INSPECTION PROCEDURE 88055

FIRE PROTECTION

PROGRAM APPLICABILITY: 2600

88055-01 INSPECTION OBJECTIVES

01.01 To determine whether the licensee has an adequate Fire Protection Program and has the necessary organization and controls in place to implement the program.

01.02 To determine whether the licensee's facility, processes, and fire protection equipment are suitably designed and adequately maintained.

01.03 To determine whether the licensee has in place an adequate Pre-Fire Plan and maintains personnel and equipment in readiness to implement the plan.

88055-02 INSPECTION REQUIREMENTS

02.01 Review the licensee's Fire Protection Program document(s) and verify that it provides for adequate management support, administrative controls, and specific tasks and time tables for periodic audits, equipment maintenance, and fire brigade training.

02.02 Examine documentation evidencing implementation of the administrative controls and determine their adequacy.

02.03 Determine whether the design and construction of the buildings, and especially any new modifications thereof, are firesafe.

02.04 Determine whether the manufacturing processes, equipment, and material storage areas are firesafe and are being operated in a firesafe manner.

02.05 Determine whether the installed fire protection systems, including fire detection, alarm, and suppression systems, and the portable extinguishers are adequate. Examine documentation and a sampling of equipment to determine whether they are maintained in proper condition for use.

02.06 Examine the current facility fire hazard analysis (if required by license condition) and inspection reports of the fire insurers and determine whether appropriate actions have been taken to correct any deficiency identified by the documents.

02.07 Examine the Pre-Fire Plan for completeness and inspect the emergency equipment for readiness.

02.08 Examine the fire brigade training program for adequacy and review documentation to determine its proper implementation.

02.09 Observe a fire emergency drill, if one is held during the inspection, and determine if it reflects readiness for an actual emergency.

02.10 Interview, if possible, a fire chief of the offsite fire department on which the licensee would most depend for assistance. Determine if the fire department personnel have reasonable familiarity with the facility and the constraints of fighting a fire within it.

88055-03 INSPECTION GUIDANCE

General Guidance. The inspection should be directed at assessing the sufficiency of the licensee's effort in three areas:

a. Documentation. The licensee should have in operation a Fire Protection Program with adequate organization, management support, and responsibilities assigned for day-to-day implementation of the program, as well as for responding to a fire emergency. The inspector should examine the program as documented in one or more documents. Information regarding administration of the program and details of the various tasks of periodic audits, equipment maintenance, and fire brigade training are not always described in a single document. In such a case, the inspector should assess the elements of the program from documentation of the performed tasks. The licensee should, however, be encouraged to have a description of the Fire Protection Program in one document.

   Typically, the licensee would have an Emergency Plan, which would incorporate his plan for responding to a fire emergency. This is acceptable as a Pre-Fire Plan if it contains information that is required by the fire fighting personnel responding to an emergency. Such information includes facility details, usually accompanied by drawings, of the fire water system, the areas where use of water is restricted, the areas of concentrated fire load, and storage of flammable or combustible liquids and hazardous chemicals. Such details are usually not found in general Emergency Plans.

b. Implementation. Adequate implementation of the program can be judged by examining the documentation of tasks performed and by physical examination of the facility and equipment, including the fire protection equipment. The inspector should review documents showing, for example, that biennial fire hazard analyses, routine fire safety audits, and maintenance of fire protection equipment have been performed; that deficiencies identified as a result of audits have been followed up and corrected; that maintenance work involving fire hazards, such as welding, is administratively controlled;

and that the fire brigade training program has been implemented. Document examination should be supplemented by plant tours during which the inspector should observe the condition of the fire protection equipment, check maintenance tags where applicable, and observe, where possible, tests of signalling systems and process safety devices designed for prevention of fire.

