3.0 GUIDELINES OF BTP CMEB 9.5-1

3.1 FIRE PROTECTION PROGRAM REQUIREMENTS

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a. Fire Protection Program	
A fire protection program should be established at each nuclear power plant. The program should establish the fire protection policy for the protection of structures, systems, and components important to safety at each plant and the procedures, equipment, and personnel required to implement the program at the plant site.	Comply. Refer to Section II.A of Appendix A5.7.
(1) The fire protection program should be under the direction of an individual who has been delegated authority commensurate with the responsibilities of the position and who has available staff personnel knowledgeable in both fire protection and nuclear safety.	Comply. Refer to Section II.A of Appendix A5.7.
(2) The fire protection program should extend the concept of defense-in-depth to fire protection in fire areas important to safety, with the following objectives: to prevent fires from starting; to detect rapidly, control, and extinguish promptly those fires that do occur; to provide protection for structures, systems, and components 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.	Comply. Refer to Section II.A of Appendix A5.7.

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(3) Responsibility for the overall fire protection program should be assigned to a person who has management control over all organizations involved in fire protection activities. Formulation and assurance of program implementation may be delegated to a staff composed of personnel prepared by training and experience in fire protection and personnel prepared by training and experience in nuclear plant safety to provide a balanced approach in directing the fire protection program for the nuclear power plant.	Administrative procedures identify the individual delegated the authority for establishing the fire protection program. The Fire Marshall developed the Fire Protection Administrative Procedure. He has nuclear plant safety expertise available as part of the operating department.
The staff should be responsible for:	
(a) Fire protection program requirements, including consideration of potential hazards associated with postulated fires, with knowledge of building layout and systems design.	Using the prefire plans for safety-related areas, hazards are defined, structures and system identified. The Fire Marshall (as administrator) maintains the plans.
(b) Post-fire shutdown capability.	The Shift Manager is responsible for operating safely and can order shutdown if he deems it necessary for safety per Administrative Procedures.
(c) Design, maintenance, surveillance, and quality assurance of all fire protection features (e.g., detection systems, suppression systems, barriers, dampers, doors, penetration seals, and fire brigade equipment).	Maintenance and surveillance are handled by the station Operating, Maintenance and Engineering programs and procedures. Offsite QA (Nuclear Oversight) is a separate organization. Onsite QA (Nuclear Oversight) organization provides review of maintenance, and purchase activities in accordance with the corporate QA Manual.
(d) Fire prevention activities (administrative controls and training).	The Fire Marshall and Training Department direct training per Administrative Procedures.

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(e) Fire brigade organization and training.	The Fire Marshall administers the station fire protection program (see 3.1.a(2)).
(f) Prefire planning.	Prefire plans are written for safety-related areas and are controlled by the Fire Marshall. Preplans were reviewed by a Fire Protection Engineer.
	Comply.
	1. Responsibility for the Fire Protection Program
	a. Initial Design and Construction Phase
	The fire protection system design for the EGC plants was developed by the project consulting engineer using members of his staff who were experienced in nuclear plant design.
	Exelon Generation Company is a member of Nuclear Electric Insurance Limited (NEIL) and therefore guidelines for fire protection design were provided in the NEIL Property Loss Prevention Standards for Nuclear Generating Stations.
	The building design was done by the consulting engineer. All design drawings which were pertinent to fire protection were submitted to a fire protection consultant as required by NEIL for their review and comment. The fire protection consultant was employed by NEIL and was therefore independent of EGC. The comments on design information made by the fire protection consultant were submitted to EGC for their action.
	Exelon Generation Company reviewed the project consultants' design drawings

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	and the fire protection consultants' comments. Judgments were made on a cost-benefit basis as to whether or not the fire protection features were to be incorporated into the plant. Consideration was given to the following plant features when evaluation of fire protection was made: a. plant and personnel safety, b. credibility of a fire or fire hazard, c. loss of generation because of fire loss, and d. protection of surrounding or adjacent equipment resulting from a fire. A Project Engineer who reported to the Project Engineering Manager coordinated fire protection design features at Braidwood. Likewise, a review of design and design changes was performed by a Fire Protection Engineer in the Station Support Services Department and by Independent Fire Protection Engineers working under contract to EGC. Resumes for the reviewers are in Appendix A5.1. Surveillance tests were performed by the Project Construction Department and by the Station. The Fire Protection Engineers were involved in pre-operational and surveillance tests.

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	b. Operating Phase
	Exelon Generation Company has a Fire Marshall and Fire Protection System Engineer at each nuclear plant. In addition, there are Fire Protection Engineers in the Corporate and/or Site design engineering departments.
	1. Properties and Equipment - The Fire Protection Engineers furnish information on underwriting standards, fire insurance rating standards and other information. When necessary they arrange for procuring advice from

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outside fire prevention agencies or other outside sources. When necessary, arrange and set up meetings to discuss and resolve any questions on current standards or fire protection equipment.

2. Fire Inspections - Site personnel, QA (Nuclear Oversight), and NEIL perform fire protection inspections of plant facilities.

3. Fire Fighting Equipment - The Station Fire Marshall sees that adequate fire fighting equipment is provided and that such equipment is maintained in good operating condition.

4. Tests - The Project Startup Group performs preoperational testing of new fire fighting equipment and automatic fire protection systems to ensure that each is in good condition and operating satisfactorily. During normal or routine inspections, one or more of the following tests may be made:

a. alarm tests,
b. drain tests,
c. churning of fire pumps,
d. inspecting of control valves,
e. physical testing of fire pumps and yard hydrants,

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	f. checking or testing water deluge systems, g. checking of automatic sprinkler systems, and h. testing of standpipes and hoses. 5. Contacts - The Station Fire Marshall maintains company contacts with local fire departments. The Station Fire Marshall and the Fire Protection Engineers maintain contact with fire prevention organizations, insurance companies, and others on matters relating to fire fighting. 6. Reporting Fires - Fire reports are issued by the station. The Fire Marshall reports fires as necessary to the insurance company. 7. Training of Personnel - The Station Training Department, Corporate Training Department, and Fire Marshall are responsible for personnel training. This is done to ensure that individuals trained become familiar with the operation and use of fire fighting equipment. 8. Rules and Standards - The Fire Protection Engineers assist and advise departments concerned with established rules and standards relative to fire prevention and protection as may be necessary. 9. Recommendations - On all recommendations initiated by insurance agencies, fire prevention organizations, and other outside activities or company departments, the Fire Protection Engineers investigate, evaluate, discuss, and review such recommendations, where necessary, before making final recommendations as to specific action to be taken.

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	10. Design Change - All design changes are reviewed for impact upon the Fire Protection Program per Administrative Procedures.

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	It is our opinion that the intent of the Branch Technical Position is met by the above outlined organizational structure in design, construction and operation of the EGC nuclear plants.
(4) The organizational responsibilities and lines of communication pertaining to fire protection should be defined between the various positions through the use of organizational charts and functional descriptions of each position's responsibilities. The following positions/organizations should be designated:	Administrative procedures define the organizational responsibilities and lines of communication for the Fire Protection Program.
(a) The upper level offsite management position which has management responsibility for the formulation, implementation, and assessment of the effectiveness of the nuclear plant fire protection program.	Administrative procedures identify the offsite-delegated individual responsible for the nuclear plant fire protection program. Assessment of the program is made by: a) EGC Fire Protection Engineers b) EGC QA (Nuclear Oversight)
(b) The offsite management position(s) directly responsible for formulating, implementing, and periodically assessing the effectiveness of the fire protection program for the licensee's nuclear power plant including fire drills and training conducted by the fire brigade and plant personnel. The results of these assessments should be reported to the upper level management position responsible for fire protection with recommendations for improvements or corrective actions as deemed necessary.	Nuclear Oversight and EGC Fire Protection Engineers have these responsibilities.

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(c)	The onsite management position responsible for the overall administration of the plant operations and emergency plans which include the fire protection and prevention program and which provide a single point of control and contact for all contingencies.	Administrative Procedures identify the onsite-delegated individual responsible for the overall administration of the plant operations and emergency plans.
(d)	The onsite position(s) which:	
	i. Implements periodic inspections to: minimize the amount of combustibles in safety-related areas; determine the effectiveness of housekeeping practices; assure the availability and acceptable condition of all fire protection systems/equipment, emergency breathing apparatus, emergency lighting, communication equipment, fire stops, penetration seals, and fire retardant coatings; and assures the prompt and effective corrective actions are taken to correct conditions adverse to fire protection and preclude their recurrence.	Administrative Procedures require the Fire Marshall to conduct periodic plant tours, identify unacceptable conditions and initiate corrective actions. Administrative Procedures state the Fire Marshall is responsible for implementation and administration of the fire protection program. Administrative Procedures state the Radiation Protection department will control and maintain emergency breathing apparatus. Administrative Procedures state Electrical Maintenance will maintain emergency lighting and communications. Fire barriers, seals, and doors are inspected per the appropriate operating, maintenance, and engineering surveillance. Administrative Procedures state the Fire Marshall will investigate fires, evaluate prevention recommendations and make recommendations when needed.
	ii. Is responsible for the fire fighting training for operating plant personnel and the plant's fire brigade; design and selection of equipment; periodic	Fire brigade training is a responsibility of both the Fire Marshall and the training department per Administrative Procedures. Operating personnel are trained periodically through the Training Department on fire fighting.

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	Inspection and testing of fire protection systems and equipment in accordance with established procedures, and evaluate test results and determine the accept-ability of the systems under test.	The Operating Manager ensures all operating surveillances are done in accordance to required guides. The Maintenance, Engineering, and Operating Managers are responsible for station procedures performed by their department. The Fire Marshall will review the surveillances he deems necessary. Evaluation of tests and surveillances are specified in test, surveillance and administrative procedures. The Fire Marshall is responsible for the purchase of fire brigade equipment.
iii.	Assists in the critique of all fire drills to determine how well the training objectives have been met.	Critique of all fire drills is a responsibility of the Fire Marshall per Administrative Procedures.
iv.	Reviews and evaluates proposed work activities to identify potential transient fire loads.	The Fire Marshall will have these responsibilities.
v.	Implements a program for indoctrination of all plant contractor personnel in appropriate administrative	Contractor's training through NGET fulfills this requirement. They are informed of emergency procedures relative to fire protection.

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	Procedures which implement the fire protection program, and the emergency procedures relative to fire protection.	
vi.	Implements a program for instruction of personnel on the proper handling of accidental events such as leaks or spills of flammable materials that are related to fire protection.	The procedure for instruction of personnel on the proper handling of oil spills is identified in Administrative Procedure for the "Control and Cleanup of Oil Spills." The procedure references corporate general instruction on spill prevention and countermeasures.
(e)	The onsite position responsible for fire protection quality assurance. This position should be responsible for assuring the effective implementation or the fire protection program by planned inspections, scheduled audits, and verification that the results of these inspections or audits are promptly reported to cognizant management personnel.	The Fire Protection Program Administrative Procedure identifies that Fire Protection Activities are treated as augmented quality per the QA program. Site/Offsite QA (Nuclear Oversight) Department personnel conduct audits and surveillances to ensure proper implementation and administration of the Fire Protection Program.
(f)	The positions which are part of the plant fire brigade:	
i.	The plant fire brigade positions should be responsible for fighting fires. The authority and responsibility of each fire brigade position relative to fire	The Fire Protection Program Administrative Procedure defines the Fire Chief and Brigade responsibilities and meets the requirements for authority and duties.

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	Protection should be clearly defined.	
	ii. The responsibilities of each fire brigade position should correspond with the actions required by the fire fighting procedures.	
	iii. The responsibilities of the fire brigade members under normal plant conditions should not conflict with their responsibilities during a fire emergency.	Administrative Procedures state that training will be scheduled through the Fire Marshall and Operating Department. The procedure specifies personnel (non-brigade) required for emergency operation.
	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 the most significant fire. The size of the fire brigade should be based upon the functions required to fight fires with adequate allowance for injuries.	Braidwood complies with BTP CMEB 9.5-1 paragraph 3.3.b. and Appendix R III.H. which requires a 5-member brigade.
	v. The recommendations for organization, training, and equipment of "Private Fire Brigades" as specified in NFPA No. 27-1975, including the applicable NFPA publications listed in the appendix to NFPA No. 27, are considered appropriate criteria for organization, training, and	See Table 3-1 for discussion of conformance with NFPA 27.

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operating a plant fire brigade.	
(5) Personnel Qualifications	Comply.
(a) The position responsible for formulation and implementation of the fire protection program should have within his organization or as a consultant a fire protection engineer who is a graduate of an engineering curriculum of accepted standing and shall have completed not less than 6 years of engineering attainment indicative of growth in engineering competency and achievement, 3 years of which shall have been in responsible charge of fire protection engineering work. These requirements are the eligibility requirements as a Member in the Society of Fire Protection Engineers.	The position responsible for the fire protection program has the use of a Fire Protection Consultant. These Consultants meet SFPE member grade requirements. Exelon Generation Company also employs Fire Protection Engineers who meet the qualification for member grade in SFPE. (The EGC Fire Protection Engineer's duties are identified in the Fire Protection Program administrative procedure.)
(b) The fire brigade members' qualifications should include satisfactory completion of a physical examination for performing strenuous activity, and of the fire brigade training described in Position C.3.d.	The fire brigade members have an annual physical which shows them capable of unrestricted activity.
(c) The personnel responsible for the maintenance and testing of the fire protection systems should be qualified by training and experience for such work.	The personnel responsible for maintenance and testing of the fire protection systems receive training scheduled by the training department.
(d) The personnel responsible for the training of the fire brigade should be qualified by training and experience for such work.	The training of the fire brigade is conducted by a qualified member of the EGC Training Department. State-certified members of the EGC Fire Marshall's staff monitor this training.

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(6) The following NFPA publications should be used for guidance to develop the fire protection program: No. 4 - "Organization for Fire Services" No. 4A - "Organization of a Fire Department" No. 6 - "Industrial Fire Loss Prevention" No. 7 - "Management of Fire Emergencies" No. 8 - "Management Responsibilities for Effects of Fire on Operations" No. 27 - "Private Fire Brigades"	The administrative procedures needed for maintaining the performance of the fire protection system and personnel were established with the guidance of the NFPA standard available at the time. See Table 3-1 for discussion of conformance with the listed NFPA publications.
(7) On sites where there is an operating reactor and construction or modification of other units is underway, the superintendent of the operating plant should have the lead responsibility for site fire protection.	Comply. Administrative procedures define this as a duty of the station manager.
b. Fire Hazards Analysis	
The fire hazards analysis should demonstrate that the plant will maintain the ability to perform safe shutdown functions and minimize radioactive releases to the environment in the event of a fire.	Comply. The overall fire protection program is based on evaluation of fire hazards so a safe shutdown can be accomplished. The fire protection program began with the protection of specific hazards in mind, to minimize, or prevent the loss of property. The main emphasis is now placed on safe plant shutdown, but the protection of ALL hazards will satisfy both reasons. Not ALL hazards are protected or separated as indicated in other sections of the report, but the basis for the fire protection program basically complies.
The fire hazards analysis should be performed by qualified fire protection and reactor systems engineers to (1) consider potential in situ and transient fire hazards; (2) determine the consequences of fire in any location in the plant on the ability to safely shut down the reactor or on the ability to minimize and control the release of radioactivity to the environment; and (3) specify	Fire hazards were considered in plant design for Braidwood Units 1 and 2. The cable separation criteria for the plant is described in Appendix 5.2 of

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	measures for fire prevention, fire detection, fire suppression, and fire containment and alternative shutdown capability as required for each fire area containing structures, systems, and components important to safety that are in conformance with NRC guidelines and regulations.	this report. The fire protection system is discussed in Appendix 5.4. Deviations from the compliance criteria of 10 CFR 50 Appendix R are listed and justified in Appendix A5.7.
	"Worst case" fires need not be postulated to be simultaneous with nonfire-related failures in safety systems, plant accidents, or the most severe natural phenomena.	
	On multiple-reactor sites, unrelated fires in two or more units need not be postulated to occur simultaneously. Fires involving facilities shared between units and fires due to man-made site-related events that have a reasonable probability of occurring and affecting more than one reactor unit (such as an aircraft crash) should be considered.	Comply. A fire involving more than one reactor unit was not postulated except for facilities shared between units.
	Because fire may affect safe shutdown systems and because the loss of function of systems used to mitigate the consequences of design basis accidents under post-fire conditions does not per se impact public safety, the need to limit fire damage to systems required to achieve and maintain safe shutdown conditions is greater than the need to limit fire damage to those systems required to mitigate the consequences of design basis accidents. Three levels of fire damage limits are established according to the safety function of the structure, system, or component:	The criteria used to demonstrate safe shutdown capability are consistent with these requirements.

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Safety Function	Fire Damage Limits	
Hot Shutdown	One train of equipment necessary to achieve hot shutdown from either the control room or emergency control station(s) must be maintained free of fire damage by a single fire, including an exposure fire.	
Cold Shutdown	Both trains of equipment necessary to achieve cold shutdown may be damaged by a single fire, including an exposure fire, but damage must be limited so that at least one train can be repaired or made operable within 72 hours using onsite capability.	
Design Basis Accidents	Both trains of equipment necessary for mitigation of consequences following design basis accidents may be damaged by a single exposure fire.	

The most stringent fire damage limit should apply for those systems that fall into more than one category. Redundant systems used to mitigate the consequences of other design basis accidents but not necessary for safe shutdown may be lost to a single

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	exposure fire. However, protection shall be provided so that a fire within only one such system will not damage the redundant system.	
	The fire hazards analysis should separately identify hazards and provide appropriate protection in locations where safety-related losses can occur as a result of:	Sections 2.3 and 2.4 basically provide for each fire zone in the plant the relevant information from this list applicable to each zone.
	(1) Concentrations of combustible contents, including transient fire loads due to combustibles expected to be used in normal operations such as refueling, maintenance, and modifications;	
	(2) Continuity of combustible contents, furnishings, building materials, or combinations thereof in configurations conducive to fire spread;	
	(3) Exposure fire, heat, smoke, or water exposure, including those that may necessitate evacuation from areas that are required to be attended for safe shutdown;	
	(4) Fire in control rooms or other locations having critical safety-related functions;	
	(5) Lack of adequate access or smoke removal facilities that impede fire extinguishment in safety-related areas;	
	(6) Lack of explosion-prevention measures;	
	(7) Loss of electric power or control circuits;	

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(8) Inadvertent operation of fire suppression systems.	Inadvertent operation of fire suppression systems has no adverse impact on safe shutdown capability as described in EC 341981 and EC 371447.
The fire hazards analysis should verify that the NRC fire protection program guidelines have been met. The analysis should list applicable elements of the program, with explanatory statements as needed to identify location, type of system, and design criteria. The analysis should identify and justify any deviations from the regulatory guidelines. Justification for deviations from the regulatory guidelines should show that an equivalent level of protection will be achieved. Deletion of a protective feature without compensating alternative protection measures will not be acceptable, unless it is clearly demonstrated that the protective measure is not needed because of the design and arrangement of the particular plant.	
c. Fire Suppression System Design Basis	
(1) Total reliance should not be placed on a single fire suppression system. Appropriate backup fire suppression capability should be provided.	Comply. Backup fire suppression equipment is provided in the form of manual hose stations and portable extinguishers at locations near where automatic fire suppression systems are installed as well as at other locations throughout the plant.
(2) A single active failure or a crack in a moderate-energy line (pipe) in the fire suppression system should not impair both the primary and backup fire suppression capability. For example, neither the failure of a fire	The primary supply of fire protection water at each station is described in Appendix 5.4. Cracks in the fire protection piping will not impair primary suppression system performance or availability of

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	pump, its power supply or controls, nor a crack in a moderate-energy line in the fire suppression system, should result in loss of function of both sprinkler and hose standpipe systems in an area protected by such primary and backup systems.	the backup hose stations. Non-safety-related portions of the fire protection system can be isolated from the safety-related portions by manual isolation valves. Loss of a main fire pump is considered in the design of the system. The SX system is also available as a backup for the hose stations.
(3)	As a minimum, the fire suppression system should be capable of delivering water to manual hose stations located within hose reach of areas containing equipment required for safe plant shutdown following the safe shutdown earthquake (SSE). In areas of high seismic activity, the staff will consider on a case-by-case basis the need to design the fire detection and suppression systems to be functional following the SSE.	Comply. See Section A5.4.1. Cross-ties to the essential service water system are provided to ensure seismically qualified water supply to the Seismic Category I portions of the fire suppression (standpipe systems) located in safety-related areas.
(4)	The fire protection systems should retain their original design capability for (a) natural phenomena of less severity and greater frequency than the most severe natural phenomena (approximately once in 10 years) such as tornadoes, hurricanes, floods, ice storms, or small-intensity earthquakes that are characteristic of the geographic region, and (b) potential man-made site-related events such as oil barge collisions or aircraft crashes that have a reasonable probability of occurring at a specific plant site. The effects of lightning strikes should be included in the overall plant fire protection program.	Comply. Seismic design is considered in the whole FP system; however, only the Category I portions are designated seismic. Floods have no effect. A single tornado missile can do no more damage than as described in 3.1c2.
(5)	The consequences of inadvertent operation of or a crack in a moderate-energy line in the fire suppression system should meet	Comply.

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the guidelines specified for moderate-energy systems outside containment in SRP Section 3.6.1.	
d. Alternate or Dedicated Shutdown	
Alternative or dedicated shutdown capability should be provided where the protection of systems whose functions are required for safe shutdown is not provided by established fire suppression methods or by Position C.5.6.	Comply. Refer to Section 2.4 "Safe Shutdown Analysis." Exemptions from 10 CFR 50 Appendix R Sections III.G and III.L are listed in Appendix A5.7.
e. Implementation of Fire Protection Programs	
(1) The fire protection program (plans, personnel, and equipment) for buildings storing new reactor fuel and for adjacent fire areas that could affect the fuel storage area should be fully operational before fuel is received at the site. Such adjacent areas include those whose flames, hot gases, and fire-generated toxic and corrosive products may jeopardize safety and surveillance of the stored fuel.	Comply. Fire brigade, and specific hose reels and fire extinguishers were functional prior to receiving fuel. Training records and surveillance were being conducted for receipt of fuel. Pre-fire plans were in place for the fuel handling building and the adjacent fire areas. The fire brigade members were trained prior to receiving fuel on site. Fire detection was operable in the Fuel Handling Building prior to receipt of fuel on site.
(2) The fire protection program for an entire reactor unit should be fully operational prior to initial fuel loading in that reactor unit.	Comply.
(3) On reactor sites where there is an operating reactor and construction or modification of other units is under way, the fire protection program should provide for continuing evaluation of fire hazards. Additional fire barriers, fire protection capability, and administrative controls should be provided as necessary to protect the	Comply. The continuing evaluation of fire hazards is accomplished by periodic inspections as specified in BWAP 1100-18 Station Housekeeping/Equipment Preservation Procedure. Administrative control to protect the operating unit from construction fire hazards is accomplished by adhering to

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operating unit from construction fire hazards.	administrative procedures for the "Breaching of Fire Barriers, Fire Penetrations, Fire Dampers, Fire Doors and Fire Floor Plugs."

3.2 ADMINISTRATIVE CONTROLS

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	Administrative controls should be used to maintain the performance of the fire protection system and personnel. These controls should establish procedures to:	Administrative controls which will be in effect will comply with the requirements of this section.
a.	Prohibit bulk storage of combustible materials inside or adjacent to safety-related buildings or systems during operation or maintenance periods. Regulatory Guide 1.39 provides guidance on housekeeping, including the disposal of combustible materials.	Comply. Refer to Section III.K.2 of Appendix A5.7.
b.	Govern the handling and limitation of the use of ordinary combustible materials, combustible and flammable gases and liquids, high efficiency particulate air and charcoal filters, dry ion exchange resins, or other combustible supplies in safety-related areas.	Comply. Refer to Section III.K.1 of Appendix A5.7.
c.	Govern the handling of and limit transient fire loads such as combustible and flammable liquids, wood and plastic products, or other combustible materials in buildings containing safety-related systems or equipment during all phases of operating, and especially during maintenance, modification, or refueling operations.	Comply. Refer to Section III.K.3 of Appendix A5.7.
d.	Designate the onsite staff member responsible for the inplant fire protection review of proposed work activities to identify potential transient fire hazards and specify required additional fire protection in the work activity procedure.	Comply. Refer to Section III.K.4 of Appendix A5.7.

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e.	Govern the use of ignition sources by use of flame permit system to control welding, flame cutting, brazing, or soldering operations. A separate permit should be 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.	Comply. Refer to Section III.K.5 of Appendix A5.7.
f.	Control the removal from the area of all waste, debris, scrap, oil spills, or other combustibles resulting from the work activity immediately following completion of the activity, or at the end of each work shift, whichever comes first.	Comply. Refer to Section III.K.6 of Appendix A5.7.
g.	Govern leak testing; similar procedures such as airflow determination should use one of the commercially available techniques. Open flames or combustion-generated smoke should not be permitted.	Comply. Leak testing is done with noncombustible materials.
h.	Maintain the periodic housekeeping inspections to ensure continued compliance with these administrative controls.	Comply. Refer to Section III.K.7 of Appendix A5.7.
i.	Control the use of specific combustibles in safety-related areas. All wood used in safety-related areas during maintenance, modification, or refueling operation (such as lay-down blocks or scaffolding) should be treated with a flame retardant. Equipment or supplies (such as new fuel) shipped in untreated combustible packing containers may be unpacked in safety-related areas if required for valid operating reasons. However, all	Comply with exceptions. Refer to Section III.K.8 of Appendix A5.7 for details.

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combustible materials should be removed from the area immediately following unpacking. Such transient combustible material, unless stored in approved containers, should not be left unattended during lunch breaks, shift changes, or other similar periods. Loose combustible packing materials such as wood or paper excelsior, or polyethylene sheeting should be placed in metal containers with tight-fitting self-closing metal covers.	
j. Disarming of fire detection or fire suppression systems should be controlled by a permit system. Fire watches should be established in areas where systems are so disarmed.	Comply. Disarming of fire detection or fire suppression systems is controlled by administrative procedure. Compensatory measures are established as required by the governing procedure.
k. Successful fire protection requires testing and maintenance of the fire protection equipment and the emergency lighting and communication. 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	Comply. The scope of the job classification for maintenance personnel identifies job responsibilities in the area of fire protection. An administrative procedure for "Fire Protection Impairment," provides instructions in the use of fire protection impairment permit cards in the event a fire protection component is taken out of service. The surveillance program (Test Plan) contains the types, frequency, and detailed procedures for testing.

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watches or temporary hose connections to water systems.	
l. Control actions to be taken by an individual discovering a fire, for example, notification of control room, attempt to extinguish fire, and actuation of local fire suppression systems.	Comply. Refer to Section III.K.9 of Appendix A5.7.
m. Control actions to be taken by the control room operator to determine the need for brigade assistance upon report of a fire or receipt of alarm on control room annunciator panel, for example, announcing location of fire over PA system, sounding fire alarms, and notifying the shift supervisor and the fire brigade leader of the type, size, and location of the fire.	Comply. Refer to Section III.K.10 of Appendix A5.7.
n. Control actions to be taken by the fire brigade after notification by the control room operator of a fire, for example, assembling in a designated location, receiving directions from the fire brigade leader, and discharging specific fire fighting responsibilities, including selection and transportation of fire fighting equipment to 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.	Comply. Refer to Section III.K.11 of Appendix A5.7.
o. Define the strategies for fighting fires in all safety-related areas and areas presenting a hazard to safety-related equipment. These strategies should designate:	Pre-fire plans have been developed for Braidwood which generally meet these guidelines. Refer to Appendix A5.7, Section K.12 for a detailed discussion of these plans and their conformance to these requirements.

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	(1) Fire hazards in each area covered by the specific prefire plans.	
	(2) Fire extinguishants best suited for controlling the fires associated with the fire hazards in that area and the nearest location of these extinguishants.	
	(3) Most favorable direction from which to attack a fire in each area in view of the ventilation direction, access hallways, stairs, and doors that are most likely to be free of fire, and the best station or elevation for fighting the fire. All access and egress routes that involve locked doors should be specifically identified in the procedure with the appropriate precautions and methods for access specified.	
	(4) 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 zone covered by the specific fire fighting procedure that could increase the hazards in the area because of overpressurization or electrical hazards).	
	(5) Vital heat-sensitive system components that need to be kept cool while fighting a local fire. Particularly hazardous combustibles that need cooling should be designated.	

