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Mr. Theodore S. Sherr
Chief, Regulatory and International Safeguards Branch
U.S. Nuclear Regulatory Commission
Two White Flint North 8A33
Washington, D.C. 20555

Reference: Comments on the June, 1999 Draft Version of NUREG-1520 '*Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility*': Chapter 7 – Fire Safety

Dear Mr. Sherr:

The Nuclear Energy Institute (NEI)[1] and its industry members are undertaking detailed reviews of each chapter of the draft Standard Review Plan (SRP) released on June 2, 1999 as part of SECY-99-147. To provide effective guidance on implementation of 10 CFR 70, we believe the SRP should be concisely written and accurately reflect the 'risk-informed, performance-based' regulatory approach incorporated into the Part 70 rule revisions.

Accompanying this letter are NEI's comments on Chapter 7 ('*Fire Safety*') of the draft SRP. The review is presented in two parts: (i) general comments on the sub-chapter, and (ii) specific language (or stylistic) improvements presented on a red-lined version of the draft SRP sub-chapter. In view of the number and complexity of NEI's proposed improvements, a second copy of SRP Chapter 7 has been prepared from which the red-lined text deletions have been removed. This version of draft SRP

[1] NEI is the organization responsible for establishing unified nuclear industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include all utilities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel fabrication facilities, materials licensees, and other organizations and individuals involved in the nuclear energy industry.

Chapter 7 will enable you to more clearly understand the improvements which NEI is recommending.

NEI is pleased that many improvements to the draft SRP developed in public meetings and workshops and proposed by industry have been incorporated into this latest draft of the SRP. The June, 1999 revision is markedly improved over earlier versions issued in 1998 and we compliment the staff for this accomplishment.

We look forward to working with you and your staff to make NUREG-1520 a clear and concise document that will facilitate implementation of the new provisions of 10 CFR Part 70. Please feel free to contact me should you have any questions concerning the proposed improvements in the attachment to this letter.

Sincerely,

Felix M. Killar, Jr.
Director, Material Licensees and Nuclear Insurance

c. Mr. Marvin S. Fertel
Dr. Carl J. Paperiello, Director NMSS

Ref: I:\Files\Part 70\SRP (June 1999 Version) Cover Letter8.msw

COMMENTS ON THE JUNE, 1999 DRAFT VERSION OF NUREG-1520
'STANDARD REVIEW PLAN FOR THE REVIEW OF A LICENSE APPLICATION FOR A FUEL CYCLE FACILITY'

CHAPTER 7: FIRE SAFETY

I. General Comments

The June, 1999 version of draft SRP Chapter 7 has been significantly simplified and streamlined. A majority of the prescriptiveness in the November, 1998 version has been eliminated and replaced by attention to an applicant's ***commitments*** to design and implement a suitable fire protection program.

Draft SRP Chapter 7 requires an applicant to adopt the guidance on fire protection provided in NFPA Standard 801 ('*Standards for Facilities Handling Radioactive Material*'). If an applicant deviates from the "acceptable guidance" of NFPA Standard 801, justification for such action must be provided. While NEI supports the NRC's acceptance of industry standards in the design, licensing and operation of fuel cycle facilities (see, for example, NRC adoption of ANSI/ANS Series 8 standards in Nuclear Criticality Safety or NFPA standards in Fire Protection), adherence to every provision and requirement of the standard should not be expected. While the standards are valuable in guiding the overall design and operation of a facility, the results of the ISA will dictate specific fire safety measures, items relied on for safety and other design and operational considerations that may differ from those detailed in the standard. The applicant must retain the flexibility to follow the overall guidance of a standard, but modify its implementation, as is appropriate for the particular facility. Blanket adherence to an entire standard should not be expected. NEI recommends, therefore, that the requirement to commit to the requirements of NFRA Standard 801 (and others) be deleted and be replaced by an applicant's commitment to design, implement and maintain fire protection measures consistent with the guidance of appropriate, nationally-accepted, industrial standards.

There remain several instances of unnecessary prescriptiveness in Chapter 7 that should be removed:

- need to have a Fire Brigade consistent with NFPA 600 cannot be justified, especially if an offsite, professional fire service is relied upon to provide full manual firefighting capability
- need for a Plant or Fire Safety Review Committee
- diked areas and run-off water containment is required (§7.4.3.3), even if the ISA does not indicate need for such structures

There are several instances where the SRP appears to exercise jurisdiction in areas over which the NRC should be deferring to other agencies (e.g. OSHA):

- Physical Security Concerns (§7.4.3.3) addresses protection of workers from the effects of fires – an area not lying within NRC jurisdiction
- Fire Hazards Analysis (§7.4.3.2) should be constrained to radiological safety considerations. To the first sentence of §7.4.3.2 should be added the words "*…as related to radiological safety*."
- §7.4.3.4 discusses the potential impact on fire safety of hazardous chemicals used at fuel cycle facilities. This section appears to regulate purely chemical hazards and fire hazards that may have no impact on radiological safety. NEI recommends deletion of this section.

NEI has recommended several changes to Chapter 7 language that more closely ties fire protection to the results of the ISA. The two are inextricably linked. Language from the draft SRP for the AVLIS facility (draft NUREG-1701) has occasionally been incorporated where it is more clearly and succinctly expressed than in draft NUREG-1520. Finally, a reorganization of several sections of Chapter 7 has been undertaken to emphasize an applicant's commitments to design and implement a Fire Protection program and to remove prescriptive program requirements.

II. Specific Comments

Specific comments are noted on the attached copy of draft SRP Chapter 7.