If a fire emergency drill is scheduled, the inspector should judge the readiness of the facility to respond to such emergencies. Inspections may be scheduled to include such drills.

c. Assessment of the Equipment and Facilities. 10 CFR 70.23 and 10 CFR 40.32 require that the licensee's equipment and facilities should be adequate to protect health and minimize danger to life or property. The inspector should examine the facility, including buildings, yards, and storage areas; and the equipment, including process equipment, bulk-storage vessels, and fire protection equipment, for compliance from the point of view of danger from fire. The basic principles of firesafe industrial building construction are (1) use of noncombustible and limited combustible building materials and (2) separation of processes involving fire hazards from one another and from non-process areas by enclosing each in a compartment. The principal fire hazards in a fuel cycle facility are related to storage, transfer, and use of flammable and combustible liquids, such as propane, anhydrous ammonia, and hydrocarbon solvents; flammable gases, such as natural gas and hydrogen; and chemicals, such as nitric acid and fluorine, which may combine with organic materials to cause fire. Additionally, machining operations of metals, such as uranium and zirconium, present fire hazards, since these metals are known to ignite spontaneously when in finely divided form. The inspector should therefore look for effective compartmentation of such operations in the design of the buildings. Process vessels, pipes, and pumps should be examined for the potential for spills. Furnaces should be examined for the potential for loss of flame and consequent release of unburned flammable gases. There should be adequate provision for mitigating such situations with suitable equipment, such as shutting off supply of the flammable substance or for its containment in the case of a liquid spill in the immediate area.

The inspector is likely to find various combinations of fire detection and suppression methods in fuel cycle facilities. Fire detection ranges from visual to automatic detection by sensors. Suppression systems may or may not be automatically actuated. The inspector, therefore, has to make a judgment as to whether, given the contents of an area and the consequence of a fire in a credible scenario, the fire protection equipment is adequate. As a rule, all facility areas having moderate to high fire hazard classification (see National Fire Protection Association Code, NFPA 10), that are not continuously manned, should be under surveillance by an automatic fire detection and alarm system. As a rule, all facility

areas having moderate to high fire hazard classification should either be covered by an appropriate automatic suppression system or be reachable by a hose stream. Water is not appropriate as a suppression agent in moderation-controlled areas, but such areas should have the absolute minimum quantities of combustibles controlled by strict administrative procedures. Regardless of any fixed fire suppression system, all facility areas should be provided with suitable types of portable fire extinguishers.

03.01 Specific Guidance

a. Inspection Requirement 02.01. The Fire Protection Program should be described in a document available for inspection and should, as a minimum, consist of the following elements:

1. Identification of the management person who is given the authority and staff assistance to implement the program. This person does not need to be a fire protection specialist.

2. Identification of a supervisory person responsible for day-to-day implementation of the program. This person should meet appropriate qualification standards and have practical experience in fire protection.

3. Composition, functions, and responsibilities of a Fire Safety Review Committee.

4. Performance of an annual fire hazard analysis.

5. A system of planning and followup for correction of deficiencies identified by the fire hazard analysis, periodic audit, or inspection report.

6. Fire protection equipment maintenance and testing program.

7. System of controlling welding and other hot working. Typically, permits are issued and a fire watch is maintained during such work.

8. Fire brigade training. Details, such as training subjects, frequency of instructional meetings and drills, tests administered, and files on individual brigade members indicating course completion should be maintained.

b. Inspection Requirement 02.02. As a minimum, the following documents should be reviewed, and it should be determined, on the basis of the review, whether the program is being properly implemented:

1. The two latest fire insurers' audit reports: determine action taken on reported deficiencies.

2. Fire Safety Review Committee meeting minutes: determine frequency of meetings, deficiencies reported, and action taken thereon.

3. Fire protection equipment maintenance records: determine whether the frequency of inspection and maintenance conforms with industry codes.

4. Welding and other hot working permits.

5. Fire brigade training schedules and individual training records: note the instructional subjects, instruction providers, frequency of refresher training, and critiques of drills.

6. Pre-Fire Plan: this is discussed below, under the specific guidance on Inspection Requirement 02.07, p. 12.

c. Inspection Requirement 02.03

1. Building Construction

(a) The process buildings should be designed and constructed to qualify as Type I construction, as classified by NFPA 220, Types of Building Construction. This requires that the structural members of the buildings, including walls, columns, beams, floors, and roofs, are constructed of approved noncombustible or limited combustible materials and have specified minimum fire resistance ratings. If non-process areas are housed in the same or adjoining buildings, the entire building complex should be of Type I construction.