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(6)	Organization of fire fighting brigades and the assignment of special duties according to job title so that all fire fighting functions are covered by any complete shift personnel complement. These duties include command control of the brigade, transporting fire suppression and support equipment to the fire scenes, applying the extinguishant to the fire, communication with the control room, and coordination with outside fire departments.	
(7)	Potential radiological and toxic hazards in fire zones.	
(8)	Ventilation system operation that ensures desired plant air distribution when the ventilation flow is modified for fire containment or smoke clearing operation.	
(9)	Operations requiring control room and shift engineer coordination or authorization.	
(10)	Instructions for plant operators and general plant personnel during fire.	

3.3 FIRE BRIGADE

SECTION	NRC POSITION	IMPLEMENTATION OR JUSTIFICATION FOR NONCOMPLIANCE
a.	The need for good organization, training, and equipping of fire brigades at nuclear power plant sites requires that effective measures be implemented to ensure proper discharge of these functions. The guidance in Regulatory Guide 1.101, "Emergency Planning for Nuclear Power Plants," should be followed as applicable.	The guidelines of Regulatory Guide 1.101 are followed where applicable. Insurance industry standards in existence at the time and NFPA 27 - "Private Fire Brigades" - were consulted in writing the procedures. The administrative procedure governing the fire protection program outlines the organization, training, and equipping of fire brigades.
b.	A site fire brigade trained and equipped for fire fighting should be established to ensure adequate manual fire fighting capability for all areas of the plant containing structures, systems, or components important to safety. The fire brigade should be at least five members on each shift. The brigade leader and at least two brigade members should have sufficient training in or knowledge of plant safety-related systems to understand the effects of fire and fire suppressants on safe shutdown capability. The qualification of fire brigade members should include an annual physical examination to determine their ability to perform strenuous fire fighting activities. The shift supervisor should not be a member of the fire brigade. The brigade leader shall be competent to assess the potential safety consequences of a fire and advise control room personnel. Such competence by the brigade leader may be evidenced by possession of an operator's license or equivalent knowledge of plant safety-related systems.	Comply, except as noted. Refer to Section III.H of Appendix A5.7 for details.

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c.	The minimum equipment provided for the brigade should consist of personal protective equipment such as turnout coats, boots, gloves, hard hats, emergency communications equipment, portable lights, portable ventilation equipment, and portable extinguishers. 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. At least 10 masks shall 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 shall be a minimum of one-half hour for the self-contained units.	Comply. Refer to Section III.H of Appendix A5.7 for details.
	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 shall be used; compressors shall be operable assuming a loss of offsite power. Special care must be taken to locate the compressor in areas free of dust and contaminants.	Comply. Refer to Section III.H of Appendix A5.7.
d.	The fire brigade training program shall ensure that the capability to fight potential fires is	The fire brigade training program meets the requirements presented in items 1 through 9 herein. Refer to

SECTION	NRC POSITION	IMPLEMENTATION OR JUSTIFICATION FOR NONCOMPLIANCE
	established and maintained. The program shall consist of an initial classroom instruction program followed by periodic classroom instruction, fire fighting practice, and fire drills.	Section III.I of Appendix A5.7 for a discussion of conformance with the requirements of items 1 through 8 below.
	(1) The initial classroom instruction should include:	
	(a) Indoctrination of the plant fire fighting 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 inplant.	
	(c) The toxic and corrosive characteristics of expected products of combustion.	
	(d) Identification of the location of fire fighting 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 fire fighting equipment and the correct method of fighting each type of fire. The types of fires covered should include fires in energized electrical equipment, fires in	

SECTION NRC POSITION	IMPLEMENTATION OR JUSTIFICATION FOR NONCOMPLIANCE
cables and cable trays, hydrogen fires, fires involving flammable and combustible liquids or hazardous process chemicals, fires resulting from construction or modification (welding), and 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 fire fighting activities (fire brigade leaders only).	
(i) Detailed review of fire fighting strategies and procedures.	
(j) Review of the latest plant modifications and corresponding changes in fire fighting plans.	
(k) Training of the plant fire brigade should be coordinated with the local fire department so that responsibilities and duties are delineated in advance. This coordination should be part of the training course and should be included in the training of the	Comply with items k and l. The local fire department is included periodically in the station fire drills, which require them coming into the plant boundary. The local fire department has been trained in operational precaution and the need for radioactive protection of personnel in fighting fires in a nuclear power plant. It is clearly understood by the local fire department that they are a reserve force only and that they

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	Local fire department staff.	will be under the direction of the station Fire Marshall or Chief at the station.
	(l) Local fire departments should be provided training in operational precautions when fighting fires on nuclear power plant sites and should be made aware of the need for radiological protection of personnel and the special hazards associated with a nuclear power plant site. Note: Items (i) and (j) may be deleted from the training of no more than two of the non-operations personnel who may be assigned to the fire brigade.	
	(2) The instruction should be provided by qualified individuals who are known ledgeable, experienced, and suitably trained in fighting the types of fires that could occur in the plant and in using the types of equipment available in the nuclear power plant.	Comply. Refer to Section III.I.1.b of Appendix A5.7.
	(3) Instruction should be provided to all fire brigade members and fire brigade leaders.	
	(4) Regular planned meetings should be held at least every 3 months for all brigade members to review changes in the fire protection program and other subjects as necessary.	Comply. Refer to Section III.I.1.d of Appendix A5.7.

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(5) Periodic refresher training sessions shall be held to repeat the classroom instruction program for all brigade members over a 2-year period. These sessions may be concurrent with the regular planned meetings.	Comply. Refer to Section III.I.1.e of Appendix A5.7.
(6) Practice	
(a) Practice sessions should be held for each shift fire brigade on the proper method of fighting the various types of fires that could occur in a nuclear power plant. These sessions shall provide brigade members with experience in actual fire extinguishment and the use of emergency breathing apparatus under strenuous conditions encountered in fire fighting.	Comply. Refer to Section III.I.2 of Appendix A5.7.
(b) These practice sessions should be provided at least once per year for each fire brigade member.	
(7) Drills	
(a) Fire brigade drills should be performed in the plant so that the fire brigade can practice as a team.	Items 7a through 7f are accomplished by administrative procedure. The type of drills and assessment of drills are documented on the Station Fire Drill record. Refer to Section III.I.3 of Appendix A5.7 for details.
(b) Drills should be performed at regular intervals not to exceed 3 months for each shift fire brigade. Each	

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fire brigade member should participate in each drill, but must participate in at least two drills per year. A sufficient number of these drills, but not less than one for each shift fire brigade per year, should be unannounced to determine the fire fighting readiness of the plant fire brigade, brigade leader, and fire protection systems and equipment. Persons planning and authorizing an unannounced drill should ensure that the responding shift fire brigade members are not aware that a drill is being planned until it is begun. Unannounced drills should not be scheduled closer than 4 weeks. At least one drill per year should be performed on a "back shift" for each shift fire brigade.	
(c) The drills should be preplanned to establish the training objectives of the drill and should be critiqued to determine how well the training objectives have been met. Unannounced drills should be planned and critiqued by members of the management staff responsible for plant	

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safety and fire protection. 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.	
(d) These drills should provide for local fire department participation periodically (at least annually).	
(e) At 3-year intervals, a randomly selected unannounced drill should be critiqued by qualified individuals independent of the licensee's staff. A copy of the written report from such individuals should be available for NRC review.	
(f) Drills should as a minimum include the following:	
i. Assessment of fire alarm effectiveness, time required to notify and assemble fire brigade, and selection, placement, and use of equipment and fire fighting strategies.	

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ii. Assessment of each brigade member's knowledge of his or her role in the fire fighting strategy for the area assumed to contain the fire. Assessment of the brigade members' conformance with established plant fire fighting procedures and use of fire fighting equipment, including self-contained emergency breathing apparatus, communication equipment, and ventilation equipment, to the extent practicable.	
iii. The simulated use of fire fighting equipment required to cope with the situation and type of fire selected for the drill. The area and type of fire chosen for the drill should 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	

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	in the area selected, allowing for fire development due to the time required to respond, to obtain equipment, and organize for the fire, assuming loss of automatic suppression capability.	
	iv. Assessment of brigade leader's direction of the fire fighting effort as to thoroughness, accuracy, and effectiveness.	
(8)	Records Individual records of training provided to each fire brigade member, including drill critiques, should be maintained for at least 3 years to ensure that each member receives training in all parts of the training program. These records of training should be available for NRC review. Retraining or broadened training for fire fighting within buildings should be scheduled for all those brigade members whose performance records show deficiencies.	Comply. Refer to Section III.I.4 of Appendix A5.7.
(9)	Guidance Documents NFPA 27, "Private Fire Brigade," should be followed in organization, training, and fire drills. This standard also is applicable for	Comply. Fire training by responsible instructors is done periodically. See Table 3-1 for delineation of conformance with NFPA 27 and NFPA 197.

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	the inspection and maintenance of fire fighting equipment. Among the standards referenced in this document, NFPA 197, "Training Standard on Initial Fire Attacks," should be utilized as applicable. NFPA booklets and pamphlets listed in NFPA 27 may be used as applicable for training references. In addition, courses in fire prevention and fire suppression that are recognized or sponsored by the fire protection industry should be utilized.	The local fire department has been checked for fire hose thread compatibility and a letter is on file to document compatibility. The letter is in Braidwood QA file No. 62.9.

3.4 QUALITY ASSURANCE PROGRAM

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The quality assurance (QA) programs of applicants and contractors should ensure that the guidelines for design, procurement, installation, and testing and the administrative controls for the fire protection systems for safety-related areas are satisfied. The QA program should be under the management control of the QA organiza-tion. This control consists of (1) formulating a fire protection QA program that incorporates suitable requirements and is acceptable to the management responsible for fire pro-tection or verifying that the program incorporates suitable requirements and is acceptable to the management responsible for fire protection, and (2) verifying the effectiveness of the QA program for fire protection through review, surveillance, and audits. Performance of other QA program func-tions for meeting the fire protection program requirements may be performed by personnel outside of the QA organi-zation. The QA program for fire protection should be part of the overall plant QA program. It should satisfy the specific criteria listed below.	The fire protection systems at Byron/Braidwood Stations Units 1 and 2 are addressed in two different manners under the Quality Assurance Program. 1. Fire protection systems classed as safety-related are covered by the entire Quality Assurance Program which includes the cri-teria set forth in Appendix B of 10 CFR 50. 2. Fire protection systems that are classed as non-safety-related and that are awarded after September 1, 1978 are procured and in-stalled in accordance with the Branch Technical Position 9.5-1. Vendors awarded with supplying or installing a fire protection system after September 1, 1978 must have an approved QA Program as required by the Quality Assurance Program and be on the Approved Bidder's List. However, exceptions may be made for selected non-safety-related systems to allow installation without an approved QA program. Each installation of this type requires a separate analysis that includes, as a minimum, a regulatory change evaluation; a definable augmented quality class break point, such as an isolation valve; and a hydraulic evaluation for added sprinklers or fire hose stations, as applicable. The applicable fire and building codes (such as NFPA codes) will be followed and a fire protection engineer will review the change.

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	Scheduled fire protection inspections are conducted under the direction of QA (Nuclear Oversight) with direct participation by a qualified fire protection engineer consultant. New designs or revisions to plant fire protection systems are reviewed as outlined in the response to Section 3.1. The Quality Assurance Program applies to procurement, design, installation, modifications and maintenance activities involving fire protection systems. As such, each specific criteria listed as "a" through "j" of Section NRC Position are covered by the Quality Assurance Program and by Department and Station Procedures. Further implementation

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	relating to specific criteria, where deemed appropriate, follow:
a. Design and Procurement Document Control Measures should be established to ensure that the guidelines of the regulatory position of this guide are included in design and procurement documents and that deviations therefrom are controlled.	
b. Instructions, Procedures, and Drawings Inspections, tests, administrative controls, fire drills, and training that govern the fire protection program should be prescribed by documented instructions, procedures, or drawings and should be accomplished in accordance with these documents.	b. Department and station procedures are established to cover specific instructions such as for inspections, tests, administrative controls, fire drills and training that govern the fire protection program.
c. Control of Purchased Material, Equipment, and Services Measures should be established to ensure that purchased material, equipment, and services conform to the procurement documents.	c. Carbon dioxide (CO_2) is controlled as a non-safety-related item per Material Engineering Group Evaluation M-94-0585-00.
d. 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 and test procedures for accomplishing the activities.	d. Independent inspections are performed by Quality Assurance (Nuclear Oversight), utilizing fire protection consultants as required.
e. Test and Test Control A test program should be established and implemented to ensure	e. Tests of fire protection equipment and systems are included in regularly scheduled station operating surveillance

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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.	procedures. These procedures and test results are reviewed and evaluated by appropriate station personnel. QA (Nuclear Oversight) also audits this area.
f. Inspection, Test, and Operating Status Measures should be established to provide for the identification of items that have satisfactorily passed required tests and inspections.	
g. Nonconforming Items Measures should be established to control items that do not conform to specified requirements to prevent inadvertent use or installation.	
h. Corrective Action Measures should be established to ensure that conditions adverse to fire protection, such as failures, malfunctions, deficiencies, deviations, defective components, uncontrolled combustible material and nonconformances, are promptly identified, reported, and corrected.	h. Tests of fire protection equipment and systems are included in regularly scheduled operating surveillance procedures. Nonconforming equipment is identified as a result of their test and corrective action taken to rectify any deficiencies as provided by the QA Program.
i. 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.	i. Documentation involving the fire protection program is retained in a central file or QA vault as provided by the QA Program.

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j. 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.	j. Scheduled audits and surveillances of the fire protection activities in our plants are performed in accordance with the QA Program by the Nuclear Oversight Department. SITE QUALITY ASSURANCE The fire protection program is covered by the Quality Assurance Program. Fire protection activities are subject to audit under the applicable portions of the approved QA program to ensure proper implementation and compliance with commitments, which is described in QA topical report (QATR) CE-1-A.

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FIRE PROTECTION AUDIT CRITERIA

Quality Assurance can use, but is not limited to, the following documents as audit reference material:

1. Station Fire Protection Report
2. Station responses to the Branch Technical Position 9.5-1
3. Station SER and Supplements

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	4. Technical Specifications 5. Station Fire Protection Procedures 6. QATR 7. NFPA Codes 8. Applicable sections of 10 CFR 50 App. R 9. 29 CFR 1910.155 to 165

3.5 GENERAL PLANT GUIDELINES

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a. Building Design	The fire area concept, as it relates to reactor safety, was not a requirement in the initial design of Byron/Braidwood Stations Units 1 and 2. As implied in the Branch Technical Position and as stated in Section 4.3.4.4 of NUREG-0050, "Recommendation Related to Browns Ferry Fire," the fire area concept is impractical to implement to any great extent to plants already under construction. The original plant design did incorporate a fire hazard separation in accordance with insurance industry standards for nuclear power plants. In areas where redundant safety-related systems could not be separated from each other by a barrier, an analysis was conducted to determine if both ESF divisions could be adversely affected by a single postulated credible fire. These areas are identified in Section 2.3. Deviations from the Appendix R separation criteria are identified and justified in Appendix A5.7.
(1) Fire barriers with a minimum fire resistance rating of 3 hours should be provided to: (a) Separate safety-related systems from any potential fires in non-safety-related areas that could affect their ability to perform their safety function; (b) Separate redundant divisions or trains of safety-related systems from each other so that both are not subject to damage from a single fire; (c) Separate individual units on a multiple-unit site unless the requirements of General Design Criterion 5 are met with respect to fires.	
(2) Appropriate fire barriers should be provided within a single safety division to separate components that present a fire hazard to other safety-related components or high concentrations of safety-related cables within that division.	The general separation criteria used for Byron/Braidwood Units 1 and 2 are described in Appendix 5.2 of this report. In general, safety-related systems are isolated from unacceptable fire hazards as discussed in Section 2.3.
(3) Openings through fire barriers for pipe, conduit, and cable trays which separate fire areas should be sealed or closed to provide a fire resistance rating at least equal to that required of the barrier itself. Openings inside conduit larger than 4 inches in diameter should be sealed at the fire barrier penetration. Openings inside	Electrical penetration seals have been installed at all barrier penetrations; their construction characteristics are described in Appendix 5.2. Mechanical penetration seals have been installed in all penetrations of rated fire barriers. All openings inside conduits which penetrate fire barriers which separate fire areas

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	conduit 4 inches or less in diameter should be sealed at the fire barrier unless the conduit extends at least 5 feet on each side of the fire barrier and is sealed either at both ends or at the fire barrier with noncombustible material to prevent the passage of smoke and hot gases. Fire barrier penetrations that must maintain environmental isolation or pressure differentials should be qualified by test to maintain the barrier integrity under such conditions.	are sealed in accordance with Appendix A5.2.2 of this report.
	Penetration designs should utilize only noncombustible materials and should be qualified by tests. The penetration qualification tests should use the time-temperature exposure curve specified by ASTM E-119, "Fire Test of Building Construction and Materials." The acceptance criteria for the test should require that:	For both the electrical and mechanical penetrations, all materials used in the construction of the rated fire stops have a flame spread of 25 or less. Penetration tests were conducted in accordance with IEEE 634-78 using the time-temperature curve of ASTM E-119. However, it should be noted that six penetration seals as described in Section 2.3 are constructed of Thermo-Lag 330-1 material and have been abandoned in place. Per NRC Information Notice 92-82, this material has been determined to be combustible. In accordance with drawing 20E-0-3600, these seals are now considered nonrated seals.
	(a) The fire barrier penetration has withstood the fire endurance test without passage of flame or ignition of cables on the unexposed side for a period of time equivalent to the fire resistance rating required of the barrier.	All rated fire barrier penetration seals have 3-hour ratings.

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(b)	The temperature levels recorded for the unexposed side are analyzed and demonstrate that the maximum temperature does not exceed 325°F.	The acceptance criteria is an average of 250°F above ambient. This is considered to be equivalent to the stated requirement.
(c)	The fire barrier penetration remains intact and does not allow projection	Fire testing is normally done per IEEE-634.

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	of water beyond the unexposed surface during the hose stream test. The stream shall be delivered through a 1-1/2-inch nozzle set at a discharge angle of 30% with a nozzle pressure of 75 psi and a minimum discharge of 75 gpm with the tip of the nozzle a maximum of 5 ft from the exposed face; or the stream shall be delivered through a 1—1/2-inch nozzle set at a discharge angle of 15% with a nozzle pressure of 75 psi and a minimum discharge of 75 gpm with the tip of the nozzle a maximum of 10 ft from the exposed face; or the stream shall be delivered through a 2-1/2-inch national standard playpipe equipped with 1-1/8-inch tip, nozzle pressure of 30 psi, located 20 ft from the exposed face.	
(4)	Penetration openings for ventilation systems should be protected by fire dampers having a rating equivalent to that required of the barrier (see NFPA-90A, "Air Conditioning and Ventilating Systems"). Flexible air duct coupling in ventilation and filter systems should be noncombustible.	Ventilation system penetrations in rated barriers are protected by fire dampers having a rating equivalent to that of the barrier. For details, see the Fire Protection Report Subsection 2.1.4.1b and c. See Table 3-1 for delineation of conformance with NFPA-90A.
(5)	Door openings in fire barriers should be protected with equivalently rated doors, frames, and hardware that have been tested and approved by a nationally recognized laboratory. Such doors should be self-closing or provided with closing mechanisms and should be inspected semiannually to verify	Access doors in fire barriers are Label A or B fire doors or are of Label A or B construction (see Section 2.1, page 2.1-8 for a detailed discussion of doors provided for rated fire barriers). See Table 3-1 for delineation of conformance with NFPA 80.

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that automatic hold-open, release, and closing mechanisms and latches are operable. (See NFPA 80, "Fire Doors and Windows.")	
One of the following measures should be provided to ensure they will protect the opening as required in case of fire: (a) Fire doors should be kept closed and electrically supervised at a continuously manned location; (b) Fire doors should be locked closed and inspected weekly to verify that the doors are in the closed position; (c) Fire doors should be provided with automatic hold-open and release mechanisms and inspected daily to verify that doorways are free of obstructions; or (d) Fire doors should be kept closed and inspected daily to verify that they are in the closed position.	All fire doors have automatic closers. Options a, b, and d are used on various doors in the plant. Cable spreading room interior doors alarm in the control room. The other supervised doors are monitored by security. Required fire doors are inspected per the appropriate operating surveillance.
The fire brigade leader should have ready access to keys for any locked fire doors.	The brigade chief can obtain a key to access all areas.
Areas protected by automatic total flooding gas suppression systems should have electrically supervised self-closing fire doors or should satisfy option (a) above.	The doors to the diesel generator day tank rooms,diesel generator ventilation shafts, and the auxiliary feedwater diesel- driven pump and day tank rooms are not electrically supervised, although they are boundaries for areas protected by automatic total flooding gas suppression systems. The fire doors to these rooms are surveilled to ensure they are in their proper position.

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(6) Personnel access routes and escape routes should be provided for each fire area. Stairwells outside primary containment serving as escape routes, access routes for fire fighting, or access routes to areas containing equipment necessary for safe shutdown should be enclosed in masonry or concrete towers with a minimum fire rating of 2 hours and self-closing Class B fire doors.	The stairwells at Braidwood which serve as escape routes for station personnel and access routes for fire fighting personnel, as per the requirements of building codes, are enclosed by 2-hour fire-rated masonry walls with self-closing fire doors, and are clearly marked.
(7) Fire exit routes should be clearly marked.	Comply, see item 6 above.
(8) Each cable spreading room should contain only one redundant safety division. Cable spreading rooms should not be shared between reactors. Cable spreading rooms should be separated from each other and from other areas of the plant by barriers having a minimum fire resistance of 3 hours.	The Braidwood design complies, except for instances where cables from both safety divisions are routed in the same cable spreading room. Fire Protection Report Section 2.4.2 describes the measures taken in these areas to assure safe shutdown.
(9) Interior wall and structural components, thermal insulation materials, radiation shielding materials, and soundproofing should be noncombustible. Interior finishes should be noncombustible. Materials that are acceptable for use as interior finish without evidence of test and listing by a nationally recognized laboratory are the following: Plaster, acoustic plaster, gypsum plasterboard (gypsum wallboard), either plain, wallpapered, or painted with oil- or water-base paint; Ceramic tile, ceramic panels;	Minor amounts of combustibles are used as architectural finish materials. These existing materials do not significantly contribute to the fire loading in the plant, and do not expose safety-related systems to undue risks.

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	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.	
(10)	Metal deck roof construction should be noncombustible and listed as "acceptable for fire" in the UL Building Materials Directory, or listed as Class I in the Factory Mutual System Approval Guide.	Not applicable. Metal deck roof construction is not used at Braidwood Station.
(11)	Suspended ceilings and their supports should be of noncombustible construction. Concealed spaces should be devoid of combustibles except as noted in Position C.6.b.	Comply.
(12)	Transformers installed inside fire areas containing safety-related systems should be of the dry type or insulated and cooled with noncombustible liquid. Transformers filled with combustible fluid that are located indoors should be enclosed in a transformer vault (see Section 450(c) of NFPA 70, "National Electrical Code").	Comply. See Table 3-1 for delineation of compliance with NFPA 70.
(13)	Outdoor oil-filled transformers should have oil spill confinement features or drainage away from the buildings. Such transformers should be located at least 50 feet distant from the building, or by ensuring	Does not fully comply. The Unit 1 (2) Unit Auxiliary Transformer 141 (241) is within approximately 30 feet of the turbine building. The turbine building wall has a 2-hour fire rating in this area. It also has a Label-B door. The turbine building and

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	that such building walls within 50 feet of oil-filled transformers are without openings and have a fire resistance rating of at least 3 hours.	equipment located inside it are non-safety-related. All outdoor transformers are separated from the safety-related auxiliary building by approximately 48 feet. The auxiliary building wall in this area has a 3-hour fire rating. A small 1,000-kVA transformer is located approximately 35 feet from the fuel handling train shed. At this location, the train shed has insulated metal siding that does not carry a fire rating. A fire hazard analysis has been performed, and it was concluded that existing fire protection features are adequate to protect this hazard. The RWST and fuel handling building, which are withn 50 feet of this transformer, have 3-hour rated walls. In addition, a temporary transformer is located within 50 ft of the Unit 2 containment building, and a pad-mounted transformer is located within 50 feet of the Unit 2 RWST and the fuel handling building.

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(14)	Floor drains sized to remove expected fire fighting waterflow without flooding safety-related equipment should be provided in those areas where fixed water fire suppression systems are installed. Floor 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 safety-related equipment in the area (see NFPA-92, "Water-proofing and Draining of Floors"). Where gas suppression systems are installed, the drains should be provided with adequate seals or the gas suppression system should be sized to compensate for the loss of the suppression agent through the drains. Drains in areas containing combustible liquids should have provisions for preventing the backflow of combustible liquids to safety-related areas through the interconnected drain systems. Water drainage from areas that may contain radioactivity should be collected, sampled, and analyzed before discharge to the environment.	Comply. See Table 3-1 for delineation of compliance with NFPA Codes. NFPA 92M-1972 is no longer an NFPA Code. Guidance for waterproofing and drainage was incorporated from other applicable NFPA Codes.
b.	Safe Shutdown Capability	
(1)	Fire protection features should be provided for structures, systems, and components important to safe shutdown. These features should be capable of limiting fire damage so that:	Refer to Appendix A5.7, Section III.G for a discussion of fire protection provided for safe shutdown capability and detailed discussion of conformance to the criteria listed in paragraphs b(1), b(2), and b(3).

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(a) One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage; and	
(b) Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours.	
(2) To meet the guidelines of Position C5.b.1, one of the following means of ensuring that one of the redundant trains is free of fire damage should be provided:	
(a) Separation of cables and equipment and associated circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers should be protected to provide fire resistance equivalent to that required of the barrier;	
(b) Separation of cables and equipment and associated circuits of redundant trains by a horizontal distance of more than 20 feet with no interventing combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area; or	

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(c) Enclosure of cable and equipment and associated circuits of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system should be installed in the fire area.	
(3) If the guidelines of Positions C5.b.1 and C5.b.2 cannot be met, then alternative or dedicated shutdown capability and its associated circuits, independent of cables, systems or components in the area, room, or zone under consideration should be provided.	
c. Alternative or Dedicated Shutdown Capability	
(1) Alternative or dedicated shutdown capability provided for a specific fire area should be able to achieve and maintain subcritical reactivity conditions in the reactor, maintain reactor coolant inventory, achieve and maintain hot standby* conditions for a PWR (hot shutdown* for a BWR) and achieve cold shutdown* conditions within 72 hours and maintain cold shutdown conditions thereafter. During the postfire shutdown, the reactor coolant system process variables shall be maintained within those predicted for a loss of normal ac power, and the fission product boundary integrity shall not be affected; i.e., there shall be no fuel clad damage, rupture, or any	Comply.

*As defined in the Technical Requirements Manual.

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primary coolant boundary, or rupture of the containment boundary.	
(2) The performance goals for the shutdown functions should be:	Comply, with following clarification. For some fire zones, it is necessary to take credit for making certain repairs in order to achieve cold shutdown within 72 hours. Refer to Section 2.4 for details for individual fire zones.
(a) The reactivity control function should be capable of achieving and maintaining cold shutdown reactivity conditions.	
(b) The reactor coolant makeup function should be capable of maintaining the reactor coolant level above the top of the core for BWRs and be within the level indication in the pressurizer for PWRs.	
(c) The reactor heat removal function should be capable of achieving and maintaining decay heat removal.	
(d) The process monitoring function should be capable of providing direct readings of the process variables necessary to perform and control the above functions.	
(e) The supporting functions should be capable of providing the process cooling, lubrication, etc., necessary to permit the operation of the equipment used for safe shutdown functions.	
(3) The shutdown capability for specific fire areas may be unique for each such area, or it	Comply.