Ref: I\Files\Part 70\SRP (June 1999 Version) Sec 7.msw

7.0 FIRE SAFETY

[Comment: Chapter 7 needs to address the two elements of a facility's Fire Protection Program: (i) organization of firefighting capability, installation and maintenance of fire protection features and systems (including items relied on for safety), fire training, etc. and (ii) revisions of the facility's ISA pertaining to fire protection resulting from facility and operational changes, improvements in fire protection technology, etc. The introduction to Chapter 7 should direct the reviewer to evaluate an applicant's ***commitments*** to implement a Fire Protection Program that will satisfy the requirements of 10 CFR 70. The SRP should allow the applicant to commit to performance indicators and not seek specific details as to how compliance with a particular indicator will be achieved. The SRP must clearly state that the design of the Fire Protection Program is based upon the results of the ISA. For example, the results of the ISA will determine which areas of the plant require non-aqueous fire suppression systems, which processes require fire detection and alarm systems and what should be the minimum required capabilities of site firefighting forces.]

7.1 PURPOSE OF REVIEW

The purpose of this review is to determine with reasonable assurance that the~~an~~ applicant has designed a facility that provides for adequate protection against fires and explosions that ~~appropriately analyzed the fire and explosion risks, which~~ could affect ~~effect~~ the safety of licensed materials and thus present an increased radiological risk~~, and provided mitigative systems and controls to protect the workers, the public health and safety, and the environment.~~ The review should also establish that the radiological consequences from fires have been considered and that suitable safety controls will be instituted to protect the workers, the public and the environment from them.

Design of a fire protection program is based upon the results of the Integrated Safety Analysis (ISA). The ISA, as summarized in the ISA Summary, was evaluated in SRP Chapter 3 ('*Integrated Safety Analysis (ISA) Commitments and ISA Summary*'). The ISA evaluated and ranked the risks posed by potential accident sequences for which fire or explosions could be the initiating event and assessed the adequacy of items relied on for safety (and complementary management measures) to ensure that fires or explosions could not threaten neither the integrity of licensed material nor the health and safety of workers or the public. SRP Chapter 7 encompasses review of the applicant's commitments to design and implement a corporate fire protection program and to examine the applicant's proposed performance indicators. The focus of the review is, therefore, on commitments and performance indicators rather than on specific details on how a commitment or performance indicator will be met.

7.2 RESPONSIBILITY FOR REVIEW

Primary: Fire Protection Reviewer

Secondary: Licensing Project Manager

S~~econdary~~upporting:
Criticality Reviewer
Environmental Reviewer
Chemical Safety Reviewer

Physical Security Reviewer
~~Supporting~~: Region or Fuel Facility Inspection Staff and Resident Inspector

7.3 AREAS OF REVIEW

10 CFR 70.62(a) requires a licensee to develop, implement ~~The regulation, 10 CFR 70.62, requires that each licensee establish~~ and maintain a safety program that will provide reasonable assurance of public health and safety and of the environment from the fire and explosion hazards of processing licensed material during normal operations, anticipated operational occurrences and credible accidents. The reviewer should first consult the ISA Summary (SRP Chapter 3) to identify those facility operations analyzed in the ISA to have a fire or explosion potential and to gain familiarity with the items relied on for safety (and complementary management measures) that are proposed to prevent or mitigate any resulting chemical or radiological risks. The fire protection program must address these process-specific risks as well as general fire prevention and fire safety management issues. Although a ~~demonstrates compliance with the performance requirements in §70.61. A~~ separate fire safety program is not required by 10 CFR 70, an applicant should provide commitments pertaining to fire safety in the following areas:~~, however, the licensee shall demonstrate that the facility's safety function includes the following (as appropriate):~~

(1) Organization and Conduct of Operations
- commitment to establish and maintain a corporate fire safety function
- commitment to develop fire prevention and protection programs
- commitment to establish a structure and organization responsible for fire prevention and protection program implementation
- commitment to staff the function with suitably qualified and experienced personnel
- commitment to refer to the facility's corrective action program the failure of a fire protection measure, fire-related item relied on for safety or fire or explosion accident
- commitment to train employees in fire prevention, emergency response action and, if appropriate, firefighting responsibilities
- commitment to report to the NRC in accordance with the requirements of 10 CFR 70.74 any abnormal, safety-significant event resulting from a fire or explosion

(2) Fire Protection Features and Systems
- commitment to maintain and inspect items relied on for safety pertaining to fire protection identified in the ISA
- commitment to maintain records of fire protection system inspection, maintenance and testing and worker training
- commitment to periodically review the adequacy of plant fire safety, to assess new fire detection, suppression and prevention technologies, to evaluate modifications to operating and maintenance procedures and plant equipment that could substantially reduce fire and explosion hazards at a reasonable cost

(3) ISA and Fire Hazard Analysis
- commitment to support revisions to the facility's ISA by means of fire hazard analysis of proposed changes in the facility's design, operation, structures or equipment and to recommend items relied on for safety or management measures that would enhance fire safety

- commitment to adhere to the baseline design criteria of 10 CFR 70.64, including defense-in-depth in the design of new processes at existing facilities that require a license amendment under 10 CFR 70.72(a)

(4) Firefighting Capability

- commitment to periodically assess the minimum required capabilities of facility or off-site firefighting personnel
- commitment to coordinate and organize onsite and offsite firefighting resources, firefighting equipment and emergency planning

The reviewer shall then examine the applicant's programs, procedures and performance indicators to implement each of these commitments.

~~Fire Safety Management: This includes safety organization, engineering review, fire prevention, inspection, testing, and maintenance, prefire plans, and qualifications, drills, and training.~~

~~Fire Risk Identification: This includes a Fire Hazards Analysis (FHA) and an Integrated Safety Analyses (ISA).~~

~~Facility Design: This includes information on building construction, fire areas, life safety, ventilation, and electrical system design. Consideration of competing requirements among fire safety and security, criticality, and environmental concerns should be accounted for.~~

~~Process Fire Safety: This involves design consideration to prevent an accident or mitigate the consequences from using process chemicals, combustible metals, flammable and combustible liquids and gasses, high temperature equipment, hot cells and glove boxes, and laboratories.~~

~~Fire Protection Systems: This includes the specified application of fire detection, alarm, and suppression systems, portable extinguishers, water supply, and emergency response organization.~~

7.4 ACCEPTANCE CRITERIA

~~An applicant that has met the following acceptance criteria, or has provided an acceptable alternative, should be considered to have an acceptable fire safety function.~~[Comment: redundant sentence. Delete.]