(b) To confine fire to its area of origin and prevent its spread, areas containing processes or materials involving fire hazards should be separated by structural barriers into fire areas. In particular, solvent extraction process areas, boiler rooms, incinerators, warehouses, control rooms, switchgear rooms, computer rooms, maintenance shops, fire pump areas, and office areas should be separate fire areas. Structural barriers, including walls, floors, ceilings, and roofs, that bound fire areas, should have a minimum of 1-hour fire resistance rating.

(c) Openings in the barriers comprising boundaries of fire areas should have doors or fire stops installed. Such devices should have at least the same fire resistance rating as the barriers they are installed in.

(d) When a process building is near installations, such as flammable liquid or gas storages, the risk of exposure fires (originating in such installations) to the process building should be evaluated and appropriate protective measures taken. NFPA 80A,

Protection of Buildings from Exterior Fire Exposures, provides guidance on such exposure protection. NFPA 30, Flammable and Combustible Liquids Code, provides minimum separation distances from tank storages.

(e) The building design should provide for safe means of egress for personnel in the event of a fire emergency. Egress routes should be clearly marked. NFPA 101, Life Safety Code, provides guidance on egress design and the requirements for protection of egress routes.

(f) Provision should be made for protection of the facility from lightning damage. The installation of such protection should comply with NFPA 78, Lightning Protection Code.

(g) All electrical wiring and installations should be made, used, and maintained in accordance with NFPA 70, National Electrical Code, and other standards that apply to special situations, such as NFPA 70B, Electrical Equipment Maintenance, NFPA 70E, Electrical Safety Requirements for Employee Workplaces, NFPA 79, Industrial Machinery, and NFPA 75, Electronic Computer/Data Processing Equipment.

2. Ventilation System

(a) The ventilation system should be designed to isolate affected areas during fire accidents and to provide channels for exhausting fire products, through filters if necessary, to outside the plant. NFPA 90A, Air Conditioning and Ventilating Systems, may be consulted on ventilation design for fire protection.

(b) Where a ventilation system is required to prevent the release of radioactive material to the atmosphere, all materials of construction and all filters for the system should be fire resistant. High efficiency particulate air (HEPA) filters should conform with Underwriters' Laboratories Standard UL-586, also designated ANSI B 132.1, High Efficiency Air Filtration Units.

(c) If a heat removal system such as a water spray system is required for the final filter plenum, it should operate automatically (with manual override) upon abnormal rise of the effluent temperature.

(d) Heating furnaces should be installed in accordance with NFPA 54 (ANSI Z223), National Fuel Gas Code, if gas-fired, or NFPA 31, Oil Burning Equipment, if oil-fired. The installation of electrical duct heaters should comply with NFPA 70 National Electrical Code.

d. Inspection Requirement 02.04

1. Processes Involving Flammable and Combustible Liquids and Gases

(a) Processes involving solvents or other chemical substances that may be classified as flammable liquids or as combustible liquids, Class II, according to NFPA 321, Basic Classification of Flammable and Combustible Liquids, should be isolated from each other and from the remainder of the facility by locating them either in separate buildings or in spaces enclosed by barriers having a minimum fire resistance rating of 1 hour.

(b) All electric motors, switchgears, lighting, and other electrical installations in these areas should be of the explosion-proof type and installed in accordance with NFPA 70, National Electrical Code.

(c) No open flame should be permitted in these areas, except for construction or maintenance work with the process shut down.

(d) The areas should be provided with automatic fire detection and automatic explosion prevention/suppression systems. NFPA 69, Explosion Prevention Systems, provides guidance on design, selection, and installation of such systems.

(e) Where a process involving a flammable or combustible liquid or gas is in the same fire area as an ignition source, such as an open flame, one or more analyzers should be installed strategically to monitor the flammable or combustible vapor or gas concentration in the air. The analyzers should activate both visible and audible alarms whenever the vapor concentration exceeds a set limit -- for example, 10 percent of the lower flammable limit. Simultaneously, ignition sources and flammable gas supplies in the area should be turned off automatically.

