustible materials.

TMI-1 CONFORMANCE

B.2 Complies. See "TMI-1 CONFORMANCE" Section B.1. Management performs tours per MA-AA-716-026, Station Housekeeping/Material Condition Program. Scheduled fire tours are also completed by Fire Marshal and/or fire engineers.

APPENDIX A POSITION

B.3 Normal and abnormal conditions or other anticipated operations such as modifications (e.g., breaking fire stops, impairment of fire detection and suppression systems) and refueling activities should be reviewed by appropriate levels of management and appropriate special actions and procedures such as fire watches or temporary fire barriers implemented to assure adequate fire protection and reactor safety. In particular:

TMI-1 CONFORMANCE

B.3 Complies. See "TMI-1 CONFORMANCE" Section B.1. AP-1038 describes Fire System Impairment Program and temporary fire barriers procedures.

APPENDIX A POSITION

B.3(a) Work involving ignition sources such as welding and flame cutting should be done under closely controlled conditions. Procedures governing such work should be reviewed and approved by persons trained and experienced in fire protection. Persons performing and directly assisting in such work should be trained and equipped to prevent and combat fires. If this is not possible, a person qualified in fire protection should directly monitor the work and function as a fire watch.

TMI-1 CONFORMANCE

B.3(a) Complies. See "TMI-1 CONFORMANCE" Section B.1. AP-1038 describes required hot work procedure and required training.

APPENDIX A POSITION

B.3(b) Leak testing and similar procedures such as air flow determination, should use one of the commercially available aerosol techniques. Open flames or combustion generated smoke should not be permitted.

TMI-1 CONFORMANCE

B.3(b) TMI-1 complies with this requirement.

APPENDIX A POSITION

B.3(c) Use of combustible material, e.g., HEPA and charcoal filters, dry ion exchange resins or other combustible supplies, in safety related areas should be controlled. Use of wood inside buildings containing safety related systems or equipment should be permitted only when suitable non-combustible substitutes are not available. If wood must be used, only fire retardant treated wood (scaffolding, lay down blocks) should be permitted.

Such materials should be allowed into safety related areas only when they are to be used immediately. Their possible and probable use should be considered in the fire hazard analysis to determine the adequacy of the installed fire protection systems.

TMI-1 CONFORMANCE

B.3(c) See "TMI-1 CONFORMANCE Section B.1

APPENDIX A POSITION

B.4 Nuclear power plants are frequently located in remote areas, at some distance from public fire departments. Also, first response fire departments are often volunteer. Public fire department response should be considered in the overall fire protection program. However, the plant should be designed to be self-sufficient with respect to fire fighting activities and rely on the public response only for supplemental or backup capability.

TMI-1 CONFORMANCE

B.4 TMI-1 is self-sufficient with respect to fire fighting activities but does have a working arrangement with local fire departments. Reference "TMI-1 CONFORMANCE" Section B.1

APPENDIX A POSITION

B.5 The need for good organization, training and equipping of fire brigades at nuclear power plant sites requires effective measures be implemented to assure proper discharge of these functions. The guidance in Regulatory Guide 1.101, "Emergency Planning for Nuclear Power Plants", should be followed as applicable.

TMI-1 CONFORMANCE

B.5 See "TMI-1 CONFORMANCE" Section B.1

APPENDIX A POSITION

B.5(a) Successful fire fighting requires testing and maintenance of the fire protection equipment, emergency lighting and communication, as well as practice as brigades for the people who must utilize the equipment. A test plan that lists the individuals and their responsibilities in connection with routine tests and inspections of the fire detection and protection systems should be developed. The test plan should contain the types, frequency and detailed procedures for testing. Procedures should also contain instructions on maintaining fire protection during those periods when the fire protection system is impaired or during periods of plant maintenance, e.g., fire watches or temporary hose connections to water systems.

TMI-1 CONFORMANCE

B.5(a) SeeTMI-1 CONFORMANCE" Section B.1

APPENDIX A POSITION

B.5(b) Basic training is a necessary element in effective fire fighting operation. In order for a fire brigade to operate effectively, it must operate as team. All members must know what their individual duties are. They must be familiar with the layout of the plant and equipment location and operation in order to permit effective fire-fighting operations during times when a particular area is filled with smoke or is insufficiently lighted. Such training can only be accomplished by conducting drills several times a year (at least quarterly) so that all members of the fire brigade have had the opportunity to train as a team, testing itself in the major areas of the plant. The drills should include the simulated use of equipment in each area and should be pre-planned and post-critiqued to establish the training objective of the drills and determine how well these objectives have been met. These drills should periodically (at least annually) include local fire department participation where possible. Such drills also permit supervising personnel to evaluate the effectiveness of communications within the fire brigade and with on scene fire team leader, the reactor operator in the Control Room, and the off-site command post.

TMI-1 CONFORMANCE

B.5(b) See "TMI-1 CONFORMANCE" Section B.1

APPENDIX A POSITION

B.5(c) To have proper coverage during all phases of operation, members of each shift crew should be trained in fire protection. Training of the plant fire brigade should be coordinated with the local fire department so the responsibilities and duties are delineated in advance. This coordination should be part of a training course and implemented into the training of the local fire department staff. Local fire departments should be educated in the operational precautions when fighting fires on nuclear power plant sites. Local fire departments should be made aware of the need for radioactive protection of personnel and the special hazards associated with a nuclear power plant site.

TMI-1 CONFORMANCE

B.5(c) See "TMI-1 CONFORMANCE" Section B.1

APPENDIX A POSITION

B.5(d) NFPA 27, "Private Fire Brigade" should be followed in organization, training, and fire drills. This standard also is applicable for the inspection and maintenance of fire fighting equipment. Among the standards referenced in this document, the following should be utilized: NFPA 194, "Standard for Screw Threads and Gaskets for Fire Hose Couplings", NFPA 196, "Standard for Fire Hose," NFPA 197, "Training Standard on Initial Fire Attacks", NFPA 601, "Recommended Manual of Instructions and Duties for the Plant Watchman on Guard." NFPA booklets and pamphlets listed on page 27-11 of Volume 8, 1971-72 are also applicable for good training references. In addition, courses in fire protection and fire suppression, which are recognized and/or sponsored by the fire protection industry should be utilized.

TMI-1 CONFORMANCE

B.5(d) See "TMI-1 CONFORMANCE" Section B.1. Note that the TMI Site fire brigade organization, training, fire drills and inspection and maintenance of fire fighting equipment meets or exceeds NFPA 600-1996 requirements which supersedes the withdrawn NFPA-27.

C. Quality Assurance Program

APPENDIX A POSITION

Quality Assurance (QA) programs of applicants and contractors should be developed and implemented to assure that the requirements for design, procurement, installation, and testing and administrative controls for the fire protection program for safety related areas as defined in this Branch Position are satisfied. The program should be under the management control of the QA organization. The QA program criteria that apply to the fire protection program should include the following:

1. Design Control and Procurement Document Control

Measures should be established to assure that all design-related guidelines of the Branch Technical Position are included in design and procurement documents and that deviations therefrom are controlled.

2. Instructions, Procedures and Drawings

Instructions, 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.

3. Control of Purchased Material, Equipment and Services

Measures should be established to assure that purchased material, equipment and services conform to the procurement documents.

4. 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 with documented installation drawings with test procedures for accomplishing the activities.

5. Test and Test Control

A test program should be established and implemented to assure 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.

6. Inspection, Test and Operating Status

Measures should be established to provide for the identification of items that have satisfactorily passed required tests and inspections.

7. Non-Conforming Items

Measures should be established to control items that do not conform to specified requirements to prevent inadvertent use of installation.

8. Corrective Action

Measures should be established to assure that conditions adverse to fire protection, such as failures, malfunctions, deficiencies, deviations, defective components, uncontrolled combustible material and non-conformances are promptly identified, reported and corrected.

9. 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.

10. 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.

TMI-1 CONFORMANCE

C. The fire protection program (system) for TMI-1 is under the scope the Quality Assurance Topical Report NO-AA-10. Those items of the fire protection program (system) which are considered necessary in the Fire Hazards Analysis Report have been entered on the TMI-1 PIMS Component Record List (CRL).

The Quality Assurance Topical Report NO-AA-10 for fire protection is under the management control of the Nuclear Safety Assessment organization. The Quality Assurance Topical Report NO-AA-10 plan covers the ten criteria under Appendix A Position C.

D. General Guidelines for Plant Protection

1. Building Design

D.1(a) APPENDIX A POSITION

(a) Plant Layouts should be arranged to:

(1) Isolate safety related systems from unacceptable fire hazards, and

TMI-1 CONFORMANCE

D.1(a)(1) The Fire Hazards Analysis Report identifies the fire zones construction features, fire hazards and fire protection systems in the fire areas and fire zones as well as the equipment required to bring the reactor to hot shutdown and cold shutdown in each fire area and fire zone.

APPENDIX A POSITION

D.1(a)(2) Alternatives:

(a) Redundant safety related systems that are subject to damage from a single fire hazard should be protected by a combination of fire retardant coatings and fire detection and suppression systems, or

TMI-1 CONFORMANCE

D.1(a)(2) (a) Locations where redundant systems required to bring the reactor to hot shutdown and cold shutdown and are subject to damage from a single fire hazard are described in the Fire Hazards Analysis Report. Passive and active fire protection features available in each fire area and/or fire zone are discussed.

APPENDIX A POSITION

D.1(a)(2) Alternatives:

(b) A separate system to perform the safety function should be provided.

TMI-1 CONFORMANCE

D.1(a)(2) (b) An alternative shutdown system is provided to insure that the reactor can be brought to hot and cold shutdown from outside the Control Room should a fire occur in either the Control Room or Relay Room. See Section 3.12 of Fire Hazards Analysis Report for discussion of other areas that rely on usage of this post fire shutdown capability independent of the Control Room.

APPENDIX A POSITION

D.1(b) In order to accomplish 1. (a) above, safety related systems and fire hazards should be identified throughout the plant. Therefore, a detailed fire hazards analysis should be made. The fire hazards analysis should be reviewed and updated as necessary. Additional fire hazards analysis should be done after any plant modification.

TMI-1 CONFORMANCE

D.1(b) An updated plant Fire Hazards Analysis Report includes plant modifications which have been performed since the initial analysis was completed. All plant modifications are reviewed for their fire hazards impact on the plant per procedure CC-AA-209 entitled "Fire Protection Program Configuration Change Review." Individual analyses for each plant modification are logged and those modifications that affect the FHAR are included in overall periodic updates of the Plant Fire Hazards Analysis Report.

APPENDIX A POSITION

D.1(c) Alternative guidance for constructed plants is shown in Section E.3, "Cable Spreading Room." Note incorrect reference to Section E.3 should be F.3.

TMI-1 CONFORMANCE

D.1(c) See "TMI-1 CONFORMANCE" for Section F.3.

APPENDIX A POSITION

D.1(d) Interior wall and structural components, thermal insulation materials and radiation shielding materials and sound-proofing should be non-combustible. Interior finishes should be non-combustible or listed by a nationally recognized testing laboratory, such as Factory Mutual or Underwriter’s Laboratory, Inc. for flame spread, smoke and fuel contribution of 25 or less in its use configuration (ASTM-E84 Test), "Surface Burning Characteristics of Building Materials").

TMI-1 CONFORMANCE

D.1(d) Interior wall and structural components, thermal insulation materials, radiation shielding materials, and sound proofing are non-combustible. Interior finishes are non-combustible or listed by a nationally recognized testing laboratory such as Factory Mutual or Underwriter's Laboratory, Inc. for:

(a) Surface flamespread of 50 or less when tested under ASTM E-84, and

(b) Potential heat release of 3500 BTU/lb. or less when tested under ASTM D-3286 or NFPA 259.