7.4.1 Regulatory Requirements

10 CFR 70.62(a) requires an applicant to establish a safety program that will provide for adequate protection against fires and explosions. 10 CFR 70.64 specifies a baseline design criterion for fire protection and requires facilities to be designed on a defense-in-depth basis. 10 CFR 70 provides general performance requirements for the facility. ~~The regulatory basis for the review should be the general and additional contents of an application as required by 10 CFR 70.22 and 70.65. In addition, the fire safety review should be conducted to provide reasonable assurance of compliance with 10 CFR 70.61, 70.62, and 10 CFR 70.64 for new facilities or new processes.~~

7.4.2 Regulatory Guidance

Relevant regulatory guidance for fire safety includes:

1) NUREG/CR-6410, *"Nuclear Fuel Cycle Facility Accident Analysis Handbook,"* 1998.

2) NUREG-1513, *"Integrated Safety Analysis Guidance Document."* latest edition.

3) Fed. Reg. 57 (No. 154) 35607-35613, "*Guidance on Fire Protection for Fuel Cycle Facilities*," 1992

4) NFPA Standard 801, "*Standards for Facilities Handling Radioactive Material*", National Fire Protection Association, Inc.

7.4.3 Regulatory Acceptance Criteria

[Comment: The following paragraph is non-specific and should be re-written as suggested. It is not a Chapter 7 task to review the acceptability of the ISA Summary.] ~~The acceptability of the application and the ISA summary will be based on the NRC staff's review of the applicant's commitments to control and mitigate fire hazards. The staff will focus on an application that is risk informed, has addressed maintaining an acceptable level of nuclear safety, and demonstrates that an applicant is prepared to react quickly and safely to extinguish fires when they occur. An applicant may use a graded approach for defining fire safety, but sufficient documentation and commitments must be made to assure the protection of workers, the public, and the environment from fire events.~~

An applicant's commitments on fire protection will be considered acceptable if they provide reasonable assurance that the following review criteria are adequately addressed and satisfied. The applicant may incorporate some or all of the requested information by reference to other sections of the application such as the Facility and Process Description (SRP Chapter 1.1) or the ISA Summary (SRP Chapter 3). Either approach is acceptable, so long as the information is adequately cross-referenced. ~~These criteria may be incorporated in the information supplied to satisfy SRP Section 3.0 (ISA) or other sections of this SRP with references provided (information need not be repeated). The fire safety reviewer reviews the application, ISA summary and other ISA documentation as needed with respect to these acceptance criteria regardless of where the information appears.~~

Nationally recognized codes and standards may be ~~are~~ used to assure fire safety. These include, but are not limited to, the National Fire Protection Association (NFPA) National Fire Codes, Factory Mutual (FM) Data Sheets and Approval Guide, Underwriters Laboratories (UL) Standards and Building Material Directory, American National Standards Institute (ANSI) Standards, and American Society for Testing Materials (ASTM) Standards. Specified standards will normally be considered as acceptable means of meeting the acceptance criteria.

The NRC staff will review the application against the following acceptance criteria:

7.4.3.1 Organization and Conduct of Operations~~Fire Safety Management Measures~~

[Comment: to minimize confusion with the 10 CFR 70.62(d) meaning assigned to the term '*management measures*', NEI recommends that this chapter be renamed '*Organization and Conduct of Operations*'],

The organization and conduct of operations should be considered acceptable if the following commitments are provided:

(1) the applicant commits to establish and maintain an organization responsible for plant fire safety
(2) the applicant commits to appoint fire safety personnel and to identify the authority and responsibility of each position
(3) the applicant commits to establish organizational relations amongst the individual positions responsible for fire protection and other line managers (e.g. emergency response)
(4) the applicant commits to specify minimum experience and qualifications for all positions involved in fire protection functions and activities that affect plant fire safety
(5) the applicant commits to develop and implement fire prevention and protection programs and to coordinate their execution with the facility's emergency response plans
(6) the applicant commits to provide fire safety training to plant operations and maintenance personnel. The applicant commits to train specialized fire protection and firefighting training (if appropriate) to the facility's emergency response personnel
(7) the applicant commits to develop and implement administrative procedures for the management of combustible materials that could initiate accident sequences and impact plant conditions that could affect the safety of radioactive materials, fire prevention and fire protection programs
(8) the applicant commits to review, revise and improve, when appropriate, the facility fire prevention and fire protection programs to reflect changes to the ISA, new technologies or new operational procedures
(9) the applicant commits to report and investigate fire incidents, to refer them to the facility's corrective action program, and to document corrective actions that are implemented
(10) the applicant commits to report to the NRC, in accordance with the requirements of 10 CFR 70.74, any accident or abnormal or safety-significant event resulting from a fire or explosion

~~An adequate application documents how fire safety is administered and assured at the licensed facility. The application should reflect a commitment to assure the items relied upon for safety as identified in the Integrated Safety Analysis (ISA) summary, Section 3.0, are available and reliable, fire safety awareness among employees is maintained, transient ignition sources and combustibles are controlled, and the facility maintains a readiness to extinguish or limit the consequences of fire. The application will be reviewed by a staff fire protection engineer and will address fire safety management measures. These measures are unique to fire safety and are therefore not included in the acceptance criteria for SRP Section 11, Management Measures.~~

~~An adequate application identifies a senior level manager who has the authority and staff to ensure that fire safety receives appropriate priority. A Plant or Fire Safety Review Committee staffed by different discipline managers should integrate plant modifications. Day-to-day supervision of fire safety should be by an individual with sufficient practical fire safety experience (that is described in the application) in nuclear facilities.~~ [Comment: mandating creation of a Fire Safety Review Committee is unnecessarily prescriptive. Plant modifications will be evaluated as part of the ISA revision process.]