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may be one unique combination of systems for all such areas. In either case, the alternative shutdown capability shall be independent of the specific fire area(s) and shall accommodate postfire conditions where offsite power is available and where offsite power is not available for 72 hours. Procedures shall be in effect to implement this capability.	
(4) If the capability to achieve and maintain cold shutdown will not be available because of fire damage, the equipment and systems comprising the means to achieve and maintain the hot standby or hot shutdown condition shall be capable of maintaining such conditions until cold shutdown can be achieved. If such equipment and systems will not be capable of being powered by both onsite and offsite electric power systems because of fire damage, an independent onsite power system shall be provided. The number of operating shift personnel, exclusive of fire brigade members, required to operate such equipment and systems shall be onsite at all times.	Comply.
(5) Equipment and systems comprising the means to achieve and maintain cold shutdown conditions should not be damaged by fire; or the fire damage to such equipment and systems should be limited so that the systems can be made operable and cold shutdown achieved within 72 hours. Materials for such repairs shall be readily available onsite and	Comply. A repair procedure has been prepared to cover any repairs required. All materials and equipment needed to make these repairs will be maintained onsite.

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	procedures shall be in effect to implement such repairs. If such equipment and systems used prior to 72 hours after the fire will not be capable of being powered by both onsite and offsite electric power systems because of fire damage, an independent onsite power system should be provided. Equipment and systems used after 72 hours may be powered by offsite power only.	
(6)	Shutdown systems installed to ensure postfire shutdown capability need not be designed to meet seismic Category I criteria, single failure criteria, or other design basis accident criteria, except where required for other reasons, e.g., because of interface with or impact on existing safety systems, or because of adverse valve actions due to fire damage.	Comply.
(7)	The safe shutdown equipment and systems for each fire area should be known to be isolated from associated circuits in the fire area so that hot shorts, open circuits, or shorts to ground in the associated circuits will not prevent operation of the safe shutdown equipment. The separation and barriers between trays and conduits containing associated circuits of one safe shutdown division and trays and conduits containing associated circuits or safe shutdown cables from the redundant division, or the isolation of these associated circuits from the safe shutdown equipment, should be such that a	Comply. There are no associated circuits as defined in IEEE 384-1974 at B/B. Associated circuits as defined in the NRC's April 6, 1982 clarification letter to Generic Letter 81-12 are addressed in Subsection 2.4.1.

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postulated fire involving associated circuits will not prevent safe shutdown.	
d. Control of Combustibles	
(1) 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:	Comply.
(a) Emergency diesel generator fuel oil day tanks.	The emergency diesel generator fuel oil day tanks are provided with automatic fire suppression.
(b) Turbine-generator oil and hydraulic control fluid systems.	The turbine-generator oil and hydraulic control fluid system are contained in the Turbine Building and thus separated from all safety-related areas.
(c) Reactor coolant pump lube oil system.	Fire Protection of the reactor coolant pump lube oil system is described in A5.7 Section III.O and 3.7.a(1)(e).
(2) 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	See Table 3-1 for delineation of conformance with NFPA 50A.

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	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.")	
(3)	The use of plastic materials should be minimized. In particular, halogenated plastics such as polyvinyl chloride (PVC) and neoprene should be used only when substitute noncombustible 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 halogenated plastics also release free chlorine and hydrogen chloride when burning which are toxic to humans and corrosive to equipment.	Comply. The use of plastic material is minimized. The use of PVC and neoprene has been severely restricted.
(4)	Storage of flammable liquids should, as a minimum, comply with the requirements of NFPA	See Table 3-1 for delineation of conformance with NFPA 30.

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30, "Flammable and Combustible Liquids Code."	
(5) Hydrogen lines in safety-related areas should be either designed to seismic Class I requirements, or sleeved such that the water pipe is directly vented to the outside, or should be equipped with excess flow valves so that in case of a line break, the hydrogen concentration in the affected areas will not exceed 2%.	Comply. A 1-inch diameter hydrogen pipe is routed from the station hydrogen system through the Auxiliary Building to the Volume Control Tank. This line provides a blanket of hydrogen above the reactor coolant in the Volume Control Tank to aid in oxygen control. Within the Auxiliary Building, the hydrogen piping is Category II, except for the sections of pipe between the Volume Control Tank and the control valve which are Category I. However, the Category II portions are seismically supported throughout this building. An excess flow check valve is also provided at the bulk storage facility. The pipe routing takes this pipe through the general areas on elevations 364'-0", 383'-0", and 401'-0", and through the Unit 1 piping penetration area on elevation 364'-0". These areas are all large open areas. Because of the large size of these areas, any hydrogen flow from a line break would be stopped by the excess flow check valve well before the concentration would reach 2%. Although these areas contain safe shutdown equipment, they hydrogen piping is separated from exposed safe shutdown equipment within these areas by the maximum distance practicable. Because of this separation and the seismic support of the piping, the hydrogen piping does not present a significant fire hazard to the safe shutdown equipment. The Volume Control Tank Room is enclosed by shield walls. The valves used for operation of the Volume

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	Control System are located in an adjacent valve aisle. Therefore, a fire in the Volume Control Tank Room would not disable system operation. A short loop of the hydrogen piping containing the hydrogen control valves also extends into this valve aisle. The hydrogen pipe between the control valve and the Volume Control Tank is Category I piping. The remainder of the hydrogen pipe is Category II, but additional margin is incorporated into the design of the pipe and supports to protect against failure under seismic loads. The Unit 2 piping is a continuation of the Unit 1 system.
e. Electrical Cable Construction, Cable Trays, and Cable Penetrations	
(1) Only metal should be used for cable trays. Only metallic tubing should be used for conduit. Thin-wall metallic tubing should not be used. Flexible metallic tubing should only be used in short lengths to connect components to equipment. Other raceways should be made of noncombustible material.	Comply for all raceways containing electrical cables. Thin wall conduit is used as a raceway in certain field-routed systems (e.g., lighting and communication).
(2) Redundant safety-related cable systems outside the cable spreading room should be separated from each other and from potential fire exposure hazards in non-safety-related areas by fire barriers with a minimum fire rating of 3 hours. These cable trays should be provided with continuous line-type heat detectors and should be accessible for manual fire fighting. Cables should be designed to	Separation of redundant safety-related cable systems by 3-hour rated barriers is not employed outside of the cable spreading rooms. The cable separation criteria used at Braidwood are described in Appendix 5.2. Continuous line-type heat detectors are not used, as they are unnecessary. All fire areas containing safety-related cable trays have ionization and thermal type fire detectors, which are effective in detecting fires involving cable materials.

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allow wetting down with fire suppression water without electrical faulting. Manual hose stations and portable hand extinguishers should be provided. Safety-related cable trays of a single division that are separated from redundant divisions by a fire barrier with a minimum rating of 3 hours and are normally accessible for manual fire fighting should be protected from the effects of a potential exposure fire by providing automatic water suppression in the area where such a fire could occur. Automatic area protection, where provided, should consider cable tray arrangements and possible transient combustibles to ensure adequate water coverage for areas that could present an exposure hazard to the cable system. Manual hose standpipe systems may be relied upon to provide the primary fire suppression (in lieu of automatic water suppression systems) for safety-related cable trays of a single division that are separated from redundant safety divisions by a fire barrier with a minimum rating of 3 hours and are normally accessible for manual fire fighting if all of the following conditions are met: (a) The number of equivalent* standard 24-inch-wide cable trays (both safety-related and non-safety-related) in a given fire area is six or less;	Automatic water-type area suppression is not employed on the cable tray system at Braidwood. Cables are not considered to be the primary fire hazard in any areas of the plant except the cable spreading rooms, and therefore they do not have specific fire suppression systems provided, except for the cable spreading rooms. However, cable trays are protected by the detection and manual suppression equipment provided for areas where they are located. Refer to Section 2.3 for detailed discussion of each fire zone.

*Trays exceeding 24 inches should be counted as two trays; trays exceeding 48 inches should be counted as three trays, regardless of tray fill.

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(b) The cabling does not provide instrumentation, control or power to systems required to achieve and maintain hot shutdown; and (c) Smoke detectors are provided in the area of these cable routings, and continuous line-type heat detectors are provided in the cable trays. Safety-related cable trays that are not accessible for manual fire fighting should be protected by a zoned automatic water system with open-head deluge or open directional spray nozzles arranged so that adequate water coverage is provided for each cable tray. Such cable trays should also be protected from the effects of a potential exposure fire by providing automatic water suppression in the area where such a fire could occur. In other areas where it may not be possible because of other overriding design features necessary for reasons of nuclear safety to separate redundant safety-related cable systems by 3-hour-rated fire barriers, cable trays should be protected by an automatic water system with open-head deluge or open directional spray nozzles arranged so that adequate water coverage is provided for each cable tray. Such cable trays should also be protected from the effects of a potential exposure fire by providing automatic water suppression in the area where such a fire could occur. The capability to	

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achieve and maintain safe shutdown considering the effects of a fire involving fixed and potential transient combustibles should be evaluated with and without actuation of the automatic suppression system and should be justified on a suitably defined basis.	
(3) Electric cable construction should, as a minimum, pass the flame test in the current IEEE Std 383. (This does not imply that cables passing this test will not require fire protection.)	All cables installed in cable trays, with the exception of certain specialty instrumentation cables, pass the IEEE 383-1974 flame test. All cables that do not pass the flame test will be identified and any corrective action which is deemed necessary will be implemented.
(4) Cable raceways should be used only for cables.	Comply.
(5) Miscellaneous storage and piping for flammable or combustible liquids or gases should not create a potential exposure hazard to safety-related systems.	Comply. Propane storage is in a separate building. Welding gases and oxygen are stored outdoors. Individual bottles of flammable gases used for calibration are located in the Auxiliary Building.
f. Ventilation	
(1) The products of combustion and the means by which they will be removed from each fire area should be established during the initial stages of plant design. Consideration should be given to the installation of automatic suppression systems as a means of limiting smoke and end heat generation. Smoke and corrosive gases should generally be discharged directly outside to an area that will not affect safety-related plant areas. The normal plant ventilation system may be used for this purpose if capable and available. To	Since all fire barrier ventilation openings have fire dampers which close if a fire causes room temperature to exceed a setpoint, automatic exhaust of combustion products is not possible. However, the means and methods to remove smoke from all safety-related plant areas have been established and are set forth in an operating procedure.

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	facilitate manual firefighting, separate smoke and heat vents should be provided in specific areas such as cable spreading rooms, diesel fuel oil storage areas, switchgear rooms, and other areas where the potential exists for heavy smoke conditions (see NFPA 204 for additional guidance on smoke control).	
(2)	Release of smoke and gases containing radioactive materials to the environment should be monitored in accordance with emergency plans as described in the guidelines of Regulatory Guide 1.101, "Emergency Planning for Nuclear Power Plants." Any ventilation system designed to exhaust potentially radioactive smoke or gases should be evaluated to ensure that inadvertent operation or single failures will not violate the radiologically controlled areas of the plant design. This requirement includes containment functions for protecting the public and maintaining habitability for operations personnel.	All smoke and gases which contain possible radioactive material is monitored prior to release to the environment. For details, see FSAR Subsections 3.1.2.6.1, 3.1.2.6.2, 6.4.1, 6.4.4.1, 6.5.1, 6.5.1.1, 9.4.1.2.b, 9.4.1.3.e, 9.4.1.3.h, 9.4.9.1.1.6-2, 9.4.9.1.2.c, and 9.4.9.1.2.e.
(3)	Special protection for ventilation power and control cables may be required. The power supply and controls for mechanical ventilation systems should be run outside the fire area served by the system where practical.	Power supply and controls for mechanical ventilation equipment are not necessarily routed outside of fire zones served by the system. Most ventilation equipment is located within the fire hazard area, thereby requiring electrical cable to be routed accordingly. However, such cabling is in conduit. To relocate the vent equipment outside the fire hazard area would be impractical. For details, see FSAR Subsections 4.4.4, 9.4.1.1.g, and 9.4.1.3.a.
(4)	Engineered safety feature filters should be protected in accordance with the guidelines	Comply. For details, see FSAR Subsections 6.5.1.2.d-5 and Fire Protection Report Subsection 2.3.3.14.

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	of Regulatory Guide 1.52. Any filter that includes combustible materials and is a potential exposure fire hazard that may affect safety-related components should be protected as determined by the fire hazards analysis.	
(5)	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.	Comply. For details, see FSAR Subsection 9.4.1.1.1.e and Figure 6.4-1.
(6)	Stairwells should be designed to minimize smoke infiltration during a fire.	Comply, see part 6 of Subsection 3.5.a.
(7)	Where total flooding gas extinguishing systems are used, area intake and exhaust ventilation dampers should be controlled in accordance with NFPA 12, "Carbon Dioxide Systems," and NFPA 12A, "Halon 1301 Systems," to maintain the necessary gas concentration.	See Table 3-1 for delineation of conformance to NFPA 12 and NFPA 12A. For details, see Fire Protection Report Subsections 2.3.3.6, 2.3.3.7, 2.3.3.8, 2.3.3.9, 2.3.3.10 and 11, 2.3.3.14, 2.3.3.16, 2.3.3.18, and 2.3.3.20.
g.	Lighting and Communication Lighting and two-way voice communication are vital to safe shutdown and emergency response in the event of fire. Suitable fixed and portable emergency lighting and communication devices should be provided as follows:	
(1)	Fixed self-contained lighting consisting of fluorescent or sealed-beam units with individual 8-hour minimum battery power supplies should be provided in areas that must be	Comply. Fixed self-contained lighting will be provided in all areas where manual operation is assumed in the safe shutdown analysis in Section 2.4. See FPR Section A.5.7.III.5.

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	manned for safe shutdown and for access and egress routes to and from all fire areas. Safe shutdown areas include those required to be manned if the control room must be evacuated.	
(2)	Suitable sealed-beam battery-powered portable hand lights should be provided for emergency use by the fire brigade and other operations personnel required to achieve safe plant shutdown.	Comply. Portable lights are provided for emergency use by the fire brigade and other operations personnel.
(3)	Fixed emergency communications independent of the normal plant communication system should be installed at preselected stations.	Comply. A plant pager system is installed. Power is supplied from MCC 033W3 and the security diesel.
(4)	A portable radio communications system should be provided for use by the fire brigade and other operations personnel required to achieve safe plant shutdown. This system should not interfere with the communications capabilities of the plant security force. Fixed repeaters installed to permit use of portable radio communication units should be protected from exposure fire damage. Preoperational and periodic testing should demonstrate that the frequencies used for portable radio communication will not affect the actuation of protective relays.	Comply. Four repeaters are provided at the Braidwood station. The repeaters are located in the Security Ready Room (SRR) on elevation 451’ in the Turbine Building along column row L The repeaters connect with the stations Distributed Antenna System (DAS) above the SRR on elevation 468’ in the Turbine Building along column row L. A single credible fire at either location could disable all repeaters. However, the hand-held radios would remain operable for the fire brigade, other operations personnel, and security to mitigate the consequences of such a fire and to achieve safe plant shutdown. Testing has demonstrated that coverage of the plant by the remaining radio system components in the event of such a fire is adequate.

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	Separate radio talk groups for normal radio system operation and an independent frequency for abnormal operations are available for use by the fire brigade and other operations personnel required to achieve safe plant shutdown. Security has its own talk group for normal operation and its own frequency for abnormal operations. Preoperational testing has demonstrated that the frequencies used for portable radio communications do not affect the actuation of protective relays nor the transmitters that input to a relay that actuates a reactor trip for an engineered safety feature. In the latter case, the area surrounding the transmitters has been labeled with appropriate warning messages. Further, portable radio transmissions are not allowed in the auxiliary electric equipment room and other designated areas. These actions have been taken in lieu of periodic testing.

3.6 FIRE DETECTION AND SUPPRESSION

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a.	Fire Detection Protection	
(1)	Detection systems should be provided for all areas that contain or present a fire exposure to safety-related equipment.	Comply with exceptions. See Table 2.2-3.
(2)	Fire detection systems should comply with the requirements of Class A systems as defined in NFPA 72D, "Standard for the Installation, Maintenance, and Use of Proprietary Protective Signaling Systems," and Class 1 circuits as defined in NFPA 70, "National Electrical Code."	See Appendix 5.4 (to be provided). See Table 3-1 for delineation of conformance to NFPA 70 and NFPA 72D.
(3)	Fire detectors should be selected and installed in accordance with NFPA 72E, "Automatic Fire Detectors." Preoperational and periodic testing of pulsed line-type heat detectors should demonstrate that the frequencies used will not affect the actuation of protective relays in other plant systems.	Comply. Line-type heat detectors are not used, in general, at B/B except in most charcoal filters and all outdoor transformers. See Table 3-1 for delineation of conformance to NFPA 72E.
(4)	Fire detection systems should give audible and visual alarm and annunciation in the control room. Where zoned detection systems are used in a given fire area, local means should be provided to identify which detector zone has actuated. Local audible alarms should sound in the fire area.	The fire detection system will give audible and visual alarm and annunciation in the control room. Local alarms are provided for areas with fixed suppression systems.
(5)	Fire alarms should be distinctive and unique so they will not be confused with any other plant system alarms.	

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(6) Primary and secondary power supplies should be provided for the fire detection system and for electrically operated control valves for automatic suppression systems. Such primary and secondary power supplies should satisfy provisions of Section 2220 of NFPA 72D. This can be accomplished by using normal offsite power as the primary supply with a 4-hour battery supply as secondary supply; and by providing capability for manual connection to the Class 1E emergency power bus within 4 hours of loss of offsite power. Such connection should follow the applicable guidelines in Regulatory Guides 1.6, 1.32, and 1.75.	The fire detection system is powered from an ESF bus. See Table 3-1 for delineation of conformance to NFPA 72D.
b. Fire Protection Water Supply Systems	
(1) An underground yard fire main loop should be installed to furnish anticipated 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). Type of pipe and water treatment should be design considerations with tuberculation as one of the parameters. Means for inspecting and flushing the systems should be provided.	See Table 3-1 for delineation of conformance to NFPA 24.
(2) Approved visually indicating sectional control valves such as post-indicator valves should be provided to isolate portions of the main for maintenance or	Comply, except for underground non-indicating valve OFP590 at the gatehouse and valve OFP983 for the Unit 2 Containment Access Facility..

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repair without shutting off the supply to primary and backup fire suppression systems serving areas that contain or expose safety-related equipment.	
(3) Valves should be installed to permit isolation of outside hydrants from the fire main for maintenance or repair without interrupting the water supply to automatic or manual fire suppression systems in any area containing or presenting a fire hazard to safety-related or safe shutdown equipment.	Comply.
(4) The fire main system piping should be separate from service or sanitary water system piping, except as described in Position C.5.c. (4).	Comply, except for connections to the service water system, the demineralized water system, the service air compressor, and the temporary cross-tie capability to the centrifugal charging pump oil coolers.
(5) 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. For multiple-reactor sites with widely separated plants (approaching 1 mile or more), separate yard fire main loops should be used.	Comply. Braidwood has only one loop in the Auxiliary Building which serves both units.
(6) If pumps are required to meet system pressure or flow requirements, a sufficient number of pumps should be provided to ensure that 100% capacity will be available assuming failure of the largest pump or loss of offsite power (e.g., three 50% pumps or two 100% pumps). This	Comply.

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can be accomplished, for example, by providing either: (a) Electric motor-driven fire pump(s) and diesel-driven fire pump(s); or (b) Two or more seismic Category I Class 1E electric motor-driven fire pumps connected to redundant Class 1E emergency power buses (see Regulatory Guides 1.6, 1.32, and 1.75). Individual fire pump connections to the yard fire main loop should be separated with sectionalizing valves between connections. Each pump and its driver and controls should be located in a room separated from the remaining fire pumps by a fire wall with a minimum rating of 3 hours. The fuel for the diesel fire pump(s) should be separated so that it does not provide a fire source exposing safety-related equipment. Alarms indicating pump running, driver availability, failure to start, and low fire-main pressure should be provided in the control room.	
The fire pump installation should conform to NFPA 20, "Standard for the Installation of Centrifugal Fire Pumps."	See Table 3-1 for delineation of conformance with NFPA 20.
(7) Outside manual hose installation should be sufficient to provide an effective hose stream to any onsite location where fixed or transient combustibles could jeopardize safety-related equipment. Hydrants should be installed approximately every 250 ft on the yard main system.	Comply, as noted. See Table 3-1 for delineation of conformance with NFPA 24.

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	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 ft. Alternatively, mobile means of providing hose and associated equipment, such as hose carts or trucks, may be used. When provided, such mobile equipment should be equivalent to the equipment supplied by three hose houses.	A dedicated fire brigade response vehicle and two mobile hose carts provide hose and equipment equivalent to that supplied by three hose houses.
(8)	Threads compatible with those used by local fire departments should be provided on all hydrants, hose couplings, and standpipe risers.	Comply.
(9)	Two separate, reliable freshwater supplies should be provided. Saltwater or brackish water should not be used unless all freshwater supplies have been exhausted. 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 failure in one tank or its piping should not cause both tanks to drain. Water supply capacity should be capable of refilling either tank in 8 hours or less.	Not applicable.
(10)	Common tanks are permitted for fire and sanitary or service water storage. When this is done, however, minimum fire water storage requirements should be dedicated by passive means, for example, use of a vertical standpipe for other water services. Administrative controls, including locks for	Not applicable.

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tank outlet valves, are unacceptable as the only means to ensure minimum water volume.	
(11) The fire water supply should be calculated on the basis of the largest expected flow rate for a period of 2 hours, but not less than 300,000 gallons. This flow rate should be based (conservatively) on 500 gpm for manual hose streams plus the largest design demand of any sprinkler or deluge system as determined in accordance with NFPA 13 or NFPA 15. The fire water supply should be capable of delivering this design demand over the longest route of the water supply system.	Comply. The original calculations on the fire protection system were based on a line break which creates the greatest friction loss in the system per NML requirements. This has the same effect as delivering water over the longest route even though the longest route was not considered in the calculation. It would take four line breaks to restrict the flow to only the longest route. See Table 3-1 for delineation of conformance to NFPA 13 and NFPA 15.
(12) Freshwater lakes or ponds of sufficient size may qualify as sole source of water for fire protection but require separate redundant suctions in one or more intake structures. These supplies should be separated so that a failure of one supply will not result in a failure of the other supply.	Comply. At Braidwood, the cooling pond serves as the sole source of water for fire protection. The fire protection water system has two separate suction intakes.
(13) When a common water supply is permitted for fire protection and the ultimate heat sink, the following conditions should be satisfied: (a) The additional fire protection water requirements are designed into the total storage capacity, and (b) Failure of the fire protection system should not degrade the function of the ultimate heat sink.	Comply. The cooling pond is of such capacity that it meets the requirements of the ultimate heat sink and fire protection. The fire protection suction intake is not used for the heat sink.

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(14)	Other water systems that may be used as one of the two fire water supplies should be permanently connected to the fire main system and should be capable of automatic alignment to the fire main system. Pumps, controls, and power supplies in these systems should satisfy the requirements for the main fire pumps. The use of other water systems for fire protection should not be incompatible with their functions required for safe plant shutdown. Failure of the other system should not degrade the fire main system.	The Essential Service Water tie-in is manual; however, this is not designed to be redundant to the fire water pumps.
c.	Water Sprinkler and Hose Standpipe Systems	
(1)	Sprinkler systems and manual hose station standpipes should have connections to the plant underground water main so that a single active failure or a crack in a moderate-energy line cannot impair both the primary and backup fire suppression systems. Alternatively, headers fed from each end are permitted inside buildings to supply both sprinkler and standpipe systems, provided steel piping and fittings meeting the requirements of ANSI B31.1, "Power Piping," are used for the headers up to and including the first valve supplying the sprinkler systems where such headers are part of the seismically analyzed hose standpipe system. When provided, such headers are considered an extension of the yard main system. Each sprinkler and standpipe system should be equipped with OS&Y (outside screw and yoke) gate valve or other approved shutoff valve and	See paragraph 3.1c(2).

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	waterflow alarm. Safety-related equipment that does not itself require sprinkler water fire protection but is subject to unacceptable damage if wet by sprinkler water discharge should be protected by water shields or baffles.	
(2)	Control and sectionalizing valves in the fire water systems should be electrically supervised or administratively controlled. The electrical supervision signal should indicate in the control room. All valves in the fire protection system should be periodically checked to verify position (see NFPA 26, "Supervision of Valves").	Electrical supervision is generally provided for valves controlling individual, fixed extinguishing systems. These valves alarm in the control room. Although interior and exterior sectional control valves are not electrically supervised, their positions are administratively controlled by station operating procedures. See Table 3-1 for delineation of conformance to NFPA 26.
(3)	Fixed water extinguishing systems should conform to requirements of appropriate standards such as NFPA 13, "Standards for the Installation of Sprinkler Systems," and NFPA 15, "Standard for Water Spray Fixed Systems."	See Table 3-1 for delineation of conformance to NFPA 13 and NFPA 15.
(4)	Interior manual hose installation should be able to reach any location that contains, or could present a fire exposure hazard to, safety-related equipment with at least one effective hose stream. To accomplish this, standpipes with hose connections equipped with a maximum of 100 feet of 1-1/2-inch woven-jacket, lined fire hose and suitable nozzles should be at least 4 inches in diameter for multiple hose connections and 2-1/2 inches in diameter for single hose connections. These systems should follow the requirements	Hose stations are generally located outside of unoccupied areas. Shutoff valves are provided for all standpipes or sections of interior piping. Generally, these standpipe hose stations are located throughout the plant at approximately 100-foot intervals on each floor. Hose reels in the station generally contain 50 feet of hose, although selected reels are supplied with up to 200 feet of hose. The standpipes used have a varying diameter of 2-1/2 inches to 4 inches. Portions of the Fire Protection System

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	of NFPA 14, "Standpipe and Hose Systems," for sizing, spacing, and pipe support requirements.	that service safety-related equipment or run through areas where safety-related equipment is housed use Seismic Category I piping.
	Hose stations should be located as dictated by the fire hazard analysis to facilitate access and use for fire fighting operations. Alternative hose stations should be provided for an area if the fire hazard could block access to a single hose station serving that area.	See Table 3-1 for delineation of conformance to NFPA 14.
	Provisions should be made to supply water at least to standpipes and hose connections for manual fire fighting in areas containing equipment required for safe plant shutdown in the event of a safe shutdown earthquake. The piping system serving such hose stations should be analyzed for SSE loading and should be provided with supports to ensure system pressure integrity. The piping and valves for the portion of hose standpipe system affected by this functional requirement should, as a minimum, satisfy ANSI B31.1, "Power Piping." The water supply for this condition may be obtained by manual operator actuation of valves in a connection to the hose standpipe header from a normal seismic Category I water system such as the essential service water system. The cross connection should be (a) capable of providing flow to at least two hose stations (approximately 75 gpm per hose station), and (b) designed to the same standards as the seismic Category I water system; it should not degrade	

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the performance of the seismic Category I water system.	
(5) The proper type of hose nozzle to be supplied to each area should be based on the fire hazard analysis. The usual combination spray/straight-stream nozzle should not be used in areas where the straight stream can cause unacceptable mechanical damage. Fixed fog nozzles should be provided at locations where high-voltage shock hazards exist. All hose nozzles should have shutoff capability. (Guidance on safe distances for water application to live electrical equipment may be found in the "NFPA Fire Protection Handbook.")	Comply. The proper type of hose nozzle is supplied to each area; fog nozzles are supplied in areas where high-voltage hazards exist and straight-stream nozzles are supplied to areas of new fuel storage.
(6) Fire hose should be hydrostatically tested in accordance with the recommendations of NFPA 1962, "Fire Hose - Care, Use, Maintenance." Hose stored in outside hose houses should be tested annually. Interior standpipe hose should be tested every 3 years.	Comply. Hose is tested per guidance of NFPA 1962.
(7) Certain fires, such as those involving flammable liquids, respond well to foam suppression. Consideration should be given to use of mechanical low-expansion foam systems, high-expansion foam generators, or aqueous film-forming foam (AFFF) systems, including the AFFF deluge system. These systems should comply with the requirements of NFPA 11, NFPA 11A, NFPA 11B, and NFPA 16, as applicable.	Comply. See Table 3-1 for delineation of conformance with NFPA 11, NFPA 11A, NFPA 11B, and NFPA 16.