(The concept of using a 3500 BTU/lb. potential heat release limitation is similar to the "limited combustible" concept described in NFPA 220).

Materials that may be used as interior finish without evidence of test and listing by a nationally recognized laboratory are the following:

- Plaster, acoustic plaster
- Gypsum plasterboard (gypsum wallboard)
- Any of the above plain, wallpapered, or painted with oil or water base paint
- Ceramic tile, ceramic panels
- Glass, glass blocks
- Brick, stone, concrete blocks, plain, or painted
- Steel and aluminum panels, plain, painted, or enameled
- Vinyl tile, vinyl-asbestos tile, linoleum or asphalt tile on concrete floors.

For fire hazard analysis purposes, floor coatings are considered non-combustible if any one of the following criteria are met:

a) The material has a structural base of noncombustible material, with a nominal depth not over 1/8-inch thick (125 mils), and has a flame spread rating not higher than 50 as defined by ASTM E-84 / NFPA 255; or

b) The material has a flame spread rating of 25 or less in it's end use configuration using the test protocol of ASTM E-84 / NFPA 255; or
c) The material has a Critical Radiant Flux not less than 0.45 watts/cm^2 when tested in accordance with ASTM E-648 / NFPA 253.

APPENDIX A POSITION

D.1(e) Metal deck roof construction should be non-combustible (see the building materials directory of the Underwriter's Laboratory, Inc.) or listed as Class 1 by Factory Mutual System Approval Guide. Where combustible material is used in metal deck roofing design, acceptable alternatives are (i) replace combustibles with non-combustible materials, (ii) provide an automatic sprinkler system, or (iii) provide ability to cover roof exterior and interior with adequate water volume and pressure.

TMI-1 CONFORMANCE

D.1(e) Roof construction on structures housing equipment required for hot and cold shutdown is of reinforced concrete to give a non-combustible rating, with the exception of auxiliary building area AB-FZ-10 and the Turbine Building which have an FM Class 1 roof.

APPENDIX A POSITION

D.1(f) Suspended ceilings and their supports should be of non-combustible construction. Concealed spaces should be devoid of combustibles. Adequate fire detection and suppression systems should be provided where full implementation is not practicable.

TMI-1 CONFORMANCE

D.1(f) Cable circuits required for insuring operation of equipment required for hot shutdown are located above the suspended non-combustible ceiling on elevation 306' - 0" of the Control Building. However, one train of redundant circuits is protected by one hour fire barrier and an automatic wet pipe sprinkler system protects the area below the suspended ceiling. All other areas containing equipment required for hot and cold shutdown meet Appendix A criteria. A fire detection system is available above the suspended ceiling on elevation 306' - 0" of the Control Building (CB-FA-1). This area also is provided with an acetylene leak detection system, which provides local alarms. This leak detection system is required to be functional when the acetylene piping contains acetylene.

APPENDIX A POSITION

D.1(g) High voltage - high amperage transformers installed inside buildings containing safety related systems should be of the dry type or insulated and cooled with non-combustible liquid. Safety related systems that are exposed to flammable oil filled transformers should be protected from the effects of fire by:

(i) replacing with dry transformers or transformers that are insulated and cooled with non-combustible liquid; or
(ii) enclosing the transformer with a three hour barrier and installing automatic water spray protection

TMI-1 CONFORMANCE

D.1(g) All inside transformers are of the dry type.

APPENDIX A POSITION

D.1(h) Buildings containing safety related systems, having openings in exterior walls closer than 50 feet to flammable oil filled transformers should be protected from the effects of a fire by:

(i) closing of the opening to have fire resistance equal to three hours,

(ii) constructing a three hour fire barrier between the transformers and the wall openings; or

(iii) closing the opening and providing the capability to maintain a water curtain in case of a fire.

TMI-1 CONFORMANCE

D.1(h) Outdoor transformers are within 50 feet of openings in the East Turbine building wall. Transformers are adequately protected by fixed automatic deluge water spray systems. The East Turbine Building wall is protected by a water curtain, which operates with the water spray systems. No safety related systems are exposed to the transformers. A 1500 KVA oil filled transformer is within 50 ft. of the Diesel Generator Building west wall. Transformer fire barrier wall provides adequate exposure protection.

APPENDIX A POSITION

D.1(i) Floor drains, sized to remove expected fire fighting water flow should be provided in those areas where fixed water fire suppression systems are installed. Drains should also be provided in other areas where hand hose lines may be used if such fire fighting water could cause unacceptable damage to equipment in the area. Equipment should be installed on pedestals, or curbs should be provided as required to contain water and direct it to floor drains. (See NFPA 92M, "Waterproofing and Draining of Floors.") Drains in areas containing combustible liquids should have provisions for preventing the spread of fire throughout the drain system. Water drainage from areas that may contain radioactivity should be sampled and analyzed before discharge to the environment. In operating plants or plants under construction, if accumulation of water from the operation of new fire suppression systems does not create unacceptable consequences, drains need not be installed.

TMI-1 CONFORMANCE

D.1(i) Floor drains are designed to remove the expected fire fighting water flow from areas where fixed water fire suppression systems are installed or where fire hose may be used. Equipment is installed on pedestals. Protection of exposed equipment from water damage is addressed in Section 6.0 of the Fire Hazards Analysis Report.

Drains in areas containing combustible liquids are designed to prevent the spread of fire throughout the drain system.

Water drainage is pumped from areas that may contain radioactivity to the miscellaneous waste storage tank in the auxiliary building for normal liquid waste processing.

The floor drain system between emergency diesels is plugged and subject to surveillance to prevent communication to the redundant diesel room.

The SBO Diesel room has ramped floors to prevent combustible liquid spread.

APPENDIX A POSITION

D.1(j) Floors, walls and ceilings enclosing separate fire areas should have minimum fire rating of three hours. Penetrations in these fire barriers, including conduits and piping, should be sealed or closed to provide a fire resistance rating at least equal to that of the fire barrier itself. Door openings should be protected with equivalent rated doors, frames and hardware that have been tested and approved by a nationally recognized laboratory. Such doors should be normally closed and locked or alarmed with alarm and annunciation in the Control Room. Penetrations for ventilation system should be protected by a standard "fire door damper" where required. (Refer to NFPA 80, "Fire Doors and Windows.") The fire hazard in each area should be evaluated to determine barrier requirements. If barrier fire resistance cannot be made adequate, fire detection and suppression should be provided, such as:

(i) water curtain in case of fire,

(ii) flame retardant coatings,

(iii) additional fire barriers.

TMI-1 CONFORMANCE

D.1(j) The Fire Hazards Analysis Report identifies the construction features of each fire area and fire zone and indicates which walls, floors and ceilings are designated as fire barriers.

All penetrations through designated fire barriers are sealed to provide a fire resistance rating equal to that of the fire barrier except containment penetrations. TMI Report 990-3018, “Fire Barrier Penetration Seal Evaluation Report” contains all fire seal information including qualification tests and evaluations. Due to overriding nuclear considerations, containment penetrations and removable concrete slabs and metal plate doors such as to the Building Spray and Decay Heat Vaults, Auxiliary Building sump, and Reactor Building annulus do not have specific fire ratings, however, their construction is considered adequate to prevent fire from spreading from one side of the penetration to the other. These features are discussed in Chapter 4.

Doors through designated fire barriers are provided with rated doors as indicated in the Fire Hazards Analysis Report. Such doors are normally closed. Unlocked doors are inspected daily to ensure that they are closed, not blocked and supervised. Only some selected fire doors are locked when they also serve as security doors. No fire doors are provided with limit switches for remote annunciation unless they also serve as a security door.

Duct penetrations through designated fire barriers are provided with fire dampers as indicated in the Fire Hazards Analysis Report.

Some exterior walls have unprotected openings or barriers provided by non-rated doors. These areas either are provided with automatic suppression or substantial construction or both to ensure protection from temporary fire hazards in the adjacent yard areas. These features are discussed in Chapter 4.

The fire hazard in each fire area and fire zone has been evaluated to determine if designated fire barriers are adequate to prevent the spread of fire from one side of the barrier to the other. Fire protection and detection features provided for each fire area and fire zone are discussed in the Fire Hazards Analysis Report.

D.2 Control of Combustibles

APPENDIX A POSITION

D.2(a) Safety related systems should be isolated or separated from combustible materials. When this is not possible because of the nature of the safety system or the combustible material, special protection should be provided to prevent a fire from defeating the safety system function. Such protection may involve a combination of automatic fire suppression, and construction capable of withstanding and containing a fire that consumes all combustibles present. Examples of such combustible materials that may not be separable from the remainder of its system are:

(1) Emergency diesel generator fuel oil day tanks

(2) Turbine-generator oil and hydraulic control fluid systems

(3) Reactor coolant pump lube oil system

TMI-1 CONFORMANCE

D.2(a) The Fire Hazards Analysis Report identifies redundant safety related systems located in the same fire area and fire zone. It describes both the fire protection features used to protect at least one redundant train of safe shutdown equipment and the combustible materials that present a fire hazard to that equipment.

APPENDIX A POSITION

D.2(b) Bulk gas storage (either compressed or cryogenic), should not be permitted inside structures housing safety-related equipment. Storage of flammable gas such as hydrogen, should be located outdoors or in separate detached buildings so that a fire or explosion will not adversely affect any safety related systems or equipment. (Refer to NFPA 50A, "Gaseous Hydrogen Systems.") Care should be taken to locate high pressure gas storage containers with the long axis parallel to building walls. This will minimize the possibility of wall penetration in the event of a container failure. Use of compressed gases (especially flammable and fuel gases) inside buildings should be controlled. (Refer to NFPA 6, "Industrial Fire Loss Prevention.")

TMI-1 CONFORMANCE

D.2(b) Bulk gas is stored in outside areas in accordance with OSHA 1910.101. A fire or explosion involving flammable gas systems and components will not adversely affect any safety related systems or equipment.

The hydrogen storage containers are not in compliance with the NRC position regarding orientation as they have their long axis perpendicular to the East wall of the turbine building. However, since the hydrogen is stored to the northeast of the transformer area, 138 feet from the East Turbine Building wall, this is acceptable because there is no safety related equipment located in this area. The permanent nitrogen cylinder banks NI-T-1A and NI-T-1B long axis is perpendicular to the Auxiliary Building Wall. Cylinders are located approximately 150 feet west of the Auxiliary Building. Nitrogen is not flammable. The auxiliary building walls are all craft hardened. The cylinder's long axis is parallel to the air intake and Pretreatment Building.

Administrative procedures to control the use of compressed gases inside buildings are in effect. (OP-AA-201-009, Control of Transient Combustible Material).

APPENDIX A POSITION

D.2(c) The use of plastic materials should be minimized. In particular, haloginated plastics such as polyvinyl chloride (PVC) and neoprene should be used only when substitute non-combustible materials are not available. All plastic materials, including flame and fire retardant materials, will burn with an intensity and BTU production in a range similar to that of ordinary hydrocarbons. When burning, they produce heavy smoke that obscures visibility and can plug air filters, especially charcoal and HEPA. The haloginated plastics also release free chlorine and hydrogen chloride when burning which are toxic to humans and corrosive to equipment.

TMI-1 CONFORMANCE

D.2(c) The quantity of plastic material throughout is negligible. Polyvinyl chloride (PVC) and neoprene are not used unless substitute, non-combustible materials are not available. In such cases, the fire hazards analysis, which reviews the modification, will document the acceptability of the use of these materials.