~~The Standard for Fire Protection for Facilities Handling Radioactive Materials, NFPA 801, specifies the following fire safety management measures: fire prevention, inspection, testing, and maintenance of fire protection systems, emergency response organization qualifications, drills, and training, and prefire plans. An adequate application documents the fire safety management measures in sufficient detail to identify their relationship to, and functions for, normal operations, anticipated (off-normal) events, and accident safety (i.e., items relied on for safety).~~ [Comment: fire safety management measures are addressed in §7.4.3.3]

7.4.3.2 Fire Hazard ~~Risk~~ Analysis

The fire hazard analysis capability should be considered acceptable if the following commitments are provided:

(1) the applicant commits to support revision of the facility ISA by conducting analysis of any accident sequences that have fire or explosion risks and to modify, if necessary, items relied on for safety and management measures
(2) the applicant commits to support the facility change process by assessing fire safety impacts of facility and process design modifications that may impact fire safety
(3) the applicant commits to revise plant fire protection measures to incorporate any significant changes or modifications to the facility or processes as a result of revisions to the facility ISA
(4) the applicant commits to review and update, as necessary, the fire analysis capability and to document that fire protection measures are adequate to ensure plant fire safety
(5) the applicant commits to ensure that fire protection measures, items relied on for safety, any safety grading of such items commensurate with fire or explosion risk and management measures continue to be adequate to ensure safe facility operation
(6) the applicant commits to ensure that both the fire protection program and the requirements for placement and reliability of fire protection measures are consistent with the results of the ISA

[Comment: the studies and tasks outlined in the following paragraph were conducted as part of the ISA. Fire Hazard Analysis (FHA) need not be considered a separate safety study, but as but one component of the ISA process. The paragraph is incorrect in stating that only high-risk accident sequences involving a fire or explosion risk are evaluated. Delete this paragraph as redundant.] ~~Knowing the fire risk allows a licensee to apply the appropriate level of fire protection to assure the safety of workers, the public, and the environment. To be risk informed, a licensee should conduct Fire Hazards Analyses (FHA) for high risk facilities. The FHA should develop bounding credible fire scenarios for each process fire area with significant fire loading, then assess or model the consequences of an unmitigated fire. NFPA 801 provides further guidance that is acceptable to the NRC staff for conducting FHAs. With respect to fire safety, the ISA summary is acceptable if the credible facility fire hazards (e.g., from the FHA) are identified for each process area, and information is provided detailing how that fire hazard was considered and addressed (i.e., the management measures and/or items relied on for safety) for each process such that the performance requirements in §70.61 are satisfied. A summary of the FHA is acceptable if it includes a description, by fire area, of the fuel loading, fire scenarios, methods of consequence analysis, the consequences, and a description of the mitigative controls.~~

7.4.3.3 Fire Protection Features and Systems~~Facility Design~~

An applicant's commitments to design and construct a facility with adequate fire protection features and systems should be considered acceptable if the following criteria are met:

(1) the applicant commits to design new facilities in accordance with the baseline design criteria specified in 10 CFR 70.64(a) and the defense-in-depth requirement of 10 CFR 70.64(b)
(2) the applicant commits to design the facility consistent with the guidance provided in NFPA 801 or other appropriate nationally recognized fire codes and standards
(3) the applicant commits to install a fire-alarm system in areas determined in the ISA to have a significant risk of fire or explosion
(4) the applicant commits to incorporate in the facility design an adequate and reliable water supply system
(5) the applicant commits to install in areas of the plant determined in the ISA to have a significant fire loading (or the potential for significant loading) automatic fire suppression systems
(6) the applicant commits to regularly inspect, test and maintain fire protection equipment in accordance with appropriate NFPA or other industry standards. ~~NFPA 801 specifies facility design considerations that are acceptable to the NRC staff. Building construction, fire area determination, electrical installation, life safety, ventilation, drainage, and lightning protection are a few of the areas covered. An adequate application~~
(7) the applicant commits to document~~s~~ in the application the fire safety considerations used in the general facility design of the licensed facilities. ~~The following are other s~~Specific issues that should be addressed include: ~~areas of concern:~~

(i) Criticality: Criticality concerns may exclude water extinguishing systems from process areas. However during major fire events, the fire may overcome the extinguishing capability of portable extinguishers and hose lines may be needed. Consideration should be given to total flooding gaseous systems in water exclusion areas with significant fire risks. The applicant ~~An adequate application~~ should address methods ~~the methodology used~~ for extinguishing fires in water exclusion areas. ~~The staff's fire safety and criticality specialist will review for adequacy.~~ [Comment: the last sentence does not an Acceptance Criteria and should be deleted.]

(ii) Environmental Concerns: The plant physical design should provide for containment and drainage in areas of the plant where a credible risk of large spills of flammable or combustible liquids exists. The design should also include provision for the drainage and hold-up of contaminated fire water following a fire. ~~Thousands of gallons of fire water can be contaminated with nuclear material during a fire event. Diked areas and drainage of process facilities need to be properly sized to accommodate this run-off. The amount of runoff can be calculated using guidance in NFPA 801. An adequate application documents fire water run-off containment. The staff's fire safety and environmental specialists will review for adequacy.~~ [Comment: the last sentence does not an Acceptance Criteria and should be deleted.]

(iii) Physical Security Concerns: Building~~s~~ layout should provide a safe means of egress for plant personnel in the event of a fire. ~~and facilities should be designed to~~

~~provide safe egress in the event of a fire, chemical, or radiological emergency.~~ Physical security of SNM may ~~inadvertently institute controls that~~ delay worker egress and fire fighter access during fire events. Physical security procedures need to allow off-site fire departments quick and efficient access to the fire emergency. ~~NFPA 801 specifies design features acceptable to the NRC and an adequate application documents the criteria used for worker egress and procedures for firefighter access. The staff's fire safety and physical security specialists will review for adequacy.~~ [Comment: the last sentence oes not an Acceptance Criteria and should be deleted.]

