9E Fire Related Administrative Controls

9E.1 Introduction

The following site-specific supplement addresses COL License Information item 9.35 as detailed in Subsection 9.5.1.6.4.

In addition to addressing the administrative controls described in Subsection 9.5.1.6.4, this Appendix provides a fire protection administrative program meeting the administrative guidance provided in Regulatory Guide (RG) 1.189, Revision 1, “Fire Protection for Nuclear Power Plants.” The presentation and numbering of this Appendix corresponds to the presentation and numbering in RG 1.189.

For completeness, standard design and hardware related information described in the DCD is referenced in this Appendix at the applicable section in RG 1.189. As discussed in the Introduction to RG 1.189, and in Section C.III of RG 1.206, “Combined License Applications for Nuclear Power Plants (LWR Edition),” this standard information is governed by the edition of industry codes and standards applicable within 6 months of the DCD submittal date.

As described in Subsection 9.5.1.2 the overall Fire Protection Program (FPP) for the facility extends the concept of defense-in-depth to fire protection in fire areas important to safety, with the following three objectives:

(a) Prevent fires from starting.

(b) Detect rapidly, control, and extinguish promptly those fires that do occur.

(c) Provide protection for SSCs important to safety so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the safe shutdown of the plant.

As discussed in Subsection 9.5.1.1.2, a principal feature of the ABWR design approach to fire protection is providing three complete divisions of safety-related cooling systems with only one division located in any single fire area. Complete burnout of any fire area without recovery will not prevent safe shutdown of the plant; therefore, complete burnout of a fire area can be tolerated (divisional separation is not practical in the case of the inerted containment, the control room and the remote shutdown room, and the basis for acceptability of these areas is discussed in more detail in Subsection 9.5.1.1.2).

(a) The overall FPP for STP 3 & 4 is collectively described in the following sections:

– Subsection 9.5.1 Fire Protection System (general descriptions, design bases and principal design features of barriers, alarm and detection systems suppression systems and HVAC systems)

– Section 13.0 Conduct of Operations

– Section 9A Fire Hazards Analysis

– Section 9B Summary of Analysis Supporting Fire Protection Design Requirements

– Section 9E Fire Related Administrative Controls

– Section 19M Fire Protection Probabilistic Risk Assessment

– Section 19Q ABWR Shutdown Risk Assessment

– Technical Specification 5.5.1.1.d, Fire Protection Program Implementation

COLA Part 5.1, Section D and Section H discuss fire protection elements related to the Emergency Plan.

(b) STPNOC organizational responsibilities for the FPP are identified in Subsection 9E.1.1 below.

(c) The authorities of personnel implementing the FPP and administrative controls are described in Subsection 9E.1.1 below.

(d) Fire protection, fire detection and suppression capability, and limiting fire damage with barriers and divisional separation are described in Subsection 9.5.1.

(e) The administrative controls and personnel requirements for fire protection and manual fire suppression activities are described in Section 9E.

(f) The automatic and manually operated fire detection and suppression systems are described in Subsection 9.5.1.

(g) The fire barriers and divisional separation provided to limit fire damage to SSCs important to safety, so that the capability to shut down the plant safely is ensured, is described in Subsection 9.5.1.

The FPP administrative controls described in this Appendix address the responsibilities for continuing evaluation of fire hazards associated with construction of STP 3 & 4 to ensure the continued safe operation of STP 1 & 2 and similarly, the safe operation of STP Units 1, 2 and 3 during the completion of STP Unit 4. STPNOC provides additional fire barriers and fire protection capability, as necessary, to protect the operating units from any fire hazards associated with these construction activities.

9E.1.1 Organization, Staffing, and Responsibilities

(a) The President & Chief Executive Officer sets policy and has overall responsibility for the formulation, implementation, and assessment of the effectiveness of the Fire Protection Program.

The Group Vice President has the executive authority and responsibility for the FPP.

(b) The Vice President Engineering and Construction reports to the Group Vice President and has direct responsibility to establish, implement and maintain written procedures for implementing the FPP and for periodically assessing the effectiveness of the FPP including fire drills and training conducted by the fire brigade and plant personnel. The results of these assessments are reported to the Group Vice President with recommendations for improvements or corrective actions as deemed necessary.

(c) The Plant General Manger is responsible for the overall administration of the plant operations and emergency plans that include the fire protection and prevention program and that provide a single point of control and contact for all contingencies.

The Plant General Manager has responsibility for approving or disapproving Fire Protection Program implementing procedures and changes thereto as recommended by the Plant Operations Review Committee (PORC).

The Plant General Manager is responsible for assisting the Plant General Manager STP 1 & 2 in assessing the potential fire related impact to STP 1 & 2 from construction activities on STP 3 & 4.