Griffolyn Type 55, 75 or 95 Fire Retardant plastic sheeting (PVC) is used when necessary to support maintenance activities. Griffolyn Type 55 FR sheeting is classified by Underwriter's Laboratories Test No. 723 as follows:

Flame Spread	10
Smoke Developed	45

Type 75 and 95 FR have similar fire retardant characteristics. The three types have been tested in accordance with NFPA 701-1977, large scale test, and are approved for use by American Nuclear Insurers and NEIL on the basis of the NFPA 701 test performance.

Other sheet plastics used will be subject to the above requirements. Exceptions may be radwaste and trash bags, however transient combustible controls apply.

APPENDIX A POSITION

D.2(d) Storage of flammable liquids should, as a minimum, comply with the requirements of NFPA 30, "Flammable and Combustible Liquids Code."

TMI-1 CONFORMANCE

D.2(d) Flammable liquids are stored in accordance with the requirements of NFPA 30.

D.3 Electric Cable Construction, Cable Trays and Cable Penetrations

APPENDIX A POSITION

D.3(a) Only non-combustible materials should be used for cable tray construction.

TMI-1 CONFORMANCE

D.3(a) Cable trays are of non-combustible metal construction.

APPENDIX A POSITION

D.3(b) See Section E.3 for Fire Protection Guidelines for Cable Spreading Rooms. Note reference to Section E.3 should be F.3.

TMI-1 CONFORMANCE

D.3(b) See "TMI-1 Conformance" for Section F.3.

APPENDIX A POSITION

D.3(c) Automatic water sprinkler systems should be provided for cable trays outside the Cable Spreading Room. Cables should be designed to allow wetting down with deluge water without electrical faulting. Manual hose stations and portable hand extinguishers should be provided as backup. Safety related equipment in the vicinity of such cable trays, that does not itself require water fire protection, but is subject to unacceptable damage from sprinkler water discharge, should be protected from sprinkler system operation or malfunction. When safety related cables do not satisfy the provisions of Regulatory Guide 1.75, all exposed cables should be covered with an approved fire retardant coating and a fixed automatic water fire suppression system should be provided.

TMI-1 CONFORMANCE

D.3(c) Automatic water sprinkler or water systems are provided outside the cable and relay room as indicated in the Fire Hazards Analysis Report. The extent of sprinkler or spray coverage is illustrated on the fire area drawings. Cables are designed to be wetted down without electrical faulting. Manual hose stations and portable extinguishers are available to fight fires in any fire area and fire zone of the plant which contain equipment required to bring the reactor to hot and cold shutdown.

Provisions for protecting equipment, required to bring the reactor to hot and cold shutdown, which do not require fire protection but which are subject to unacceptable damage from sprinkler water discharge are described in Section 6.0 of the updated Fire Hazards Analysis Report.

When redundant cable trays or conduits in the same fire area or fire zone contain electrical circuits connected to equipment which is required to bring the plant to hot and cold shutdown, one redundant tray or conduit is protected by a fire rated barrier unless other mitigating features are provided. This criterion is consistent with the separation criteria and fire barrier requirements of Appendix R to 10CFR50 Section III.G. Previous commitments in the plant Safety Evaluation Report required that Marinite boards or equivalent boards such as M-Board, Ceraboard, 3M Interam, or other non-combustible barriers be interposed between redundant safety related trays which do not meet the separation requirements of Regulatory Guide 1.75. The same separation protection is provided for conduit. These barriers as well as wraps and Rockbestos cable identified on Drawing No. 1D-775-57-1000 will remain in place unless they interfere with the installation of one hour fire barriers on cable tray and conduit as described above.

Electrical separation criteria are described in the UFSAR Section 8.2.2.12.

APPENDIX A POSITION

D.3(d) Cable and cable tray penetration of fire barriers (vertical and horizontal) should be sealed to give protection at least equivalent to that fire barrier. The design of fire barriers for horizontal and vertical cable trays should, as a minimum, meet the requirements of ASTM E-119, "Fire Test of Building Construction and Materials," including the hose stream test. Where installed penetration seals are deficient with respect to fire resistance, these seals may be protected by covering both sides with an approved fire retardant material. The adequacy of using such material should be demonstrated by suitable testing.

TMI-1 CONFORMANCE

D.3(d) Cable and cable tray penetrations of designated fire barriers (vertical and horizontal) are sealed to give protection equivalent to that of the fire barrier. The design of these seals meets the requirements of the ASTM E-119 fire test including the hose stream test. Repairs to existing penetration seals and installation of new seals are made in accordance with Maintenance Procedure 1420-FB-1. This procedure insures the penetration seals maintain the ASTM-E-19 tested configurations.

APPENDIX A POSITION

D.3(e) Fire breaks should be provided as deemed necessary by the fire hazards analysis. Flame or flame retardant coatings may be used as a fire break for grouped electrical cables to limit spread of fire in cable ventings. (Possible cable derating owing to use of such coating materials must be considered during design.)

TMI-1 CONFORMANCE

D.3(e) Fire breaks using an ASTM E-119 tested design were installed in the communication cable trays inside containment where the same group passes below electrical penetrations carrying redundant safety related circuits. This was the only plant area where fire breaks were deemed necessary. No derating of the cabling (non-NSR) will occur as a result of this installation, which consists of short 9 inch sections of foam. The need for these fire breaks has been superseded by implementation of 10CFR50 Appendix R. Thermolag and Mecatiss installations addressed cable ampacity derating in their design. There are no ampacity derating issues as the result of 3M Interam or Class 1E circuit separation barriers.

APPENDIX A POSITION

D.3(f) New electrical cable constructions should, as a minimum, pass the current IEEE No. 383 flame test. (This does not imply that cables passing this test will not require additional fire protection.) For cable installation in operating plants and plants under construction that do not meet the IEEE No. 383 flame test requirements, all cables must be covered with an approval flame retardant coating and properly derated.

TMI-1 CONFORMANCE

D.3(f) Original plant cables were purchased with flame retardant jackets. New electrical cable construction meets the current IEEE 383 flame test.

All plant original cable was required to be certified as meeting IEEE 383 requirements with some exceptions such as panel and switchboard and instrument wiring that met other UL requirements. Exceptions have been documented and also tracked in support of the FHAR such as prewired evaporator skids that required the use of PVC jacketed cable. One such exception has been documented under ECR 13-00177, Plant Process Computer Replacement, for a power cable that does not meet the requirements of IEEE 383.

APPENDIX A POSITION

D.3(g) Applicable to new cable installations.

TMI-1 CONFORMANCE

D.3(g) All new cable will meet the requirements of the IEEE 383 flame test except as follows. Cable run in conduit or enclosed panels is considered non-combustible with respect to the fire hazard it poses and therefore need not meet the IEEE 383 flame test requirements. Some applications utilize cable construction, which is not tested to the IEEE 383 flame test. It may not be practical or possible to require conformance to IEEE 383. In such cases, the fire hazards analysis, which reviews the modification, will document the acceptability of the deviation.

APPENDIX A POSITION

D.3(h) Cable trays, raceways, conduit, trenches, or culverts should be used only for cables. Miscellaneous storage should not be permitted, nor should piping for flammable or combustible liquids or gases be installed in these areas. Installed equipment in cable tunnels or culverts, need not be removed if they present no hazard to the cable runs as determined by the fire hazards analysis.

TMI-1 CONFORMANCE

D.3(h) This criteria is met.

APPENDIX A POSITION

D.3(i) The design of cable tunnels, culverts and spreading rooms should provide for automatic or manual smoke venting as required to facilitate manual fire fighting capability.

TMI-1 CONFORMANCE

D.3(i) The Relay Room does have provisions for manual smoke venting. A gaseous suppression system is installed in the Relay Room to provide extinguishment prior to the generation of any appreciable amount of smoke. Portable fans and portable exhaust ductwork will ventilate any smoke from the Control Building. The ductwork will pass through doors and through the “Patio” area identified as fire zone FH-FZ-5, as is the case for the Relay Room, or through doors to the Control Building stairwell. In either case, the exhaust ductwork will ultimately direct the smoke into the Turbine Building where it will be exhausted, diluted, and vented to the outside through roof mounted fans.

APPENDIX A POSITION

D.3(j) Cables in the Control Room should be kept to the minimum necessary for operation of the Control Room. All cables entering the Control Room should terminate there. Cables should not be installed in floor trenches or culverts in the Control Room. Existing cabling installed in concealed floor and ceiling spaces should be protected with an automatic total flooding halon system.

TMI-1 CONFORMANCE

D.3(j) Cables in the Control Room come primarily through the floor from the Relay Room and terminate in control panels, consoles or equipment. Some cables are contained in cable tray and open top annunciator boxes above the suspended ceiling in the Control Room. The cables terminate in the subject annunciator boxes. The quantity of cables located in this space above the ceiling is low and presents a very low fire loading.

D.4 Ventilation

APPENDIX A POSITION

D.4(a) The products of combustion that need to be removed from a specific fire area should be evaluated to determine how they will be controlled. Smoke and corrosive gases should generally be automatically discharged directly outside to a safe location. Smoke and gases containing radioactive materials should be monitored in the fire area to determine if release to the environment is within the permissible limits of the Plant Technical Specifications. The products of combustion that need to be removed from a specific fire area should be evaluated to determine how they will be controlled.

TMI-1 CONFORMANCE

D.4(a) Ventilation for critical areas is evaluated in Sections 2.0 and 4.0 of this report. Areas containing radioactive material release potentials are also outlined. Monitoring of radioactive contamination is discussed in Chapter 11 of the FSAR and the environmental technical specifications. Monitoring of specific areas will be accomplished in accordance with existing TMI-1 procedures when necessary. The use of portable smoke removal equipment is discussed in fire preplans.

APPENDIX A POSITION

D.4(b) Any ventilation system designed to exhaust smoke or corrosive gases should be evaluated to ensure that inadvertent operation or single failures will not violate the controlled areas of the plant design. This requirement includes containment functions for protection of the public and maintaining habitability for operations personnel.

TMI-1 CONFORMANCE

D.4(b) No systems are designed solely for smoke removal. Existing ventilation systems that would be used for smoke removal meet these criteria.

APPENDIX A POSITION

D.4(c) The power supply and controls for mechanical ventilation systems should be run outside the fire area served by the system.

TMI-1 CONFORMANCE

D.4(c) The power supply and controls for the mechanical ventilation systems used to cool redundant safe shutdown equipment have been run in the same area as the applicable equipment. These controls meet the separation requirements outlined in Chapter 8 of the FSAR. Those ventilation systems, which are necessary to support safe shutdown activities have been reviewed for Appendix R. Non-compliances and their resolutions are covered by exemption requests as discussed in Section 3.14 of this report.

APPENDIX A POSITION

D.4(d) Fire suppression systems should be installed to protect charcoal filters in accordance with Regulatory Guide 1.52, "Design Testing and Maintenance Criteria for Atmospheric Cleanup Air Filtration."

TMI-1 CONFORMANCE

D.4(d) All charcoal filters including the charcoal filter for the kidney system inside the Reactor Building are provided with manually actuated deluge water spray systems. All charcoal filters are provided with thermal detection systems to alarm in the event of a rise in temperature in the charcoal. The charcoal filters associated with the kidney system in the Reactor Building are protected by automatic deluge water spray.

The single exception is the charcoal filters in the ESF Ventilation Room (AB-FZ-11) on the roof of the Auxiliary Building. This is an outdoor enclosure separated from the Auxiliary Building by 3 hour fire rated barriers. As such, the room does not present an exposure to any plant areas containing safety related or safe shutdown required equipment, components, or cables. These filters are provided with thermal detection. Suppression system is available from a hose reel in the adjacent chemical addition room.