~~**7.4.3.4 Process Fire Safety**~~

[Comment: this section §7.4.3.4 appears to regulate purely chemical hazards and fire hazards that may have no impact on radiological safety. Assessment by the NRC of a facility's fire protection program should be consistent with the 1988 NRC-OSHA MOU – and specifically with clause (iii) that directs NRC review to prevention of fires or explosions the results of which could affect the safety of radioactive materials and thereby present an increased radiation risk. A facility's fire protection program for hazardous chemicals need not be assessed by the NRC. Consideration of the impacts of fires and explosions involving hazardous chemicals, including those produced from radioactive materials, was addressed in the ISA and appropriate safety controls were identified for installation in the plant. Delete this paragraph.]

~~Many hazardous chemicals used by fuel cycle facilities contribute to the fire hazard. The licensee should identify these chemicals and their effect on fire safety. In fire areas containing radiological material, NFPA 801 provides design criteria that is acceptable to the NRC staff for laboratories, high temperature equipment, hots cells, and glove boxes. The staff's fire safety and chemical safety specialists will review the application for adequacy.~~

~~The following are a few of the more common hazardous substances used at fuel cycle facilities:~~

~~Anhydrous Ammonia: Explosive, flammable, and toxic gas used to make hydrogen.~~
~~Fluorine: Reacts violently with organic material or metal powders and water vapor.~~
~~Hydrogen: Explosive and flammable gas used in reduction processes.~~
~~Hydrogen Peroxide: Off-gases hydrogen and oxygen, incompatible with some extinguishers.~~
~~Nitric Acid: Nitrates organic material, lowering the ignition temperature of combustibles.~~
~~Sulfuric Acid: Absorbs water from organic material in an exothermic reaction, causing ignition.~~
~~Zirconium: Combustible metal that burns at elevated temperatures.~~

7.4.3.~~4~~5 Fire Fighting Capability ~~Protection~~ and Emergency Response

[Comment: The commitment to install a fire detection, alarm and suppression systems was included in §7.4.3.3 under "*Fire Protection Features and Systems*". Delete this paragraph.] ~~The application should document the fire detection, alarm, and suppression systems and emergency response organizations provided for licensed facilities. The ISA summary (see SRP Section 3.0) should identify and list the items relied upon for fire safety. NFPA 801 provides criteria that is acceptable to the NRC staff for the design, installation, testing, and maintenance of the fire protection systems and the requirements for an effective emergency response organization. An adequate application should describe the fire protection provided in all process areas.~~[Comment: the fire protection to be provided in a process area will depend on the results of the ISA!]

The applicant's commitments to establish manual fire fighting capability should be considered acceptable if the following criteria are met:

(1) the applicant commits to establish a manual fire fighting capability that is staffed by a well-trained and fully equipped onsite fire emergency response team, by qualified offsite resources, or by a coordinated combination of the two approaches, as is appropriate for the facility.
(2) the applicant commits to coordinate and provide liaison with offsite fire fighting resources and to establish a clear line of authority at the fire scene when reliance is placed on offsite response
(3) the applicant commits to enter into a formal agreement (or memorandum of understanding) that documents the assistance to be provided by the offsite organization(s) and that describes the minimum fire fighting manpower and equipment to be provided during fire emergencies and the estimated response time
(4) if the facility will rely on offsite fire fighting resources, the applicant commits to undertake periodic training with such offsite fire emergency response team in such areas as facility access, plant layout, emergency egress routes, ventilation systems, fire hydrants, items relied on for safety related to fire prevention, etc.
(5) if the facility will rely on manual fire fighting capability provided by onsite fire emergency personnel, the applicant commits to establish, equip and train the personnel to provide the required services
(6) the applicant commits to develop a fire emergency response plan as part of the facility's Emergency Preparedness Plan (SRP Chapter 8) for each area determined in the ISA to be important to plant fire safety. Such plans should identify, for example, access and egress routes, radiological hazards, automatic and manually operated fire suppression measures, locations of items relied on for safety, special procedures for fire suppression because of nuclear criticality, etc.

~~Facilities with significant fire risks may need a fire emergency response team in accordance with NFPA 600, "Industrial Fire Brigades." If the off-site fire department is depended upon for plant safety, periodic training with the fire department is necessary to become familiar with facility access procedures, plant layout, and pre-fire plans. A memorandum of understanding (MOU) between the applicant and the fire departments may be necessary to define the protection required.~~

7.5 REVIEW PROCEDURES

7.5.1 Acceptance Review

[Comment: Proposed revisions to this section 7.5 are mainly stylistic and are designed to ensure consistency amongst all of the SRP chapters.]

~~During the acceptance review, t~~The primary reviewer should evaluate~~s~~ the application to determine whether it addresses the "Areas of Review" in Section 7.3. If significant deficiencies are identified, the applicant should be requested to submit additional material prior to ~~for completeness as required by 10 CFR Part 70 regarding fire safety for fuel cycle facilities and whether necessary criteria discussed in Section 7.3 "Areas of Review," have been addressed. If~~

~~significant deficiencies are identified in the application, the application should be returned or additional information should be requested before~~ the start of the safety evaluation.

7.5.2 Safety Evaluation

The primary reviewer shall perform a safety evaluation against the Acceptance Criteria in Section 7.4 including the applicant's commitments to design, implement and maintain each element of the fire protection program. The reviewers may consult with the supporting reviewers and NRC inspection staff to identify and resolve any issues related to the licensing review and to ensure that descriptions in the fire safety section are consistent with descriptions in other sections of the application that may interface with fire safety. Commitments and provisions made in the applicant's fire safety section should be in accordance with other sections of the SRP. For example, the supporting nuclear criticality safety reviewer should establish that the applicant's program provides reasonable assurance that a water-based suppression system will not adversely affect criticality safety. The primary reviewer will prepare a Safety Evaluation Report (SER) for the Licensing Project Manager in support of licensing action.~~During the Safety Evaluation, the primary and secondary reviewers evaluate the adequacy of the application to comprehensively describe the fire safety of the licensed activity as covered in Section 7.3 "Areas of Review" and the commitments made to the criteria specified in Section 7.4 "Acceptance Criteria." The staff may request the applicant or licensee to provide additional information or modify the submittal to meet the acceptance criteria.~~

Reviewers should note that NFPA 801 uses "administrative control" in a different sense than Part 70 and elsewhere in this SRP. In Part 70 an administrative control, which is a subset of items relied on for safety, is the human action necessary to meet safety performance requirements. It is supported by management measures (training, QA, procedures, ...) that ensure the action will be taken if needed. In NFPA 801, administrative controls are the training, qualifications, procedures, etc. behind the human action. These elements are "Management Measures" in Part 70.