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d. Halon Suppression Systems	Comply, except as noted below.
Halon fire extinguishing systems should comply with the requirements of NFPA 12A and NFPA 12B, "Halogenated Fire Extinguishing Agent Systems - Halon 1301 and Halon 1211." Only UL-listed or FM-approved agents should be used. Provisions for locally disarming automatic Halon systems should be key locked and under strict administrative control. Automatic Halon extinguishing systems should not be disarmed unless controls as described in Position C.2.c. are provided.	See Table 3-1 for delineation of conformance with NFPA 12A and NFPA 12B. Interlock and alarms are tested initially by startup group. The halon is purchased with a Certification of Conformance. The control panels will be locked with the keys controlled by operating. The disarming of the system will alarm in the control room.
In addition to the guidelines of NFPA 12A and 12B, preventive maintenance and testing of the systems, including check-weighing of the Halon cylinders, should be done at least quarterly.	Testing of halon cylinders will be performed semiannually, as allowed by NFPA 12A.
Particular consideration should also be given to: (1) Minimum required Halon concentration, distribution, soak time, and ventilation control; (2) Toxicity of Halon; (3) Toxicity and corrosive characteristics of the thermal decomposition products of Halon; and (4) Location and selection of the activating detectors.	Pre-discharge alarms are provided locally, except for the Halon system protecting the QA Records Vault. Pre-discharge timers delay the discharge to allow personnel time to leave the area. The Halon systems for the Upper Cable Spreading Rooms also alarm in the control room. Concentration testing is done by the vendor. They verify hold time and concentration. Ventilation is controlled by fire damper held by electro-thermal links. There are only ventilation ducts and cables in the area. Neither is likely to experience serious corrosive damage. The rooms will be vented per the smoke removal procedure.

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e. Carbon Dioxide Suppression Systems	
Carbon dioxide extinguishing systems should comply with the requirements of NFPA 12, "Carbon Dioxide Extinguishing Systems." Where automatic carbon dioxide systems are used, they should be equipped with a predischarge alarm system and a discharge delay to permit personnel egress. Provisions for locally disarming automatic carbon dioxide systems should be key locked and under strict administrative control. Automatic carbon dioxide extinguishing systems should not be disarmed unless controls as described in Position C.2.c. are provided.	Comply. Braidwood has an evacuation time with alarm on CO_2 systems. Local disarming will be electrically supervised and administratively controlled by Operating. Disarming the system will alarm in the control room. Valves will be verified every 31 days, per operating surveillance, for position. See Table 3-1 for delineation of conformance with NFPA 12.
Particular consideration should also be given to:	
(1) Minimum required CO_2 concentration, distribution, soak time, and ventilation control;	Concentration and hold times are verified by a test during the construction phase. Ventilation is controlled with electro-thermal links fire dampers. In addition to a predischarge alarm for personnel protection, an odorizer has been added to the CO_2 systems which adds a wintergreen odor to the CO_2.
(2) Anoxia and toxicity of CO_2;	
(3) Possibility of secondary thermal shock (cooling) damage;	
(4) Conflicting requirements for venting during CO_2 injection to prevent overpressurization versus sealing to prevent loss of agent; and	
(5) Location and selection of the activating detectors.	

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f.	Portable Extinguishers	
	Fire extinguishers should be provided in areas that contain, or could present a fire exposure hazard to, safety-related equipment in accordance with guidelines of NFPA 10, "Portable Fire Extinguishers, Installation, Maintenance and Use." Dry chemical extinguishers should be installed with due consideration given to possible adverse effects on safety-related equipment installed in the area.	Comply. See Table 3-1 for delineation of conformance with NFPA 10.

3.7 GUIDELINES FOR SPECIFIC PLANT AREAS

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a. Primary and Secondary Containment	
(1) Normal Operation - Fire protection requirements for the primary and secondary containment areas should be provided for hazards identified by the fire hazards analysis.	Braidwood complies except as identified below.
Examples of such hazards include lubricating oil or hydraulic fluid system for the primary coolant pumps, cable tray arrangements and cable penetrations, and charcoal filters. Because of the general inaccessibility of primary containment during normal plant operation, protection should be provided by automatic fixed systems. The effects of postulated fires within the primary containment should be evaluated to ensure that the integrity of the primary coolant system and the containment is not jeopardized assuming no action is taken to fight the fire.	Fixed automatic suppression is not provided. Hose stations and portable extinguishers are available throughout the containment. Ionization detectors provide local coverage over cable penetrations. Heat detectors are provided over the reactor coolant pumps.
(a) Operation of the fire protection systems should not compromise the integrity of the containment or other safety-related systems. Fire protection activities in the containment areas should function in conjunction with total containment requirements such as ventilation and control of contaminated liquid and gaseous release.	Comply. Manual hose stations are relied upon for primary suppression inside the containment. Safety-related equipment inside the containment is qualified for a post-LOCA environment, including water spray. Fire fighting activities are thus not expected to adversely affect safe shutdown components or the containment integrity.

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(b)	Inside noninerted containment one of the fire protection means stated in Positions C.5.b.1 and C.5.b.2 or the following fire protection means should be provided: separation of cables and equipment and associated nonsafety circuits of redundant trains by a noncombustible radiant energy shield having a minimum fire rating of one-half hour.	Division 11 and 12 cable comes in close proximity. Descriptions of such occurrences and justification are provided in Appendix A5.7.
(c)	In primary containment, fire detection systems should be provided for each fire hazard. The type of detection used and the location of the detectors should be the most suitable for the particular type of fire hazard identified by the fire hazard analysis. A general area fire detection capability should be provided in the primary containment as backup for the above described hazard detection. To accomplish this, suitable smoke or heat detectors compatible with the radiation environment should be installed.	Fire detection systems are provided over reactor coolant pumps and electrical penetrations. A general area fire detection system is not employed in the containment at Braidwood.
(d)	Standpipe and hose stations should be inside PWR containments and BWR containments that are not inerted. Standpipe and hose stations inside containment may be connected to a high quality water supply of sufficient quantity and pressure other than the fire main loop if plant-specific features prevent extending the fire	Comply. Standpipes and hose stations are provided inside the containment. The normal fire protection system is used. The containment penetrations comply with the stated requirements.

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	main supply inside containment. For BWR drywells, standpipe and hose stations should be placed outside the drywell with adequate lengths of hose, no longer than 100 ft, to reach any location inside the drywell with an effective hose stream. The containment penetration of the standpipe system should meet the isolation requirements of General Design Criterion 56 and should be seismic Category I and Quality Group B.	
(e)	The reactor coolant pumps should be equipped with an oil collection system if the containment is not inerted during normal operation. The oil collection system should be so designed, engineered, and installed that failure will not lead to fire during normal or design basis accident conditions and that there is reasonable assurance that the system will withstand the safe shutdown earthquake. Such collection systems should be capable of collecting lube oil from all potential pressurized and unpressurized leakage sites in the reactor coolant pump lube oil systems. Leakage should be collected and drained to a vented closed container that can hold the entire lube oil system inventory. A flame arrester is required in the	Comply. Refer to Section III.O of Appendix A5.7.

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	vent if the flash point characteristics of the oil present the hazard of fire flashback. Leakage points to be protected should include lift pump and piping overflow lines, lube oil cooler, oil fill and drain lines and plugs, flanged connections on oil lines, and lube oil reservoirs where such features exist on the reactor coolant pumps. The drain line should be large enough to accommodate the largest potential oil leak.	
(f)	For secondary containment areas, cable fire hazards that could affect safety should be protected as described in Position C.5.e(2). The type of detection system for other fire hazards identified by the fire hazards analysis should be the most suitable for the particular type of fire hazard.	Braidwood does not have a secondary containment area.
(2)	Refueling and Maintenance - 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-gas fuel supply). Possible fires would not necessarily be in the vicinity of fixed detection and suppression systems. Management procedures and controls necessary to ensure adequate fire protection for transient fire loads are discussed in Position C.1.	Comply. Administrative procedures ensure adequate fire protection for transient fire loads.

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Adequate self-contained breathing apparatus should be provided near the containment entrances for fire fighting and damage control personnel. These units should be independent of any breathing apparatus or air supply systems provided for general plant activities and should be clearly marked as emergency equipment.	Two self-contained breathing units are provided at each entrance to the containment and at selected locations in the containment. These air packs will provide the necessary air for fire fighting and damage control personnel. These units are independent from the station's supplied air system.
b. Control Room Complex	
The control room complex (including galleys, office spaces, etc.) should be protected against disabling fire damage and should be separated from other areas of the plant by floors, walls, and roof having minimum fire resistance ratings of 3 hours. Peripheral rooms in the control room complex should have automatic water suppression and should be separated from the control room by noncombustible construction with a fire resistance rating of 1 hour. Ventilation system openings between the control room and peripheral rooms should have automatic smoke dampers that close on operation of the fire detection or suppression system. If a halon flooding system is used for fire suppression, these dampers should be strong enough to support the pressure rise accompanying halon discharge and sealed tightly against infiltration of halon into the control room. Carbon dioxide flooding systems are not acceptable for these areas.	The walls, floor, and roof are 3-hour fire barriers as shown in Fire Protection Report Figures 2.3-7 and 2.3-8 Sheets 1 and 3. Neither automatic fixed suppression systems nor smoke dampers are provided for peripheral rooms (i.e., offices) in the control room complex. For details see FSAR Subsections 6.4.2.3, 6.4.2.4, and Fire Protection Report Subsection 2.3.2.1. Control room fire dampers are held by thermal links not hooked to the detectors. Portable fire extinguishers are provided in the control room. A hose station is available near the entrance to the control room.
Manual fire fighting capability should be provided for both:	The approximate locations of extinguishers and hoses are shown on Fire Protection Report Figure 2.3-8 Sheets 1 and 3.

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(1) Fire originating within a cabinet, console, or connecting cables; and (2) Exposure fires involving combustibles in the general room area. Portable Class A and Class C fire extinguishers should be located in the control room. A hose station should be installed immediately outside the control room.	
Nozzles that are compatible with the hazards and equipment in 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.	Comply.
Smoke detectors should be provided in the control room, cabinets, and consoles. If redundant safe shutdown equipment is located in the same control room cabinet or console, additional fire protection measures should be provided. Alarm and local indication should be provided in the control room.	Do not comply fully. Smoke detectors are installed in the exhaust vents of the cabinets. Detectors are installed at the ceiling. Additional protection is not provided. Fire Hazards panel is installed for indication where separation was not met. Ceiling detectors alarm on OPM01J, 1PM09J, and the duct detectors alarm on OPM02J and the SER. Smoke detectors are provided in the control room exhaust ducts. Additionally, fire protection features are not provided for panels containing redundant safe shutdown equipment; however, this equipment is addressed in Section 2.4.

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Breathing apparatus for control room operators should be readily available.	Comply. Seven (7) S.C.B.A. with dedicated air bottles will be provided for the control room emergency personnel. Additional bottled air supplies are maintained onsite for a total of six (6) hours of breathing air for each of the seven emergency staff personnel. Two additional S.C.B.A. units are maintained to comply with single failure criteria for Regulatory Guide 1.95.

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		For details see FSAR Subsection 6.4.1.f.
	The outside air intake(s) for the control room ventilation system should be provided with smoke detection capability to alarm in the control room to enable manual isolation of the control room ventilation system and thus prevent smoke from entering the control room.	Comply in terms of providing ionization detectors at outside air intakes, as well as isolating the intakes on ionization detection with provision to use alternate intakes for makeup air. In addition, all the air is passed through recirculation charcoal filters. The detectors alarm at OPM02J and the SER. The manual damper controls are on OPM02J. For details see FSAR Subsections 9.4.1.2b and 9.4.1.1.1e, and 6.4.1h.
	Venting of smoke produced by fire in the control room by means of the normal ventilation system is acceptable; however, provision should be made to permit isolation of the recirculating portion of the normal ventilation system. Manually operated venting of the control room should be available to the operators.	Comply. The manual controls for air intake are on OPM02J. For details see FSAR Subsection 9.4.1.3d and Fire Protection Report Subsection 2.3.2.1.
	All cables that enter the control room should terminate in the control room. That is, no cabling should be routed through the control room from one area to another. Cables in underfloor and ceiling spaces should meet the separation criteria necessary for fire protection.	Comply. All cables that enter the control room terminate in the control room. The ESF Division 11 cables enter from the ceiling and ESF Division 12 cables enter from the floor. Cable separation is defined in IEEE Standard 384-1974 and NRC Regulatory Guide 1.75.
	Air-handling functions should be ducted separately from cable runs in such spaces; i.e., if cables are routed in underfloor or ceiling spaces, these spaces should not be used as air	Comply, except as explained below. Ceiling and floor are not used as a plenum. Ducts are not used for cable runs.

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plenums for ventilation of the control room. Fully enclosed electrical raceways located in such underfloor and ceiling spaces, if over 1 square foot in cross-sectional area, should have automatic fire suppression inside. Area automatic fire suppression should be provided for underfloor and ceiling spaces if used for cable runs unless all cable is run in 4-inch or smaller steel conduit or the cables are in fully enclosed raceways internally protected by automatic fire suppression.	There are no electrical cable trays located under floor and ceiling spaces. Currently, this is also true for the raised floor in the process computer room, which is part of the control room complex. There are some conduits above dropped ceiling. Upper cable spreading room has automatic halon and lower cable spreading room has automatic CO_2. Upper cable spreading room has manual CO_2 as a backup.
There should be no carpeting in the control room.	Carpeting in the main control room has a flame spread of 25 or less.
c. Cable Spreading Room	
The primary fire suppression in the cable spreading room should be an automatic water system such as closed-head sprinklers, open-head deluge system, or open directional water spray system. Deluge and open spray systems should have provisions for manual operation at a remote station; however, there should be provisions to preclude inadvertent operation. Location of sprinkler heads or spray nozzles should consider cable tray arrangements and possible transient combustibles to ensure adequate water coverage for areas that could present exposure hazards to the cable system. Cables should be designed to allow wetting down with water supplied by the fire suppression system without electrical faulting.	Comply, except as explained below: The Byron/Braidwood design includes several cable spreading rooms at elevation 439'-0" and 463'-4-1/2". The rooms are designed such that redundant safe shutdown cabling is routed through separate rooms (except as noted in Section 2.4.2) and isolated by 3-hour fire barriers. The upper cable spreading rooms are protected by an automatic Halon 1301 system, with a manual CO_2 backup system. Manual hose stations and portable extinguishers provide additional backup. The lower cable spreading areas are protected by an automatic CO_2 system. Backup is provided by manual hose stations and portable extinguishers. Conformance of the halon and CO_2 systems as installed at Braidwood to the requirements of the governing codes, NFPA 12 and NFPA 12A, will be evaluated.

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Open-head deluge and open directional spray system should be zoned. The use of foam is acceptable. Cable spreading rooms should have: (1) At least two remote and separate entrances for access by fire brigade personnel; (2) An aisle separation between tray stacks at least 3 feet wide and 8 feet high; (3) Hose stations and portable extinguishers installed immediately outside the room; (4) Area smoke detection; and (5) Continuous line-type heat detectors for cable trays inside the cable spreading room. Drains to remove fire fighting water should be provided. When gas systems are installed, drains should have adequate seals or the gas extinguishing systems should be sized to compensate for losses through the drains. A separate cable spreading room should be provided for each redundant division. Cable spreading rooms should not be shared between reactors. Each cable spreading room should be separated from the others and from other areas of the plant by barriers with a minimum fire	Cable spreading rooms 3.3B-1 and 3.3B-2 have only one access door. The BTP position is that an automatic water suppression system should be installed in the cable spreading rooms. The Braidwood system provides adequate fire protection in the cable spreading rooms without an automatic water system. Hose stations are available for use in the cable spreading rooms if required. An automatic water suppression system was not installed in the cable rooms because of concerns about the probability and effects of inadvertent actuations. The thermal elements in the Fenwal rate compensated heat detectors are very similar to the thermal elements in the automatic water suppression systems. Since a cable fire would generate large quantities of smoke in a very early stage of a fire, the ionization detectors would be very effective in detecting small cable fires and annunciating in the control room. If the fire was of such magnitude that the thermal detectors sensed the fire, the automation actuation of the fire suppression system would then be initiated. The detector circuits are designed that if either of the redundant detection zones failed, the remaining detection zone could then solely initiate the automatic suppression system. For this application the cross-zoning of rate compensated heat detectors with ionization detectors would not reduce the responsiveness of a fire detection system compared to a closed-head sprinkler system. A deluge system which indiscriminately sprays a large area will result in a significant effort to restore the cable spreading room to normal conditions and could

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	rating of 3 hours. If this is not possible, a dedicated system should be provided. The ventilation system to each cable spreading room should be designed to isolate the area upon actuation of any gas extinguishing system in the area. Separate manually actuated smoke venting that is operable from outside the room should be provided for the cable spreading room.	potentially cause other problems if water leaks into adjacent areas such as the control room which is below the upper cable spreading room, or the ESF switchgear room which is below the lower cable spreading room. Inadvertent actuation of a halon or CO_2 system would have no adverse effects. The probability of a fire in a cable spreading room is quite low. The main combustible material is cable insulation. The cables are covered with EPR or EPDM insulation with hypalon jackets. The cables have passed IEEE 383-1974 flame tests. In the event of a fire in a cable spreading room, spread of the fire would be prevented by 3-hour fire barriers. Disabling of one full cable spreading room would not prevent safe shutdown of the plant due to the redundancy and separation criteria used in design. This fire barrier construction ensures a long residence time in the event of a halon or CO_2 discharge. In the unlikely event that water is required to quench hot areas after a fire, manual application of water using the nearby hose stations will provide localized control without the effects to the general area which could result from actuation of a deluge system. As shown in the Braidwood Fire Protection Report, hose stations are located in each compartment of the upper and lower cable spreading areas. Hose stations are located adjacent to each doorway so that water availability will be guaranteed even if severe smoke conditions exist. In summary, the Braidwood cable spreading area fire protection system design ensures that fire will not compromise plant safety. Use of automatic halon or CO_2 systems instead of water deluge reduces the probability

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	of a plant shutdown or equipment damage in the event of a spurious actuation. Additionally, the area is well supplied with manual hose stations and portable fire extinguishers.
d. Plant Computer Rooms	
Computer rooms for computers performing safety-related functions that are not part of the control room complex should be separated from other areas of the plant by barriers having a minimum fire resistance rating of 3 hours and should be protected by automatic detection and fixed automatic suppression. Computers that are part of the control room complex but not in the control room should be separated and protected as described in Position C.7.b. Computer cabinets located in the control room should be protected as other control room equipment and cable runs therein. Non-safety-related computers outside the control room complex should be separated from safety-related areas by fire barriers with a minimum rating of 3 hours and should be protected as needed to prevent fire and smoke damage to safety-related equipment.	The process computer at Braidwood is non-safety-related and is part of the control room complex. Automatic fixed suppression is not provided. Fire protection features which are provided are described in Subsection 2.3.4 of this report.
e. Switchgear Rooms	
Switchgear rooms containing safety-related equipment should be separated from the remainder of the plant by barriers with a minimum fire rating of 3 hours. Redundant switchgear safety divisions should be separated from each other by barriers with a 3-hour fire rating. Automatic fire detectors should alarm and annunciate in the control room	Comply, except as noted below: Alarms do not annunciate locally. Doors in the L-line wall on EL 426'-0" that separate the Switchgear Rooms and adjacent turbine building fire zones are non-labeled fire doors. The subject doors are addressed in Generic Letter 86-10 Evaluation EC-EVAL 392603; this evaluation determined that the doors are adequate for the fire hazards to which they are exposed and justifies the use of each non-labeled fire door. Refer to EC 391762 and EC-EVAL 392603.

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and alarm locally. Cables entering the switchgear room that do not terminate or perform a function there should be kept at a minimum to minimize the combustible loading. These rooms should not be used for any other purpose. Fire hose stations and portable fire extinguishers should be readily available outside the area.	
Equipment should be located to facilitate access for manual fire fighting. Drains should be provided to prevent water accumulation from damaging safety-related equipment (see NFPA 92M, "Waterproofing and Draining of Floors"). Remote manually actuated ventilation should be provided for venting smoke when manual fire suppression effort is needed (see Position C.5.f).	See Table 3-1 for delineation of conformance with NFPA 92M.
f. Remote Safety-Related Panels	Comply, except as noted below:
Redundant safety-related panels remote from the control room complex should be separated from each other by barriers having a minimum fire rating of 3 hours. Panels providing remote shutdown capability should be separated from the control room complex by barriers having a minimum fire rating of 3 hours. Panels providing remote shutdown capability should be electrically isolated from the control room complex so that a fire in either area will not affect shutdown capability from the other area. 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	The remote shutdown panels can be electrically isolated from control room equipment by transfer switches located on the panels. For control room evacuation or damage, this isolates the remote shutdown panels from the control room, but also renders the control room panels inoperable. The redundant remote shutdown panels are not separated from each other by 3-hour-rated barriers. They are located alongside each other in the same room. The automatic detectors provided for the remote shutdown control room do not alarm locally. Alternate shutdown is provided for a fire in the remote shutdown control room by operating equipment from the switchgear rooms and locally. This is covered by Braidwood Procedure 1BWOA ELEC-5.

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and limited to those required for operation. Portable extinguishers and manual hose stations should be readily available in the general area.	
g. Safety-Related Battery Rooms	
Safety-related battery rooms should be protected against fires and explosions. Battery rooms should be separated from each other and other areas of the plant by barriers having a minimum fire rating of 3 hours inclusive of all penetrations and openings. DC switchgear and inverters should not be located in these battery rooms. Automatic fire detection should be provided to alarm and annunciate in the control room and alarm locally. Ventilation systems in the battery rooms should be cap-able of maintaining the hydrogen concentration well below 2 vol-%. Loss of ventilation should be alarmed in the control room. Standpipe and hose and portable extinguishers should be readily available outside the room.	Comply, with exception noted below. The safety-related batteries are located in the same fire zone with their associated battery charger, inverter, and dc switchgear and distribution panels. The battery itself is located in a separate room within the larger miscellaneous electric equipment room (fire zone) and has its own ventilation system, but is separated by 3-hour walls and an unrated ceiling. Each battery and electrical equipment room is separated from its redundant counterpart and other fire zones by 3-hour-rated fire barriers. Detectors do not alarm locally.
h. Turbine Building	
The turbine building should be separated from adjacent structures containing safety-related equipment by a fire barrier with a minimum rating of 3 hours. The fire barriers should be designed so as to maintain structural integrity even in the event of a complete collapse of the turbine structure. Openings and penetrations in the fire barrier should be minimized and should not be located where the turbine oil system or generator hydrogen cooling system creates	The Applicant complies with this position with two exceptions. The complete collapse of the turbine building structure is not a design basis event for the Braidwood plant. This building, although not a Category I structure, is designed for the SSE and other Category I loads. Fire protection features are adequate to prevent a fire of sufficient severity to threaten the integrity of the structure from developing. Additionally, four fire doors in L-line wall that separate the turbine building on El3 401'-0" and adjacent DG Rooms and four fire doors in the L-line wall that separate the turbine building on El.426'-0" and Switchgear Rooms are non-labeled fire doors.

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a direct fire exposure hazard to the barrier. Considering the severity of the fire hazards, defense in-depth may dictate additional protection to ensure barrier integrity.	The subject doors are addressed in Generic Letter 86-10 Evaluation EC-EVAL 32603; this evaluation determined that the doors are adequate for the fire hazards to which they are exposed and justifies the use of each non-labeled fire door. Refer to EC 391762 and EC-EVAL 392603.
i. Diesel Generator Areas	
Diesel generators should be separated from each other and from other areas of the plant by fire barriers having a minimum fire resistance rating of 3 hours.	Comply, except as noted below: UV detectors do not alarm locally. Thermal detectors do alarm locally prior to CO_2 discharge. Doors in the L-line wall on EL 401'-0" that separate the dg Rooms and adjacent turbine building fire zones are non-labeled fire doors. The subject doors are addressed in Generic Letter 86-10 Evaluation EC-EVAL 392603; this evaluation determined that the doors are adequate for the fire hazards to which they are exposed and justifies the use of each non-labeled fire door. Refer to EC 391762 and EC-EVAL 392603.
Automatic fire suppression should be installed to combat any diesel generator or lubricating oil fires; such systems should be designed for operation when the diesel is running without affecting the diesel. Automatic fire detection should be provided to alarm and annunciate in the control room and alarm locally. Hose stations and portable extinguishers should be readily available outside the area. Drainage for fire fighting water and means for local manual venting of smoke should be provided.	Some diesel oil piping associated with one ESF train is routed through redundant train fire areas. Some diesel oil piping associated with one ESF train is routed through the redundant train's room. Calculations (MAD 90-0079 and 3C8-0890-001) have been performed to demonstrate that even if this DO piping is unprotected, a fire in this zone does not affect the operability of the redundant diesel generator. Therefore, a fire in this zone would not affect the ability to shut down the plant safely. However, fire wrap was added as a conservative measure on most DO lines associated with the ESF train credited for safe shutdown.

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	Day tanks with total capacity up to 1100 gallons are permitted in the diesel generator area under the following conditions:	
	(1) The day tank is located in a separate enclosure with a minimum fire resistance rating of 3 hours, including doors or penetrations. These enclosures should be capable of containing the entire contents of the day tanks and should be protected by an automatic fire suppression system, or	

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(2) The day tank is located inside the diesel generator room in a diked enclosure that has sufficient capacity to hold 110% of the contents of the day tank or is drained to a safe location.	
j. Diesel Fuel Oil Storage Areas	
Diesel fuel oil tanks with a capacity greater than 1,100 gallons should not be located inside buildings containing safety-related equipment. If above-ground tanks are used, 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 3 hours. Potential oil spills should be confined or directed away from buildings containing safety-related equipment. Totally buried tanks are acceptable outside or under buildings (see NFPA 30, "Flammable and Combustible Liquids Code," for additional guidance). Above-ground tanks should be protected by an automatic fire suppression system.	Comply, except as noted below: Diesel fuel oil tanks are located within the Auxiliary Building. See Table 3-1 for delineation of conformance with NFPA 30. The outdoor above-ground diesel fuel oil storage tanks (located more than 100 feet away from any building containing safety-related equipment) are not protected by an automatic fire suppression system. Potential fuel oil spills are confined within a berm. Manual suppression capability will prevent the fire from spreading from the berm.
k. Safety-Related Pumps	
Pump houses and rooms housing redundant safety-related pump trains should be separated from each other and from other areas of the plant by fire barriers having at least 3-hour ratings. These rooms should be protected by automatic fire detection and	Comply, except as noted below: Most safety-related pumps are located in the Auxiliary Building. Most pumps are located in individual rooms separated from other plant areas by walls of substantial construction, but which generally do not carry fire ratings.

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suppression unless a fire hazards analysis can demonstrate that a fire will not endanger other safety-related equipment required for safe plant shut-down. Fire detection should alarm and annunciate in the control room and alarm locally. Hose stations and portable extinguishers should be readily accessible.	Automatic fire detection is provided for all pumps, but automatic suppression is in general not provided. Refer to the applicable portions of Sections 2.3 and 2.4 of this Fire Protection Report for a description of individual pumps and the fire hazards and safe shutdown analyses. Deviations from the 10 CFR 50 Appendix R criteria are listed in Appendix A5.7. Ionization detectors are provided which annunciate and alarm in the control room. Detectors do not alarm locally.
Floor drains should be provided to prevent water accumulation from damaging safety-related equipment (see Position C.5.a.(14)). Provisions should be made for manual control of the ventila-tion system to facilitate smoke removal if required for manual fire fighting operation (see Position C.5.f).	
l. New Fuel Area	
Hand portable extinguishers should be located within this area. Also, 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.	Comply, except as noted below: Ionization and ultraviolet detectors are provided which annunciate and alarm in the control room. Detectors do not alarm locally.