2. Machining Operations of Combustible Metals

(a) Metals such as uranium and zirconium, and their alloys, are known to be combustible, especially when in a finely divided form. Machining operations in the facility should, therefore, be evaluated for the potential for combustible dust cloud formation and combustible scrap and swarf accumulation from operations, such as sawing, grinding, machining, and abrasive cutting. Fire protection measures for these metals are similar. NFPA 482, Production, Processing, Handling and Storage of Zirconium, provides guidance.

(b) No open flames should be permitted in the areas where machining operations of combustible metals are performed. If maintenance operations, such as welding, are to be performed in the vicinity, machining operations should be halted, and metal scraps should be removed.

(c) Machining operations on combustible metals should be performed in enclosures with a dust-collection system in operation. The collected dust should be ducted to a dust collector and also a HEPA filter, if required, for removal of radioactive particles. The collection hood and duct leading to the filter should be designed to minimize deposition of the fines and to facilitate cleaning.

(d) Scrap and swarf generated by machining operations and accumulated in the immediate area should be swept as frequently as necessary and collected under water in covered metal containers. Such collections should be removed daily from the process areas. Dust and sludge collected in the dust separators and ducts should be removed as often as necessary.

(e) Extinguishing agents suitable for the particular metal fire, as well as suitable scoops or applicators, should be readily available to the operator performing the machining.

3. Incinerators

(a) Incinerators should be separated from the remainder of the facility by fire barriers having a minimum 1-hour fire resistance rating.

(b) Where the incinerator is required to burn radioactive contaminated waste, its exhaust should be ducted to a filtration system before release to the environment. The exhaust may also be ducted to the facility off-gas system. Such ducts should be designed to minimize deposition of particulate effluent and to facilitate cleaning.

(c) Depending on the temperature of the exhaust, a cooling water spray or passage through a liquid precipitation separator may be required for both cooling and dust separation.

4. Boilers and Boiler Furnaces

(a) Boilers for the supply of steam for process operation and boiler furnaces should be separated from the remainder of the facility by fire barriers having a minimum 1-hour fire resistance rating.

(b) The construction and operation of the boiler furnaces should comply with the relevant standards in the NFPA

85 series, depending on the type of furnace and the fuel used.

(c) The fuel storage tanks should be separated from the furnace area by fire barriers having a minimum 1-hour fire resistance rating. The fuel lines should be laid out to minimize possibility of damage.

5. Stationary Combustion Engines

(a) Stationary combustion engines, if located in part of a structure housing fuel processes, should be in enclosures having a fire resistance rating of at least 1 hour.

(b) Fuel storage tanks, except for day tanks, should be located outside the room and be constructed in accordance with NFPA 30, Flammable and Combustible Liquids Code. Unenclosed day tanks should be constructed and have capacities limited according to NFPA 37, Stationary Combustion Engines and Gas Turbines.

(c) The engine exhaust system should be designed to prevent ignition of any combustible material by contact with hot metal surfaces or by leaking exhaust gases or sparks.

(d) The stationary combustion engine room should be ventilated effectively to minimize accumulation of combustible vapor and possibility of explosion. NFPA 37 provides guidance.

6. Storage and Handling of Flammable and Combustible Liquids and Gases

(a) The construction, installation, operation, and maintenance of combustible liquid storage and the related loading and dispensing systems should comply with NFPA 30, Flammable and Combustible Liquids Code.

(b) Indoor storage of flammable and combustible liquids may be permitted in limited quantities in approved closed containers for the purpose of day-use (such as for diesel engine operation) and maintenance work. Appropriate portable fire extinguishers should be available.

(c) Steel supports of above-ground storage tanks should be protected from exposure fires, whenever dictated by proximity of other flammable or combustible storage tanks, located in a common diked area, or by proximity of a tank-truck loading/unloading area.

(d) The construction, installation, operation, and maintenance of bulk gas (including liquified gas) storage and the related loading and dispensing

systems should comply with good industry practice and the relevant NFPA Standards, as applicable, e.g., NFPA 50, Bulk Oxygen Systems at Consumer Sites, NFPA 50B, Liquified Hydrogen Systems at Consumer Sites, and NFPA 54, National Fuel Gas Code.

7. Hot Cells

(a) The construction materials for hot cells should be noncombustible. The internal surface coatings should be noncombustible or limited combustible.