7.6 EVALUATION FINDINGS

[Comment: Proposed revisions to this section 7.6 are mainly stylistic and are designed to ensure consistency amongst all of the SRP chapters.]

The staff will write an SER addressing each topic reviewed and explain why the NRC staff has reasonable assurance that the applicant's facility will be designed and constructed in accordance with appropriate standards and that the fire protection program will be adequate to protect the health and safety of the workers and public and the environment. License conditions may be proposed to impose requirements where the application is deficient. The following kinds of statements and conclusions will be included in the staff's SER: ~~The staff's review should verify that sufficient information has been provided in the license application to satisfy the intent of 10 CFR Part 70 requirements relating to the overall safety program and is consistent with the fire safety criteria in this SRP. On the basis of this information, the staff should be able to evaluate the application in meeting the appropriate criteria. The staff will document the fire safety review as follows.~~

The applicant has committed to an acceptable ~~established a~~ Fire Protection Program based upon the results of the ISA and that meets ~~meeting~~ the acceptance criteria of ~~the~~ SRP Chapter 7. Fire safety measures address significant fire hazards, suitable fire protection features are

proposed as items relied on for safety to control these hazards and the applicant commits to maintain such controls and management measures to ensure the overall adequacy of facility fire safety. In addition, the applicant has provided commitments and information relating to the fire safety organization and conduct of operations, fire protection measures and manual fire fighting capability. ~~The program includes a Plant Safety Review Committee responsible for integrating modifications to the facility and a Fire Safety Manager responsible for the day to day program implementation. Fire prevention, inspection, testing, and maintenance of fire protection systems, and the qualification, drills, and training of plant personnel are in accordance with applicable NFPA codes and standards. (Note: fire protection training requirements may be described in this section of the SRP or in SRP Section 11.3)~~

~~The applicant has conducted risk analysis in accordance with NFPA 801. The FHAs identified credible fire scenarios that bound the fire risk. The ISA used these scenarios and identified fire protection items important to safety. In particular, wet pipe sprinkling the process areas, isolating high temperature equipment within fire barriers, and a fire brigade meeting NFPA 600. An MOU with the fire department documents the protection required and the annual exercises. Procedures are in-place to allow efficient access by the fire department to plant process areas during fire emergencies.~~

The staff concludes that the applicant's capabilities meet or exceed the guidance provide in SRP Chapter 7. The staff concludes that the applicant's proposed equipment, facilities and procedures provide a reasonable level of assurance that adequate fire protection will be provided and maintained for those items relied on for safety to meet the safety performance requirements and baseline design criteria of 10 CFR 70. ~~Accordingly, the staff concludes that the applicant's description of fire safety complies with applicable NRC regulations and industry standards and can be implemented for the specific phases identified in the facility application.~~

7.7 REFERENCES

~~Code of Federal Regulations, 29 CFR 1910, "Occupational Safety and Health Standards."~~[Comment: this reference is never cited in SRP Chapter 7. Delete, as it is really not applicable to the topic in Chapter 7.]

Fed. Reg. 57 (No. 154) 35607-35613, "*Guidance on Fire Protection for Fuel Cycle Facilities*," 1992

NFPA Standard 801, "*Standards for Facilities Handling Radioactive Material*", National Fire Protection Association, Inc.

National Fire Protection Association, "National Fire Codes."

~~U.S. Nuclear Regulatory Commission, Information Notice No. 92-14, "Uranium Oxide Fires at Fuel Cycle Facilities," February 21, 1992.~~[Comment: this reference is never cited in SRP Chapter 7. Delete, as it is really not applicable to the topic in Chapter 7.]

~~U.S. Nuclear Regulatory Commission, Information Notice No. 97-23, "Evaluation and Reporting of Fires and Unplanned Chemical Reaction Events at Fuel Cycle Facilities," May 7, 1997.~~ [Comment: this reference is never cited in SRP Chapter 7. The reporting requirements for the revised 10 CFR 70 differ from those in this Reg. Guide. Consult 10 CFR 70.74].

PROPOSED REVISION OF SRP (NUREG-1520) CHAPTER 7
INCORPORATING RECOMMENDATIONS
OF THE
NUCLEAR ENERGY INSTITUTE
(AUGUST, 1999)

7.0 FIRE SAFETY

7.1 PURPOSE OF REVIEW

The purpose of this review is to determine with reasonable assurance that the applicant has designed a facility that provides for adequate protection against fires and explosions that could affect the safety of licensed materials and thus present an increased radiological risk. The review should also establish that the radiological consequences from fires have been considered and that suitable safety controls will be instituted to protect the workers, the public and the environment from them.

Design of a fire protection program is based upon the results of the Integrated Safety Analysis (ISA). The ISA, as summarized in the ISA Summary, was evaluated in SRP Chapter 3 ('*Integrated Safety Analysis (ISA) Commitments and ISA Summary*'). The ISA evaluated and ranked the risks posed by potential accident sequences for which fire or explosions could be the initiating event and assessed the adequacy of items relied on for safety (and complementary management measures) to ensure that fires or explosions could not threaten neither the integrity of licensed material nor the health and safety of workers or the public. SRP Chapter 7 encompasses review of the applicant's commitments to design and implement a corporate fire protection program and to examine the applicant's proposed performance indicators. The focus of the review is, therefore, on commitments and performance indicators rather than on specific details on how a commitment or performance indicator will be met.