APPENDIX A POSITION

D.4(e) The fresh air supply intakes to areas containing safety related equipment or systems should be located remote from the exhaust air outlets and smoke vents of other fire areas to minimize the possibility of contaminating the intake air with the products of combustion.

TMI-1 CONFORMANCE

D.4(e) Fresh air supply intakes are remotely located with respect to exhaust air outlets, thus minimizing the possibility of contaminating the intake air with the products of combustion.

APPENDIX A POSITION

D.4(f) Stairwells should be designed to minimize smoke infiltration during a fire. Staircases should serve as escape routes and access routes for fire fighting. Fire exit routes should be clearly marked. Stairwells, elevators and chutes should be enclosed in masonry towers with minimum fire rating of three hours and automatic fire doors at least equal to the enclosure construction, at each opening into the building. Elevators should not be used during fire emergencies. Where stairwells or elevators cannot be enclosed in three hour fire rated barrier with equivalent fire doors, escape and access routes should be established by pre-fire plan and practiced in drills by operating and fire brigade personnel.

TMI-1 CONFORMANCE

D.4(f) The Control Building stairwell is enclosed as indicated on the layout drawings attached to this report. All other stairways are open between floors. Escape and access routes have been established by pre-fire plan and are practiced in drills by operating and fire brigade personnel. All fire exit routes are clearly posted throughout TMI-1.

For TMI-1 essential personnel, such as fire brigade members, in responding to a fire shall not use the TMI-1 elevators in the Turbine Building, Auxiliary/Fuel Handling, or Reactor Building during a TMI-1 power plant fire. Should they become stranded the delay of these individuals in response to performing their essential actions could place TMI-1 outside of previously analyzed response capabilities.

For non TMI-1 power plant fires as well as TMI-2 or office building fires, the use of the elevator may be acceptable following evaluation of the fire in relation to its potential impact on the elevator service or impact individuals using the elevator.

In all fire scenarios, following evaluation of the fire and its potential impact on the elevator in question, the elevator may be used for the transportation of easily replaceable equipment if deemed safe to do so.

APPENDIX A POSITION

D.4(g) Smoke and heat vents may be useful in specific areas such as cable spreading rooms and diesel fuel oil storage areas and switchgear rooms. When natural-convection ventilation is used, a minimum ratio of 1 sq. foot of venting area per 200 sq. feet of floor area should be provided. If forced convection ventilation is used, 300 cfm should be provided for every 200 sq. feet of floor area. See NFPA No. 204 for additional guidance on smoke control.

TMI-1 CONFORMANCE

D.4(g) Portable ventilation equipment is provided. Smoke removal plans have been developed and are practiced by the fire brigade periodically in drills.

APPENDIX A POSITION

D.4(h) Self-contained breathing apparatus, using full face positive pressure masks, approved by NIOSH (National Institute for Occupational Safety and Health - approval formerly given by the U. S. Bureau of Mines) should be provided for fire brigade, damage control and control room personnel. Control room personnel may be furnished breathing air by a manifold system piped from a storage reservoir if practical. Service or operating life should be a minimum of one half hour for the self-contained units.

At least two extra air bottles should be located onsite for each self-contained breathing unit. In addition, an onsite 6-hour supply of reserve air should be provided and arranged to permit quick and complete replenishment of exhausted supply air bottles as they are returned. If compressors are used as a source of breathing air, only units approved for breathing air should be used. Special care must be taken to locate the compressor in areas free of dust and contaminates.

TMI-1 CONFORMANCE

D.4(h) Self-contained breathing apparatus using full face positive pressure masks approved by NIOSH, are provided for the fire brigade, damage control and control room personnel. Each self-contained breathing apparatus has a 60-minute air supply and a 60-minute backup cylinder. Also, there is an air compressor and cascade system at TMI-1 for unlimited air supply. Precautions have been taken to locate the compressor in areas free of dust and contaminants.

APPENDIX A POSITION

D.4(i) Where total flooding gas extinguishing systems are used, area intake and exhaust ventilation dampers should close upon initiation of gas flow to maintain necessary gas concentration. (See NFPA 12, "Carbon Dioxide Systems," and 12A, "Halon 1301 Systems.")

TMI-1 CONFORMANCE

D.4(i) Where required, ventilation dampers close automatically on actuation of a gaseous extinguishing system.

D.5 Lighting and Communication

APPENDIX A POSITION

Lighting and two way voice communication a vital to safe shutdown and emergency response in the event of fire. Suitable fixed and portable emergency lighting and communication devices should be provided to satisfy the following requirements.

TMI-1 CONFORMANCE

D.5 Emergency lighting at TMI-1 meets these requirements. This has been resolved with the NRC per R. Reid letter of November 19, 1980, item 3.2.12 "Emergency Lighting."

Voice communication is provided by regular and portable phones, sound powered phones, GAI page systems, and portable radios.

APPENDIX A POSITION

D.5(a) Fixed emergency lighting should consist of sealed beam units with individual 8-hour minimum battery power supplies.

TMI-1 CONFORMANCE

D.5(a) All areas needed for safe shutdown and access/egress routes to safety related areas are provided with fixed 8 hour sealed beam emergency lighting units. Exemption from this requirement is identified in Section 3.14 for the Control Room. At least one lighting system for the control room is available for all fire scenarios.

In addition, emergency lighting for means of egress lighting is provided throughout TMI-1 and is powered from emergency AC safety related switchgear. The emergency AC power is more reliable and does not present the maintenance problems associated with sealed beam units.

APPENDIX A POSITION

D.5(b) Suitable sealed beam battery powered portable hand lights should be provided for emergency use.

TMI-1 CONFORMANCE

D.5(b) Sealed beam battery powered portable hand lights are provided for emergency use. Portable sealed beam 8 hour emergency lights are provided for Reactor Building access and at the Remote Shutdown Panel Area for operator use. Additional portable lights are available in the Service Building and in the Auxiliary Building by the operators work station. In addition to these storage locations, there are additional eight hour sealed portable lights available in the primary and secondary operators work areas, shift managers office, fire brigade equipment, storage areas, and fire van for use.

APPENDIX A POSITION

D.5(c) Fixed emergency communication should use voice powered head sets at pre-selected stations.

TMI-1 CONFORMANCE

D.5(c) Headsets, powered by 110V safety related switchgear can be plugged into jacks throughout TMI-1. Voice powered headsets are available for emergency feedwater use.

APPENDIX A POSITION

D.5(d) Fixed repeaters installed to permit use of portable radio communications units should be protected from exposure fire damage.

TMI-1 CONFORMANCE

D.5(d) At TMI-1, two fixed repeaters are housed in a radio room located in the Turbine Building, Elevation 322 ft. These two units are the (1) Security and (2) Operations fixed radios, which are connected to a plant-wide antenna network and enables portable radio communication throughout the station. A back-up Operations fixed radio is located in the Pretreatment Building. This unit is widely separated from the Turbine Building units and can provide portable radio communication to the exteriors of the main plant in the event of a fire or water damage to the Turbine Building units, at a minimum. The radios carried by operations personnel and security have both channels. If necessary, communication availability can be enhanced through the use of the Red and Grey Page Phone Systems, the Maintenance and Instrumentation System, line-of-sight two-way radios and runners.

For alternate shutdown, the Grey Page Phone System and the Maintenance and Instrumentation System are available for fires in the Control and Relay Room. The Red Page Phone System is available for fires in the ESAS area.

These systems are available with or without off-site power available.

E. Fire Detection and Suppression

1. Fire Detection

APPENDIX A POSITION

E.1(a) Fire detection systems should, as a minimum, comply with NFPA 72D, "Standard for the Installation Maintenance and Use of Proprietary Protective Signaling Systems". Deviations from the requirements of NFPA 72D should be identified and justified.

TMI-1 CONFORMANCE

E.1(a) Fire detection systems are designed in conformance with NFPA 72D when used in safety related areas of the Reactor, Intermediate, Auxiliary, Control and Fuel Handling Buildings, except that no recorder is provided. The design of the fire detection systems has been accepted by the NRC as detailed in the R. Reid letter of November 19, 1980, item 3.2.4 "Adequacy of Detection System Design." The incipient fire detection system installed in the Control Building consists of detectors and air lines which provide actuation and supervisory signals through existing panels in the Control Building designed as described above.

APPENDIX A POSITION

E.1(b) Fire detection system should give audible and visual alarm and annunciation in the Control Room. Local audible alarms should also sound at the location of the fire.

TMI-1 CONFORMANCE

E.1(b) Fire detection systems give audible and visual alarm through the TMI-1 annunciation system in the control room. Local alarms do not sound at all locations. Alarms however do sound at the local fire panels for the Reactor Building, Control Building, Intake Screen, and Pump House, Auxilliary/Fuel Handling Building, and Intermediate Building.

APPENDIX A POSITION

E.1(c) Fire alarms should be distinctive and unique. They should not be capable of being confused with any other plant system alarms.

TMI-1 CONFORMANCE

E.1(c) Fire alarms have standard annunciator tone. However, engraved flashing windows are provided for the fire alarm in the Control Room. The plant fire emergency alarm is distinctive and unique from all other alarms.

APPENDIX A POSITION

E.1(d) Fire detection and actuation systems should be connected to the plant emergency power supply.

TMI-1 CONFORMANCE

E.1(d) The fire detection systems have backup batteries while the deluge actuation systems are connected to TMI-1 emergency power supply.

2. Fire Protection Water Supply Systems

APPENDIX A POSITION

E.2(a) An underground yard fire main loop should be installed to furnish anticipated fire water requirements. NFPA 24 - Standard for Outside Protection - gives necessary guidance for such installation. It references other design codes and standards developed by such organizations as the American National Standards Institute (ANSI) and the American Water Works Association (AWWA). Lined steel or cast iron pipe should be used to reduce internal tuberculation. Such tuberculation deposits in an unlined pipe over a period of years can significantly reduce water flow through the combination of increased friction and reduced pipe diameter. Means for treating and flushing the systems should be provided. Approved visually indicating sectional control valves, such as Post Indicator Valves, should be provided to isolate portions of the main for maintenance or repair without shutting off the entire system. Visible location marking signs for underground valves is acceptable. Alternative valve position indicators should also be provided.

The fire main system piping should be separate from service or sanitary water system piping. For operating plants, fire main system piping that can be isolated from service or sanitary water system piping is acceptable.

TMI-1 CONFORMANCE

E.2(a) The underground yard fire main loop is installed in accordance with NFPA 24 with the following exceptions (1) the pipe is unlined and (2) mechanical fittings not authorized above (as described in ECR 08-00650). Underground pipe is carbon steel (ASTM A-53 Gr. B, ASTM A-106 Gr. B, ASTM A 134, or API 5L, Gr. B), shop coated for underground service with hot coal tar enamel and asbestos felt per AWWA Spec. C-203. Replacement sections are coated with an equivalent coating for protection.

The underground yard fire main comprises two 12 inch pipe loops. One loop surrounds the plant (see E.2(b) for interface with Unit 2 loop), and the other loop surrounds the Unit 1 natural draft cooling towers.

The two loops are connected by a 16 inch tie line. Post indicator valves (PIV's) are provided to permit isolating sections of the main in the event of a break, and for repairs and extensions. The 12" piping loop surrounding Unit "1A" Cooling Tower will no longer serve the "1A" Cooling Tower directly, but the 12" piping will continue to serve the remainder of the underground main loop.

Flushing is accomplished by using hose connection headers at the fire pump(s) discharge lines for system flush and chemical and biocide treatment flushes and fire hydrants.

The fire main piping is separate from the domestic and sanitary water service piping except for the fire/cooling water feed to the Station Blackout Diesel Generator. This feed can be isolated by manually closing yard post indicator valves.