The Plant General Manager is responsible for the evaluation of the potential fire related impact to STP 3 from construction activities on STP 4 (see additional discussion in Section 1.10S).

(d) The Fire Protection Coordinator reports through the chain of command to the Vice President, Engineering and Construction. Primary responsibility for implementation of the FPP has been delegated to the Fire Protection Coordinator, who is an individual knowledgeable through education, training, and/or experience in fire protection and nuclear safety. Other personnel are available to assist the Fire Protection Coordinator as necessary to accomplish the following:

(i) Implement periodic inspections to minimize the amount of combustibles in plant areas important to safety; determine the effectiveness of housekeeping practices; ensure the availability and acceptable condition of all fire protection systems/equipment, emergency breathing apparatus, emergency lighting, communication equipment, fire stops, penetration seals, and fire-retardant coatings; and ensure that prompt and effective

corrective actions are taken to correct conditions adverse to fire protection and preclude their recurrence

(ii) Provide firefighting training for operating plant personnel and the plant's fire brigade; design and select equipment; periodically inspect and test fire protection systems and equipment in accordance with established procedures; and evaluate test results and determine the acceptability of the systems under test

(iii) Assist in the critique of all fire drills to determine how well the training objectives have been met

(iv) Review proposed work activities with regard to in-plant fire protection, identify potential transient fire hazards, and specify required additional fire protection in the work activity procedure

(v) Implement a program to indoctrinate all plant contractor personnel in appropriate administrative procedures that implement the FPP and the emergency procedures relative to fire protection

(vi) Implement a program to instruct personnel on the proper handling of accidental events such as leaks or spills of flammable materials that are related to fire protection

(vii) Review hot work

(e) The Vice President Oversight and Regulatory Affairs is responsible for:

(i) Establishing the fire protection quality assurance program in accordance with Regulatory Position 1.7, Quality Assurance, of RG 1.189 as delineated in the document “STP 3 & 4 Quality Assurance Program Description”

(ii) Ensuring effective implementation of the FPP quality assurance program by planned surveillances and scheduled audits

(iii) Ensuring results of FPP surveillance and audit activities are promptly reported to cognizant management personnel

(f) The plant's fire brigade positions and responsibilities are identified as follows:

(i) The plant fire brigade positions are responsible for fighting fires. The authority and responsibility of each fire brigade position relative to fire protection are clearly defined.

(ii) The responsibilities of each fire brigade position correspond with the actions required by the firefighting procedures.

(iii) Collateral responsibilities of the fire brigade members do not conflict with their responsibilities related to the fire brigade during a fire emergency. A collateral responsibility is a required action or decision that would adversely affect the fire brigade member's ability to perform a required fire fighting function.

(iv) The minimum number of trained fire brigade members available on site for each operating shift should be consistent with the activities required to combat credible and challenging fires, but is no less than five members. The size of the fire brigade is based upon the functions required to fight fires, with adequate allowance for injuries. Fire brigade staffing accounts for the operational and emergency response demands on shift personnel in the event of a significant fire.

9E.1.2 Fire Hazards Analysis

This topic is addressed in Section 9A.

9E.1.3 Safe-Shutdown Analysis

This topic is addressed in Subsections 9.5.1.3.11 and 9.5.1.3.12.

9E.1.4 Fire Test Reports and Fire Data

This topic is addressed in Subsection 9.5.13.7 (COL License Information Item 9.24).

9E.1.5 Compensatory Measures

Temporary changes to specific fire protection features necessary to accomplish maintenance or modifications are permissible when accompanied by interim compensatory measures, such as fire watches, temporary fire barriers, or backup suppression capability.

Compensatory measures may be implemented as an interim step to restore operability or to otherwise enhance the capability of degraded or nonconforming fire protection related SSCs until the final corrective action is complete. Reliance on a compensatory measure for operability is given important consideration in establishing the time frame for completing the corrective action. Nonconforming conditions or degraded conditions requiring an operator action to demonstrate operability are resolved expeditiously.

The guidance provided in NRC Inspection Manual Part 9900, "Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety" is utilized when compensatory measures are relied upon.

9E.1.6 Fire Protection Training and Qualifications

The Vice President, Engineering and Construction, maintains available staff for the FPP knowledgeable in both fire protection and nuclear safety.

9E.1.6.1 Fire Protection Staff Training and Qualifications

Fire protection staff qualifications:

(a) The Fire Protection Coordinator, or a person available for consultation, is a graduate of an accredited engineering or fire science curriculum and has a minimum of six years applicable experience, three of which have been in the area of fire protection. Education and/or experience acceptable to the Society of Fire Protection Engineers for full member status may be considered as equivalent qualifications.

(b) Fire brigade training is discussed in Subsection 9E.1.6.4. Brigade member qualification includes satisfactory completion of a physical exam for performance of strenuous physical activity.