(b) The liquid-filled windows should contain a noncombustible medium. Hydraulic fluids in the master-slave manipulators should be of the nonflammable type.

(c) Where process materials and equipment present fire hazard, the quantities of combustible materials and the sources of ignition should be maintained at the absolute minimum. If flammable gases or vapors may be present in explosive proportions, an inert atmosphere should be provided when operating the hot cell.

(d) Where combustible materials are used in a hot cell, extinguishing agents, compatible with the materials handled, and their delivery systems should be provided within the hot cell. Nuclear criticality concerns should be considered in selecting extinguishing media.

(e) Filters for the exhaust air from a hot cell should be of noncombustible construction

(f) Further guidance for hot cell fire protection is provided in NFPA 801, Facilities Handling Radioactive Materials.

8. Glove Boxes

(a) The construction materials for glove boxes may be of the limited combustible type if only noncombustible process materials are used within them. Otherwise, the glove box, except for the gloves, should be of noncombustible construction.

(b) If combustible materials are used, or if there is the possibility of an explosive mixture forming within the glove box, the relevant guidance provided for hot cells should also apply.

(c) If a number of glove boxes are operated in series, fire dampers should be provided at intervals to impede propagation of fire.

9. Laboratories. The fire protection methods of laboratories handling radioactive materials are similar to those of chemical laboratories. Guidance is provided in NFPA 45, Laboratories Using Chemicals.

e. Inspection Requirement 02.05

1. Fire Detection and Alarm Systems

(a) Automatic fire detectors of appropriate types should be installed in all areas having substantial combustibles, that are infrequently visited or are occupied only part of the 24-hour day.

(b) Automatic combustible vapor and gas detectors should be installed in areas where there is a potential for leakage of flammable or combustible liquids or gases.

(c) Automatic fire detectors and combustible vapor/gas detectors should actuate audible and visible alarms in the area of origin of the alarm, as well as at a central constantly supervised monitoring station. Such monitoring stations should constantly have available information on the status and functioning of the fire and combustible vapor/gas detection systems and of the installed fire suppression systems, including a zone indication of the origin of an alarm. These systems should comply with the requirements of NFPA 72D, Proprietary Protective Signaling Systems, and NFPA 72E, Automatic Fire Detectors.

(d) Manual fire alarm actuators (pull-boxes) or telephones should be available at strategic locations, e.g., near area exits.

(e) Actuation of any fire suppression system, such as flow through a sprinkler system, should actuate visible and audible alarms.

2. Fire Suppression Equipment

(a) Automatic water sprinkler coverage is the preferred method of fire suppression for most areas having significant fire hazard. The notable exceptions are areas where moderation control to prevent accidental nuclear criticality is necessary and areas with concentrations of energized electrical equipment, including computer installations and control rooms. NFPA 13, Sprinkler Systems, provides guidance for selection and design of sprinkler systems.

(b) Plant areas having significant fire hazards, and where water is unsuitable as a suppression agent, should be protected by other systems employing fire suppression agents such as inert gases, carbon dioxide, halon (where already installed), and high-

or low-expansion foam, as appropriate. Guidance on carbon dioxide and halon systems is provided in NFPA 12 and NFPA 12A, respectively. Guidance on the selection and design of foam systems is provided in NFPA 11 and NFPA 11A. Selection of gaseous suppression systems should take into account protection of personnel and possible pressurization of the enclosure protected.

(c) Coverage by standpipe and hose systems should be provided for the protection of all process and non-process areas. The hose outlet locations should be readily accessible. Guidance on standpipe and hose systems is provided in NFPA 14.

(d) Portable fire extinguishers, suitable in capacity and in the type of suppression agent used, should be available throughout the facility, irrespective of availability of any other fire suppression system. The number and capacity of such extinguishers and their deployment should be guided by NFPA 10, Portable Fire Extinguishers.

3. Fire Protection Water System

(a) Adequate supply of water for the installed fire protection systems should be ensured. Additional supply of fire fighting water that may be needed by an outside fire department should be planned for in consultation with them. Compatible connections should be provided for outside fire department use. The fire water-distribution system should be designed and constructed for high reliability. NFPA 24, Private Fire Service Mains and Their Appurtenances, should be used for guidance.