APPENDIX A POSITION

E.2(b) A common yard fire main loop may serve multi-unit nuclear power plant sites, if cross-connected between units. Sectional control valves should permit maintaining independence of the individual loop around each unit. For such installations, common water supplies may also be utilized. The water supply should be sized for the largest single expected flow. For multiple reactor sites with widely separated plants (approaching 1 mile or more), separate yard fire main loops should be used. Sectionalized systems are acceptable.

TMI-1 CONFORMANCE

E.2(b) A common yard fire main loop serves TMI-1 and TMI-2. Sectional control valves (post indicator valves) are provided to permit independence of the individual loop around each unit. The water supply is sized for the largest single expected flow.

APPENDIX A POSITION

E.2(c) If pumps are required to meet system pressure or flow requirements, a sufficient number of pumps should be provided so that 100% capacity will be available with one pump inactive (e.g., pumps). The connection to the yard fire main loop from each fire pump should be widely separated, preferably located on opposite sides of the plant. Each pump should have its own driver with independent power supplies and control. At least one pump (if not powered from the emergency diesels) should be driven by non-electrical means, preferably diesel engine. Pumps and drivers should be located in rooms separated from the remaining pumps and equipment by a minimum three-hour fire wall. Alarms indicating pump running, driver availability, or failure to start should be provided in the Control Room.

Details of the fire pump installation should, as a minimum, conform to NFPA 20, "Standard for the Installation of Centrifugal Fire Pumps."

TMI-1 CONFORMANCE

E.2(c) Three automatic starting fire pumps (2500 gpm @ 125 psig; two diesel driven and one electrically motor driven) are provided for TMI-1, thereby meeting this requirement. There is sufficient capacity with one of these pumps inactive to insure 2575 gpm to the most remote deluge system plus 1000 gpm for hoses. This is the site's largest single expected flow.

Connectors to the underground yard fire main loop are at least 50 feet apart. Two of the fire pumps in the Unit 1 Intake Screen and Pumphouse are separated by a 3 hour fire wall. The other fire pump is spatially separated, in the Unit 1 circulating water pumphouse.

Alarms indicating pump running, driver availability and failure to start for the three pumps are provided in the Unit 1 Control Room. The fire pump installation conforms to NFPA 20, with the exception of a remote stop button in the Unit 1 Control Room for the electric motor driven pump.

Details of fire pump installations should conform to National Fire Protection Association Standard #20 (NFPA 20), "Standard for the Installation of Stationary Pumps for Fire Protection." Deviations from NFPA 20 are permissible when sound reasons for deviations are documented by the equipment owner. The FS-P-1 and FS-P-3 pumps conform to the 1999 NFPA 20 with the following deviations:

1. NFPA 20, section 9-3.4 requires automatic operation selector switches to be in a locked enclosure. The site security restrictions maintain these buildings locked. “Not on Auto” control room alarm and procedural guidance at TMI preclude the need to secure the FS-P-1 or FS-P-3 controller enclosure.
2. NFPA 20, figure A-7.5.2.1(a) specifies check valves with drilled clappers in the pressure sensing lines of “dirty-water” applications such as FS-P-1 or FS-P-3. The FS-P-1 or FS-P-3 pressure sensing line has ground-face unions with orifices, which NFPA identifies as a “clean water” option. This configuration will remain in use because:
    A. The union/orifice setup has functioned adequately since installation.
    B. This sensing line configuration is not likely to fail in such a way as to trap full system pressure and preclude pump start.
    C. The FS-P-1 and FS-P-3 pressure sensing lines were disassembled and flushed during controller installation in 2003 for FS-P-1 and in 2006 for FS-P-3.
3. NFPA 20, section 9-5.3.1 requires automatic start tests via a weekly program timer to actuate the sensing line drain solenoid valve to simulate system pressure drop. This program timer will not be required as FS-P-1 and FS-P-3 receive regular surveillance test starts by plant operations personnel using approved procedures.
4. 1999 NFPA 20, section 9-5.2.4 describes sequence timers on multi-pump systems to prevent simultaneous starting of multiple pumps, to address the potential for water hammer. The Joslyn Clark controller is designed such that this time delay is in effect for remote starting from the control room. As a control room remote start could be done, during an actual fire, TMI Operations views a time delay at that time as unacceptable, and this feature is not incorporated into FS-P-1 or FS-P-3. The fire pumps at TMI are installed in a parallel arrangement (no pump provides discharge to the suction side of another pump or is reliant on the start of another pump). The sequential starting of the fire pumps at TMI for all automatic start signals is satisfied using the staggered pressure approach. The start sequence for the pumps is the motor driven pump followed by the diesel driven pumps. The pressure setpoints for each pump’s start signal are within approximately 10 psig of each other. By using this approach, all three fire pumps are able to maintain independence with regards to their control function. The sequential starting of the fire pumps is strictly for system demand purposes, no pump is reliant on the start of one of the others. Section 9-5.2.4 of the 1999 NFPA Fire

Protection Handbook states that if water requirements call for more than one pumping unit to operate, the units shall start at intervals of 5 to 10 seconds. Given the high demand of certain deluge systems at TMI, the timed subsequent starting of the diesel driven pumps is not desirable. These deluge systems, by design, send a start signal to both the motor driven pump and one of the diesel driven pumps. Voiding in the system would only be exacerbated during a 5-10 second time delay between pump starts. Due to this, no timing device is installed in the system for automatic starts. However, given the nature of the two pumps, the motor driven pump would be expected to come up to speed quicker than the diesel driven pump. This natural delay is considered to be enough to prevent excessive surges in the system.

5. NFPA 20, sections 7-5.2.1.c and 9-5.2.1.c state that there shall be no isolation valves in pump controller pressure sensing lines. Based on experience, TMI fire pump discharge valves are not absolutely leak tight and allow minimal leakage into the controller cabinet, necessitating dismantling of the sensing line for pressure switch calibration. For this reason, a sensing line isolation valve will be retained on FS-P-1. The infrequent (every three years for pressure switch calibration) use of this valve, limited access to FS-P-1 (locked building), monthly test starts via sensing line pressure reduction and procedural guidance for maintaining this valve open will all preclude accidental closure of this valve.

APPENDIX A POSITION

E.2(d) Two separate reliable water supplies should be provided. If tanks are used, two 100% (minimum of 300,000 gallons each) system capacity tanks should be installed. They should be so interconnected that pumps can take suction from either or both. However, a leak in one tank or its piping should not cause both tanks to drain. The main plant fire water supply capacity should be capable of refilling either tank in a minimum of eight hours.

Common tanks are permitted from fire and sanitary or service water storage. When this is done, however, minimum fire water storage requirements should be dedicated by means of a vertical standpipe for other water services.

TMI-1 CONFORMANCE

E.2(d) Water supply is from the Susquehanna River for two of the fire pumps and the circulating water flume for the third fire pump.

A 100,000 gallon filtered water (preferred make-up is from Pretreatment wells) altitude tank is connected into the fire main piping. For fire protection, 90,000 gallons are held in reserve. Internal piping permits 10,000 gallons to flow to the makeup demineralizers.

APPENDIX A POSITION

E.2(e) The fire water supply (total capacity and flow rate) should be calculated on the basis of the largest expected flow rate for a period of two hours, but not less than 300,000 gallons. This flow rate should be based (conservatively) on 1,000 gpm for manual hose streams plus the greater of:

1) all sprinkler heads opened and flowing in the largest designed fire area; or

2) the largest open head deluge system(s) operating.

TMI-1 CONFORMANCE

E.2(e) The maximum flow demand is 2575 gpm to the most remote deluge system, plus 1000 gpm for manual hose streams.

A single pump is designed to run at 150 percent of rated capacity, which is 3750 gpm at 80 psig. Both diesel-driven pumps FS-P-1 and FS-P-3 have enough fuel oil available in FO-T-4 and FO-T-3 respectively for continuous run time greater than 2 hours.

APPENDIX A POSITION

E.2(f) Lakes or fresh water ponds of sufficient size may qualify as sole source of water for fire protection, but require at least two intakes to the pump supply. When a common water supply is permitted for fire protection and the ultimate heat sink, the following conditions should also be satisfied:

(1) The additional fire protection water requirements are designed into the total storage capacity; and

(2) Failure to the fire protection system should not degrade the

function of the ultimate heat sink.

TMI-1 CONFORMANCE

E.2(f) This condition does not apply to TMI-1.

APPENDIX A POSITION

E.2(g) Outside manual hose installation should be sufficient to reach any location with an effective hose stream. To accomplish this, hydrants should be installed approximately every 250 feet on the yard main system. The lateral to each hydrant from the yard main should be controlled by a visually indicating or key operated (curb) valve. A hose house, equipped with hose and combination nozzle and other auxiliary equipment recommended in NFPA 24, "Outside Protection," should be provided as needed but at least every 1,000 feet. Threads compatible with those used by local fire departments should be provided on all hydrants, hose couplings and standpipe risers.

TMI-1 CONFORMANCE

E.2(g) Fire hydrants are located approximately 250 feet apart around the perimeter of TMI-1 and TMI-2. An exception to this is on the east side of TMI-2 where a hydrant was removed due to obstruction. The lateral to each fire hydrant is controlled by a key operated (curb) valve. Hydrants inside the protected area are provided with a hose house containing 250 feet of 2 1/2 inch hose, combination fog nozzle, and auxiliary equipment. The hydrant south of Warehouse 1 is similarly equipped as is the hydrant at the fire training area.

The inventory requirements of NFPA 24 were used as guidance in establishing equipment inventory. The TMI fire brigade van carries a similar inventory of equipment.

Threads are compatible with those used by local fire departments, which all use standard thread connections.

3. Water Sprinklers and Hose Standpipe Systems

APPENDIX A POSITION

E.3(a) Each automatic sprinkler system and manual hose station standpipe should have an independent connection to the plant underground water main. Headers fed from each end are permitted inside buildings to supply multiple sprinkler and standpipe systems. When provided, such headers are considered an extension of the yard main system. The header arrangement should be such that no single failure can impair both the primary and backup fire protection systems.

Each sprinkler and standpipe system should be equipped with OS&Y (outside screw and yoke) gate valve, or other approved shut off valve, and water flow alarm. Safety related equipment that does not itself require sprinkler water fire protection, but is subject to unacceptable damage if wetted by sprinkler water discharge should be protected by water shields or baffles.

TMI-1 CONFORMANCE

E.3(a) The 12” underground main water header provides water by more than one flow path to the inside of the turbine building, service building, intake screen and pump house, auxiliary building, fuel handling building, control building, circulating water pump house, and the station black out diesel building.

After entering these buildings, a 12” header fed from each end further provides a main distribution flow path in these buildings providing fire service water to protect safety related equipment. These 12” building distribution headers also have isolation valves to isolate portions of the building distribution header.

Branching off of these 12” building headers are smaller distribution headers to feed the fire equipment in the reactor building, intermediate building, and diesel buildings. Should there be a failure of a 12” building distribution header, depending on its location, it could possibly affect fire systems in one or possibly two of these three buildings.

In areas where both the primary and back-up suppression can be impaired by a single failure in the header, backup suppression can be routed to the area from an unaffected location.

Automatic sprinkler and deluge systems as well as manual hose station standpipes are fed from the main header and can be isolated without impacting the main distribution header.

Each sprinkler and standpipe system is equipped with an OS&Y gate valve. Each sprinkler system except condenser pit in Turbine Building is equipped with a water flow alarm. Standpipe systems are not equipped with a water flow alarm. Protection of exposed equipment from water damage is addressed in Section 6.0 of the Fire Hazards Analysis Report.