(c) Personnel responsible for the maintenance and testing of the fire protection systems are qualified by training and experience for this work.

(d) The Fire Protection Coordinator is responsible for the training of the fire brigade and is qualified by knowledge, suitable training, and experience for the conduct of this training.

9E.1.6.2 General Employee Training

General employees are instructed in their responsibilities to prevent and detect fires. Training includes information on the types of fires and related extinguishing agents, specific fire hazards at the site, and actions in the event of a fire suppression system actuation. Specific instruction includes:

(a) Principal responsibility to notify the control room upon discovering a fire, prior to attempting to extinguish the fire

(b) Actions upon actuation of local fire suppression systems or hearing a fire alarm

(c) Administrative controls on the use of combustibles and ignition sources

(d) Actions necessary in the event of a combustible liquid spill or leak or combustible gas release or leaks

9E.1.6.3 Fire Watch Training

Fire watches are used for observation and control of fire hazards associated with hot work and may provide compensatory measures for degraded fire protection systems and features. Specific fire watch training provides instruction on fire watch duties, responsibilities, and required actions for both 1-hour roving and continuous fire watches. Fire watch qualifications include hands-on training on a practice fire with the extinguishing equipment to be used while on fire watch. If fire watches are to be used as compensatory actions, the fire watch training includes recordkeeping requirements if required by 9E.1.5.

9E.1.6.4 Fire Brigade Training and Qualifications

Fire brigade training establishes and maintains the capability to fight credible and challenging fires. The program consists of initial classroom instruction followed by periodic classroom instruction, firefighting practice, and fire drills (See 9E.3.5.1.4 for drill guidance).

The training recommendations of NFPA 600, “Standard on Industrial Fire Brigades” provide applicable criteria for training the plant fire brigade.

9E.1.6.4.1 Qualifications

The brigade leader and at least two brigade members have sufficient training in or knowledge of plant systems to understand the effects of fire and fire suppressants on safe-shutdown capability. The brigade leader has training or experience necessary to assess the potential safety consequences of a fire and advise control room personnel as evidenced by possession of an operator's license or equivalent knowledge of plant systems. The qualification of fire brigade members includes an annual physical examination to determine their ability to perform strenuous firefighting activities.

9E.1.6.4.2 Instruction

Instruction is provided in the following:

(a) indoctrination of the plant firefighting plan with specific identification of each individual's responsibilities

(b) identification of the type and location of fire hazards and associated types of fires that could occur in the plant

(c) the toxic and corrosive characteristics of expected products of combustion

(d) identification of the location of firefighting equipment for each fire area and familiarization with the layout of the plant, including access and egress routes to each area

(e) the proper use of available firefighting equipment and the correct method of fighting each type of fire, including the following:

(i) fires involving radioactive materials

(ii) fires in energized electrical equipment

(iii) fires in cables and cable trays

(iv) hydrogen fires

(v) fires involving flammable and combustible liquids or hazardous process chemicals

(vi) fires resulting from construction or modifications (welding)

(vii) record file fires

(f) the proper use of communication, lighting, ventilation, and emergency breathing equipment

(g) the proper method for fighting fires inside buildings and confined spaces

(h) the direction and coordination of the firefighting activities (fire brigade leaders only)

(i) detailed review of firefighting strategies and procedures

(j) review of the latest plant modifications and corresponding changes in firefighting plans

9E.1.6.4.3 Fire Brigade Practice

Practice sessions are held for the fire brigade of each shift on the proper method of fighting the various types of fires that could occur in a nuclear power plant. These sessions provide brigade members with experience in actual fire extinguishment and the use of self-contained breathing apparatus under the strenuous conditions encountered in firefighting. Practice sessions are held at least once per year for each fire brigade member.

9E.1.6.4.4 Fire Brigade Training Records

Individual records of training provided to each fire brigade member, including drill critiques, for at least 3 years to ensure that each member receives training in all parts of the training program. Records of fire brigade training are available for NRC inspection.

9E.1.7 Quality Assurance

The quality assurance program for fire protection adopts Section 1.7, Quality Assurance, of RG 1.189, and is addressed in the “STP 3 & 4 Quality Assurance Program Description.”

9E.1.8 Fire Protection Program Changes/Code Deviations

Changes to the STP 3 & 4 FPP will be evaluated and processed in accordance with 10 CFR 52.98(c).

9E.2 Fire Prevention

9E.2.1 Control of Combustibles

Administrative controls and procedures control the handling and use of combustibles, prohibit storage of combustibles in plant areas important to safety, establish designated storage areas with appropriate fire protection, and control use of specific combustibles (e.g., wood) in plant areas important to safety.