7.2 RESPONSIBILITY FOR REVIEW

Primary: Fire Protection Reviewer

Secondary: Licensing Project Manager

Supporting:

Criticality Reviewer
Environmental Reviewer
Chemical Safety Reviewer
Physical Security Reviewer
Region or Fuel Facility Inspection Staff and Resident Inspector

7.3 AREAS OF REVIEW

10 CFR 70.62(a) requires a licensee to develop, implement and maintain a safety program that will provide reasonable assurance of public health and safety and of the environment from the fire and explosion hazards of processing licensed material during normal operations, anticipated

operational occurrences and credible accidents. The reviewer should first consult the ISA Summary (SRP Chapter 3) to identify those facility operations analyzed in the ISA to have a fire or explosion potential and to gain familiarity with the items relied on for safety (and complementary management measures) that are proposed to prevent or mitigate any resulting chemical or radiological risks. The fire protection program must address these process-specific risks as well as general fire prevention and fire safety management issues. Although a separate fire safety program is not required by 10 CFR 70, an applicant should provide commitments pertaining to fire safety in the following areas:

(5) Organization and Conduct of Operations

- commitment to establish and maintain a corporate fire safety function
- commitment to develop fire prevention and protection programs
- commitment to establish a structure and organization responsible for fire prevention and protection program implementation
- commitment to staff the function with suitably qualified and experienced personnel
- commitment to refer to the facility's corrective action program the failure of a fire protection measure, fire-related item relied on for safety or fire or explosion accident
- commitment to train employees in fire prevention, emergency response action and, if appropriate, firefighting responsibilities
- commitment to report to the NRC in accordance with the requirements of 10 CFR 70.74 any abnormal, safety-significant event resulting from a fire or explosion

(6) Fire Protection Features and Systems

- commitment to maintain and inspect items relied on for safety pertaining to fire protection identified in the ISA
- commitment to maintain records of fire protection system inspection, maintenance and testing and worker training
- commitment to periodically review the adequacy of plant fire safety, to assess new fire detection, suppression and prevention technologies, to evaluate modifications to operating and maintenance procedures and plant equipment that could substantially reduce fire and explosion hazards at a reasonable cost

(7) ISA and Fire Hazard Analysis

- commitment to support revisions to the facility's ISA by means of fire hazard analysis of proposed changes in the facility's design, operation, structures or equipment and to recommend items relied on for safety or management measures that would enhance fire safety
- commitment to adhere to the baseline design criteria of 10 CFR 70.64, including defense-in-depth in the design of new processes at existing facilities that require a license amendment under 10 CFR 70.72(a)

(8) Firefighting Capability

- commitment to periodically assess the minimum required capabilities of facility or off-site firefighting personnel
- commitment to coordinate and organize onsite and offsite firefighting resources, firefighting equipment and emergency planning

The reviewer shall then examine the applicant's programs, procedures and performance indicators to implement each of these commitments.

7.4 ACCEPTANCE CRITERIA

7.4.1 Regulatory Requirements

10 CFR 70.62(a) requires an applicant to establish a safety program that will provide for adequate protection against fires and explosions. 10 CFR 70.64 specifies a baseline design criterion for fire protection and requires facilities to be designed on a defense-in-depth basis. 10 CFR 70 provides general performance requirements for the facility.

7.4.2 Regulatory Guidance

Relevant regulatory guidance for fire safety includes:

1) NUREG/CR-6410, *"Nuclear Fuel Cycle Facility Accident Analysis Handbook,"* 1998.

2) NUREG-1513, *"Integrated Safety Analysis Guidance Document."* latest edition.

3) Fed. Reg. 57 (No. 154) 35607-35613, "*Guidance on Fire Protection for Fuel Cycle Facilities*," 1992

4) NFPA Standard 801, "*Standards for Facilities Handling Radioactive Material*", National Fire Protection Association, Inc.

7.4.3 Regulatory Acceptance Criteria

An applicant's commitments on fire protection will be considered acceptable if they provide reasonable assurance that the following review criteria are adequately addressed and satisfied. The applicant may incorporate some or all of the requested information by reference to other sections of the application such as the Facility and Process Description (SRP Chapter 1.1) or the ISA Summary (SRP Chapter 3). Either approach is acceptable, so long as the information is adequately cross-referenced.

Nationally recognized codes and standards may be used to assure fire safety. These include, but are not limited to, the National Fire Protection Association (NFPA) National Fire Codes, Factory Mutual (FM) Data Sheets and Approval Guide, Underwriters Laboratories (UL) Standards and Building Material Directory, American National Standards Institute (ANSI) Standards, and American Society for Testing Materials (ASTM) Standards. Specified standards will normally be considered as acceptable means of meeting the acceptance criteria.

The NRC staff will review the application against the following acceptance criteria:

7.4.3.1 Organization and Conduct of Operations

The organization and conduct of operations should be considered acceptable if the following commitments are provided:

(11)the applicant commits to establish and maintain an organization responsible for plant fire safety
(12)the applicant commits to appoint fire safety personnel and to identify the authority and responsibility of each position
(13)the applicant commits to establish organizational relations amongst the individual positions responsible for fire protection and other line managers (e.g. emergency response)
(14)the applicant commits to specify minimum experience and qualifications for all positions involved in fire protection functions and activities that affect plant fire safety
(15)the applicant commits to develop and implement fire prevention and protection programs and to coordinate their execution with the facility's emergency response plans
(16)the applicant commits to provide fire safety training to plant operations and maintenance personnel. The applicant commits to train specialized fire protection and firefighting training (if appropriate) to the facility's emergency response personnel
(17)the applicant commits to develop and implement administrative procedures for the management of combustible materials that could initiate accident sequences and impact plant conditions that could affect the safety of radioactive materials, fire prevention and fire protection programs
(18)the applicant commits to review, revise and improve, when appropriate, the facility fire prevention and fire protection programs to reflect changes to the ISA, new technologies or new operational procedures
(19)the applicant commits to report and investigate fire incidents, to refer them to the facility's corrective action program, and to document corrective actions that are implemented
(20)the applicant commits to report to the NRC, in accordance with the requirements of 10 CFR 70.74, any accident or abnormal or safety-significant event resulting from a fire or explosion