APPENDIX A POSITION

E.3(b) All valves in the fire water systems should be electrically supervised. The electrical supervision signal should indicate in the Control Room and other appropriate command locations in the plant (See NFPA 26, "Supervision of Valves"). When electrical supervision of fire protection valves is not practicable, an adequate management supervision program should be provided. Such a program should include locking valves open with strict key control; tamper proof seals; and periodic, visual check of all valves.

TMI-1 CONFORMANCE

E.3(b) Shutoff valves controlling sprinkler and deluge systems are electrically supervised and alarm in the Control Room.

Valves which are not electrically supervised are supplied with tamper proof seals. Additionally, a management supervision program exists that requires visual valve position inspection in accordance with AP-1038.

APPENDIX A POSITION

E.3(c) Automatic sprinkler systems should, as a minimum, conform to requirements of appropriate standards such as NFPA 13, "Standard for the Installation of Sprinkler Systems" and NFPA 15, "Standard for Water Spray Fixed Systems."

TMI-1 CONFORMANCE

E.3(c) Valves which are not electrically supervised are supplied with tamper proof seals. Additionally, a management supervision program exists that requires visual valve position inspection in accordance with Technical Specification Surveillance Requirements.

Sprinkler systems throughout TMI-1 meet the design and installation requirements of NFPA 13 and/or NFPA 15. Note that the manually actuated preaction systems protecting the ESF Relay Cabinets in the Control Building and the decay heat valves in the Reactor Building are not provided with approved spray valves as required by NFPA 15. Water is introduced to the system by manually operated gate valves. Note that the water supply for the systems protecting the decay heat valves is from the Reactor Building hose standpipe system.

APPENDIX A POSITION

E.3(d) Interior manual hose installation should be able to reach any location with at least one effective hose steam. To accomplish this, standpipes with hose connections equipped with a maximum of 75 feet of 1 1/2 inch woven jacket lined fire hose and suitable nozzles should be provided in all buildings, including containment, on all floors and should be spaced at not more than 100-foot intervals.

Individual standpipes should be at least 4-inch diameter for multiple hose connections and 2 1/2-inch diameter for single hose connections. These systems should follow the requirements of NFPA No. 14 for sizing, spacing and pipe support requirements (NELPIA).

Hose stations should be located outside entrances to normally unoccupied areas and inside normally occupied areas. Standpipes serving hose stations in areas housing safety related equipment should have shut off valves and pressure reducing devices (if applicable) outside the area.

E.3(d) TMI-1 CONFORMANCE

Hose reels are provided throughout TMI-1 as indicated on layout drawings attached to this report, and are located such that they are capable of reaching any area of the plant with at least one effective hose stream.

Fire Hose stations may have a combination of 1 ½" non-collapsible hose and/or 1 ¾" collapsible hose with 1 ½" connections. Hose stations with all 1 ¾" hose with 1 ½" connections is also acceptable as friction loss greatly decreases with use of this larger diameter hose. The pipe size and arrangement are adequate and meet the requirements of NFPA 14. Some hose reels are equipped with more than 75 feet. Pressure loss from 75' of 1 ½" hose is comparable to 100' of 1 ¾" hose with 1 ½" couplings.

Shutoff/isolation valves and/or pressure reducing devices are provided at hose stations and shut off valves at the main feed to the standpipe.

Since only qualified fire brigade members may utilize fire hose reels, the pressure reducing devices at the hose reels may be over ridden to provide maximum pressure for optimum hose nozzle pattern. Brigade members have been trained on this evolution.

APPENDIX A POSITION

E.3(e) The proper type of hose nozzles to be supplied to each area should be based on the fire hazard analysis. The usual combination spray/ straight-stream nozzle may cause unacceptable mechanical damage (for example, the delicate electronic equipment in the Control Room) and be unsuitable. Electrically safe nozzles should be provided at locations where electrical equipment or cabling is located.

TMI-1 CONFORMANCE

E.3(e) All hose reels are provided electrically safe nozzles. Combination fog-straight stream nozzles are also available for fire brigade use. Personnel are adequately trained to make proper use of hose stations.

APPENDIX A POSITION

E.3(f) Certain fire such as those involving flammable liquids respond well to foam suppression. Consideration should be given to use of any of the available foams for such specialized protection application. These include the more common chemical and mechanical low expansion foams, high expansion foam and the relatively new aqueous film forming foam (AFFF).

TMI-1 CONFORMANCE

E.3(f) There are no major flammable liquid hazards in TMI-1. Areas involving combustible liquids are adequately diked and separated from the plant. Therefore permanent foam suppression systems are not utilized as a fire protection feature. TMI has foam suppression capability and the site fire brigade is trained on its use and proper application. In addition, offsite assistance with additional foam suppression capability is also available.

4. Halon Suppression Systems

APPENDIX A POSITION

E.4 The use of Halon fire extinguishing agents should as a minimum comply with the requirements of NFPA 12A and 12B, "Halogenated Fire Extinguishing Agent Systems - Halon 1301 and Halon 1211." Only UL or FM approved agents should be used.

In addition to the guidelines of NFPA 12A and 12B, preventative maintenance and testing of the systems, including check weighing of the Halon cylinders should be done at least quarterly.

Particular consideration should also be given to:

(a) minimum required Halon concentration and soak time

(b) toxicity of Halon

(c) toxicity and corrosive characteristics of thermal decomposition products of Halon.

TMI-1 CONFORMANCE

E.4 Four (4) Halon 1301 systems are provided in the Air Intake Tunnel which comply with NFPA standards.

Regular quarterly inspections of Halon systems include visual inspection by qualified personnel. The quarterly inspection involves checking for leaks by measuring the internal pressure of the extinguisher, which would indicate any mass loss. Weight checks are performed semi-annually.

Consideration has been given to items (a), (b), and (c) in the design of the systems. Note that soak time is not a required consideration for the design of the Air Intake Tunnel Halon Systems since these systems are designed as explosive suppression systems to discharge in less than a second rather than a fire suppression system requiring soak time.

5. Carbon Dioxide Suppression Systems

APPENDIX A POSITION

E.5 The use of carbon dioxide extinguishing systems should as a minimum comply with the requirements of NFPA 12, "Carbon Dioxide Extinguishing Systems."

Particular consideration should also be given to:

(a) minimum required CO_2 concentration and soak time;

(b) toxicity of CO_2;

(c) possibility of secondary thermal shock (cooling) damage;

(d) offsetting requirements for venting during CO_2 injection to prevent over pressurization versus sealing to prevent loss of agent;

(e) design requirements from over-pressurization; and

(f) possibility and probability of CO_2 systems being out-of-service because of personnel safety consideration. CO_2 systems are disarmed whenever people are present in an area so protected. Areas entered frequently (even though duration time for any visit is short) have often been found with CO_2 systems shut off.

TMI-1 CONFORMANCE

E.5 A carbon dioxide system is provided for the protection of the relay room at elevation 338' of the Control Building.

The carbon dioxide system is designed in accordance with NFPA 12 to deliver a concentration of 50 percent by volume. The quality of carbon dioxide gas purchased to recharge the storage tank should meet NFPA 12 requirements. Gas certified to have purity of 99.5% with a dew point of -30^{o}F or below that has not been manufactured by conversion of dry ice is acceptable.

Consideration has been given to items (a) through (f).

Technical Evaluation ECR 08-00963 "CO2 Discharge Into Control Building Relay Room" (including analysis using GOTHIC computer modeling software - MPR calculation 0080-0151-01) demonstrates:

(1) Automatic discharge of the relay room CO_2 system will provide CO_2 concentration in excess of NFPA 12 fire suppression requirement.

(2) Automatic discharge of the relay room CO_2 system will not cause pressures above room and CO_2 containment design assumptions. This evaluation showed the maximum differential pressure would be 0.12 psid based on pressure relief pathways via door gaps and the CRDM mechanism penetration going from the Relay Room to the Patio.

(3) Automatic discharge of the relay room CO_2 system will make adjacent rooms (ESAS, 1D 4160V switchgear, and 1E 4160V switchgear) IDLH atmospheres. Operators will don SCBAs to perform fire safe shutdown actions if control room evacuation is required.

6. Portable Extinguishers

APPENDIX A POSITION

E.6 Fire extinguishers should be provided in accordance with guidelines of NFPA 10 and 10A, "Portable Fire Extinguishers, Installation, Maintenance and Use." Dry chemical extinguishers should be installed with due consideration given to cleanup problems after use and possible adverse effects on equipment installed in the area.

TMI-1 CONFORMANCE

E.6 Portable fire extinguishers are located as indicated on the fire area drawings attached with the fire hazards analysis. The extinguishers are designed, maintained and used in accordance with the requirements of NFPA 10.

F. Guidelines for Specific Plant Areas

1. Primary and Secondary Containment

APPENDIX A POSITION

Normal Operation

F.1(a) Fire protection requirements for the primary and secondary containment areas should be provided on the basis of specific identified hazards. For example:

- Lubricating oil or hydraulic fluid system for the primary coolant pumps
- Cable tray arrangements and cable penetrations
- Charcoal filters
- Fire suppression systems should be provided based on the fire hazards analysis.
- Fixed fire suppression capability should be provided for hazards that could jeopardize safe plant shutdown. Automatic sprinklers are preferred. An acceptable alternate is automatic gas (Halon or CO_2) for hazards identified as requiring fixed suppression protection.

An enclosure may be required to confine the agent if a gas system is used. Such enclosures should not adversely affect safe shutdown, or other operating equipment in containment.

Automatic fire suppression capability need not be provided in the primary containment atmospheres that are inerted during normal operation. However, special fire protection requirements during refueling and maintenance operations should be satisfied as provided below.

TMI-1 CONFORMANCE

F.1(a) The Fire Hazards Analysis Report outlines the protection for containment areas. Note that the installation of the oil collection system has been accepted by the NRC with respect to the requirements of Appendix R to 10CFR50 Section III.O, which pertain to the oil collection system for the Reactor Coolant Pumps. Reference letter LIL 077 dated March 19, 1981, H.D. Hukill to D.G. Eisenhut and follow-up letter LIL 142 dated May 15, 1981, H.D.Hukill to D.G. Eisenhut. The 1989 Reactor Coolant Pump Motor Lube Oil System upgrade including sight glass relocation and remote fill stations for RCP Lube Oil Reservoirs has been evaluated and determined to have no adverse impact on safe shutdown by GPUN. Although not in strict accordance with Appendix R, Section III.O, an exemption request has been submitted to NRC via Letter C311-89-2120. The exemption was granted by NRC as documented in paragraph 3.14.13.

An automatic deluge system is provided for the kidney fitter charcoal system located in the reactor building.

APPENDIX A POSITION

Refueling and Maintenance

F.1(b) Refueling and maintenance operations in containment may introduce additional hazards such as contamination control materials, decontamination supplies, wood planking, temporary wiring, welding and flame cutting (with portable compressed fuel gas supply). Possible fires would not necessarily be in the vicinity of fixed detection and suppression systems.

Management procedures and controls necessary to assure adequate fire protection are discussed in Section 3.

Equivalent protection from portable systems should be provided if it is impractical to install standpipes with hose stations.

TMI-1 CONFORMANCE

F.1(b) Procedures OP-MA-201-004, OP-AA-201-006, and OP-AA-201-009 provide control for additional hazards during refueling and maintenance operation. Work involving ignition sources such as welding and flame cutting shall be done under closely controlled conditions governed by procedures. These procedures are enforced during all phases of plant operation, refueling and maintenance.

During refueling and maintenance activities as discussed in AP-1038 the Reactor Building fire service is placed in service and is available for use. In addition, portable extinguishers both inside the Reactor Building and at the entrance to the Reactor Building are verified to be functional.