9E.2.1.1 Transient Fire Hazards

Bulk storage of combustible materials is prohibited inside or adjacent to buildings or systems important to safety during all modes of plant operation. Procedures govern the handling of and limit transient fire hazards such as combustible and flammable liquids, wood and plastic products, high-efficiency particulate air (HEPA) and charcoal filters, dry ion exchange resins, or other combustible materials in buildings containing systems or equipment important to safety during all phases of operation, particularly during maintenance, modification, or refueling operations.

Transient fire hazards that cannot be eliminated are controlled and suitable protection is provided. Specific controls and protective measures include the following:

(a) Unused ion exchange resins are not stored in areas that contain or expose equipment important to safety.

(b) Hazardous chemicals are not stored in areas that contain or expose equipment important to safety.

(c) Use of wood inside buildings containing systems or equipment important to safety is permitted only when suitable noncombustible substitutes are not available. All wood smaller than 152 mm x 152 mm (6 in x 6 in) used in plant areas important to safety during maintenance, modification, or refueling operation (such as lay-down blocks or scaffolding) should be treated with a flame-retardant. See NFPA 703, "Standard for Fire-Retardant Treated Wood and Fire-Retardant Coatings for Building Materials." Wood is allowed into plant areas important to safety only when needed for immediate use.

(d) The use of plastic materials is minimized. Halogenated plastics such as polyvinyl chloride and neoprene are used only when substitute noncombustible materials are not available.

(e) Use of combustible material such as HEPA and charcoal filters, dry ion exchange resins, or other combustible supplies in areas important to safety are controlled. Such materials are allowed into areas important to safety only when they needed for immediate use.

(f) Equipment or supplies (such as new fuel) shipped in untreated combustible packing containers may be unpacked in areas containing equipment or systems important to safety if required for valid operating reasons. However, combustible materials are removed from the area immediately following unpacking. Such transient combustible material, unless stored in approved containers, is not left unattended. Loose combustible packing material, such as wood or paper excelsior or polyethylene sheeting, is placed in metal containers with tight-fitting, self-closing metal covers or other approved containers.

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

(h) Temporary power cables used during maintenance outages are treated as transient combustibles and potential ignition sources. Procedures address fire protection for temporary electrical power supply and distribution.

9E.2.1.2 Modifications

Fire prevention elements of the FPP are maintained when plant modifications are made. Modification procedures contain provisions that evaluate the impacts of modifications on the fire prevention design features and programs. Personnel in the

fire protection organization review modifications of SSCs to ensure that fixed fire loadings are not increased beyond those accounted for in the fire hazards analysis, or if increased, suitable protection is provided and the fire hazards analysis is revised accordingly.

9E.2.1.3 Flammable and Combustible Liquids and Gases

The handling, use, and storage of flammable and combustible liquids comply with the provisions of NFPA 30, “Flammable and Combustible Liquids Code.”

Miscellaneous storage and piping for flammable or combustible liquids or gases is controlled to avoid a potential fire exposure hazard to systems important to safety.

Combustible materials are isolated or separated from systems important to safety. When this is not possible because of the nature of the safety system or the combustible material, special protection is provided to prevent a fire from defeating the safety system function. Examples of such combustible materials that may not be separable from the remainder of its system are EDG fuel oil day tanks, turbine-generator oil and hydraulic control fluid systems.

RCP lube oil systems are not applicable to the ABWR.

Diesel fuel oil tanks, turbine-generator lube oil and hydraulic systems are discussed in Subsection 9.5.1.

Bulk gas storage meets the guidelines of Subsection 9E.7.5.

9E.2.1.4 External/Exposure Fire Hazards

An evaluation of external fire hazards including the potential for wildfires is addressed in Subsection 2.2S.3.1.4. Additional relevant discussion is provided in Subsection 9.5.1 for diesel fuel oil storage and COL license information provided in Subsections 9.5.13.9, Applicant Fire Protection Program, and 9.5.13.15, Identification of Chemicals.

9E.2.2 Control of Ignition Sources

Design, installation, modification, maintenance, and operational procedures and practices are used to control potential ignition sources such as electrical equipment (permanent and temporary), hot work activities (e.g., open flame, welding, cutting, and grinding), high-temperature equipment and surfaces, heating equipment (permanent and temporary installation), reactive chemicals, static electricity, and smoking.

9E.2.2.1 Open Flame, Welding, Cutting, and Grinding (Hot Work)

Work involving ignition sources such as welding and flame cutting is done under controlled conditions. Persons performing and directly assisting in such work are trained and equipped to prevent and combat fires, or if this is not possible, a person qualified in fire protection directly monitors the work and functions as a fire watch.

The use of ignition sources is governed by a hot work permit system to control open flame, welding, cutting, brazing, or soldering operations. A separate permit is normally issued for each area where work is to be done. If work continues over more than one shift, the permit should be valid for not more than 24 hours when the plant is operating or for the duration of a particular job during plant shutdown. NFPA 51B, “Standard for Fire Prevention During Welding, Cutting and Other Hot Work,” includes guidance for safeguarding the hazards associated with welding and cutting operations.