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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.	
m. Spent Fuel Pool Area	
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.	Comply, except as noted below: Ionization and ultraviolet detectors are provided which annunciate and alarm in the control room. Detectors do not alarm locally.
n. Radwaste and Decontamination Areas	
Fire barriers, automatic fire suppression and detection, and ventilation controls should be provided.	Comply, except as noted below: Radwaste areas within the Auxiliary Building are separated from other Auxiliary Building areas by non-fire-rated walls. The radwaste areas within the service building are provided with 3-hour-rated barriers between the adjacent turbine building and between other service building areas. Most radwaste areas are not provided with automatic fire suppression systems. Automatic suppression with only partial coverage is provided for radwaste areas within the service building. Refer to Subsection 2.3.14 for detailed description of the various radwaste areas of the plant. Decontamination areas are not treated as separate fire areas, and hence do not have fire barriers or automatic suppression systems. Four such areas are identified on plant drawings. A decontamination skid is shown on the ground floor of the service building. It is part of fire zone 14.6-0. A decontamination station is shown in the radwaste tunnel on Elevation 383 feet 0 inch near column-row 26/N. It

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	is part of fire zone 14.1-0. In the fuel handling building, a decontamination area is shown on Elevation 401 feet 0 inch near column-row 17/Z. It is a pit for washing down spent fuel casks and has neither rated fire barriers nor automatic suppression. It is part of fire zone 12.1-0 (refer to Subsection 2.3.12). Finally, a decontamination/change area and a decontamination pad are shown on Elevation 426 feet 0 inch in the general area of the Auxiliary Building between column-rows 15-21/U-V. These rooms are separated from the rest of the Auxiliary Building by non-fire-rated walls, and they do not have automatic suppression. Refer to Subsection 2.3.11 for a detailed description of these areas.
o. Safety-Related Water Tanks	
Storage tanks that supply water for safe shutdown should be protected from the effects of an exposure fire. Combustible materials should not be stored next to outdoor tanks.	Comply.
p. Records Storage Areas	
Records storage areas should be so located and protected that a fire in these areas does not expose safety-related systems or equipment (see Regulatory Guide 1.88, "Collection, Storage, and Maintenance of Nuclear Power Quality Assurance Records").	Comply. The record storage areas are located such that there is no exposure to safety-related systems. The main record storage facility is located in the service building. For compliance with Regulatory Guide 1.88, see B/B-FSAR Page A1.88-1.
q. Cooling Towers	
Cooling towers should be of noncombustible construction or so located and protected that a fire will not adversely affect any safety-related systems or equipment. Cooling towers should be of noncombustible construction when the basins are	NA

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used for the ultimate heat sink or for the fire protection water supply.	
r. Miscellaneous Areas	
Miscellaneous areas such as shops, warehouses, auxiliary boiler rooms, fuel oil tanks, and flammable and combustible liquid storage tanks should be so located and protected that a fire or effects of a fire, including smoke, will not adversely affect any safety-related systems or equipment.	Comply.

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3.8 SPECIAL PROTECTION GUIDELINES	
a. Storage of Acetylene-Oxygen Fuel Gases	
Gas cylinder storage location should not be in areas that contain or expose safety-related equipment or the fire protection systems that serve those safety-related areas. A permit system should be required to use this equipment in safety-related areas of the plant (also see Position C.2).	Comply. A fire prevention procedure for welding and cutting covers the permit needed to use acetylene-oxygen fuel gases.
b. Storage Areas for Ion Exchange Resins	
Unused ion exchange resins should not be stored in areas that contain or expose safety-related equipment.	Comply.
c. Hazardous Chemicals	
Hazardous chemicals should not be stored in areas that contain or expose safety-related equipment.	Hazardous chemicals such as caustic soda, sulphuric acid, etc., are kept in proper containers in accordance with fire protection recommendations. Ventilation and flood protection are provided. Storage areas have curbs, good drainage, and sump capability.
d. Materials Containing Radioactivity	
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	Comply.

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for removal of decay heat from entrained radioactive materials.	

BRAIDWOOD STATION

NFPA Code Deviations

For

Unit 1 and Common Areas

INTRODUCTION

The National Fire Protection Association (NFPA) code review conducted for Braidwood Station includes Unit 1 and common areas. On a case-by-case basis, the applicable NFPA codes (as referenced in the Branch Technical Position CMEB 9.5-1) were utilized to perform a detailed analysis and evaluation of the fire protection program at Braidwood Station.

The fire protection program review included the fire protection design, installation, acceptance testing, periodic surveillance and maintenance in addition to administrative responsibility. Results of the ongoing code review were forwarded to Commonwealth Edison via itemized deficiency reports. Each item was then evaluated in detail and resolved per NFPA requirements or listed in this finalized deviation report. The review included safety and non-safety-related areas of the plant.

Inspection, testing and maintenance surveillance/predefine activities for the fire protection systems are controlled by the Company's Predefine Program, as described by administrative procedure. This program utilizes an electronic predefine database designed to prompt the scheduling and performance of all predefine activities entered into the system.

A 25% extension of the frequency interval specified for the surveillance/predefine activity is permitted to facilitate scheduling of the activity and to provide consideration for unit operating conditions that may not be suitable for conducting the surveillance/predefine activity (e.g. transient conditions or other ongoing surveillance maintenance activities). This 25% extension does not significantly degrade the reliability that results from performing the surveillance/predefine activity at its specified frequency. This is based on the recognition that the most probable result of any particular surveillance/predefine activity being performed is the verification of conformance with the requirements for the surveillance/predefine activity.

The 25% surveillance/predefine activity frequency interval extension is not intended to be used repeatedly merely as an operational convenience to extend surveillance/predefine activity frequency intervals.

In conclusion, significant progress has been made to identify and resolve noted deficiencies and to assure that the Braidwood fire protection design, installation, and testing program satisfies the guidance of NFPA.

The following NFPA codes were utilized in the Braidwood Station review:

NFPA 4 – 1977 (Organization of Fire Services) and NFPA 4A – 1969 (Fire Department Organization) previously dealt with public or municipal organizations but were withdrawn as NFPA codes and are no longer applicable at the station level.

NFPA 6 – 1974 (Industrial Fire Loss Prevention), NFPA 7 – 1974 (Fire Emergencies Management), and NFPA 8 – 1974 (Management Responsibilities for Effects of Fire on Operations) are no longer NFPA codes but contained useful information on loss prevention organization and responsibility. Guidance from NFPA as well as BTP CMEB 9.5-1 and 10 CFR 50, Appendix R was incorporated into station procedures which clearly define the organization and responsibility of the Braidwood fire protection program.

NFPA 10 - 1984 (Portable Fire Extinguishers)

NFPA 11 - 1983 (Low Expansion Foam and Combined Agent Systems)

NFPA 11A - 1983 (Medium & High Expansion Foam Systems) is not applicable as there are none of these systems at the station.

NFPA 11B (Synthetic Foam & Combined Agent Systems) is no longer a NFPA code and is not applicable as there are none of these systems at the station.

NFPA 12 - 1985 (Carbon Dioxide Extinguishing Systems)

NFPA 12A - 1985 (Halon 1301 Fire Extinguishing Systems)

NFPA 12B - 1985 (Halon 1211 Fire Extinguishing Systems) is not applicable as there are none of these systems at the station.

NFPA 13 - 1985 (Installation of Sprinkler Systems)

NFPA 13A - 1981 (Inspection, Testing and Maintenance of Sprinkler Systems)

NFPA 14 - 1983 (Standpipe and Hose Systems)

NFPA 15 - 1985 (Water Spray Fixed Systems)

NFPA 16 - 1980 (Deluge Foam-Water Sprinkler Systems)

NFPA 20 - 1983 (Centrifugal Fire Pumps)

NFPA 24 - 1984 (Private Fire Service Mains and Their Appurtenances)

NFPA 26 - 1983 (Supervision of Valves Controlling Water Supplies)

NFPA 27 - 1981 (Private Fire Brigades)

NFPA 30 - 1984 (Flammable and Combustible Liquids)

NFPA 37 - 1984 (Stationary Combustion Engines and Gas Turbines)

NFPA 50A - 1984 (Gaseous Hydrogen Systems)

NFPA 51B - 1984 (Fire Prevention in Cutting & Welding Processes)

NFPA 69 - 1978 (Explosion Prevention Systems) is not applicable as there are no explosion suppression systems at the station. Guidance for protecting the over pressurization of vessels containing flammable liquids and compressed gases is covered in the NFPA 30, NFPA 37 and NFPA 50A code reviews.

NFPA 70 - 1984 (National Electrical Code) specifically excludes electric utility generation facilities. However, specific references from the BTP CMEB 9.5-1 regarding indoor transformers and proprietary signaling systems were reviewed. There are no combustible fluid transformers located indoors. The proprietary signaling system is covered in the NFPA 72D review.

NFPA 72D - 1979 (Proprietary Signaling Systems)

NFPA 72E - 1984 (Automatic Fire Detectors)

NFPA 80 - 1983 (Fire Doors and Windows)

NFPA 90A - 1985 (Air Conditioning and Ventilating Systems)

NFPA 92M - 1972 (Waterproofing and Draining of Floors) is no longer a NFPA code. Guidance for waterproofing and drainage was incorporated from applicable NFPA codes.

NFPA 197 - 1966 (Training Standard on Initial Fire Attack) has been renumbered NFPA 1410 and deals with public fire departments and pumper companies and is not applicable at the station level.

NFPA 204M - 1985 (Smoke & Heat Venting)

NFPA 220 - 1985 (Types of Building Construction) is incorporated into the Byron/Braidwood Fire Protection Report building descriptions.

NFPA 231C - 1980 (Rack Storage of Materials)

NFPA 232 - 1980 (Protection of Records)

NFPA 232AM - 1980 (Fire Protection for Archives and Record Centers)

NFPA 251 - 1985 (Fire Tests of Building Construction and Materials) is incorporated into the Byron/Braidwood Fire Protection Report description of materials.

NFPA 259 - 1982 (Test Method for Potential Heat of Building Materials) is included in the Byron/Braidwood Fire Protection Report combustible loadings and heat release values.

NFPA 1962 - 1979 (Care, Use and Maintenance of Fire Hose)

NFPA 802 - 1983 (Fire Protection for Nuclear Research Reactors) does not apply to commercial facilities. Guidance for fire protection was incorporated from NRC regulations and NFPA.

Table 3-1
NFPA CODE DEVIATION REPORT

NFPA 10 - 1984, "Standard for Portable Fire Extinguishers"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 10, para. 4-4.3, Each extinguisher shall have a tag or label securely attached that indicates the month and year the maintenance was performed and shall identify the person performing the service.	Permanently mounted fire extinguishers located in the Containment Building do not have tags or labels securely attached.	Completed surveillance procedure records that contain this information are maintained. This practice is considered equivalent. Paper tags are not provided in the Containment Building due to sump blockage concerns.
2	NFPA 10, para. 4.3.1, Fire extinguishers shall be inspected when initially placed in service and thereafter at approximately 30-day intervals.	Portable handheld extinguishers are inspected at approximately a 90-day frequency based on historical review of failure rate. Hand portable extinguishers inside containment during at power conditions are inspected during planned refuel outages.	Historical review indicates a failure rate of <1%. Administrative procedure allows extension of interval for inspection if failure rate is <1%. During at power conditions, access to containment is controlled administratively to prevent unauthorized Entry. The risk that fire extinguishers located in containment will be tampered with is very small. Inspections and maintenance or replacement of fire extinguishers in containment is performed during planned refuel outages.
3	NFPA 10, para. 4.4.1, Extinguishers shall be subjected to maintenance not more than a year apart	Compliance will be met for all hand portable extinguishers except for those located inside containment during at power conditions. These extinguishers are subjected to maintenance during planned refuel outages.	During at power conditions, access to containment is controlled administratively to prevent unauthorized Entry. The risk that fire extinguishers located in containment will be tampered with is very small. Maintenance or replacement of fire extinguishers in containment is performed during planned refuel outages.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 10 - 1984, "Standard for Portable Fire Extinguishers"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
4	NFPA 10, para. 4-3.1, Extinguishers shall be inspected monthly, or at more frequent intervals when circumstances require.	Wheeled portable extinguishers are inspected at quarterly frequency based on historical review of failure rate.	Historical review indicates a failure rate of < 1%. Administrative procedure allows extension of frequency interval for inspection if the failure rate is < 1%.
5	NFPA 10, para. 4-3.1, Extinguishers shall be inspected monthly, or at more frequent intervals when circumstances require.	CO2 portable extinguishers are inspected at annual frequency based on historical review of failure rate.	Historical review indicates a failure rate of < 1%. Administrative procedure allows extension of frequency interval for inspection if the failure rate is < 1%.
6	NFPA 10, para. 4-3.1, Extinguishers shall be inspected monthly, or at more frequent intervals when circumstances require.	AFFF Wheeled portable extinguishers are inspected at annual frequency based on historical review of failure rate.	Historical review indicates a failure rate of < 1%. Administrative procedure allows extension of frequency interval for inspection if the failure rate is < 1%.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 11 - 1983, "Standard for Low Expansion Foam and Combined Agent Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 11, para. 5-4, Operating and maintenance instructions shall be posted at the control equipment with a second copy maintained on file.	Data will be maintained on file only	All pertinent data is maintained on permanent file. Therefore, it is not necessary to post all information at the equipment.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 12 - 1985, "Standard on Carbon Dioxide Extinguishing Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 12, para. 1-8.3.8, The source of fuel shall be automatically shut off.	The fuel supply to the diesel generators and auxiliary diesel feedwater pump do not shut off automatically upon system actuation.	The continued operation of this equipment may be necessary for operating safety-related equipment. No action necessary.
2	NFPA 12, para. 1-11.2, At least annually, all carbon dioxide systems shall be thoroughly inspected and tested for proper operation by competent personnel.	The systems are surveilled on a 3 year frequency with the exception of the upper cable spreading Room CO2 System which is still at 18 months.	System demonstration procedure was reviewed; SEE EC 394429 for justification.
3	NPFA 12, para. 2-4.1, after the design concentration is reached, the concentration shall be maintained for a substantial period of time, but not less than 20 minutes.	The Upper Cable Spreading room manual systems are not designed to maintain a single actuation, 20 minute hold time.	System is administratively operated to perform an additional manual actuation after 10 minutes, to provide a hold time equal to 20 minutes. (M)MPC Letter dated Oct. 3, 1984).

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 12 - 1985, "Standard on Carbon Dioxide Extinguishing Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
4	NFPA 12, para. 1-6.1.1, Appropriate warning signs shall be affixed outside of those spaces where concentrations of carbon dioxide gas can accumulate, not only in protected spaced but in the adjacent areas where the carbon dioxide could migrate. Typical signs are shown below: Typical sign in protected space: WARNING CARBON DIOXIDE GAS WHEN ALARM OPERATES VACATE IMMEDIATELY Typical sign at entrance to protected space: WARNING CARBON DIOXIDE GAS WHEN ALARM OPERATES DO NOT ENTER UNTIL VENTED Typical sign in nearby space: CAUTION CARBON DIOXIDE DISCHARGE INTO A NEARBY SPACE MAY COLLECT HERE WHEN ALARM OPERATES VACATE IMMEDIATELY	Signage in areas that are protected by carbon dioxide gas are in accordance with the 2005 edition of NFPA 12, para. 4.3.2.	Braidwood Station is in compliance with the intent of para. 1-6.1.1 of the 1985 Edition of NFPA 12. Para. 4.3.2 of the 2005 Edition of NFPA 12 further enhances the wording in signs used, as well as incorporates universal safety symbols to further improve personnel safety.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 12A - 1985 "Standard on Halon 1301 Fire Extinguishing Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 12A, Section 1-9.4.5, Container Test.	Halon cylinder testing is performed per Section 4-2 of the 1997 Edition of NFPA 12A, and not per the 1985 Edition of this standard.	This deviation identified that halon cylinder testing is performed per a more recent edition of the code. Testing does not deviate from the requirements of Section 4-2 of NFPA 12A, 1997 Edition.
2	NFPA 12A, para. 1-11.1.1, at least annually, all systems shall be thoroughly inspected and tested for proper operation by competent personnel.	The halon systems for the upper cable spreading rooms and QA Vault are functionally tested every 3 years.	Performance-based review of system testing, in accordance with Station-Approved procedures, supports this frequency. (Reference EC# 358660 and 394429)
3	NFPA 12A, PARA. 1-8.2.2, detecting equipment shall be installed, tested and maintained in accordance with NFPA 72E, Standards on Automatic Fire Detectors.	SEE NFPA 72E for deviations.	EC 394429 Provides justification
4	NFPA 12A, Para. 1-11.1.6, at least semiannually, the agent quantity and pressure of refillable containers shall be checked.	UCSR Halon cylinders weight and pressure check are performed annually.	Performance Base Review of system testing, in accordance with station approved procedures, supports this frequency. (Reference EC#403823)