(b) The fire pump installation should be adequate to deliver water at full pressure at the farthest hydrant, standpipe, and hose station or sprinkler system. The installation should comply with the requirements of NFPA 20, Centrifugal Fire Pumps.

(c) Provisions should be made for alternate sources of power for fire pumps, so that failure of one source will not disable the installation. A diesel engine-driven pump is typically used as an alternative to an electrically driven one.

(d) The fire protection water-distribution system should be designed so that the failure of a single component, e.g., a pump, valve, etc., does not prevent the ability to deliver fire fighting water to any part of the facility.

f. Inspection Requirement 02.06

1. A systematic fire hazard analysis should divide the facility into "fire areas" and evaluate the fire safety of each area and of the facility as a whole. The analysis for each fire area should:

   (a) account for all radioactive and combustible materials, including estimates of their heat content;

   (b) describe the processes performed and their potential for fire or explosion;

   (c) account for the sources of heat and flame;

   (d) list all fire detection and suppression equipment; and

   (e) consider credible fire scenarios and evaluate the adequacy of the fire protection measures.

2. Any significant modification of buildings, processes, or inventories should necessitate a new fire hazard analysis.

3. Biennial fire hazard analyses may or may not have been required by license condition. In that case, the inspector should review audit reports of the facility's Safety Review Committee; these reports should include fire safety audits. Fire insurance companies also perform annual audits. The inspector should determine, by inspection of documents and by physical inspection of the facility, whether deficiencies reported in the audits and in the fire hazard analyses have been corrected.

g. Inspection Requirement 02.07. A Pre-Fire Plan should assign individual and alternate responsibilities for suppressing incipient fires; calling for the site fire brigade and, if necessary, offsite fire department assistance; personnel evacuation; orderly shutdown of processes; and safeguarding and control of radioactive material. The plan should clearly indicate, preferably with the help of site plans and drawings, the location of fire fighting equipment such as portable extinguishers, automatic fire suppression systems, block valves, stand-pipes, hydrants, and hoses. It should indicate the areas of concentration of combustibles, storages of flammable or combustible liquids, and areas where use of water for fire suppression is restricted.

   Fire emergency planning is sometimes encompassed in the general radiological emergency planning required by license condition. However, a Pre-Fire Plan is different from a Radiological Contingency Plan in that it requires information needed by fire-fighting personnel responding to an emergency. Often, the same team of employees is trained to respond to both fire and radiological emergencies. This is acceptable, since a fire emergency may turn out to be a radiological emergency, as well.

h. Inspection Requirement 02.08

1. The organization, training, and equipment of the fire brigade should be adequate to respond to any credible fire emergency, with assistance from offsite fire departments, where such assistance is available. NFPA 600, Private Fire Brigades, should be used for guidance.

2. All members of the brigade should receive adequate training. NFPA 600 provides guidance on the subjects of training and the frequency of refresher sessions and drills. The inspector should look for documentation of the meetings held, subjects taught, examinations given, and names of the attendees and the instructors. Documentation should also include training files for each fire brigade members.

3. The inspector should obtain documentation showing that fire drills have been held at least annually, that the drills have been duly critiqued, and repeated if serious deficiencies were found. Joint drills with offsite fire departments should be held at least biennially.

4. The offsite fire department most likely to respond to calls for assistance should be reasonably familiar with the facility. Members of the department should be given annual familiarization tours of the facility.

88055-04 INSPECTION RESOURCES

Approximately 28 hours of actual inspection time will be required to perform this procedure. The normal frequency of inspection is annual.

88055-05 REFERENCES

05.01 National Fire Protection Association (NFPA) Codes

NFPA 10, "Portable Fire Extinguishers."

NFPA 11, "Low Expansion Foam and Combined Agent Systems."

NFPA 11A, "Medium- and High-Expansion Foam Systems."

NFPA 12, "Carbon Dioxide Extinguishing Systems."

NFPA 12A, "Halon 1301 Fire Extinguishing Systems."

NFPA 12B, "Halon 1211 Fire Extinguishing Systems."

NFPA 13, "Sprinkler Systems."

NFPA 14, "Standpipe and Hose Systems."

NFPA 15, "Water Spray Fixed Systems for Fire Protection."