9E.2.2.2 Temporary Electrical Installations

Plant administrative controls provide for engineering review of temporary electrical installations. These reviews ensure that appropriate precautions, limitations, and maintenance practices are established for the term of such installations. NFPA 70, “National Electrical Code” is used for guidance on temporary electrical installations.

9E.2.2.3 Other Sources

Open flames or combustion-generated smoke are not permitted for leak testing and similar procedures such as airflow determinations. Procedures and practices provide for control of temporary heating devices. Use of space heaters and maintenance equipment (e.g., tar kettles for roofing operations) in plant areas are controlled and reviewed by the STP 3 & 4 fire protection staff. Engineering procedures and practices provide assurance that temporary heating devices are properly installed according to the UL listing, including required separations from combustible materials and surfaces. Temporary heating devices are placed to avoid overturning and installed in accordance with their listing, including clearance to combustible material, equipment, or construction. Asphalt and tar kettles are located in a safe place or on a fire-resistive roof at a point where they avoid ignition of combustible material below. Continuous supervision is maintained while kettles are in operation and metal kettle covers and fire extinguishers are provided.

9E.2.3 Housekeeping

Administrative controls are established to reduce fire hazards in areas containing SSCs important to safety. These controls govern removal of waste, debris, scrap, oil spills, and other combustibles after completion of a work activity or at the end of the shift. Administrative controls also include procedures for performing and maintaining periodic housekeeping inspections to ensure continued compliance with fire protection controls. Housekeeping practices ensure that drainage systems especially drain hub grills, in areas containing fixed water-based suppression systems remain free of debris to minimize flooding if the systems discharge. RG 1.39, “Housekeeping Requirements for Water-Cooled Nuclear Power Plants,” provides guidance on housekeeping, including the disposal of combustible materials.

9E.2.4 Fire Protection System Maintenance and Impairments

Fire protection administrative controls are established to address the following:

(a) Fire protection features are maintained and tested by qualified personnel. (See Subsection 9E.1.6.1).

(b) Impairments to fire barriers, fire detection, and fire suppression systems are controlled by a permit system. Compensatory measures (see Subsection 9E.1.5) are established in areas where systems are so disarmed.

(c) Test plans that list the individuals and their responsibilities in connection with routine tests and inspections of the fire protection systems are developed. The test plans contain the types, frequency, and detailed procedures for testing. Frequency of testing is based on the code of record for the applicable fire protection system. Procedures 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).

(d) Fire barriers, including dampers, doors, and penetration seals, are routinely inspected. Penetration seals are inspected on a frequency and relative sample basis that provides assurance that the seals are functional. Sample size and inspection frequency are determined by the total number of penetrations and observed failure rates. Inspection frequency ensures that all seals will be inspected every 10 years. Inspections conform to NFPA 25, “Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.”

9E.3 Fire Detection and Suppression

9E.3.1 Fire Detection

This topic is discussed in Subsection 9.5.1.

9E.3.2 Fire Protection Water Supply Systems

This topic is discussed in Subsection 9.5.1

9E.3.3 Automatic Suppression Systems

This topic is discussed in Subsection 9.5.1

9E.3.4 Manual Suppression Systems and Equipment

This topic is discussed in Subsection 9.5.1

9E.3.5 Manual Firefighting Capabilities

9E.3.5.1 Fire Brigade

A site fire brigade trained and equipped for firefighting is established and on site at all times to ensure adequate manual firefighting capability for all areas of the plant containing SSCs important to safety. The fire brigade leader has ready access to keys for any locked doors. Subsection 9E.1.6.4 provides guidance on fire brigade training and qualifications.

9E.3.5.1.1 Fire Brigade Staffing

The fire brigade includes at least five members on each shift. The shift supervisor is not a member of the fire brigade.

9E.3.5.1.2 Equipment

The equipment provided for the brigade consists of personal protective equipment, such as turnout coats, bunker pants, boots, gloves, hard hats, emergency communications equipment, portable lights, portable ventilation equipment, and portable extinguishers. Self-contained breathing apparatus (SCBA) using full-face positive-pressure masks approved by the National Institute for Occupational Safety and Health (approval formerly given by the U.S. Bureau of Mines) is provided for fire brigade, damage control, and control room personnel. At least 10 masks should be available for fire brigade personnel. Control room personnel may be furnished breathing air by a manifold system piped from a storage reservoir if practical. Service or rated operating life should be at least 30 minutes for the self-contained units. STP 3 & 4 conforms to NFPA 1404, “Standard for Fire Service Respiratory Protection Training.”

Fire brigade equipment is stored in accordance with manufacturers recommendations (e.g., firefighter clothing should not be stored where it will be subjected to ultraviolet light from the sun, welding, or fluorescent lights).