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 13 - 1985, "Standard for the Installation of Sprinkler Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 13, para. 2-9.2.2, The pressure gauges shall have a maximum limit not less than twice the normal working pressure at the point where installed.	Installed gauges have a limit of 300 psi.	Gauges are adequate for expected working pressures of 180 psi and are considered acceptable.
2	NFPA 13, para. 3-14.1.1 and 3-14.2, All valves shall be listed.	The Powell, Anchor- Darling, ITT Grinnell and Rockwell-Edwards valves are not listed.	The valves are designed to ANSI Standards and working pressure of 285 psi. Therefore, the valves are considered acceptable.
3	NFPA 13, para. 3-15.1.2, Hanger assemblies shall be listed.	Hanger assemblies in safety-related areas are not listed.	In the Auxiliary Building, all sprinkler system supports are seismically designed by Sargent & Lundy to ANSI B31.1 and are acceptable.
4	NFPA 13, para. 2-7.1, A fire department connection shall be provided.	A fire department pumper connection is not provided.	The only source of water is the cooling lake, therefore, a pumper connection would be of no value without a municipal supply.
5	NFPA 13, Chapter 4. Spacing, locations and position of sprinklers shall be made in accordance with NFPA.	Deviating locations and positions of sprinklers were identified.	Field changes made to eliminate obstructions where practical. Other partial obstructions are protected by adjacent sprinklers which provide overlapping coverage for the area. Obstructions to the foam sprinkler heads located in the Diesel Fuel Oil Storage Tank Rooms have been evaluated under GL 86-10 evaluation, EC# 391656 and found to be acceptable.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 13 - 1985, "Standard for the Installation of Sprinkler Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
6	NFPA 13, para. 7-1.2, The installer shall identify a hydraulically designed system by an attached placard.	Signs or placards are not provided for hydraulically designed systems.	The placards have been provided for the hydraulically designed systems.
7	NFPA 13, para. 3-11.2.5, Each interior sectional valve shall be provided with a sectional drain valve.	Drains are not provided at each sectional valve.	Drainage provisions are made throughout the piping system at locations other than at each sectional valve. This arrangement is adequate to drain all portions of the system(s).
8	NFPA 13, para. 3-10.3.4, Clearance shall be provided around all piping extending through walls and floors.	Some portions of the piping pass through walls and floors without clearance.	Sargent & Lundy has designed anchor points on the fire protection piping, therefore, clearances are not provided as it would affect the structural design.
9	NFPA 13A, para. 4-4.1, Gauges should be checked monthly on sprinkler systems and weekly on deluge systems.	Gauges are checked quarterly and semi-annually.	With periodic alarm tests, inspector's test, drain test, valve position surveillance, system operability will be monitored. Quarterly gauge checks are considered more than adequate.
10	NFPA 13A, para. 4-4.2, Gauges should be checked with an inspector's gauge every 5 years.	No procedure for 5-year check.	Gauges will be observed quarterly on drain tests. Any unusual conditions will be resolved, including gauge off scale. This will satisfy a separate gauge check every 5 years and is considered acceptable.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 13 - 1985, "Standard for the Installation of Sprinkler Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
11	NFPA 13-2002 Edition, para. 7.3.2.3.1, pre-action sprinkler piping shall be automatically supervised where there are more than 20 sprinklers on the system.	The Containment Access Facility (CAF) pre-action sprinkler piping is not automatically supervised and has more than 20 sprinklers.	This deviation is considered acceptable based upon the justification provided in EC 355868.
12	NFPA 13, para. 4-4.8.2.3 "Shall be placed 6 to 12 in. from the draft stop on the side away from the opening to form a water curtain."	AUX Building stairwell sprinklers near P/18 has sprinklers located closer than 6 inches.	This deviation is considered acceptable based upon the justification provided in EC 399104.
13	N/A	The deluge systems piping for Main Power Transformers 1E and 1W are designed in accordance with applicable sections of NFPA 13-2013.	The deluge systems piping for Main Power Transformers 1E and 1W are redesigned (Reference EC 379761). It is acceptable to design the new systems to the code year (2013) that was current at the time of design.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 13A - 1981, "Inspection, Testing and Maintenance of Sprinkler Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 13A, para. 2-7.1.4, All control valves of the sprinkler system should be inspected at regular intervals Sealed valves -weekly Locked valves and valves with tamper switches – monthly	The sprinkler system alarm shutoff valves position verification is performed at quarterly frequency based on historical review of failure rate.	Historical review indicates a failure rate of < 1%. Administrative procedure allows extension of frequency interval for inspection if the failure rate is < 1%.
2	NFPA 13A, para. 2-7.1.4, All control valves of the sprinkler system should be inspected at regular intervals Sealed valves -weekly Locked valves and valves with tamper switches – monthly	The automatic deluge system trim valves position verification is performed at quarterly frequency based on historical review of failure rate.	Historical review indicates a failure rate of < 1%. Administrative procedure allows extension of frequency interval for inspection if the failure rate is < 1%.
3	NFPA 13A, para. 4-7.1, Test alarms quarterly by opening the inspector's test connections.	The automatic deluge (Turbine Bearing) system alarm test is performed at semiannual frequency based on historical review of failure rate.	Historical review indicates a failure rate of < 1%. Administrative procedure allows extension of frequency interval for inspection if the failure rate is < 1%.
4	NFPA 13A, para. 4-5.3, Water flow alarm devices should be tested at least quarterly, weather permitting.	The automatic deluge (Turbine Bearing) system alarm test is performed at semiannual frequency based on historical review of failure rate.	Historical review indicates a failure rate of < 1%. Administrative procedure allows extension of frequency interval for inspection if the failure rate is < 1%.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 13A - 1981, "Inspection, Testing and Maintenance of Sprinkler Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
5	NFPA 13A, para. 2-6.1, Main drain valves water flow tests should be made quarterly from water supply test pipes.	Main drain valve water flow tests are not performed.	See EC 357163 for justification.
6	NFPA 13A, para. 2.5-1, Private hydrants should be inspected monthly to verify that they are visible and readily accessible with caps in place.	Private hydrants are inspected annually.	Private hydrants are inspected annually to NFPA 25 inspection, test, and maintenance requirements.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 14 - 1983, "Standard for the Installation of Standpipe and Hose Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 14, para. 3-2.2, All portions of each story of a building shall be within 30 ft of a nozzle when attached to not more than 100 ft of hose.	All portions of the steam tunnel do not meet this requirement.	The present arrangement and proposed resolution is acceptable per NRR site audit of 8-18-86.
2	NFPA 14, para. 4-2.1 & 4-4.2, Valves at the main riser, including hose valves, shall be approved.	Anchor-Darling, Conval, Anderson Greenwood, Powell and ITT Grinnell valves are not listed.	The valves are designed per ANSI Standards and a working pressure of 285 psi. Therefore, the valves are considered acceptable.
3	NFPA 14, para. 4-7.1, Where pressure at any hose outlet exceeds 100 psi, an approved device shall be installed to reduce the pressure to 100 psi.	Pressure reducing devices are not installed for hose stations.	Fire brigade members have been trained for hose pressure in excess of 150 psi. This will satisfy the omission of pressure reducing devices.
4	NFPA 14, para. 5-2.3 At least one water supply shall be automatic and capable of supplying the streams first operated until secondary sources can be brought into action.	A water supply is not available at the River Screenhouse.	The hose stations at the River Screenhouse have been removed. The water supply from the Circulating Water Make-up Pumps is insufficient to support the proper operation of the hose stations. The local fire department provides water suppression capability. This is considered acceptable.
5	NFPA 14, para. 3-3.1 Standpipes shall be located in fire rated stair enclosures.	Standpipes are located throughout the plant.	In order to provide adequate distribution of hose stations throughout the facility, it is not possible to enclose the entire standpipe system. Sectionalizing valves are provided to isolate a minimum number of hose stations if necessary. This design is considered acceptable.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 14 - 1983, "Standard for the Installation of Standpipe and Hose Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
6	NFPA 14, para. 7-6.1.1, Pipe hangers shall be approved.	Pipe hangers in safety-related areas are not listed.	In containment, Auxiliary Building and Fuel Handling the piping supports are seismically designed by Sargent & Lundy in accordance with ANSI B31.1. Therefore, the hanger design is considered acceptable.
7	NFPA 14-1983, para. 4-4.3.1, Listed fire hose shall be used.	Hard rubber hose is used for the cable spreading room area and electric cable tunnels. The hose may not be listed by UL or approved by Factory Mutual (FM). The listing or approval is dependent on availability of listing or approval from the applicable authority at the time of procurement.	Hard rubber hose is used on these hose stations for maneuverability in the cable areas. The hose is hydrostatically tested and surveilled to the same standards regardless of listing or approval status.
8	NFPA 14-1983, para. 4-4.3.2 & 4.3.3, Each station provided with a 1.5-inch hose shall be equipped with a listed rack and affixed with a label, "Fire hose for use by occupants."	U.L. listed replacement hose reels are no longer available. These reels will be replaced with similar non-listed hose reels, as needed.	Fire hose is used by trained fire brigade personnel only. Non-listed hose reels do not affect the firefighting performance of the hose station. Other than red color-coded piping, no other labels are required.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 15 - 1985, "Standard for Water Spray Fixed Systems for Fire Protection"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 15, para. 2-6, Hangers shall be approved.	Hangers are not listed in safety-related areas.	Hanger supports in Containment, Auxiliary Building and Fuel Handling Building are seismically designed by Sargent & Lundy to ANSI B31.1 and are considered acceptable.
2	NFPA 15, para 2-7, All valves shall be approved.	The Anchor-Darling, Target Rock solenoid, Rockwell Edwards, and ITT Grinnell valves on the charcoal filters units are not listed.	The valves are designed to ANSI Standards and a working pressure of 285 psi and are considered acceptable.
3	NFPA 15, para. 2-1.2, Only listed devices shall be employed.	The Namco Controls and Micro Switch Co. valve position limit switches on the charcoal filters are not listed.	The Namco switch is manufactured for nuclear environments and the Micro switch device has a U.L. electrical listing. The switches are utilized for special applications and will be tested periodically and are acceptable as is.
4	NFPA 15, para. 2-1.2, Only listed devices shall be employed.	The Spraying Systems Co. nozzles on the charcoal filters are not listed.	The unique configuration of each charcoal filter requires a specialized nozzle for adequate water spray application. There are no listed nozzles available for this purpose. The existing equipment is acceptable.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 15 - 1985, "Standard for Water Spray Fixed Systems for Fire Protection"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
5	NFPA 15, para. 2-8.4, Automatic detection equipment shall be listed.	The following charcoal filters utilize United Electric or Conax heat detection devices that are not specifically listed for fire protection service: Braidwood charcoal filters 1VP05FA & FB have been removed per EC 401148 and 2VP05FA & FB have been removed per EC 401150, 0VF05FA & FB, 0VC06FA & FB, OVF04F, 1VQ09F, 2VQ09F, 00G04F & 5F, 0VW012F/18F, and 0VV21F & 22F. The United Electric devices are U.L. listed for hazardous atmospheres and the Conax RTD thermocouples are industrial grade heat sensing devices. The detectors are an acceptable design for alarm purposes since the water spray systems are actuated manually.	The United Electric devices are U.L. listed for hazardous atmospheres and the Conax RTD thermocouples are industrial grade heat sensing devices. The detectors are an acceptable design for alarm purposes since the water spray systems are actuated manually.
6	NFPA 15, para. 4-6.2, Adequate provisions shall be made to promptly and effectively dispose of all liquids from the fire area during operation of all systems in the fire area.	Charcoal filter drains not sized for largest possible water flow.	Administrative procedures have been written to address potential overflow. This is acceptable.
7	NFPA 15, para. 6-2.7, Main Drain flow tests shall be made after valves are reopened (See NFPA 13A, Recommended Practice for the Inspection, Testing and maintenance of Sprinkler System.)	Main drain valve water flow tests are not performed.	See EC-EVAL 357163 for justification.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 16 - 1980, "Standard for the Installation of Deluge Foam-Water Sprinkler Systems and Foam-Water Spray Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 16, para. 2-1, All component parts shall be listed.	The ASCO "Redhat" solenoid valve and Rockwood model A-20 pneumatic actuator are not listed.	A listed solenoid valve is not available for this installation. Upon testing completion, the equipment should be acceptable.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 20 - 1983, "Standard for the Installation of Centrifugal Fire Pumps"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 20, paras. 2-7.6 and 8 3.1, The floor shall be pitched for adequate drainage of escaping water or fuel away from the pump, driver, controller, fuel tank, etc. The pump room shall be provided with a floor drain.	The diesel fire pump room floor is pitched towards a floor drain that contains a sleeved pipe with an opening 4" above the floor.	The entire room is designated as a curbed area inside the Lake Screen House. This is considered adequate.
2	NFPA 20, para. 2-10.5, Listed valves shall be installed on the system side of the check valve.	Powell gate valves are not listed.	The Powell valves are designed to ANSI Standards and working pressure of 285 psi and are considered acceptable.
3	NFPA 20, para. 2-13.3.1, Hose valves shall be listed.	Vogt gate valves are not listed (test header).	The Vogt test header valves are designed to ANSI Standards and working pressure of 740 psi and are considered acceptable.
4	NFPA 20, para. 2-13.3,1, Test header pipe shall be 12".	A 10" pipe is installed.	The 10" test header pipe provides adequate flow as recorded on all previous fire pump tests. Therefore, the 10" line is acceptable.
5	NFPA 20, para. 6-3.1.1, Fire pump feeder conductors inside buildings shall be enclosed by 2" of concrete or equivalent 1-hour fire resistance.	Some conductors are not in concrete (elec. pump).	All conductors are in heavy steel conduit that will provide fire resistance and the cable routing is acceptable.
6	NFPA 20, para. 7-1.1.1, All controllers shall be listed for electric motor driven fire pump service.	Electric motor controller is not listed.	Justification is provided in T. R. Tramm's letter of 12 14 83 to H. R. Denton.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 20 - 1983, "Standard for the Installation of Centrifugal Fire Pumps"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
7	NFPA 20, paras. 7-1.1.3, 7 3.7.1, 7-3.8 & 7 3.9, Wiring diagrams, marking of each motor control device, and instructions shall be mounted on the controller.	All electrical information is not attached to the controller on the electric motor-driven fire pump.	Complete electrical information including diagrams, ratings, and vendor manuals are permanently on file at the station. The data are retrievable via equipment identification number. Therefore, all pertinent data are available when required.
8	NFPA 20, para. 7-4.3, An over current protective device shall be located within the fire pump controller.	Over current device is not located within the fire pump controller.	Over current protection is provided from 4160-V switchgear bus 144, cubicle 000 and considered acceptable.
9	NFPA 20, para. 7-4.6 Alarms shall be provided for (b) loss of line power, and (c) phase reversal.	Line power is monitored on the feeder source and there is no phase reversal alarm.	Loss of power on the 4160-V bus which feeds the fire pump motor is annunciated on control room panel 1PM07J. Phase reversal is highly improbable and therefore is not alarmed.
10	NFPA 20, para. 7-6.2, An ammeter and voltmeter shall be provided on the controller.	An ammeter is attached to the electric pump controller, but not a voltmeter.	For testing, provisions are made to measure volts and amps. This is acceptable for testing and surveillance purposes.
11	NFPA 20, para. 8-6.1, Engines shall be started no less that once a week and run for no less than 30 minutes to attain normal running temperatures.	Diesel engines are started every 31 days.	The diesel engine fire pump will be started from ambient conditions and operated 30 minutes or more every 31 days.
12	NFPA 20, para. 8-6.2 Oil shall be changed in accordance with the manufacturer's recommendations but not less than annually.	Oil is changed in accordance with the manufacturer's recommendations but exceeds the, "not less frequently than annually," requirement.	Manufacturer's recommendation allows for alternate methods to determine oil change intervals established through use of oil analysis. Oil analysis performed under PMID 39101-07.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 20 - 1983, "Standard for the Installation of Centrifugal Fire Pumps"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
13	NFPA 20, para. 8-2.7.2, The automatic electric solenoid valve in the cooling water line for the heat exchanger shall be listed for fire protection service.	The solenoid valve is not listed.	A listed valve is not available in the required pressure rating for the diesel engine pump. The existing valve has tested satisfactory and is considered acceptable.
14	NFPA 20, para. 9-4.2.2, An alarm shall be provided indicating that the controller switch has been turned to the off or manual position (separate signal).	The off and manual positions on the diesel engine pump are combined with other trouble condition alarms.	Control rooms alarm response procedure BWAR-O-38-C7 addresses trouble conditions including controller position "off." Since all trouble conditions are investigated, a separate signal is not necessary.
15	NFPA 20, para. 2-4, Pumps shall be provided with an accurate nameplate.	Nameplate data on electric motor-driven pump indicates BHP-3202	Accurate brake horsepower data are provided on vendor drawings and manual is on file at the station.
16	NFPA 20, para. 11-4.5, When units are to be tested weekly by manual means, at least one start shall be accomplished by reducing the water pressure.	Fire pumps are tested every 31 days.	The water- and diesel-driven fire pumps are operated every 31 days.
17	NFPA 20, Para 11-3.1, An annual Test of the fire pump assembly (pump, driver and controller) shall be performed to determine its ability to continue to attain satisfactory performance at peak loads.	A functional test is performed at least once per 18 months to demonstrate fire pump's ability at minimum, rated and peak load conditions.	The testing is performed per BwAP 1110-1, Fire Protection Program System Requirements.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 24 - 1984, "Standard for the Installation of Private Service Mains and Their Appurtenances"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 24, para. 3-1.1, All control valves shall be listed.	Essential service water valves 0SX172 and 0SX174, and the Powell and Anchor-Darling valves are not listed.	The SX valves are ASME section III and provide a cross-tie to ensure a seismically qualified backup water supply to portions of Category I standpipes in safety-related areas. The Powell and Anchor-Darling valves are designated to ANSI Standards and working pressure of 285 psi. These valves are considered acceptable.
2	NFPA 24, para. 3-2.2, A check valve shall be installed in each connection.	Check valves are not installed at the connections to essential service water (SX), makeup demineralized water, and the station air compressors.	The valved connections are normally closed with procedures written to monitor potential leakage. This is considered acceptable.
3	NFPA 24, para. 3-3.1 & 3-1.1, Every connection from the fire main to a building shall be provided with a listed indicating valve, unless a non-indicating underground gate valve with roadway box and T-wrench is accepted by the authority having jurisdiction.	Valve 0FP590 for the Gate House hose stations is a non-indicating underground valve with roadway box. Valve 0FP983 for the Unit 2 Containment Access Facility is a non-indicating underground valve with roadway box.	Procedures are written to surveil the valve, and T wrenches are available to operating personnel. This is considered acceptable.
4	NFPA 24, para. 3-3.2, Post indicator valves shall be located not less than 40 ft from buildings.	The following valves are less than the 40 ft distance: 0FP579, 0FP591, 0FP580, 0FP592, 0FP581, 0FP593, 0FP582, 0FP602, 0FP588.	The vales are located along blank walls and are accessible. This is considered adequate.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 24 - 1984, "Standard for the Installation of Private Service Mains and Their Appurtenances"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
5	NFPA 24, para. 4-2.3, Hydrants shall be at least 40 ft from buildings.	The following hydrants are less than the 40 ft distance: 0FP05S, 0FP23S, 0FP070, 0PF24S, 0FP21S.	The hydrants are located along blank walls and can be isolated from the fire main. This is considered acceptable.
6	NFPA 24, para. 8-6.2.10, Thrust blocks or other suitable means of restraint shall be provided at fittings for each change in direction of a pipeline and at tees, plugs, caps, and bends.	Insufficient documentation to determine thrust restraint locations on flanged hydrant connections.	A Technical Staff Surveillance will monitor any unusual system leakage. Thrust blocks have been provided as necessary during routine maintenance and hydrant repositioning. The present anchoring is considered adequate.
7	NFPA 24, para. 7-2, All ferrous metal pipe shall be lined.	Pipe is not lined.	Periodic flow tests will monitor the interior condition of the pipe. Hydraulic calculations will also utilize a conservative C factor of 100 to account for extended age. This is adequate in lieu of lining pipe.
8	NFPA 24, para. 4-3.6, To ensure proper functioning, dry barrel hydrants shall be tested semiannually.	Hydrants are tested annually.	Hydrants are tested at least once per 12 months to ensure proper functioning.
9	NFPA 24, para. 4-1.1, Hydrants shall have not less than a 6" connection with the mains.	Wall hydrant 1FP01S in the Unit 1 Containment Access Facility has a 3" supply connection from the main.	Calculation BRW-05-0099-M has demonstrated that there is sufficient flow to provide two effective hose streams from hydrant 1FP01S.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 26 - 1983, "Supervision of Valves Controlling Water Supplies for Fire Protection"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 26, para. 3-1, The locked open valves should be inspected monthly.	Locked open valves are inspected every 92 days.	Locked open valves are inspected every 92 days to verify the valve is in the correct position.
2	NFPA 26, para. 3-1, A systematic weekly inspection (or monthly in the case of locked - open valves) of each valve should be made.	The sprinkler system alarm shutoff valves position verification is performed at quarterly frequency based on historical review of failure rate.	Historical review indicates a failure rate of < 1%. Administrative procedure allows extension of frequency interval for inspection if the failure rate is < 1%.
3	NFPA 26, para. 3-1, A systematic weekly inspection (or monthly in the case of locked - open valves) of each valve should be made.	The automatic deluge system trim valves position verification is performed at quarterly frequency based on historical review of failure rate.	Historical review indicates a failure rate of < 1%. Administrative procedure allows extension of frequency interval for inspection if the failure rate is < 1%.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 27 - 1981, "Recommendations for Organization, Training and Equipment of Private Fire Brigades"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 27, para. 4-2.1, Training should be conducted and supervised, where possible, by a State Certified Fire Service Instructor.	Classroom training is conducted by training department instructors.	The classroom instructors are qualified for the subject areas presented. In addition, two state certified Fire Service Instructors are involved in all live fire training and some classroom instruction. The training program is considered acceptable.
2	NFPA 27, para. 4-3, Training sessions should be held at least monthly for one hour or more per shift	Training sessions are conducted quarterly.	Training sessions conducted quarterly result in a total of 12 hours of training per year for each brigade member. This level of training is considered as satisfying NFPA.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 30 - 1984, "Flammable and Combustible Liquids Code"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 30, para. 2-7.1, All tanks shall be tested as evidence of an ASME Code Stamp or U.L. label. Tanks not marked shall be tested with good engineering principles.	Provide testing documentation for: 0D003T, 0D012T, 1T001T, 0T001T and 0T002T.	Tanks were fabricated and tested to industry standards (API 650, AWWAD100 and Westinghouse Standards). Tanks not labeled. N stamp not required.
2	NFPA 30, para. 2-7.2, When the vertical length of fill or vent pipes is such that when filled with liquid the static head imposed on the bottom of the tank exceeds 10 psi, the tank and piping shall be hydrostatically tested equal to the static head.	Provide hydro. test documentation for: 0D003T, 00D01TA, OT001T, 0T002T and OD005T.	Per M&MPC letter dated January 29, 1987, M&MPC have reviewed the ANSI B31.1 pneumatic and/or leak rate test data on this equipment and find the results satisfactory. The tanks were tested per Design Specification requirements. The in-service testing has been done by virtue of being in service since 1989. There have been no leaks identified.
3	NFPA 30, para. 3-7.1, NFPA 37, para. 5-7-1, Unless tested in accordance with ANSI B31, all piping shall be hydrostatically tested to 150% of the maximum system pressure or 110% pneumatically, but not less than 5 psig at the highest point for 10 minutes.	Provide piping hydro. test documentation for: 0D003T, 0D012T, 00D01TA, 1T001T, 1DO11T, 0T001T, 0T002T, 1D001TA, TC, TB & TD, 1D002TA & TB, 0D006T, 1D010T and OD005T.	Per M&MPC letter dated January 29, 1987, M&MPC have reviewed the ANSI B31.1 pneumatic and/or leak rate test data on this equipment and find the results satisfactory. The in-service testing has been done by virtue of being in service since 1989. There have been no leaks identified.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 30 - 1984, "Flammable and Combustible Liquids Code"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
4	NFPA 30, para. 2-2.5.4, and NFPA 37, para. 5-6.1, The total capacity of venting device(s) shall be in accordance with Table 2-8 (i.e., 699, 380 cubic ft per hour (CFH) for 0D003T, 563,600 CFH for 0D012T, 38,400 CFH for 00D01TA).	Demonstrate the venting capacity is provided via: 6" breather vent on 0D003T, 6" breather vent on 0D012T, 2" breather vent on 00D01TA.	0D003T and 0D012T are outdoor diesel fuel oil storage tanks that are not required for safe shutdown and no safe shutdown components are located by these tanks. The area is diked. This is considered acceptable. The vent line on 00D01TA is sized for maximum flow via 2" fill line. In addition, a high level alarm is provided. This is considered adequate.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 37 - 1984 "Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 37, para. 5-4.2, Tanks shall be provided with high level automatic shutoff.	The following tanks do not have a high level automatic shutoff: 1D002TA & TB and 1D010T.	An automatic shutoff will not be provided on the safety-related tanks as they may be required for operation.
2	NFPA 37, para. 5-3.7.1, At least 15 inch clearance shall be left around the tank.	The following tanks have less than 15 inch clear space: 1D002TA, 1D002TB and 1D010T.	The clearance is sufficient for maintenance and inspection activities.
3	NFPA 37, para. 5-5.3 and NFPA 30, para. 2-4.4.8, Tanks shall be equipped with a device or other suitable means to prevent overflow into the building.	Overflow lines 1D066AA4, AB4, AC4, and AD4 terminate inside tank rooms: 1D00TA, TC, TB & TD. Tank 0D005T has no overflow line. Tank 0D006T overflow line terminates inside the building.	In tank rooms 1D001TA, TC, TB, & TD, the overflow lines terminate to a floor drain which is piped to a fire and oil sump. This is considered acceptable. Tank 0D005T utilizes a sight tube and gauge to observe oil level. This is adequate for filling operations. The overflow line on 0D006T terminates in a sump which can be manually pumped out. This is considered acceptable.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 50A - 1984, "Standard for Gaseous Hydrogen Systems at Consumer Sites"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 50A, para. 4-1.3, Electrical equipment within 15' shall be in accordance with Article 501 of the National Electric Code for Class I, Division 2 locations.	The Nelson Electric enclosure at top rear of the hydrogen control cabinet is Class I, Division 2, Group B but not U.L. labeled.	Per manufacturer, the Class 654 enclosure was not U.L. listed at the time it was purchased and installed. However, the 654 enclosure is now listed and identical to the installed device. Therefore, the equipment is acceptable.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 51B - 1984, "Standard for Fire Prevention In Use of Cutting and Welding Processes"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 51B, para. 3-2.3: Where practicable, all combustibles shall be relocated at least 35 ft. (11 mm) horizontally from the work site. Where relocation is impracticable, combustibles shall be protected with flameproofed covers or otherwise shielded with metal or fire-resistant guards or curtains.	In instance where the scope of work and tools used to conduct hot work results in possible slag, sparks, spatter, or similar mobile sources of ignition further than 35 ft., the distance shall be extended to encompass the area. The required distance or area shall be specified and approved on the hot work permit. In instances where the scope of work and tools (e.g. shielded metal arc welding or gas metal arc welding) used to conduct hot work are known to be incapable of generating slag, sparks, spatter, or similar mobile sources of ignition capable of leaving the immediate area of hot work, then the 35 ft. may be reduced to an area that encompasses the sources of ignition and typically not less than 10 ft. The required distance or area shall be specified and approved on the hot work permit.	Braidwood is in compliance with NFPA 51B – 1984. NFPA generated changes to 51B which were incorporated into the 2009 edition of the Standard for Fire Prevention in Use of Cutting and Welding Processes. NFPA 51B – 2009 paragraphs 5.4.2(14) and 5.4.2(15) allow the Permit Authorizing Individual(PAI) to extend or retract the 35 ft. area surrounding hot work based upon the potential travel distance of mobile ignition sources. Revision 11 or OP-AA-201-004, Fire Prevention for Hot Work, incorporates paragraphs 5.4.2(14) and 5.4.2(15) of NFPA 51B, 2009 edition at Braidwood Station

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 72D - 1979, "Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 72D, para. 2-2.2.1(c), Equipment shall be so designed that it shall be capable of performing its intended function at a relative humidity of 85 + 5% and an ambient temperature of 90 °F+ 4 °F for a duration of 24 hours.	Equipment is designed for a 70% relative humidity (fire protection panels).	The environment is controlled by the HVAC system that contains a humidity controller which maintains a setting of 40% RH + 5% RH and heating controls which maintain a temperature setting of 75 °F + 2 °F. This design is considered acceptable for the fire protection panel environment.
2	NFPA 72D, para. 2-4.3(b), Every two months or more frequently, test shall be performed for all circuit interfaces and water flow actuated devices.	The automatic deluge system alarm tests are performed at semiannual frequency based on historical review of failure rate.	Historical review indicates a failure rate of < 1%. Administrative procedure allows extension of frequency interval for inspection if the failure rate is < 1%.
3	NFPA 72D, para. 2-4.3(c), Gate valve supervisory switches shall be tested semiannually.	Gate valve supervisory switches are tested annually.	Supervised valves are also surveilled monthly. Therefore, annual alarm tests should be acceptable.
4	NFPA 72D, para. 2.6.2.3, The secondary (standby) supply shall be provided and shall consist of storage batteries with a 24-hour supply, engine driven generators or a combination of engine driven generators and batteries.	The secondary power supply is provided from Bus 134/234 in lieu of storage batteries or generator.	Bus 134/234 is normally fed from Bus 144/244 which is supplied from the system auxiliary transformer, and it also has a diesel generator backup in case of a loss-of-offsite power. This supply is as reliable as was intended by the NFPA code, and is considered to be acceptable.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 72D-1979, "Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
5	NFPA 72D, para. 2-6.2.4, A separate power supply, independent of the main power supply shall be provided for the operation of trouble signals.	Trouble signals are fed from the primary source.	Bus 132/232 (ESF Bus) is the primary power supply to the proprietary alarm systems. Due to the high reliability of the primary power supply, this is considered to be acceptable.
6	NFPA 72D, para. 3-6.2.2, Signals transmitted shall indicate distinctively the particular function (such as valve position, pressure, etc.) of the automatic sprinkler system which is abnormal and its restoration to a normal condition.	Common trouble alarm indications are provided.	Upon receipt of a trouble alarm, an operator is dispatched to the area and fire watch may be initiated until the trouble is cleared. This is considered acceptable.
7	NFPA 72D, para. 4-4.1, Provide separate, distinctive, audible trouble and alarm signals at the Control Room panels 1PM09J/2PM09J.	Distinctive audible alarm and trouble indications are not provided between Unit 1 & 2 panels.	The Unit 1 and 2 fire alarm panels are not adjacent to one another in the Control Room. It will be obvious to an operator responding to a fire alarm which unit is affected. This is considered acceptable.
8	NFPA 72D, para. 3-5.1.2, Automatic fire detectors which have integral trouble contacts shall be wired on the initiating device circuit so that a trouble condition on one detector will not impair the alarm operation from other initiating devices.	Ionization detection systems do not have this trouble feature.	Upon receipt of a trouble alarm, an operator is dispatched to the area and a fire watch may be initiated until trouble is cleared. This is considered acceptable.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 72E - 1984, "Standard on Automatic Fire Detectors"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 72E, para. 2-5.1.1, All fire detection devices shall be listed.	The following charcoal filters utilize United Electric or Conax heat detection devices that are not specifically listed for fire protection service: Braidwood charcoal filters 1VP05FA & FB have been removed per EC 401148 and 2VP05FA & FB have been removed per EC 401150, 0VC05FA & FB, 0VC06FA & FB, 0VF04F, 1VQ09F, 2VQ09F, 00G04F/5F, 0VV21F & 22F and 0VW12F/18F.	The United Electric devices are U.L. listed for hazardous atmospheres and the Conax RTD thermocouples are industrial grade heat sensing devices. These devices are an acceptable design for alarm purposes since the water spray systems are actuated manually.
2	NFPA 72E, para. 8-3.2.2, Test one or more heat detectors semiannually. Test all in five years.	All rate compensation heat detectors are tested every 3 years. Containment Building Detectors are tested every 18 months. EDG Air Duct Detectors are tested every 4 years.	SEE EC 394429 for justification.
3	NFPA 72E, para. 8-3.3.1, All smoke detectors shall be tested at least semiannually.	All smoke detectors are tested every 3 years. Containment Building Detectors are tested every 18 months. EDG Air Duct Detectors are tested every 4 years.	SEE EC 394429 for justification.
4	NFPA 72E, para. 4-3.7.3, If beams exceed 18 inches in depth and are more than 8 feet on centers, each bay shall require at least one spot type detector.	Not all bays located at the South end of detection zone 2D-75 that meet this criterion have a detector.	Detectors are not required in these bays as determined in EC 353989.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 72E - 1984, "Standard on Automatic Fire Detectors"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
5	NFPA 72E, para. 8-3.3.1, Sensitivity Testing shall be performed within 1 year after installation and every alternate year thereafter.	Detector Sensitivity Testing is done every 5 years.	SEE EC 394429 for justification
6	NFPA 72E, para. 8-3.4, All Flame Detectors, Fire-Gas Detectors and other Fire Detectors shall be tested at least semiannually.	UV Detector are tested every 3 years	SEE EC 394429 for justification

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 80 - 1983, "Standard for Fire Doors and Windows"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 80, para. 1-6.1, Only labeled or listed doors shall be used.	The labels for several doors are either missing, damaged, or illegible. Piano-type hinges are installed the length of some doors and the labeling could not be verified.	A certificate of conformance from the manufacturer is on file stating that the referenced doors were manufactured and delivered as listed fire doors.
2	NFPA 80, para. 1-6.1, Only labeled or listed doors shall be used.	Several security doors are either oversized or provided with a modified two-point latch and electric strike. The doors are not labeled. Two doors at EL. 401'-0" in the L line wall are reinforced with steel plates for HELB pressure loading in conjunction with seismic loading under HELB design basis analysis. One door also has horizontal stiffeners. The doors are not labeled. Several doors at EL. 401'-0" AND el. 426'-0" in the L-line wall are reinforced with steel plates for HELB pressure loading in conjunction with seismic loading under HELB design basis analysis. The doors are not labeled.	The justification for the use of non-labeled doors of "A construction" is contained on pages 2.1-8 through 2.1-9b of NOTE: Amendment 25 of the B/B FPR does not have a page 2.1-9b. (Multiple occurrences) The subject doors are addressed in Generic Letter 86-10 Evaluation EC-EVAL 393561; this evaluation determined that the modified doors are adequate for the fire hazards to which they are exposed and justifies the use of each non-labeled door. Refer to EC 392850 and EC EVAL 393561 or EC 391762 and EC-EVAL 392603.
3	NFPA 80, para. 1-6.3, Authorities having jurisdiction shall be consulted as to the size of oversized doors which may be deemed acceptable in a given location.	Several oversized doors are not labeled.	The justification for the use of non-labeled doors of "A construction" is contained on pages 2.1-8 through 2.1-9b of the Braidwood Fire Protection Report

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 80 - 1983, "Standard for Fire Doors and Windows"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
4	NFPA 80, para. 2-5.1, Only labeled door frames shall be used.	Labels for several door frames are either missing or illegible. The doors installed in some frames are provided with piano-type hinges which run the length of the frame and labeling could not be verified.	A certificate of conformance from the manufacturer is on file stating that the referenced frames were manufactured and delivered as listed frames.
5	NFPA 80, para. 2-5.1, Only labeled door frames shall be used.	Several security doors have been modified with security hardware. The frames for two doors at EL.401'-0" in the L-line wall area reinforced for HELB pressure loading in conjunction with seismic loading under HELB design basis analysis. The door frames are not labeled.	The justification for the use of these frames is provided on pages 2.1-8 through 2.1-9b of the Braidwood Fire Protection Report. The subject door frames are addressed in Generic Letter 86 10 Evaluation EC-EVAL 393561; this evaluation determined that the modified doors are adequate for the fire hazards to which they are exposed and justifies the use of each non-labeled door and frame. Refer to EC 392850 and EC-EVAL 393561 or EC 391762 and EC-EVAL 392603.
6	NFPA 80, para. 2-5.4, The clearance between doors and frames and the clearance between the meeting edges of doors swinging in pairs shall not exceed 1/8 inch.	The clearance between doors and frames and the clearance between the meeting edges of doors swinging in pairs may exceed 1/8 inch.	The clearances may be increased as stated and justified in EC- EVAL#339805. Clearances that satisfy the criteria specified in the EC-EVAL represent an acceptable minor deviation from NFPA 80 and may be considered operable without additional evaluation or corrective action.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 80 - 1983, "Standard for Fire Doors and Windows"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
7	NFPA 80, para. 2-5.4, The clearance between the bottom of a door and sill shall not exceed 3/8 inch. Where there is no sill, clearance shall not exceed 3/4 inch.	The clearance between the bottom of a door and sill may exceed 3/8 inch. Where there is no sill, clearance may exceed 3/4 inch.	The clearances may be increased as stated and justified in EC-EVAL#339805. Clearances that satisfy the criteria specified in the EC-EVAL represent an acceptable minor deviation from NFPA 80 and may be considered operable without additional evaluation or corrective action.
8	NFPA 80, para. 2-8.1.3, Hinges shall be secured to frames with steel screws. Types of screws will vary depending on material used for the manufacture of labeled door frames. Refer to labeled door frame manufacturers' instructions and published listings for specific screw requirements.	The hinges for two doors at EL. 401'-0" in the L-line wall area replaced to support steel plates added to reinforce the doors for HELB pressure loading in conjunction with seismic loading under HELB design basis analysis. The replacement hinges are not attached to the door frame; they are welded to a short hollow steel section, which is welded to a plate that is attached to the concrete wall and/or structural steel. Attachments to the wall are made with ¾" concrete expansion anchors. The other hinge leaf is attached to the door with through bolts.	Attachment of the subject door hinges is addressed in Generic Letter 86-10 Evaluation EC EVAL 393561; this evaluative determined that the modified doors are adequate for the fire hazards to which they are exposed and justifies the use of each non-labeled door and hinge configuration. Refer to EC 392850 and EC-EVAL 393561 or EC 391762 and EC-EVAL 392603.
9	NFPA 80, para. 2-8.2.1, Only labeled locks and latches shall be used.	Several doors are provided with security hardware.	The justification for non-labeled hardware for security doors is contained on pages 2.1 8 through 2.1 9b of the Braidwood Fire Protection Report.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 80 - 1983, "Standard for Fire Doors and Windows"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
10	NFPA 80, para. 2-8.4.1, Where there is an astragal or projecting latch bolt that prevents the inactive door leaf from closing and latching before the active door closes, a coordinating device shall be used.	These doors are not provided with a coordinating device: SD 172 and SD 174.	The coordinating devices have been installed on Doors SD-172 and SD-174 (WO 1382059 & WO 1382061).
11	NFPA 80, para. 2-9, Gasketing on fire doors or frames shall be furnished only in accordance with the published listing of the door frame or gasketing material manufacturer. Exception: Where acceptable to the authority having jurisdiction, gasketing of non-combustible or limited combustible material may be applied to the frame providing closing and latching of the door is not thereby inhibited.	Several doors are provided with gasketing around the frame.	Gasketing is installed to assist the HVAC air flow/pressurization within the plant. The gasketing does not affect the operability of the door and is considered acceptable.
12	NFPA 80, Para 14-2.1.1 Hardware shall be examined frequently, and any parts found to be inoperative shall be replaced immediately.	The inspection frequency is extended on fire rated doors.	Performance based review of system testing, in accordance with station approved procedures, supports frequency extension (EC 403823).