NFPA 16, "Deluge Foam-Water Sprinkler and Foam-Water Spray Systems."

NFPA 20, "Centrifugal Fire Pumps."

NFPA 24, "Private Fire Service Mains and Their Appurtenances."

NFPA 30, "Flammable and Combustible Liquids Code."

NFPA 31, "Oil Burning Equipment."

NFPA 37, "Stationary Combustion Engines and Gas Turbines."

NFPA 45, "Laboratories Using Chemicals."

NFPA 50, "Bulk Oxygen Systems at Consumer Sites."

NFPA 50B, "Liquified Hydrogen Systems at Consumer Sites."

NFPA 51B, "Fire Prevention in Use of Cutting and Welding Processes."

NFPA 54, "ANSI Z223.1-1984, National Fuel Gas Code."

NFPA 69, "Explosion Prevention Systems."

NFPA 70, "National Electrical Code."

NFPA 70B, "Electrical Equipment Maintenance."

NFPA 70E, "Electrical Safety Requirements for Employee Workplaces."

NFPA 72D, "Proprietary Protective Signaling Systems."

NFPA 72E, "Automatic Fire Detectors."

NFPA 75, "Electronic Computer/Data Processing Equipment."

NFPA 77, "Static Electricity."

NFPA 78, "Lightning Protection Code."

NFPA 79, "Industrial Machinery."

NFPA 80, "Fire Doors and Windows."

NFPA 80A, "Protection of Buildings from Exterior Fire Exposures."

NFPA 85D, "Fuel Oil-Fired Multiple Burner Boiler-Furnaces."

NFPA 86C, "Industrial Furnaces Using a Special Processing Atmosphere."

NFPA 90A, "Air Conditioning and Ventilating Systems."

NFPA 90B, "Warm Air Heating and Air Conditioning Systems."

NFPA 101, "Life Safety Code."

NFPA 204M, "Smoke and Heat Venting."

NFPA 220, "Types of Building Construction."

NFPA 251, "Fire Tests of Building Construction and Materials."

NFPA 321, "Basic Classification of Flammable and Combustible Liquids."

NFPA 482, "Production, Processing, Handling and Storage of Zirconium."

NFPA 600, "Private Fire Brigades."

NFPA 801, "Facilities Handling Radioactive Materials."

NFPA 803, "Light Water-Cooled Nuclear Reactors."

05.02 U.S. Nuclear Regulatory Commission Documents

U.S. Nuclear Regulatory Commission, "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities," NUREG 0762, Rev. 1, November 1987.

U.S. Nuclear Regulatory Commission, Standard Review Plan 9.5.1, "Guidelines for Fire Protection for Nuclear Power Plants," NUREG 0800, Rev. 2, July 1981.

U.S. Nuclear Regulatory Commission, "Standard Format and Content for Fire Protection Sections of License Applications for Fuel Cycle Facilities," Draft Regulatory Guide No. DG 3006, September 1990.

U.S. Nuclear Regulatory Commission, "Guidance on Management Controls/Quality Assurance, Requirements for Operation, Chemical Safety, and Fire Protection for Fuel Cycle Facilities," Federal Register, Vol, 54, No. 53, March 1989.

05.03 Other Documents

American National Standards Institute, N665-1985, "Facilities for Fabricating Fuel for Light Water Reactors (LWR) - Fire Protection."

American National Standards Institute/American Society of Heating, Refrigeration, and Air Conditioning Engineers, ANSI/ASHRAE 15, "Safety Code for Mechanical Refrigeration."

American Society for Testing and Materials, ASTM E-84, "Surface Burning Characteristics of Building Materials," 1976.

American Society for Testing and Materials, ASTM E-119, "Fire Test of Building Construction and Materials," 1976.

Factory Mutual System Approval Guide, "Equipment, Materials, Services for Conservation of Property."

National Fire Protection Association, Fire Protection Handbook.

Underwriters Laboratories Standard UL 555, "Standard for Fire Dampers and Ceiling Dampers."

Underwriters Laboratories Standard UL 586, (ANSI B 132.1), "High-Efficiency Air Filtration Units."

Underwriters Laboratories, Building Materials Directory.

END