At least a 1-hour supply of breathing air in extra bottles is located on the plant site for each self-contained breathing apparatus. In addition, an onsight 6-hour supply of reserve air is provided for the fire brigade personnel and arranged to permit quick and complete replenishment of exhausted air supply bottles as they are returned.

During refueling and maintenance periods, self-contained breathing apparatus is provided near the containment entrances for firefighting and damage control personnel. These units are marked as emergency equipment and are independent of the plant breathing air system provided inside containment and general areas.

9E.3.5.1.3 Procedures and Prefire Plans

Procedures are established to control actions by the fire brigade upon notification by the control room of a fire and to define firefighting strategies. These procedures include the following:

(a) actions to be taken by control room personnel to notify the fire brigade upon report of a fire or receipt of an alarm on the control room fire alarm panel (e.g., announcing the location of the fire over the public address system, sounding fire alarms, and notifying the shift supervisor and the fire brigade leader of the type, size, and location of the fire)

(b) actions to be taken by the fire brigade after notification by the control room of a fire (e.g., assembling in a designated location, receiving directions from the fire brigade leader, and discharging specific firefighting responsibilities, including selection and transportation of firefighting equipment to the fire location, selection of protective equipment, operating instructions for use of fire suppression systems, and use of preplanned strategies for fighting fires in specific areas)

(c) strategies for fighting fires in all plant areas, including the following:

(i) fire hazards in each area covered by the specific prefire plans

(ii) SSCs credited for fire safe shutdown

(iii) fire suppression agents best suited for extinguishing the fires associated with the fire hazards in that area and the nearest location of these suppression agents

(iv) most favorable direction from which to attack a fire in each area in view of the ventilation direction, access hallways, stairs, and doors that are most likely to be free of fire, and the best station or elevation for fighting the fire, as well as all access and egress routes involving locked doors and the appropriate precautions and methods for access specified

(v) plant systems that should be managed to reduce the damage potential during a local fire and the location of local and remote controls for such management (e.g., any hydraulic or electrical systems in the area/zone covered by the specific firefighting procedure that could increase the hazards in the area because of over-pressurization or electrical hazards)

(vi) vital heat-sensitive system components that need to be kept cool while fighting a local fire, in particular, hazardous combustibles that need cooling

(vii) organization of firefighting brigades and the assignment of special duties (including command control of the brigade, transporting fire suppression and support equipment to the fire scenes, applying the extinguishing agent to the fire, communication with the control room, and coordination with outside fire departments, according to job title so that all firefighting functions are covered by any complete shift personnel complement

(viii) potential radiological and toxic hazards in fire areas/zones

(ix) ventilation system operation that ensures desired plant air distribution when the ventilation flow is modified for fire containment or smoke clearing operation

(x) operations requiring control room and shift engineer coordination or authorization

(xi) instructions for plant operators and general plant personnel during fire

(xii) communications between the fire brigade leader, fire brigade, offsite mutual aid responders, control room, and licensee's emergency response organization

Firefighting procedures identify the techniques and equipment for the use of water in fighting electrical cable fires in nuclear plants, particularly in areas containing a high concentration of electric cables with plastic insulation in accordance with NFPA 1620, “Recommended Practice for Pre-Incident Planning.”

9E.3.5.1.4 Performance Assessment/Drill Criteria

Fire brigade drills are performed so that the fire brigade can practice as a team.

Drills are performed quarterly for each shift fire brigade. Each fire brigade member should participate in at least two drills annually.

A sufficient number of these drills, but not less than one for each shift's fire brigade per year, are unannounced to determine the firefighting readiness of the plant's fire brigade, brigade leader, and fire protection systems and equipment. Persons planning and authorizing an unannounced drill ensure that the responding shift fire brigade members are not aware that a drill is being planned until it has begun. At least one drill per year is performed on a “back shift” for each shift's fire brigade.

Drills are preplanned to establish training objectives and critiqued to determine how well the training objectives have been met. Members of the management staff responsible for plant safety and fire protection should plan and critique unannounced drills. Performance deficiencies of a fire brigade or of individual fire brigade members should be remedied by scheduling additional training for the brigade or members.

Unsatisfactory drill performance should be followed by a repeat drill within 30 days.

The local fire department is invited to participate in drills at least annually.

At 3-year intervals, qualified individuals independent of STPNOC critique a randomly selected unannounced drill. Drills include the following:

(a) The effectiveness of the fire alarms, time required to notify and assemble the fire brigade, and selection, placement, and use of equipment and firefighting strategies should be assessed.

(b) Each brigade member's knowledge of his or her role in the firefighting strategy for the area assumed to contain the fire, and the brigade member's conformance with established plant firefighting procedures and use of firefighting equipment, including self-contained emergency breathing apparatus, communication, lighting, and ventilation should be assessed.