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 90A - 1985, "Standard for the Installation of Air Conditioning and Ventilating Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 90A, para. 4-3 (a)&(b), In systems over 2,000 cfm, listed smoke detectors shall be installed and automatically stop the fan(s).	Not all duct detectors stop the fan(s).	Sargent & Lundy's NFPA 90A compliance checklist dated 10/9/1986, Rev 1 (HVAC Systems Review in compliance with NFPA 90A) identifies detector functions and list specific deviations from the NFPA code including justifications. M&MPC has performed review of the checklist as documented in their letters dated 4/16/1987 and 4/5/1988. The Smoke Removal Plan BwOP FP-27 was revised based on the formal review of the plan per M&MPC letter dated 1/22/1988. The BwOP FP-27 includes related information regarding fan trip with respect to the duct detector and direct fan shutdown to ensure closure of the fire dampers.
2	NFPA 90A, para. 4-5.1, 4-5.2, and 4-5.3, Detectors shall be installed in accordance with NFPA 72E and shall sound an alarm in a normally occupied area or through the building fire alarm system.	The duct detectors alarm in the main control room HVAC panel as common fire or trouble alarms and are not installed on the fire alarm system per NFPA 72E or 72D.	The common fire/trouble alarm in the main control room also records a printed message which indicates the local HVAC panel. The local HVAC panel indicates separate fire and trouble alarms. Operating procedures address these alarm conditions. This is acceptable for the duct detector alarm system.
3	NFPA 90A, para. 2-4.1, Air filters shall have a U.L. Class 1 or 2 rating.	Effective May 1, 2012 Underwriters Laboratory (UL) will no longer classify air filters as Class 1 or Class 2 under Standard UL 900	Filters are to be Class 1 or 2. After May 1, 2012, filters shall comply with NFPA 90A-2012, Section 4.2.2.2 and comply with ANSI/UL 900 Standard for air filters.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 90A - 1985, "Standard for the Installation of Air Conditioning and Ventilating Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
4	NFPA 90A para. 3-3.7.1.6, Fusible links shall have a temperature rating approximately 50°F above the maximum temperature that normally is encountered when the system is in operation or shut down, but not less than 160°F.	Some fusible links have a temperature rating greater than 50°F above the normally encountered maximum room temperature due to abnormal accident conditions associated with a HELB.	The fusible link temperature rating is significantly below typical fire temperatures. A Certificate of Conformance was provided by SR Products for the non-UL listed ETLs stating that the ETLs are designed and manufactured with the same parts and standards as their UL listed devices. Refer to EC 388397, EC 388398 or EC 392191.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 232 - 1980, "Standard for the Protection of Records"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 232, paras. 2-4 & 2-14.1, A vault shall not exceed 5,000 cu. ft. An oversize vault not over 25,000 cu. ft may be used and equipped with automatic sprinkler protection.	The QA vault is approximately 8,450 cu. ft. and is not equipped with automatic sprinklers.	The QA vault is protected by an automatic Halon 1301 fire suppression system with a connected reserve. This is adequate protection in lieu of sprinklers.
2	NFPA 232, para. 2-14.2, Where mobile shelving is used, smoke detectors shall be provided in addition to automatic sprinklers.	Automatic sprinklers are not provided in the Q.A. vault.	Smoke detectors associated with the Halon 1301 suppression system are provided. This is acceptable.
3	NFPA 232, para. 2-10.4, Doors shall be equipped with an automatic closing device and a heat actuated or smoke actuated release to close them.	A heat or smoke actuated device does not close the door (QA vault).	The door is normally locked closed and is equipped with an automatic door closure. A heat or smoke interlocking device is not necessary for this reason.
4	NFPA 232, para. 2-9.2 Roofs of vaults shall not be pierced for any purpose.	HVAC supply and exhaust ducts penetrate roof (QA vault).	HVAC openings are protected by a series of two 1-1/2-hr fire treated dampers that will automatically close upon fire or actuation of the halon system. This provides a fire barrier for the roof and is acceptable.
5	NFPA 232, para. 2-10.1, The vault shall be provided with a listed 4-hr door.	A 3-hr U.L. labeled door is installed (QA vault).	Based on external fire exposure, the 3-hr door provides adequate protection.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 232 - 1980, "Standard for the Protection of Records"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
6	NFPA 232, para. 2-11.2, Lighting shall be vapor proof or explosion proof controlled by a switch outside the vault. No other electrical devices shall be permitted within the vault	The lighting switch is inside the vault in addition to a telephone, thermostat, exit sign, and a temp/humidity recorded (QA vault).	Electrics have been installed per the National Electrical Code and present no inherent hazard. In addition, U.L. listed Class P gasketed light fixtures are installed with thermal ballast protection. This is acceptable.

Table 3-2 is a listing of NFPA deviations identified for safety-related areas on Braidwood Unit 2. This list indicates deviations which were not identified on the Unit 1 NFPA deviation list.

Table 3-2
NFPA CODE DEVIATION REPORT

NFPA 12 - 1985, "Standard on Carbon Dioxide Extinguishing Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 12A, para. 2-6.2.2, The agent (halon) discharge shall be substantially complete in a nominal 10 seconds.	Due to the extra quantity of halon added to the original design to maintain the soaking period, the nominal 10 second discharge is exceeded.	The time to reach initial concentration is not affected and, therefore, a longer discharge period has no impact on the halon suppression capability.

Table 3-2 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 13 - 1985, "Standard for the Installation of Sprinkler Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 13, para. 3-8.4, Return bends shall be used when pendent sprinklers are supplied from a raw water source.	Return bends are not provided for pendent sprinklers.	The sprinkler systems have been adequately flushed and the plant fire protection water is strained through a screen prior to its introduction into the system.
2	NFPA 13, para. 4-4.8.2.3, Where sprinklers installed to protect floor openings are located closer than 6 feet apart, cross baffles shall be provided.	Cross baffles are not provided on the systems protecting the center stairwell of the Auxiliary Building.	Each of the sprinklers for these systems is provided with a 5 inch baffle plate, which along with some minor obstructions from equipment between sprinklers, will adequately prevent prewetting of the sprinklers.
3	NFPA 13-2007 Edition, para. 7.3.2.4.1, pre-action sprinkler piping shall be automatically supervised where there are more than 20 sprinklers on the system.	The Containment Access Facility (CAF) pre-action sprinkler piping is not automatically supervised and has more than 20 sprinklers.	This deviation is considered acceptable based upon the justification provided in EC 366860.
4	NFPA 13, Chapter 4. Spacing, locations and position of sprinklers shall be made in accordance with NFPA.	During the walkdown of the systems, deviating locations and positions of sprinklers where identified	Obstructions to the foam sprinkler heads located in the Diesel Fuel Oil Storage Tank Rooms have been evaluated under GL 86-10 evaluation, EC 380157 and found to be acceptable.

Table 3-2 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 14 - 1983, "Standard for the Installation of Standpipe and Hose Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 14-1983, para. 4-4.3.1, Listed fire hose shall be used.	Hard rubber hose is used for the cable spreading room areas and electric cable tunnels. The hose may or may not be listed by UL or approved by Factory Mutual (FM). The listing or approval is dependent on availability of the listing or approval from the applicable authority at the time of procurement.	Hard rubber hose is utilized on these hose stations for maneuverability in the cable areas. The hose is hydrostatically tested and surveilled to the same standards regardless of listing or approval status.

Table 3-2 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 24 - 1984, "Standard for the Installation of Private Service Mains and Their Appurtenances"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 24, para. 8-3.1, Pipe shall not be run under buildings.	The Receiving Building Warehouse and Gate House extension were built over the underground fire main.	Sargent & Lundy letter of January 26, 1988 (R. Salsbury to J. Robinson) references review indicating loading to piping from buildings to negligible.

Table 3-2 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 30 - 1984, "Flammable and Combustible Liquids Code"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 30, para. 2-7.1, All tanks shall be tested as evidence of an ASME Code Stamp or U.L. label. Tanks not marked shall be tested with good engineering principles.	Tank 2T001T is not marked with an ASME Code Stamp or U.L. label. The tank was not designed to any specific code such as API 650 or ASME section VIII.	The main turbine oil reservoir was designed and constructed to Westinghouse Standards. The tank and associated piping was leak tested at normal operating pressure per ANSI Standards.
2	NFPA 30, para. 2-7.2, When the vertical length of fill or vent pipes is such that when filled with liquid the static head imposed on the bottom of the tank exceeds 10 psi, the tank and piping shall be hydrostatically tested equal to the static head.	The flame arrestor vent lines on the following tanks have large vertical lengths and could impose a 10 psi static head: 2D01TA/TB, 2D002TA/TB, 2D010T & 2D011T	The tanks are provided with overflow lines which could prevent a static head increase above 10 psi. Therefore, the tanks are not tested to this criteria.
3	NFPA 30, para. 3-7, Unless tested in accordance with ANSI B31, all piping shall be hydrostatically tested to 150% of the maximum system pressure or 110% pneumatically, but not less than 5 psig at the highest point for 10 minutes.	Piping is tested to ANSI Standards except open ended piping (e.g., overflow, vent lines, etc.) which is not tested from the point of the last control valve to the open end of the pipe.	Per S&L spec. L-2739, code case N-240 alleviates testing all open ended piping.
4	NFPA 30, para. 2-2.5.4, The total capacity of normal and emergency venting shall be in accordance with Table 2-8 of NFPA 30 and/or the listed venting requirements.	Long lengths of vent piping are prevalent on all tanks. Total venting capacity may be hindered by pipe lengths and height.	S&L has calculated that no additional venting is required due to the lack of heat generated by a fire in the tank storage areas. (S&L letter of 11/1/84, Leutloff to Smith).
5	NFPA 30, para. 2-2.7.4, The fill pipe entering the top of a tank shall terminate within 6 in. of the bottom of the tank.	The fill lines for tanks OVR11TA/TB terminate approximately 1.5 foot from the tank's bottom.	During system operation, liquid level will be maintained above the 1.5 foot level, utilizing the low liquid level alarm and administrative controls.

Table 3-2 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 30 - 1984, "Flammable and Combustible Liquids Code"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
6	NFPA 30-1984, para. 4-4.1.3, Maximum floor area of an inside storage room should be limited to 500 square feet for a 2-hour fire resistance rated storage room with an installed fire protection system.	The floor area of the paint and oil room is 830 square feet.	NFPA 30 does not provide requirements for inside storage rooms with a 3-hour fire resistance rating. This room has a 3-hour fire resistance rating and is fully sprinkled.
7	NFPA 30-1984, para. 4-4.1.6, Exhaust and makeup ventilation inlets shall be located within 12 inches of the floor	Various exhaust and makeup ventilation inlets are located in excess of 12 inches from the floor.	NFPA 91, "Standard for the Installation of Blower and Exhaust Systems for Dust, Stock and Vapor Removal or Conveying," para. 3-2.1, allows for ventilation through a system of suction ducts. This is considered to be acceptable, as the requirements of NFPA 91 are referenced as being applicable.
8	NFPA 30-1984, para. 4-4.1.6, NFPA 91 1983 para. 2-7.8, When ducts pass through a fire wall, they shall be provided with fire doors on both sides of the wall.	Fire doors are not provided.	UL listed, 3-hour rated fire dampers OVJ11Y and OVJ12Y are provided in the wall openings. These dampers are centered within the opening.
9	NFPA 30-1984, para. 4-4.1.6, The mechanical ventilation system for dispensing areas shall be equipped with an airflow switch or other equally reliable methods which is interlocked to sound an audible alarm upon failure of the ventilation system	No means is provided to indicate failure of the ventilation system.	The dispensing of flammable liquids is administratively controlled and includes verification that the ventilation system is operating

Table 3-2 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 37 - 1984 "Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 37, para. 5-7.1, Unless tested in accordance with ANSI B31, all piping shall be hydrostatically tested to 150% of the maximum system pressure or 110% pneumatically, but not less than 5 psig at the highest point for 10 minutes.	Piping is tested to ANSI Standards except open ended piping (e.g., overflow, vent lines, etc.) which is not tested from the point of the last control valve to the open end of the pipe.	Per S&L spec. L-2739, code case N-240 alleviates testing all open ended piping
2	NFPA 37, para. 5-6.1, The total capacity of normal and emergency venting shall be in accordance with Table 2-8 of NFPA 30 and/or the listed venting requirements.	Long lengths of vent piping are prevalent on all tanks. Total venting capacity may be hindered by pipe lengths and height.	S&L has calculated that no additional venting is required due to the lack of heat generated by a fire in the tank storage areas. (S&L letter of 11/1/84, Leutloff to smith)

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 90A - 1985, "Standard for the Installation of Air Conditioning and Ventilating Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 90A para. 3-3.7.1.6, Fusible links shall have a temperature rating approximately 50°F above the maximum temperature that normally is encountered when the system is in operation or shut down, but no less than 160°F	Some fusible links have a temperature rating greater than 50°F above the normally encountered maximum room temperature due to abnormal accident conditions associated with HELB.	The fusible link temperature rating is significantly below typical fire temperatures and below ignition temperature of the material on either side of the wall. A Certificate of Conformance was provided by SR Products for non-UL listed ETLs stating that the ETLs are designed and manufactured with the same parts and standards as their UL listed devices. Refer to EC 388947, 388948, or 392192.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 15 - 1985, "Standard for Water Spray Fixed Systems for Fire Protection"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
5	NFPA 15, para. 2-8.4, Automatic detection equipment shall be listed.	The following charcoal filters utilize United Electric or Conax heat detection devices that are not specifically listed for fire protection service: Braidwood charcoal filters 1VP05FA & FB have been removed per EC 401148 and 2VP05FA & FB have been removed per EC 401150, 0VF05FA & FB, 0VC06FA & FB, OVF04F, 1VQ09F, 2VQ09F, 00G04F & 5F, 0VW012F/18F, and 0VV21F & 22F. The United Electric devices are U.L. listed for hazardous atmospheres and the Conax RTD thermocouples are industrial grade heat sensing devices. The detectors are an acceptable design for alarm purposes since the water spray systems are actuated manually.	The United Electric devices are U.L. listed for hazardous atmospheres and the Conax RTD thermocouples are industrial grade heat sensing devices. The detectors are an acceptable design for alarm purposes since the water spray systems are actuated manually.
6	NFPA 15, para. 4-6.2, Adequate provisions shall be made to promptly and effectively dispose of all liquids from the fire area during operation of all systems in the fire area.	Charcoal filter drains not sized for largest possible water flow.	Administrative procedures have been written to address potential overflow. This is acceptable.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 15 - 1985, "Standard for Water Spray Fixed Systems for Fire Protection"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
7	NFPA 15, para. 6-2.7, Main Drain flow tests shall be made after valves are reopened (See NFPA 13A, Recommended Practice for the Inspection, Testing and maintenance of Sprinkler System.)	Main drain valve water flow tests are not performed.	See EC-EVAL 357163 for justification.
8	N/A	The deluge systems piping for Main Power transformers 1E and 1W are designed in accordance with applicable sections of NFPA 15-2012.	The deluge systems piping for Main Power Transformers 1E and 1W are redesigned (Reference EC #379761). It is acceptable to design the new systems to the code year (2012) that was current at the time of design.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 16 - 1980, "Standard for the Installation of Deluge Foam-Water Sprinkler Systems and Foam-Water Spray Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 16, para. 2-1, All component parts shall be listed.	The ASCO "Redhat" solenoid valve and Rockwood model A-20 pneumatic actuator are not listed.	A listed solenoid valve is not available for this installation. Upon testing completion, the equipment should be acceptable.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 20 - 1983, "Standard for the Installation of Centrifugal Fire Pumps"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 20, paras. 2-7.6 and 8 3.1, The floor shall be pitched for adequate drainage of escaping water or fuel away from the pump, driver, controller, fuel tank, etc. The pump room shall be provided with a floor drain.	The diesel fire pump room floor is pitched towards a floor drain that contains a sleeved pipe with an opening 4" above the floor.	The entire room is designated as a curbed area inside the Lake Screen House. This is considered adequate.
2	NFPA 20, para. 2-10.5, Listed valves shall be installed on the system side of the check valve.	Powell gate valves are not listed.	The Powell valves are designed to ANSI Standards and working pressure of 285 psi and are considered acceptable.
3	NFPA 20, para. 2-13.3.1, Hose valves shall be listed.	Vogt gate valves are not listed (test header).	The Vogt test header valves are designed to ANSI Standards and working pressure of 740 psi and are considered acceptable.
4	NFPA 20, para. 2-13.3,1, Test header pipe shall be 12".	A 10" pipe is installed.	The 10" test header pipe provides adequate flow as recorded on all previous fire pump tests. Therefore, the 10" line is acceptable.
5	NFPA 20, para. 6-3.1.1, Fire pump feeder conductors inside buildings shall be enclosed by 2" of concrete or equivalent 1-hour fire resistance.	Some conductors are not in concrete (elec. pump).	All conductors are in heavy steel conduit that will provide fire resistance and the cable routing is acceptable.
6	NFPA 20, para. 7-1.1.1, All controllers shall be listed for electric motor driven fire pump service.	Electric motor controller is not listed.	Justification is provided in T. R. Tramm's letter of 12 14 83 to H. R. Denton.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 20 - 1983, "Standard for the Installation of Centrifugal Fire Pumps"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
7	NFPA 20, paras. 7-1.1.3, 7 3.7.1, 7-3.8 & 7 3.9, Wiring diagrams, marking of each motor control device, and instructions shall be mounted on the controller.	All electrical information is not attached to the controller on the electric motor-driven fire pump.	Complete electrical information including diagrams, ratings, and vendor manuals are permanently on file at the station. The data are retrievable via equipment identification number. Therefore, all pertinent data are available when required.
8	NFPA 20, para. 7-4.3, An over current protective device shall be located within the fire pump controller.	Over current device is not located within the fire pump controller.	Over current protection is provided from 4160-V switchgear bus 144, cubicle 000 and considered acceptable.
9	NFPA 20, para. 7-4.6 Alarms shall be provided for (b) loss of line power, and (c) phase reversal.	Line power is monitored on the feeder source and there is no phase reversal alarm.	Loss of power on the 4160-V bus which feeds the fire pump motor is annunciated on control room panel 1PM07J. Phase reversal is highly improbable and therefore is not alarmed.
10	NFPA 20, para. 7-6.2, An ammeter and voltmeter shall be provided on the controller.	An ammeter is attached to the electric pump controller, but not a voltmeter.	For testing, provisions are made to measure volts and amps. This is acceptable for testing and surveillance purposes.
10a	NFPA 20. Para. 8-6.1, Engines shall be started no less than once a week and run for no less than 30 minutes to attain normal running temperatures.	Diesel engines are started every 31 days.	The diesel engine fire pump will be started from ambient conditions and operated 30 minutes or more every 31 days.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

10b	NFPA 20, para. 8-6.2, Engine Maintenance. Engines shall be kept clean, dry, and well lubricated. The proper oil level shall be maintained in the crankcase. Oil shall be changed in accordance with the manufacturer's recommendations, but not less frequently than annually.	Oil is changed in accordance with the manufacturer's recommendations but exceed the, "not less frequently than annually," requirement.	Manufacturer recommendation allows for an alternate method to determine oil change intervals established through the use of Lubrication Oil Analysis. Oil Analysis is performed under PMID 39101-07 for the diesel engine fire pump.
11	NFPA 20, para. 8-6.1, Engines shall be started no less that once a week and run for no less than 30 minutes to attain normal running temperatures.	Diesel engines are started every 31 days.	The diesel engine fire pump will be started from ambient conditions and operated 30 minutes or more every 31 days.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 20 - 1983, "Standard for the Installation of Centrifugal Fire Pumps"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
12	NFPA 20, para. 8-2.7.2, The automatic electric solenoid valve in the cooling water line for the heat exchanger shall be listed for fire protection service.	The solenoid valve is not listed.	A listed valve is not available in the required pressure rating for the diesel engine pump. The existing valve has tested satisfactory and is considered acceptable.
13	NFPA 20, para. 9-4.2.2, An alarm shall be provided indicating that the controller switch has been turned to the off or manual position (separate signal).	The off and manual positions on the diesel engine pump are combined with other trouble condition alarms.	Control rooms alarm response procedure BWAR-O-38-C7 addresses trouble conditions including controller position "off." Since all trouble conditions are investigated, a separate signal is not necessary.
14	NFPA 20, para. 2-4, Pumps shall be provided with an accurate nameplate.	Nameplate data on electric motor-driven pump indicates BHP-3202	Accurate brake horsepower data are provided on vendor drawings and manual is on file at the station.
15	NFPA 20, para. 11-4.5, When units are to be tested weekly by manual means, at least one start shall be accomplished by reducing the water pressure.	Fire pumps are tested every 31 days.	The water- and diesel-driven fire pumps are operated every 31 days.
16	NFPA 20, Para 11-3.1, An annual Test of the fire pump assembly (pump, driver and controller) shall be performed to determine its ability to continue to attain satisfactory performance at peak loads.	A functional test is performed at least once per 18 months to demonstrate fire pump's ability at minimum, rated and peak load conditions.	The testing is performed per BwAP 1110-1, Fire Protection Program System Requirements.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 24 - 1984, "Standard for the Installation of Private Service Mains and Their Appurtenances"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 24, para. 3-1.1, All control valves shall be listed.	Essential service water valves 0SX172 and 0SX174, and the Powell and Anchor-Darling valves are not listed.	The SX valves are ASME section III and provide a cross-tie to ensure a seismically qualified backup water supply to portions of Category I standpipes in safety-related areas. The Powell and Anchor-Darling valves are designated to ANSI Standards and working pressure of 285 psi. These valves are considered acceptable.
2	NFPA 24, para. 3-2.2, A check valve shall be installed in each connection.	Check valves are not installed at the connections to essential service water (SX), makeup demineralized water, and the station air compressors.	The valved connections are normally closed with procedures written to monitor potential leakage. This is considered acceptable.
3	NFPA 24, para. 3-3.1 & 3-1.1, Every connection from the fire main to a building shall be provided with a listed indicating valve, unless a non-indicating underground gate valve with roadway box and T-wrench is accepted by the authority having jurisdiction.	Valve 0FP590 for the Gate House hose stations is a non-indicating underground valve with roadway box. Valve 0FP983 for the Unit 2 Containment Access Facility is a non-indicating underground valve with roadway box.	Procedures are written to surveil the valve, and T wrenches are available to operating personnel. This is considered acceptable.
4	NFPA 24, para. 3-3.2, Post indicator valves shall be located not less than 40 ft from buildings.	The following valves are less than the 40 ft distance: 0FP579, 0FP591, 0FP580, 0FP592, 0FP581, 0FP593, 0FP582, 0FP602, 0FP588.	The vales are located along blank walls and are accessible. This is considered adequate.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 24 - 1984, "Standard for the Installation of Private Service Mains and Their Appurtenances"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
5	NFPA 24, para. 4-2.3, Hydrants shall be at least 40 ft from buildings.	The following hydrants are less than the 40 ft distance: 0FP05S, 0FP23S, 0FP070, 0PF24S, 0FP21S.	The hydrants are located along blank walls and can be isolated from the fire main. This is considered acceptable.
6	NFPA 24, para. 8-6.2.10, Thrust blocks or other suitable means of restraint shall be provided at fittings for each change in direction of a pipeline and at tees, plugs, caps, and bends.	Insufficient documentation to determine thrust restraint locations on flanged hydrant connections.	A Technical Staff Surveillance will monitor any unusual system leakage. Thrust blocks have been provided as necessary during routine maintenance and hydrant repositioning. The present anchoring is considered adequate.
7	NFPA 24, para. 7-2, All ferrous metal pipe shall be lined.	Pipe is not lined.	Periodic flow tests will monitor the interior condition of the pipe. Hydraulic calculations will also utilize a conservative C factor of 100 to account for extended age. This is adequate in lieu of lining pipe.
8	NFPA 24, para. 4-3.6, To ensure proper functioning, dry barrel hydrants shall be tested semiannually.	Hydrants are tested annually.	Hydrants are tested at least once per 12 months to ensure proper functioning.
9	NFPA 24, para. 4-1.1, Hydrants shall have not less than a 6" connection with the mains.	Wall hydrant 1FP01S in the Unit 1 Containment Access Facility has a 3" supply connection from the main.	Calculation BRW-05-0099-M has demonstrated that there is sufficient flow to provide two effective hose streams from hydrant 1FP01S.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 26 - 1983, "Supervision of Valves Controlling Water Supplies for Fire Protection"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 26, para. 3-1, The locked open valves should be inspected monthly.	Locked open valves are inspected every 92 days.	Locked open valves are inspected every 92 days to verify the valve is in the correct position.
2	NFPA 26, para. 3-1, A systematic weekly inspection (or monthly in the case of locked - open valves) of each valve should be made.	The sprinkler system alarm shutoff valves position verification is performed at quarterly frequency based on historical review of failure rate.	Historical review indicates a failure rate of < 1%. Administrative procedure allows extension of frequency interval for inspection if the failure rate is < 1%.
3	NFPA 26, para. 3-1, A systematic weekly inspection (or monthly in the case of locked - open valves) of each valve should be made.	The automatic deluge system trim valves position verification is performed at quarterly frequency based on historical review of failure rate.	Historical review indicates a failure rate of < 1%. Administrative procedure allows extension of frequency interval for inspection if the failure rate is < 1%.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 27 - 1981, "Recommendations for Organization, Training and Equipment of Private Fire Brigades"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 27, para. 4-2.1, Training should be conducted and supervised, where possible, by a State Certified Fire Service Instructor.	Classroom training is conducted by training department instructors.	The classroom instructors are qualified for the subject areas presented. In addition, two state certified Fire Service Instructors are involved in all live fire training and some classroom instruction. The training program is considered acceptable.
2	NFPA 27, para. 4-3, Training sessions should be held at least monthly for one hour or more per shift	Training sessions are conducted quarterly.	Training sessions conducted quarterly result in a total of 12 hours of training per year for each brigade member. This level of training is considered as satisfying NFPA.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 30 - 1984, "Flammable and Combustible Liquids Code"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 30, para. 2-7.1, All tanks shall be tested as evidence of an ASME Code Stamp or U.L. label. Tanks not marked shall be tested with good engineering principles.	Provide testing documentation for: 0D003T, 0D012T, 1T001T, 0T001T and 0T002T.	Tanks were fabricated and tested to industry standards (API 650, AWWAD100 and Westinghouse Standards). Tanks not labeled. N stamp not required.
2	NFPA 30, para. 2-7.2, When the vertical length of fill or vent pipes is such that when filled with liquid the static head imposed on the bottom of the tank exceeds 10 psi, the tank and piping shall be hydrostatically tested equal to the static head.	Provide hydro. test documentation for: 0D003T, 00D01TA, OT001T, 0T002T and OD005T.	Per M&MPC letter dated January 29, 1987, M&MPC have reviewed the ANSI B31.1 pneumatic and/or leak rate test data on this equipment and find the results satisfactory. The tanks were tested per Design Specification requirements. The in-service testing has been done by virtue of being in service since 1989. There have been no leaks identified.
3	NFPA 30, para. 3-7.1, NFPA 37, para. 5-7-1, Unless tested in accordance with ANSI B31, all piping shall be hydrostatically tested to 150% of the maximum system pressure or 110% pneumatically, but not less than 5 psig at the highest point for 10 minutes.	Provide piping hydro. test documentation for: 0D003T, 0D012T, 00D01TA, 1T001T, 1DO11T, 0T001T, 0T002T, 1D001TA, TC, TB & TD, 1D002TA & TB, 0D006T, 1D010T and OD005T.	Per M&MPC letter dated January 29, 1987, M&MPC have reviewed the ANSI B31.1 pneumatic and/or leak rate test data on this equipment and find the results satisfactory. The in-service testing has been done by virtue of being in service since 1989. There have been no leaks identified.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 30 - 1984, "Flammable and Combustible Liquids Code"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
4	NFPA 30, para. 2-2.5.4, and NFPA 37, para. 5-6.1, The total capacity of venting device(s) shall be in accordance with Table 2-8 (i.e., 699, 380 cubic ft per hour (CFH) for 0D003T, 563,600 CFH for 0D012T, 38,400 CFH for 00D01TA).	Demonstrate the venting capacity is provided via: 6" breather vent on 0D003T, 6" breather vent on 0D012T, 2" breather vent on 00D01TA.	0D003T and 0D012T are outdoor diesel fuel oil storage tanks that are not required for safe shutdown and no safe shutdown components are located by these tanks. The area is diked. This is considered acceptable. The vent line on 00D01TA is sized for maximum flow via 2" fill line. In addition, a high level alarm is provided. This is considered adequate.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 37 - 1984 "Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 37, para. 5-4.2, Tanks shall be provided with high level automatic shutoff.	The following tanks do not have a high level automatic shutoff: 1D002TA & TB and 1D010T.	An automatic shutoff will not be provided on the safety-related tanks as they may be required for operation.
2	NFPA 37, para. 5-3.7.1, At least 15 inch clearance shall be left around the tank.	The following tanks have less than 15 inch clear space: 1D002TA, 1D002TB and 1D010T.	The clearance is sufficient for maintenance and inspection activities.
3	NFPA 37, para. 5-5.3 and NFPA 30, para. 2-4.4.8, Tanks shall be equipped with a device or other suitable means to prevent overflow into the building.	Overflow lines 1D066AA4, AB4, AC4, and AD4 terminate inside tank rooms: 1D00TA, TC, TB & TD. Tank 0D005T has no overflow line. Tank 0D006T overflow line terminates inside the building.	In tank rooms 1D001TA, TC, TB, & TD, the overflow lines terminate to a floor drain which is piped to a fire and oil sump. This is considered acceptable. Tank 0D005T utilizes a sight tube and gauge to observe oil level. This is adequate for filling operations. The overflow line on 0D006T terminates in a sump which can be manually pumped out. This is considered acceptable.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 50A - 1984, "Standard for Gaseous Hydrogen Systems at Consumer Sites"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 50A, para. 4-1.3, Electrical equipment within 15' shall be in accordance with Article 501 of the National Electric Code for Class I, Division 2 locations.	The Nelson Electric enclosure at top rear of the hydrogen control cabinet is Class I, Division 2, Group B but not U.L. labeled.	Per manufacturer, the Class 654 enclosure was not U.L. listed at the time it was purchased and installed. However, the 654 enclosure is now listed and identical to the installed device. Therefore, the equipment is acceptable.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 51B - 1984, "Standard for Fire Prevention In Use of Cutting and Welding Processes"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 51B, para. 3-2.3: Where practicable, all combustibles shall be relocated at least 35 ft. (11 mm) horizontally from the work site. Where relocation is impracticable, combustibles shall be protected with flameproofed covers or otherwise shielded with metal or fire-resistant guards or curtains.	In instance where the scope of work and tools used to conduct hot work results in possible slag, sparks, spatter, or similar mobile sources of ignition further than 35 ft., the distance shall be extended to encompass the area. The required distance or area shall be specified and approved on the hot work permit. In instances where the scope of work and tools (e.g. shielded metal arc welding or gas metal arc welding) used to conduct hot work are known to be incapable of generating slag, sparks, spatter, or similar mobile sources of ignition capable of leaving the immediate area of hot work, then the 35 ft. may be reduced to an area that encompasses the sources of ignition and typically not less than 10 ft. The required distance or area shall be specified and approved on the hot work permit.	Braidwood is in compliance with NFPA 51B – 1984. NFPA generated changes to 51B which were incorporated into the 2009 edition of the Standard for Fire Prevention in Use of Cutting and Welding Processes. NFPA 51B – 2009 paragraphs 5.4.2(14) and 5.4.2(15) allow the Permit Authorizing Individual(PAI) to extend or retract the 35 ft. area surrounding hot work based upon the potential travel distance of mobile ignition sources. Revision 11 or OP-AA-201-004, Fire Prevention for Hot Work, incorporates paragraphs 5.4.2(14) and 5.4.2(15) of NFPA 51B, 2009 edition at Braidwood Station