2. Control Room

APPENDIX A POSITION

F.2 The Control Room is essential to safe reactor operation. It must be protected against disabling fire damage and should be separated from other areas of the plant by floors, walls and roofs having minimum fire resistance ratings of three hours.

Control room cabinets and consoles are subject to damage from two distinct fire hazards:

a) Fire originating within a cabinet or console; and

b) Exposure fire involving combustibles in the general room area.

Hose stations adjacent to the Control Room with portable extinguishers in the Control Room are acceptable.

Nozzles that are compatible with the hazards and equipment is the Control Room should be provided for the manual hose station. The nozzles chosen should satisfy actual fire fighting needs, satisfy electrical safety and minimize physical damage to electrical equipment from hose stream impingement.

Fire detection in the control room cabinets, and consoles should be provided by smoke and heat detectors in each fire area. Alarm and annunciation should be provided in the Control Room. Fire alarms in other parts of the plant should also be alarmed and annunciated in the Control Room.

Breathing apparatus for control room operators should be readily available. Control room floors, ceiling, supporting structures, and walls, including penetrations and doors, should be designed to a minimum fire rating of three hours. All penetration seals should be air tight. Manually operated ventilation systems are acceptable.

If such concealed spaces are used, however, they should have fixed automatic total flooding Halon protection.

TMI-1 CONFORMANCE

F.2 The Control Room is separated from the Fuel Handling Building and Turbine Building by 3 hour fire resistance rated walls, and from the Control Building as described in Section 4 of the Fire Hazards Analysis Report. Section 4 also discusses these ratings and outlines the protection for the Control Room.

Hose stations are provided adjacent to the Control Room. Portable extinguishers are provided both inside and outside the Control Room in accessible areas. In addition, a CO_2 cylinder with a hose reel is located in the control room to provide additional manual suppression capability.

Hose reels are provided with electrically safe nozzles. Combination fog-straight stream nozzles are also available for fire brigade use. Personnel are adequately trained to make proper use of hose stations. Smoke detectors are provided in the ceiling of the room, in the ventilation exhaust duct for the building and inside or above the exhaust air flow path of consoles as described in Section 4 of the Fire Hazards Analysis Report. Additional protection is outlined in the Fire Hazard Analysis Report.

Breathing apparatuses for control room operators are readily available.

3. Cable Spreading Room

APPENDIX A POSITION

F.3(a)(1) The preferred acceptable methods are:

Automatic water system such as closed head sprinklers, open head deluge, or open directional spray nozzles. Deluge and open spray systems should have provisions for manual operation at a remote station; however, there should also be provisions to preclude inadvertent operation. Location of sprinkler heads or spray nozzles should consider cable tray sizing and arrangements to assure adequate water coverage. Cables should be designed to allow wetting down with deluge water without electrical faulting. Open head deluge and open directional spray systems should be zoned so that a single failure will not deprive the entire area of automatic fire suppression capability. The use of foam is acceptable, provided it is of a type capable of being delivered by a sprinkler or deluge system, such as an Aqueous Film Forming Foam (AFFF).

TMI-1 CONFORMANCE

F.3(a)(1) The relay room or cable spreading room (elevation 338') is protected by an automatic low pressure CO_2 system.

Water spray is not advocated because of the potential damage to relay cabinets in the relay/cable spread areas although hose protection is available.

APPENDIX A POSITION

F.3(a)(2) Manual hoses and portable extinguishers should be provided as backup.

TMI-1 CONFORMANCE

F.3(a)(2) Portable fire extinguishers are provided. Hose reels are installed as described in Section 4 of the Fire Hazards Analysis Report.

APPENDIX A POSITION

F.3(a)(3) Each cable spreading room of each unit should have divisional cable separation, and be separated from the other and the rest of the plant by a minimum three-hours rated fire wall (Refer to NFPA 251 or ASTM E-119 for fire test resistance rating).

TMI-1 CONFORMANCE

F.3(a)(3) Divisional cable separation for TMI-1 is in accordance with Regulatory Guide 1.75. The cable spreading room is separated from the rest of TMI-1 by a 3 hour fire resistance rating, and is widely separated from the TMI-2 cable spreading room. However, the CRDM bus duct has a louvered enclosure and penetrates the west wall.

APPENDIX A POSITION

F.3(a)(4) At least two remote and separate entrances are provided to the room for access by fire brigade personnel; and

TMI-1 CONFORMANCE

F.3(a)(4) Three remote entrances are provided to the room. Reference Section 4 of the Fire Hazards Analysis Report.

APPENDIX A POSITION

F.3(a)(5) Aisle separation provided between tray stacks should be at least three feet wide and eight feet high.

TMI-1 CONFORMANCE

F.3(a)(5) The Relay Room has clear access at floor level for manual fire suppression activities. Cable trays are installed well above floor level and separation is provided in accordance with Reg Guide 1.75. Post fire shutdown independent of the Relay Room is provided the room has detection and a total flooding suppression system.

APPENDIX A POSITION

F.3(b)(1-4) For cable spreading rooms that do not provide divisional cable separation of a(3), in addition to meeting a(1), (2), (4), and (5) above, the following should also be provided:

(1) Divisional cable separation should meet the guidelines of Regulatory Guide 1.75, "Physical Independence of Electrical Systems."

(2) All cabling should be covered with a suitable fire retardant coating.

(3) As an alternative to a(1) above, automatically initiated gas systems (Halon or CO_2) may be used for primary fire suppression, provided a fixed water system is used as a backup.

(4) Plants that cannot meet the guidelines of Regulatory Guide 1.75, in addition to meeting a(1), (2), (4), and (5) above, an auxiliary shutdown system with all cabling independent of the cable spreading room should be provided.

TMI-1 CONFORMANCE

F.3(b)(1) Divisional cable separation in the TMI-1 cable spreading room is in accordance with Regulatory Guide 1.75 as stated in "TMI-1 CONFORMANCE" section F.3(a)(3).

F.3(b)(2) Cabling is not covered with fire retardant coating.

F.3(b)(3) As stated in "TMI-1 CONFORMANCE" section F.3(a)(1), an automatically initiated CO_2 suppression system is provided for primary fire suppression; however, a fixed water system is not provided as a back-up because of the potential damage to relay cabinets in the area.

F.3(b)(4) An alternative shutdown system is provided to insure that the reactor can be brought to hot and cold shutdown from outside the Control Room should a fire occur in either the Control Room or Relay Room. See Section 3.12 of Fire Hazards Analysis Report.

4. Computer Room

APPENDIX A POSITION

F.4 Safety related computers should be separated from other areas of the plant by barriers having a minimum three-hours fire resistant rating. Automatic fire detection should be provided to alarm and annunciate in the Control Room and alarm locally. Manual hose stations and portable water and Halon fire extinguishers should be provided.

TMI-1 CONFORMANCE

F.4 TMI-1 computers are not safety related.

5. Switchgear Rooms

APPENDIX A POSITION

F.5 Switchgear rooms should be separated from the remainder of the plant by minimum three-hours rated fire barriers to the extent practicable. Automatic fire detection should alarm and annunciate in the control room and alarm locally. Fire hose stations and portable extinguishers should be readily available.

Acceptable protection for cables that pass through the switchgear room is automatic water or gas agent suppression. Such automatic suppression must consider preventing unacceptable damage to electrical equipment and possible necessary containment of agent following discharge.

TMI-1 CONFORMANCE

F.5 Safety related switchgear rooms are separated from the remainder of TMI-1 by 3 hour fire resistance rated walls, floors and ceiling. In the Intake Screen and Pump House, redundant switchgear is separated from each other by a three hour fire barrier wall. The Fire Hazards Analysis Report outlines the protection requirements for these areas. Portable fire extinguishers are readily available. Fire hose stations are available as discussed in the fire hazards analysis.

Water or gas suppression systems are not provided where cables pass through the switchgear room. However, fire seals are provided where these cables penetrate the fire barriers.

6. Remote Safety Related Panels

APPENDIX A POSITION

F.6 The general area housing remote safety related panels should be provided with automatic fire detectors that alarm locally and alarm and annunciate in the Control Room. Combustible materials should be controlled and limited to those required for operation. Portable extinguishers and manual hose stations should be provided.

TMI-1 CONFORMANCE

F.6 Combustible materials are controlled in these areas. HVAC duct smoke detectors or area fire detectors are provided which alarm in the Control Room only. Fire suppression equipment is provided for these areas as detailed in the Fire Hazards Analysis Report.

7. Station Battery Rooms

APPENDIX A POSITION

F.7 Battery rooms should be protected against fire explosions. Battery rooms should be separated from each other and other areas of the plant by barriers having a minimum fire rating of three-hours inclusive of all penetrations and openings. (See NFPA 69, "Standard on Explosion Prevention Systems.") Ventilation systems in the battery rooms should be capable of maintaining the hydrogen concentration well below 2% by volume hydrogen concentration. Standpipe and hose and portable extinguishers should be provided.

Alternatives:

(a) Provide a total fire rated barrier enclosure of the battery room complex that exceeds the fire load contained in the room.

(b) Reduce the fire load to be within the fire barrier capability of 1 1/2 hours.

OR

(c) Provide a remote manual actuated sprinkler system in each room and provide the 1 1/2 hours fire barrier separation.

TMI-1 CONFORMANCE

F.7 The battery rooms are separated from other areas by 3 hour fire resistance rated walls, floors and ceiling. The Fire Hazards Analysis Report outlines the protection requirements for these areas.

The ventilation system will maintain the hydrogen concentration well below 2 percent by volume. Portable fire extinguishers are provided and a hose reel is available. Loss of ventilation flow alarms in the Control Room. Combustible gas monitors are located in the exhaust ventilation ducts.

8. Turbine Lubrication and Control Oil Storage and Use Areas

APPENDIX A POSITION

F.8 A blank fire wall having minimum resistance rating of three hours should separate all areas containing safety related systems and equipment from the turbine oil system. When a blank wall is not present, open head deluge protection should be provided for the turbine oil hazards and automatic open head water curtain protection should be provided for wall openings.

TMI-1 CONFORMANCE

F.8 Open head automatic deluge water spray systems are provided on all turbine oil hazards and an automatic wet pipe sprinkler system is provided for all areas underneath the operating floor of the Turbine Building. This system extends to above the 355'-0" elevation where protection is provided for the space enclosed by the turbine walkway platform (elev. 355' is normally dry, with closed control valves). A manual preaction system is provided for the main turbine bearing and the steam generator feed pump turbine bearings. The Turbine Building is separated from the Control, Fuel Handling, Intermediate and Service Buildings by three hour fire barriers. All penetrations through these barriers are fire sealed except for containment penetrations, which do not have specific fire ratings due to overriding nuclear considerations but their construction is adequate to prevent the spread of fire to the Reactor Building.

Presently there is equipment required to bring the reactor to hot shutdown on elevation 322'-0" of the Turbine Building. Alternate equipment in a separate fire area is available. Reference the Fire Hazards Analysis Report for the discussion on this item.

9. Diesel Generator Areas

APPENDIX A POSITION

F.9 Diesel generators should be separated from each other and other areas of the plant by fire barriers having a minimum fire resistance rating of three hours.

When day tanks cannot be separated from the diesel-generator one of the following should be provided for the diesel generator are:

(a) Automatic open head deluge or open head spray nozzle system(s)

(b) Automatic closed head sprinklers

(c) Automatic AFFF that is delivered by a sprinkler deluge or spray system

(d) Automatic gas system (Halon or CO_2) may be used in lieu of foam or sprinklers to combat diesel generator and/or lubricating oil fires.

TMI-1 CONFORMANCE

F.9 Diesel Generators are separated from each other and other areas of the plant by three hour fire barriers. As described in the Fire Hazards Analysis Report (Section 4) each diesel generator area is protected by an automatic wet pipe sprinkler system.