(c) The simulated use of firefighting equipment required to cope with the situation and type of fire selected for the drill should be evaluated. The area and type of fire chosen for the drill should differ from those used in the previous drills so that brigade members are trained in fighting fires in various plant areas. The situation selected should simulate the size and arrangement of a fire that could reasonably occur in the area selected, allowing for fire development during the time required to respond, obtain equipment, and organize for the fire, assuming loss of automatic suppression capability.

(d) The brigade leader's direction of the firefighting effort should be assessed with regard to thoroughness, accuracy, and effectiveness.

Drill records are retained for a period of 3 years (See Subsection 9E.1.6.4 for additional discussion on drill records.)

9E.3.5.2 Offsite Manual Firefighting Resources

9E.3.5.2.1 Capabilities

The local offsite fire departments that provide back up manual firefighting resources should have the following capabilities:

(a) Personnel and equipment with capacities consistent with those assumed in the plant's fire hazards analysis and prefire plans

(b) Hose threads or adapters to connect with onsite hydrants, hose couplings, and standpipe risers (Also see Subsection 9E.3.4.2).

9E.3.5.2.2 Training

Local offsite fire department personnel who provide back up manual firefighting resources should be trained in the following:

(a) Operational precautions when fighting fires on nuclear power plant sites and the need for radiological protection of personnel and the special hazards associated with a nuclear power plant site

(b) The procedures for notification and expected roles of the offsite responders

(c) Site access procedures and the identity (by position and title) of the individual in the onsite organization who will control the responders' support activities (offsite response support personnel should be provided with appropriate identification cards where required)

(d) Fire protection authorities, responsibilities, and accountabilities with regard to responding to a plant fire, including the fire event command structure between the plant fire brigade and offsite responders

(e) Plant layout, plant fire protection systems and equipment, plant fire hazards, and prefire response plans and procedures

9E.3.5.2.3 Agreement/Plant Exercise

STP 3 & 4 establishes written mutual aid agreements with offsite fire departments. Plant procedures delineate fire protection authorities, responsibilities, and accountabilities with regard to responding to plant fire or emergency events, including the fire event command structure between the plant fire brigade and offsite responders.

The plant fire brigade drill schedule should provide for periodic local fire department participation (at least annually). These drills should effectively exercise the fire event command structure between the plant fire brigade and offsite responders. (See Subsection 9E.3.5.1.4 for guidance on conduct and evaluation of fire brigade drills.)

9E.4 Building Design/Passive Features

This topic is discussed in Subsection 9.5.1

9E.5 Safe-Shutdown Capability

The systems required for safe shutdown are discussed in Section 7.4 and the fire protection design features for safe shutdown are discussed in detail in Subsection 9.5.1.

9E.5.1 Post-Fire Safe-Shutdown Performance Goals

This topic is discussed in Section 7.4 and Subsection 9.5.1.

9E.5.2 Cold Shutdown and Allowable Repairs

This topic is discussed in Section 19Q.6.

9E.5.3 Fire Protection of Safe-Shutdown Capability

The systems required for safe shutdown are discussed in Section 7.4 and the fire protection design features for protecting safe-shutdown capability are discussed in detail in Subsection 9.5.1.

Additionally, for Operator Manual Actions, in the event that the final as-built fire safe shutdown analysis performed to meet ITAAC 2.15.6 identifies the need for a operator manual action(s) not previously described in the DCD, then the applicable regulatory guidance associated with operator manual actions (i.e., RG 1.189, Revision 1, Fire Protection for Nuclear Power Plants, paragraph 5.3.3 Operator Manual Actions) will be utilized. In addition the guidance provided in NUREG 1852, Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire, will be utilized to demonstrate that the operator manual actions are feasible and can be reliably accomplished.

9E.5.4 Alternative and Dedicated Shutdown Capability

The remote shutdown system is described in Subsections 7.4.1.4, 9.5.1.1 and 9.5.1.1.2.

9E.5.5 Post-Fire Safe-Shutdown Procedures

Procedures for effecting safe shutdown reflect the results and conclusions of the safe-shutdown analysis. Time-critical operations for effecting safe shutdown identified in the safe-shutdown analysis and incorporated in post-fire procedures are validated.

9E.5.5.1 Safe-Shutdown Procedures

Post-fire safe-shutdown operating procedures are developed for those areas where alternative or dedicated shutdown is required.

9E.5.5.2 Alternative/Dedicated Shutdown Procedures

Procedures describe the tasks to implement alternative/dedicated shutdown capability when offsite power is available and when offsite power is not available for 72 hours.

These procedures address necessary actions to compensate for spurious actuations and high-impedance faults if such actions are identified in the Fire Hazards Analysis (Section 9A) to effect safe shutdown.