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 72D - 1979, "Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 72D, para. 2-2.2.1(c), Equipment shall be so designed that it shall be capable of performing its intended function at a relative humidity of 85 + 5% and an ambient temperature of 90 °F+ 4 °F for a duration of 24 hours.	Equipment is designed for a 70% relative humidity (fire protection panels).	The environment is controlled by the HVAC system that contains a humidity controller which maintains a setting of 40% RH + 5% RH and heating controls which maintain a temperature setting of 75 °F + 2 °F. This design is considered acceptable for the fire protection panel environment.
2	NFPA 72D, para. 2-4.3(b), Every two months or more frequently, test shall be performed for all circuit interfaces and water flow actuated devices.	The automatic deluge system alarm tests are performed at semiannual frequency based on historical review of failure rate.	Historical review indicates a failure rate of < 1%. Administrative procedure allows extension of frequency interval for inspection if the failure rate is < 1%.
3	NFPA 72D, para. 2-4.3(c), Gate valve supervisory switches shall be tested semiannually.	Gate valve supervisory switches are tested annually.	Supervised valves are also surveilled monthly. Therefore, annual alarm tests should be acceptable.
4	NFPA 72D, para. 2.6.2.3, The secondary (standby) supply shall be provided and shall consist of storage batteries with a 24-hour supply, engine driven generators or a combination of engine driven generators and batteries.	The secondary power supply is provided from Bus 134/234 in lieu of storage batteries or generator.	Bus 134/234 is normally fed from Bus 144/244 which is supplied from the system auxiliary transformer, and it also has a diesel generator backup in case of a loss-of-offsite power. This supply is as reliable as was intended by the NFPA code, and is considered to be acceptable.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 72D-1979, "Standard for the Installation, Maintenance and Use of Proprietary Protective Signaling Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
5	NFPA 72D, para. 2-6.2.4, A separate power supply, independent of the main power supply shall be provided for the operation of trouble signals.	Trouble signals are fed from the primary source.	Bus 132/232 (ESF Bus) is the primary power supply to the proprietary alarm systems. Due to the high reliability of the primary power supply, this is considered to be acceptable.
6	NFPA 72D, para. 3-6.2.2, Signals transmitted shall indicate distinctively the particular function (such as valve position, pressure, etc.) of the automatic sprinkler system which is abnormal and its restoration to a normal condition.	Common trouble alarm indications are provided.	Upon receipt of a trouble alarm, an operator is dispatched to the area and fire watch may be initiated until the trouble is cleared. This is considered acceptable.
7	NFPA 72D, para. 4-4.1, Provide separate, distinctive, audible trouble and alarm signals at the Control Room panels 1PM09J/2PM09J.	Distinctive audible alarm and trouble indications are not provided between Unit 1 & 2 panels.	The Unit 1 and 2 fire alarm panels are not adjacent to one another in the Control Room. It will be obvious to an operator responding to a fire alarm which unit is affected. This is considered acceptable.
8	NFPA 72D, para. 3-5.1.2, Automatic fire detectors which have integral trouble contacts shall be wired on the initiating device circuit so that a trouble condition on one detector will not impair the alarm operation from other initiating devices.	Ionization detection systems do not have this trouble feature.	Upon receipt of a trouble alarm, an operator is dispatched to the area and a fire watch may be initiated until trouble is cleared. This is considered acceptable.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 72E - 1984, "Standard on Automatic Fire Detectors"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 72E, para. 2-5.1.1, All fire detection devices shall be listed.	The following charcoal filters utilize United Electric or Conax heat detection devices that are not specifically listed for fire protection service: Braidwood charcoal filters 1VP05FA & FB have been removed per EC 401148 and 2VP05FA & FB have been removed per EC 401150, 0VC05FA & FB, 0VC06FA & FB, 0VF04F, 1VQ09F, 2VQ09F, 00G04F/5F, 0VV21F & 22F and 0VW12F/18F.	The United Electric devices are U.L. listed for hazardous atmospheres and the Conax RTD thermocouples are industrial grade heat sensing devices. These devices are an acceptable design for alarm purposes since the water spray systems are actuated manually.
2	NFPA 72E, para. 8-3.2.2, Test one or more heat detectors semiannually. Test all in five years.	All rate compensation heat detectors are tested every 3 years. Containment Building Detectors are tested every 18 months. EDG Air Duct Detectors are tested every 4 years.	SEE EC 394429 for justification.
3	NFPA 72E, para. 8-3.3.1, All smoke detectors shall be tested at least semiannually.	All smoke detectors are tested every 3 years. Containment Building Detectors are tested every 18 months. EDG Air Duct Detectors are tested every 4 years.	SEE EC 394429 for justification.
4	NFPA 72E, para. 4-3.7.3, If beams exceed 18 inches in depth and are more than 8 feet on centers, each bay shall require at least one spot type detector.	Not all bays located at the South end of detection zone 2D-75 that meet this criterion have a detector.	Detectors are not required in these bays as determined in EC 353989.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 72E - 1984, "Standard on Automatic Fire Detectors"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
5	NFPA 72E, para. 8-3.3.1, Sensitivity Testing shall be performed within 1 year after installation and every alternate year thereafter.	Detector Sensitivity Testing is done every 5 years.	SEE EC 394429 for justification
6	NFPA 72E, para. 8-3.4, All Flame Detectors, Fire-Gas Detectors and other Fire Detectors shall be tested at least semiannually.	UV Detector are tested every 3 years	SEE EC 394429 for justification
7	N/A	The thermistor wire detection for Main Power Transformers 1E and 1W is designed in accordance with applicable sections of NFPA 72-2013.	The thermistor wire detection for Main Power Transformers 1E and 1W is redesigned (Reference EC #379761). It is acceptable to design the new detection to the code year (2013) that was current at the time of design.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 80 - 1983, "Standard for Fire Doors and Windows"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 80, para. 1-6.1, Only labeled or listed doors shall be used.	The labels for several doors are either missing, damaged, or illegible. Piano-type hinges are installed the length of some doors and the labeling could not be verified.	A certificate of conformance from the manufacturer is on file stating that the referenced doors were manufactured and delivered as listed fire doors.
2	NFPA 80, para. 1-6.1, Only labeled or listed doors shall be used.	Several security doors are either oversized or provided with a modified two-point latch and electric strike. The doors are not labeled. Two doors at EL. 401'-0" in the L line wall are reinforced with steel plates for HELB pressure loading in conjunction with seismic loading under HELB design basis analysis. One door also has horizontal stiffeners. The doors are not labeled. Several doors at EL. 401'-0" AND el. 426'-0" in the L-line wall are reinforced with steel plates for HELB pressure loading in conjunction with seismic loading under HELB design basis analysis. The doors are not labeled.	The justification for the use of non-labeled doors of "A construction" is contained on pages 2.1-8 through 2.1-9b of NOTE: Amendment 25 of the B/B FPR does not have a page 2.1-9b. (Multiple occurrences) The subject doors are addressed in Generic Letter 86-10 Evaluation EC-EVAL 393561; this evaluation determined that the modified doors are adequate for the fire hazards to which they are exposed and justifies the use of each non-labeled door. Refer to EC 392850 and EC EVAL 393561 or EC 391762 and EC-EVAL 392603.
3	NFPA 80, para. 1-6.3, Authorities having jurisdiction shall be consulted as to the size of oversized doors which may be deemed acceptable in a given location.	Several oversized doors are not labeled.	The justification for the use of non-labeled doors of "A construction" is contained on pages 2.1-8 through 2.1-9b of the Braidwood Fire Protection Report

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 80 - 1983, "Standard for Fire Doors and Windows"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
4	NFPA 80, para. 2-5.1, Only labeled door frames shall be used.	Labels for several door frames are either missing or illegible. The doors installed in some frames are provided with piano-type hinges which run the length of the frame and labeling could not be verified.	A certificate of conformance from the manufacturer is on file stating that the referenced frames were manufactured and delivered as listed frames.
5	NFPA 80, para. 2-5.1, Only labeled door frames shall be used.	Several security doors have been modified with security hardware. The frames for two doors at EL.401'-0" in the L-line wall area reinforced for HELB pressure loading in conjunction with seismic loading under HELB design basis analysis. The door frames are not labeled.	The justification for the use of these frames is provided on pages 2.1-8 through 2.1-9b of the Braidwood Fire Protection Report. The subject door frames are addressed in Generic Letter 86 10 Evaluation EC-EVAL 393561; this evaluation determined that the modified doors are adequate for the fire hazards to which they are exposed and justifies the use of each non-labeled door and frame. Refer to EC 392850 and EC-EVAL 393561 or EC 391762 and EC-EVAL 392603.
6	NFPA 80, para. 2-5.4, The clearance between doors and frames and the clearance between the meeting edges of doors swinging in pairs shall not exceed 1/8 inch.	The clearance between doors and frames and the clearance between the meeting edges of doors swinging in pairs may exceed 1/8 inch.	The clearances may be increased as stated and justified in EC- EVAL#339805. Clearances that satisfy the criteria specified in the EC-EVAL represent an acceptable minor deviation from NFPA 80 and may be considered operable without additional evaluation or corrective action.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 80 - 1983, "Standard for Fire Doors and Windows"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
7	NFPA 80, para. 2-5.4, The clearance between the bottom of a door and sill shall not exceed 3/8 inch. Where there is no sill, clearance shall not exceed 3/4 inch.	The clearance between the bottom of a door and sill may exceed 3/8 inch. Where there is no sill, clearance may exceed 3/4 inch.	The clearances may be increased as stated and justified in EC-EVAL#339805. Clearances that satisfy the criteria specified in the EC-EVAL represent an acceptable minor deviation from NFPA 80 and may be considered operable without additional evaluation or corrective action.
8	NFPA 80, para. 2-8.1.3, Hinges shall be secured to frames with steel screws. Types of screws will vary depending on material used for the manufacture of labeled door frames. Refer to labeled door frame manufacturers' instructions and published listings for specific screw requirements.	The hinges for two doors at EL. 401'-0" in the L-line wall area replaced to support steel plates added to reinforce the doors for HELB pressure loading in conjunction with seismic loading under HELB design basis analysis. The replacement hinges are not attached to the door frame; they are welded to a short hollow steel section, which is welded to a plate that is attached to the concrete wall and/or structural steel. Attachments to the wall are made with ¾" concrete expansion anchors. The other hinge leaf is attached to the door with through bolts.	Attachment of the subject door hinges is addressed in Generic Letter 86-10 Evaluation EC EVAL 393561; this evaluative determined that the modified doors are adequate for the fire hazards to which they are exposed and justifies the use of each non-labeled door and hinge configuration. Refer to EC 392850 and EC-EVAL 393561 or EC 391762 and EC-EVAL 392603.
9	NFPA 80, para. 2-8.2.1, Only labeled locks and latches shall be used.	Several doors are provided with security hardware.	The justification for non-labeled hardware for security doors is contained on pages 2.1 8 through 2.1 9b of the Braidwood Fire Protection Report.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 80 - 1983, "Standard for Fire Doors and Windows"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
10	NFPA 80, para. 2-8.4.1, Where there is an astragal or projecting latch bolt that prevents the inactive door leaf from closing and latching before the active door closes, a coordinating device shall be used.	These doors are not provided with a coordinating device: SD 172 and SD 174.	The coordinating devices have been installed on Doors SD-172 and SD-174 (WO 1382059 & WO 1382061).
11	NFPA 80, para. 2-9, Gasketing on fire doors or frames shall be furnished only in accordance with the published listing of the door frame or gasketing material manufacturer. Exception: Where acceptable to the authority having jurisdiction, gasketing of non-combustible or limited combustible material may be applied to the frame providing closing and latching of the door is not thereby inhibited.	Several doors are provided with gasketing around the frame.	Gasketing is installed to assist the HVAC air flow/pressurization within the plant. The gasketing does not affect the operability of the door and is considered acceptable.
12	NFPA 80, Para. 14-2.1.1, hardware shall be examined frequently and any parts found to be inoperative shall be replaced immediately.	Braidwood is extending the time between inspection on multiple fire rated doors.	Performance Based Review of system testing, in accordance with station approved procedures, supports this frequency (Reference EC# 403823).

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 90A - 1985, "Standard for the Installation of Air Conditioning and Ventilating Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 90A, para. 4-3 (a)&(b), In systems over 2,000 cfm, listed smoke detectors shall be installed and automatically stop the fan(s).	Not all duct detectors stop the fan(s).	Sargent & Lundy's NFPA 90A compliance checklist dated 10/9/1986, Rev 1 (HVAC Systems Review in compliance with NFPA 90A) identifies detector functions and list specific deviations from the NFPA code including justifications. M&MPC has performed review of the checklist as documented in their letters dated 4/16/1987 and 4/5/1988. The Smoke Removal Plan BwOP FP-27 was revised based on the formal review of the plan per M&MPC letter dated 1/22/1988. The BwOP FP-27 includes related information regarding fan trip with respect to the duct detector and direct fan shutdown to ensure closure of the fire dampers.
2	NFPA 90A, para. 4-5.1, 4-5.2, and 4-5.3, Detectors shall be installed in accordance with NFPA 72E and shall sound an alarm in a normally occupied area or through the building fire alarm system.	The duct detectors alarm in the main control room HVAC panel as common fire or trouble alarms and are not installed on the fire alarm system per NFPA 72E or 72D.	The common fire/trouble alarm in the main control room also records a printed message which indicates the local HVAC panel. The local HVAC panel indicates separate fire and trouble alarms. Operating procedures address these alarm conditions. This is acceptable for the duct detector alarm system.
3	NFPA 90A, para. 2-4.1, Air filters shall have a U.L. Class 1 or 2 rating.	Effective May 1, 2012 Underwriters Laboratory (UL) will no longer classify air filters as Class 1 or Class 2 under Standard UL 900	Filters are to be Class 1 or 2. After May 1, 2012, filters shall comply with NFPA 90A-2012, Section 4.2.2.2 and comply with ANSI/UL 900 Standard for air filters.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 90A - 1985, "Standard for the Installation of Air Conditioning and Ventilating Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
4	NFPA 90A para. 3-3.7.1.6, Fusible links shall have a temperature rating approximately 50°F above the maximum temperature that normally is encountered when the system is in operation or shut down, but not less than 160°F.	Some fusible links have a temperature rating greater than 50°F above the normally encountered maximum room temperature due to abnormal accident conditions associated with a HELB.	The fusible link temperature rating is significantly below typical fire temperatures. A Certificate of Conformance was provided by SR Products for the non-UL listed ETLs stating that the ETLs are designed and manufactured with the same parts and standards as their UL listed devices. Refer to EC 388397, EC 388398 or EC 392191.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 232 - 1980, "Standard for the Protection of Records"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 232, paras. 2-4 & 2-14.1, A vault shall not exceed 5,000 cu. ft. An oversize vault not over 25,000 cu. ft may be used and equipped with automatic sprinkler protection.	The QA vault is approximately 8,450 cu. ft. and is not equipped with automatic sprinklers.	The QA vault is protected by an automatic Halon 1301 fire suppression system with a connected reserve. This is adequate protection in lieu of sprinklers.
2	NFPA 232, para. 2-14.2, Where mobile shelving is used, smoke detectors shall be provided in addition to automatic sprinklers.	Automatic sprinklers are not provided in the Q.A. vault.	Smoke detectors associated with the Halon 1301 suppression system are provided. This is acceptable.
3	NFPA 232, para. 2-10.4, Doors shall be equipped with an automatic closing device and a heat actuated or smoke actuated release to close them.	A heat or smoke actuated device does not close the door (QA vault).	The door is normally locked closed and is equipped with an automatic door closure. A heat or smoke interlocking device is not necessary for this reason.
4	NFPA 232, para. 2-9.2 Roofs of vaults shall not be pierced for any purpose.	HVAC supply and exhaust ducts penetrate roof (QA vault).	HVAC openings are protected by a series of two 1-1/2-hr fire treated dampers that will automatically close upon fire or actuation of the halon system. This provides a fire barrier for the roof and is acceptable.
5	NFPA 232, para. 2-10.1, The vault shall be provided with a listed 4-hr door.	A 3-hr U.L. labeled door is installed (QA vault).	Based on external fire exposure, the 3-hr door provides adequate protection.

Table 3-1 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 232 - 1980, "Standard for the Protection of Records"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
6	NFPA 232, para. 2-11.2, Lighting shall be vapor proof or explosion proof controlled by a switch outside the vault. No other electrical devices shall be permitted within the vault	The lighting switch is inside the vault in addition to a telephone, thermostat, exit sign, and a temp/humidity recorded (QA vault).	Electrics have been installed per the National Electrical Code and present no inherent hazard. In addition, U.L. listed Class P gasketed light fixtures are installed with thermal ballast protection. This is acceptable.

Table 3-2 is a listing of NFPA deviations identified for safety-related areas on Braidwood Unit 2. This list indicates deviations which were not identified on the Unit 1 NFPA deviation list.

Table 3-2
NFPA CODE DEVIATION REPORT

NFPA 12 - 1985, "Standard on Carbon Dioxide Extinguishing Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 12A, para. 2-6.2.2, The agent (halon) discharge shall be substantially complete in a nominal 10 seconds.	Due to the extra quantity of halon added to the original design to maintain the soaking period, the nominal 10 second discharge is exceeded.	The time to reach initial concentration is not affected and, therefore, a longer discharge period has no impact on the halon suppression capability.

Table 3-2 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 13 - 1985, "Standard for the Installation of Sprinkler Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 13, para. 3-8.4, Return bends shall be used when pendent sprinklers are supplied from a raw water source.	Return bends are not provided for pendent sprinklers.	The sprinkler systems have been adequately flushed and the plant fire protection water is strained through a screen prior to its introduction into the system.
2	NFPA 13, para. 4-4.8.2.3, Where sprinklers installed to protect floor openings are located closer than 6 feet apart, cross baffles shall be provided.	Cross baffles are not provided on the systems protecting the center stairwell of the Auxiliary Building.	Each of the sprinklers for these systems is provided with a 5 inch baffle plate, which along with some minor obstructions from equipment between sprinklers, will adequately prevent prewetting of the sprinklers.
3	NFPA 13-2007 Edition, para. 7.3.2.4.1, pre-action sprinkler piping shall be automatically supervised where there are more than 20 sprinklers on the system.	The Containment Access Facility (CAF) pre-action sprinkler piping is not automatically supervised and has more than 20 sprinklers.	This deviation is considered acceptable based upon the justification provided in EC 366860.
4	NFPA 13, Chapter 4. Spacing, locations and position of sprinklers shall be made in accordance with NFPA.	During the walkdown of the systems, deviating locations and positions of sprinklers where identified	Obstructions to the foam sprinkler heads located in the Diesel Fuel Oil Storage Tank Rooms have been evaluated under GL 86-10 evaluation, EC 380157 and found to be acceptable.

Table 3-2 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 14 - 1983, "Standard for the Installation of Standpipe and Hose Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 14-1983, para. 4-4.3.1, Listed fire hose shall be used.	Hard rubber hose is used for the cable spreading room areas and electric cable tunnels. The hose may or may not be listed by UL or approved by Factory Mutual (FM). The listing or approval is dependent on availability of the listing or approval from the applicable authority at the time of procurement.	Hard rubber hose is utilized on these hose stations for maneuverability in the cable areas. The hose is hydrostatically tested and surveilled to the same standards regardless of listing or approval status.

Table 3-2 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 24 - 1984, "Standard for the Installation of Private Service Mains and Their Appurtenances"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 24, para. 8-3.1, Pipe shall not be run under buildings.	The Receiving Building Warehouse and Gate House extension were built over the underground fire main.	Sargent & Lundy letter of January 26, 1988 (R. Salsbury to J. Robinson) references review indicating loading to piping from buildings to negligible.

Table 3-2 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 30 - 1984, "Flammable and Combustible Liquids Code"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 30, para. 2-7.1, All tanks shall be tested as evidence of an ASME Code Stamp or U.L. label. Tanks not marked shall be tested with good engineering principles.	Tank 2T001T is not marked with an ASME Code Stamp or U.L. label. The tank was not designed to any specific code such as API 650 or ASME section VIII.	The main turbine oil reservoir was designed and constructed to Westinghouse Standards. The tank and associated piping was leak tested at normal operating pressure per ANSI Standards.
2	NFPA 30, para. 2-7.2, When the vertical length of fill or vent pipes is such that when filled with liquid the static head imposed on the bottom of the tank exceeds 10 psi, the tank and piping shall be hydrostatically tested equal to the static head.	The flame arrestor vent lines on the following tanks have large vertical lengths and could impose a 10 psi static head: 2D01TA/TB, 2D002TA/TB, 2D010T & 2D011T	The tanks are provided with overflow lines which could prevent a static head increase above 10 psi. Therefore, the tanks are not tested to this criteria.
3	NFPA 30, para. 3-7, Unless tested in accordance with ANSI B31, all piping shall be hydrostatically tested to 150% of the maximum system pressure or 110% pneumatically, but not less than 5 psig at the highest point for 10 minutes.	Piping is tested to ANSI Standards except open ended piping (e.g., overflow, vent lines, etc.) which is not tested from the point of the last control valve to the open end of the pipe.	Per S&L spec. L-2739, code case N-240 alleviates testing all open ended piping.
4	NFPA 30, para. 2-2.5.4, The total capacity of normal and emergency venting shall be in accordance with Table 2-8 of NFPA 30 and/or the listed venting requirements.	Long lengths of vent piping are prevalent on all tanks. Total venting capacity may be hindered by pipe lengths and height.	S&L has calculated that no additional venting is required due to the lack of heat generated by a fire in the tank storage areas. (S&L letter of 11/1/84, Leutloff to Smith).
5	NFPA 30, para. 2-2.7.4, The fill pipe entering the top of a tank shall terminate within 6 in. of the bottom of the tank.	The fill lines for tanks OVR11TA/TB terminate approximately 1.5 foot from the tank's bottom.	During system operation, liquid level will be maintained above the 1.5 foot level, utilizing the low liquid level alarm and administrative controls.

Table 3-2 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 30 - 1984, "Flammable and Combustible Liquids Code"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
6	NFPA 30-1984, para. 4-4.1.3, Maximum floor area of an inside storage room should be limited to 500 square feet for a 2-hour fire resistance rated storage room with an installed fire protection system.	The floor area of the paint and oil room is 830 square feet.	NFPA 30 does not provide requirements for inside storage rooms with a 3-hour fire resistance rating. This room has a 3-hour fire resistance rating and is fully sprinkled.
7	NFPA 30-1984, para. 4-4.1.6, Exhaust and makeup ventilation inlets shall be located within 12 inches of the floor	Various exhaust and makeup ventilation inlets are located in excess of 12 inches from the floor.	NFPA 91, "Standard for the Installation of Blower and Exhaust Systems for Dust, Stock and Vapor Removal or Conveying," para. 3-2.1, allows for ventilation through a system of suction ducts. This is considered to be acceptable, as the requirements of NFPA 91 are referenced as being applicable.
8	NFPA 30-1984, para. 4-4.1.6, NFPA 91 1983 para. 2-7.8, When ducts pass through a fire wall, they shall be provided with fire doors on both sides of the wall.	Fire doors are not provided.	UL listed, 3-hour rated fire dampers OVJ11Y and OVJ12Y are provided in the wall openings. These dampers are centered within the opening.
9	NFPA 30-1984, para. 4-4.1.6, The mechanical ventilation system for dispensing areas shall be equipped with an airflow switch or other equally reliable methods which is interlocked to sound an audible alarm upon failure of the ventilation system	No means is provided to indicate failure of the ventilation system.	The dispensing of flammable liquids is administratively controlled and includes verification that the ventilation system is operating

Table 3-2 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 37 - 1984 "Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 37, para. 5-7.1, Unless tested in accordance with ANSI B31, all piping shall be hydrostatically tested to 150% of the maximum system pressure or 110% pneumatically, but not less than 5 psig at the highest point for 10 minutes.	Piping is tested to ANSI Standards except open ended piping (e.g., overflow, vent lines, etc.) which is not tested from the point of the last control valve to the open end of the pipe.	Per S&L spec. L-2739, code case N-240 alleviates testing all open ended piping
2	NFPA 37, para. 5-6.1, The total capacity of normal and emergency venting shall be in accordance with Table 2-8 of NFPA 30 and/or the listed venting requirements.	Long lengths of vent piping are prevalent on all tanks. Total venting capacity may be hindered by pipe lengths and height.	S&L has calculated that no additional venting is required due to the lack of heat generated by a fire in the tank storage areas. (S&L letter of 11/1/84, Leutloff to smith)

Table 3-2 (Cont'd)
NFPA CODE DEVIATION REPORT

NFPA 90A - 1985, "Standard for the Installation of Air Conditioning and Ventilating Systems"

ITEM	NFPA REFERENCE	DEVIATION	COMMENTS / RESOLUTION
1	NFPA 90A para. 3-3.7.1.6, Fusible links shall have a temperature rating approximately 50°F above the maximum temperature that normally is encountered when the system is in operation or shut down, but no less than 160°F	Some fusible links have a temperature rating greater than 50°F above the normally encountered maximum room temperature due to abnormal accident conditions associated with HELB.	The fusible link temperature rating is significantly below typical fire temperatures and below ignition temperature of the material on either side of the wall. A Certificate of Conformance was provided by SR Products for non-UL listed ETLs stating that the ETLs are designed and manufactured with the same parts and standards as their UL listed devices. Refer to EC 388947, 388948, or 392192.