10. Diesel Fuel Oil Storage Areas

APPENDIX A POSITION

F.10 Diesel fuel oil tanks with a capacity greater than 1100 gallons should not be located inside the buildings containing safety related equipment. They should be located at least 50 feet from any building containing safety related equipment, or if located within 50 feet, they should be housed in a separate building with construction having a minimum fire resistance rating of three hours. Buried tanks are considered as meeting the three hour fire resistance requirements. See NFPA 30, "Flammable and Combustible Liquids Code," for additional guidance.

When located in a separate building, the tank should be protected by an automatic fire suppression system such as AFFF or sprinklers.

In operating plants where tanks are located directly above or below the diesel generators and cannot reasonably be moved, separating floors and

main structural members should, as a minimum, have fire resistance rating of three hours. Floors should be liquid tight to prevent leaking of possible oil spills from one level to another. Drains should be provided to remove possible oil spills and fire fighting water to a safe location.

One of the following acceptable methods of fire protection should also be provided:

a) Automatic open head deluge or open head spray nozzle system(s)

b) Automatic closed head sprinklers; or

c) Automatic AFFF that is delivered by a sprinkler system or spray system

TMI-1 CONFORMANCE

F.10 Diesel fuel for the emergency diesel generators is stored in a 30,000 gallon underground tank. The diesel fuel storage tank for the SBO Diesel is located in a separate fire rated room in TMI-2.

11. Safety Related Pumps

APPENDIX A POSITION

F.11 Pump houses and rooms housing safety related pumps should be protected by automatic sprinkler protection unless a fire hazards analysis can demonstrate that a fire will not endanger other safety related equipment required for safe plant shutdown. Early warning fire detection should be installed with alarm and annunciation locally and in the Control Room. Local hose stations and portable extinguishers should also be provided.

Equipment pedestals or curbs and drains should be provided to remove and direct water away from safety related equipment.

Provisions should be made for manual control of the ventilation system to facilitate smoke removal if required for manual fire fighting operation.

TMI-1 CONFORMANCE

F.11 The screen house containing safety related pumps is protected with a wet pipe, sprinkler system and fire detection system that each provide alarms in the Control Room. Portable fire extinguishers are provided. The Fire Hazard Analysis Report identifies other safety related pumps and protection.

Equipment is installed on concrete pads. Adequate drainage for water is provided. (See Section 6.0 for water damage evaluation)

Portable fans provide smoke removal, if required, in non-radiological areas of the plant. Radiological areas of the plant may use installed systems to remove smoke following a fire.

12. New Fuel Area

APPENDIX A POSITION

F.12 Hand portable extinguishers should be located within this area. Also, local hose stations should be located outside but within hose reach of this area. Automatic fire detection should alarm and annunciate in the Control Room and alarm locally. Combustibles should be limited to a minimum in the new fuel area. The storage area should be provided with a drainage system to preclude accumulation of water.

The storage configuration of new fuel should always be so maintained as to preclude criticality for any water density that might occur during fire water application.

TMI-1 CONFORMANCE

F.12 Manual suppression equipment such as hose stations and portable fire extinguishers are provided as indicated in the fire hazards analysis. Automatic detection is provided in the exhaust ventilation ducts. No local alarms are provided.

The fuel assemblies are stored as per paragraph 9.7.1.2 of the TMI-1 updated FSAR.

13. Spent Fuel Pool Area

APPENDIX A POSITION

F.13 Protection for the spent fuel pool area should be provided by local hose stations and portable extinguishers. Automatic fire detection should be provided to alarm and annunciate in the Control Room and to alarm locally.

TMI-1 CONFORMANCE

F.13 Manual suppression equipment such as hose stations and portable extinguishers are provided. Automatic detection is provided in the exhaust ventilation duct. No local alarms are provided.

14. Radwaste Building

APPENDIX A POSITION

F.14 The Radwaste Building should be separated from other areas of the plant by fire barriers having at least three-hour ratings. Automatic sprinklers should be used in all areas where combustible materials are located. Automatic fire detection should be provided to annunciate and alarm in the Control Room and alarm locally. During a fire, the ventilation systems in these areas should be capable of being isolated. Water should drain to liquid radwaste building sumps. Acceptable alternative fire protection is automatic fire detection to alarm and annunciate in the Control Room, in addition to manual hose stations and portable extinguishers consisting of hand held and large wheeled units.

TMI-1 CONFORMANCE

F.14 The plant has no Radwaste Building per se. These facilities are provided in the Auxiliary Building. Automatic detection is provided in the main exhaust ventilation duct, which is automatically isolated upon detection of smoke. No local alarms are provided. See the Fire Hazards Analysis Report for the Auxiliary Building.

15. Decontamination Areas

APPENDIX A POSITION

F.15 The decontamination areas should be protected by automatic sprinklers if flammable liquids are stored. Automatic fire detection should be provided to annunciate and alarm in the Control Room and alarm locally. The ventilation system should be capable of being isolated. Local hose stations and hand portable extinguishers should e provided as backup to the sprinkler system.

TMI-1 CONFORMANCE

F.15 The personnel decontamination area is located in the Control Building at elevation 306'. The equipment decontamination area is located in the Waste Packaging and Handling facility. The Fire Hazard Analysis Report outlines the protection for these areas.

16. Safety Related Water Tanks

APPENDIX A POSITION

F.16 Storage tanks that supply water for safe shutdown should be protected from the effects of fire. Local hose stations and portable extinguishers should be provided. Portable extinguishers should be located in nearby hose houses. Combustible materials should not be stored next to outdoor tanks. A minimum of 50 feet of separation should be provided between outdoor tanks and combustible materials where feasible.

TMI-1 CONFORMANCE

F.16 Condensate Storage tanks located in the yard are separated from each other by more than 400 feet with the service and diesel generator buildings located between them. Yard hydrants are provided in the area of the tanks.

The Borated Water Storage Tank is located outside the Auxiliary Building on the northwest corner. There is no significant amount of combustible material in the area adjacent to the tank. Yard fire hydrants are provided in the area of the tanks.

17. Cooling Towers

APPENDIX A POSITION

F.17 Cooling towers should be of non-combustible construction or so located that a fire will not adversely affect any safety related systems or equipment. Cooling towers should be of non-combustible construction when the basins are used for the ultimate heat sink or for the fire protection water supply. Cooling towers of combustible construction, so located that a fire in them could adversely affect safety related systems or equipment should be protected with an open head deluge system installation with hydrants and hose houses strategically located.

TMI-1 CONFORMANCE

F.17 Cooling towers are not required for safe shutdown. Combustible portions of the “B” cooling tower, however, are protected by dry pipe pilot actuated deluge water system. The “A” cooling tower has non-combustible fill and supports, so a suppression system is not required. The basins for the cooling towers are not used for the ultimate heat sink or as the sole source of fire protection water supply.

18. Miscellaneous Areas

APPENDIX A POSITION

F.18 Miscellaneous areas such as records storage areas, shops, warehouses, and auxiliary boiler rooms should be so located that a fire or effects of a fire, including smoke, will not adversely affect any safety related systems or equipment. Fuel oil tanks for auxiliary boilers should be buried or provided with dikes to contain the entire tank contents.

TMI-1 CONFORMANCE

F.18 The shops, warehouses and auxiliary boiler area are protected by automatic sprinklers, and are separated from safety related systems or equipment by fire barriers. Therefore, fire or smoke would not affect safety related systems or equipment. The fuel oil tank for the auxiliary boiler is provided with a dike. Record storage vaults are located in a separate building and are provided with rated walls, doors and total flooding suppression systems suitable for the protection of records.

G. Special Protection Guidelines

1. Welding and Cutting, Acetylene - Oxygen Fuel Gas Systems

APPENDIX A POSITION

G.1 This equipment is used in various areas throughout the plant. Storage locations should be chosen to permit fire protection by automatic sprinkler systems. Local hose stations and portable equipment should be provided as backup. The requirements of NFPA 51 and 51B are applicable to these hazards. A permit system should be required to utilize this equipment. (Also refer to 2f herein.)

TMI-1 CONFORMANCE

G.1 Storage of all oxygen/acetylene is maintained out-of-doors. Tanks in use by maintenance and/or contractor personnel are closely supervised and are covered by procedure OP-AA-201-004 which incorporates a permit system in accordance with NFPA 51B. No automatic fire suppression systems are provided. Hot work permits requires appropriate fire extinguisher(s) to be available and ready for use by a qualified individual. Local hose stations are provided throughout the plant as described in the fire hazards analysis.

APPENDIX A POSITION

G.2 Dry ion exchange resins should not be stored near essential safety related systems. Dry unused resins should be protected by automatic wet pipe sprinkler installations. Detection by smoke and heat detectors should alarm and annunciate in the Control Room and alarm locally. Local hose stations and portable extinguishers should provide backup for these areas. Storage areas of dry resin should have curbs and drains. (Refer to 92M, "Waterproofing and Draining of Floors.")

TMI-1 CONFORMANCE

G.2 Powdered resins (Powdex) are utilized in the Condensate Demineralizers and in the cycle makeup pretreatment demineralizers all of which are located in the Turbine Building, which is protected by an automatic wet pipe sprinkler system in the area of the demineralizers. Local hose stations and portable extinguishers are provided as back-up to the sprinkler system. Unused resins are stored in the area of the demineralizers and are thus protected by wet pipe sprinklers, hose stations and portable extinguishers. No smoke and heat detection is provided in these areas. The resins are not stored near essential safety related systems.

Powdered resins in limited quantities are stored in the chemical addition room on the 331' elevation of the Auxiliary Building for addition to the WDL or MU demineralizers. The area is monitored by smoke detectors that alarm in the Control Room and is protected by hose reels and portable fire extinguishers.

3. Hazardous Chemicals

APPENDIX A POSITION

G.3 Hazardous chemicals should be stored and protected in accordance with the recommendations of NFPA 49, "Hazardous Chemicals Data." Chemicals storage areas should be well ventilated and protected against flooding conditions since some chemicals may react with water to produce ignition.

TMI-1 CONFORMANCE

G.3 The hazardous chemicals at TMI-1, as defined in NFPA 49, are sodium hydroxide and sulfuric acid, and are presently stored and protected in accordance with the recommendations of the now withdrawn NFPA 49 code. Chemical storage areas are well ventilated and protected against flooding.

4. Materials Containing Radioactivity

APPENDIX A POSITION

G.4 Materials that collect and contain radioactivity such as spent ion exchange resins, charcoal filters, and HEPA filters should be stored in closed metal tanks or containers that are located in areas free from ignition sources or combustibles. These materials should be protected from exposure to fires in adjacent areas as well. Consideration should be given to requirements for removal of isotopic decay heat from entrained radioactive materials.

TMI-1 CONFORMANCE

G.4 Spent ion exchange resins will always be completely contained and will, therefore, never be exposed to ignition sources or combustibles. Spent charcoal filters and HEPA filters will be exposed only during their removal from service in areas of the plant that have equipment required for safe shutdown. After removal, they will be stored in metal drums that will completely contain them from any ignition sources or combustibles.

Areas of the plant that do not have equipment required for safe shut down of the plant may have exposed HEPA or charcoal filters to permit isotopic decay, however, they are considered a transient combustible and are handled accordingly.

For discussion of fire protection for these materials refer to Sections 2 and 4 of the Fire Hazards Analysis Report.

Filtering systems (charcoal) are protected by deluge fire protection systems as discussed in the applicable sections of the Fire Hazards Analysis Report.

Reference OP-TM-201-009-1001 - for removal of resins and charcoal.