Procedures governing return to the control room following evacuation address the following conditions:

(a) The fire has been extinguished and so verified by appropriate fire protection personnel.

(b) The control room has been deemed habitable by appropriate fire protection personnel and the shift supervisor.

(c) Damage has been assessed and, if necessary, corrective action has been taken to ensure that necessary safety, control, and information systems are functional (some operators may assist with these tasks), and the shift supervisor has authorized return of plant control to the control room.

(d) Turnover procedures that ensure an orderly transfer of control from the alternative/dedicated shutdown panel to the control room have been completed.

9E.5.5.3 Repair Procedures

For the ABWR, repair procedures are not necessary to achieve safe shutdown. See discussion in Subsection 9.5.1.1.2 and Section 19Q.6.

9E.5.6 Shutdown/Low-Power Operations

The design features providing for fire protection during nonpower operation are discussed in Section 19Q ABWR Shutdown Risk Assessment.

9E.6 Fire Protection for Areas Important to Safety

The following areas were outside the scope of the ABWR Standard Plant Design and are addressed in Subsection 9.5.13.9 (COL License Information Item 9.26):

(a) Main Transformer

(b) Equipment entry lock

(c) Fire protection pumphouse

(d) Ultimate heat sink

9E.7 Protection of Special Fire Hazards Exposing Areas Important to Safety

9E.7.1 Reactor Coolant Pump Oil Collection

This topic is not applicable to the ABWR.

9E.7.2 Turbine/Generator Building

This topic is discussed in Subsection 9.5.1.

9E.7.3 Station Transformers

Fire protection for the Main Transformer was outside the scope of the ABWR Standard Plant Design and is addressed in Subsection 9.5.13.9 (COL License Information Item 9.26).

9E.7.4 Diesel Fuel Oil Storage Areas

This topic is discussed in Subsection 9.5.1.

9E.7.5 Flammable Gas Storage and Distribution

To reduce the possibility of wall penetration in the event of a container failure, care is taken to locate high-pressure gas storage containers with the long axis parallel to building walls. Acetylene-oxygen gas cylinders are not stored in areas that contain or expose equipment important to safety or the fire protection systems that serve those equipment areas.

The fire hazards associated with bulk storage of hydrogen for generator cooling is addressed in Table 2.2S-2, STP Onsite Chemical Storage and Table 2.2S-6, Onsite chemical Storage-Disposition. The bulk storage system meets the guidance of EPRI Report NP-5283-SR-A. The bulk storage system is described in Section 10.2.

9E.7.6 Nearby Facilities

An evaluation of external fire hazards including the potential for wildfires is addressed in Subsection 2.2S.3.1.4 which indicated that no special FPP provisions are required for the threat of fire or explosion from nearby facilities.

9E.8 Fire Protection for New Reactors

9E.8.1 General

9E.8.2 Enhanced Fire Protection Criteria

As discussed in Subsection 9.5.1.1.2, a principal feature of the ABWR design approach to fire protection is providing three complete divisions of safety-related cooling systems with only one division located in any single fire area. Complete burnout of any fire area without recovery will not prevent safe shutdown of the plant; therefore, complete burnout of a fire area can be tolerated (divisional separation is not practical in the case of the inerted containment, the control room and the remote shutdown panel rooms and the basis for acceptability of these areas is discussed in more detail in Subsection 9.5.1.1.2).

9E.8.3 Passive Plant Safe-Shutdown Condition

Not applicable; the ABWR is an evolutionary design with active safety features.

9E.8.4 Applicable Industry Codes and Standards

The NFPA codes and standards of record related to the design and installation of fire protection systems and features for the certified ABWR are those referenced in Section 1.8.

For the FPP of STP 3 & 4, the codes and standards of record will also be those referenced in Section 1.8 except for FPP programmatic aspects that are not addressed in the ABWR certified design. These programmatic aspects of the FPP will be in accordance with those NFPA codes and standards, listed in this Appendix, in effect 180 days before the submittal of the STP 3 & 4 COL application. In the event that a later code or standard has a programmatic aspect that cannot be practically implemented due to design or installation features of the earlier code or standard, then the earlier code or standard will apply.

9E.8.5 Other New Reactor Designs

This topic is not applicable to the ABWR.

9E.8.6 Fire Protection Program Implementation Schedule

The elements of the FPP described in this program that are necessary to protect new fuel from the adverse affects of a fire in the new fuel storage area or adjacent areas will be implemented prior to the receipt of new fuel. Other required elements of the FPP will be implemented prior to initial fuel load.

9E.8.7 Fire Protection for Nonpower Operation

The design features providing for fire protection during nonpower operation are discussed in Section 19Q.6, Fires During Maintenance.

9E.9 Fire Protection for License Renewal

Any future application for license renewal of STP 3 & 4 will be accompanied by appropriate evaluations of fire protection systems as may be required by applicable regulations.