7.4.3.2 Fire Hazard Analysis

The fire hazard analysis capability should be considered acceptable if the following commitments are provided:

(7) the applicant commits to support revision of the facility ISA by conducting analysis of any accident sequences that have fire or explosion risks and to modify, if necessary, items relied on for safety and management measures
(8) the applicant commits to support the facility change process by assessing fire safety impacts of facility and process design modifications that may impact fire safety
(9) the applicant commits to revise plant fire protection measures to incorporate any significant changes or modifications to the facility or processes as a result of revisions to the facility ISA
(10) the applicant commits to review and update, as necessary, the fire analysis capability and to document that fire protection measures are adequate to ensure plant fire safety
(11) the applicant commits to ensure that fire protection measures, items relied on for safety, any safety grading of such items commensurate with fire or explosion risk and management measures continue to be adequate to ensure safe facility operation
(12) the applicant commits to ensure that both the fire protection program and the requirements for placement and reliability of fire protection measures are consistent with the results of the ISA

7.4.3.3 Fire Protection Features and Systems

An applicant's commitments to design and construct a facility with adequate fire protection features and systems should be considered acceptable if the following criteria are met:

(7) the applicant commits to design new facilities in accordance with the baseline design criteria specified in 10 CFR 70.64(a) and the defense-in-depth requirement of 10 CFR 70.64(b)
(8) the applicant commits to design the facility consistent with the guidance provided in NFPA 801 or other appropriate nationally recognized fire codes and standards
(9) the applicant commits to install a fire-alarm system in areas determined in the ISA to have a significant risk of fire or explosion
(10) the applicant commits to incorporate in the facility design an adequate and reliable water supply system
(11) the applicant commits to install in areas of the plant determined in the ISA to have a significant fire loading (or the potential for significant loading) automatic fire suppression systems
(12) the applicant commits to regularly inspect, test and maintain fire protection equipment in accordance with appropriate NFPA or other industry standards.
(7) the applicant commits to document in the application the fire safety considerations used in the general facility design of the licensed facilities. Specific issues that should be addressed include:

(i) Criticality: Criticality concerns may exclude water extinguishing systems from process areas. However during major fire events, the fire may overcome the extinguishing capability of portable extinguishers and hose lines may be needed. Consideration should be given to total flooding gaseous systems in water exclusion areas with significant fire risks. The applicant should address methods for extinguishing fires in water exclusion areas.

(ii) Environmental Concerns: The plant physical design should provide for containment and drainage in areas of the plant where a credible risk of large spills of flammable or combustible liquids exists. The design should also include provision for the drainage and hold-up of contaminated fire water following a fire.

(iii) Physical Security Concerns: Building layout should provide a safe means of egress for plant personnel in the event of a fire. Physical security of SNM may delay worker egress and fire fighter access during fire events. Physical security procedures need to allow off-site fire departments quick and efficient access to the fire emergency.

7.4.3.4 Fire Fighting Capability and Emergency Response

The applicant's commitments to establish manual fire fighting capability should be considered acceptable if the following criteria are met:

(7) the applicant commits to establish a manual fire fighting capability that is staffed by a well-trained and fully equipped onsite fire emergency response team, by qualified offsite resources, or by a coordinated combination of the two approaches, as is appropriate for the facility.

(8) the applicant commits to coordinate and provide liaison with offsite fire fighting resources and to establish a clear line of authority at the fire scene when reliance is placed on offsite response

(9) the applicant commits to enter into a formal agreement (or memorandum of understanding) that documents the assistance to be provided by the offsite organization(s) and that describes the minimum fire fighting manpower and equipment to be provided during fire emergencies and the estimated response time

(10) if the facility will rely on offsite fire fighting resources, the applicant commits to undertake periodic training with such offsite fire emergency response team in such areas as facility access, plant layout, emergency egress routes, ventilation systems, fire hydrants, items relied on for safety related to fire prevention, etc.

(11) if the facility will rely on manual fire fighting capability provided by onsite fire emergency personnel, the applicant commits to establish, equip and train the personnel to provide the required services

(12) the applicant commits to develop a fire emergency response plan as part of the facility's Emergency Preparedness Plan (SRP Chapter 8) for each area determined in the ISA to be important to plant fire safety. Such plans should identify, for example, access and egress routes, radiological hazards, automatic and manually operated fire suppression measures, locations of items relied on for safety, special procedures for fire suppression because of nuclear criticality, etc.

7.5 REVIEW PROCEDURES

7.5.1 Acceptance Review

The primary reviewer should evaluate the application to determine whether it addresses the "Areas of Review" in Section 7.3. If significant deficiencies are identified, the applicant should be requested to submit additional material prior to the start of the safety evaluation.

7.5.2 Safety Evaluation

The primary reviewer shall perform a safety evaluation against the Acceptance Criteria in Section 7.4 including the applicant's commitments to design, implement and maintain each element of the fire protection program. The reviewers may consult with the supporting reviewers and NRC inspection staff to identify and resolve any issues related to the licensing review and to ensure that descriptions in the fire safety section are consistent with descriptions in other sections of the application that may interface with fire safety. Commitments and provisions made in the applicant's fire safety section should be in accordance with other sections of the SRP. For example, the supporting nuclear criticality safety reviewer should establish that the applicant's program provides reasonable assurance that a water-based suppression system will not adversely affect criticality safety. The primary reviewer will prepare a Safety Evaluation Report (SER) for the Licensing Project Manager in support of licensing action.

Reviewers should note that NFPA 801 uses "administrative control" in a different sense than Part 70 and elsewhere in this SRP. In Part 70 an administrative control, which is a subset of items relied on for safety, is the human action necessary to meet safety performance requirements. It is supported by management measures (training, QA, procedures, ...) that ensure the action will

be taken if needed. In NFPA 801, administrative controls are the training, qualifications, procedures, etc. behind the human action. These elements are "Management Measures" in Part 70.

7.6 EVALUATION FINDINGS

The staff will write an SER addressing each topic reviewed and explain why the NRC staff has reasonable assurance that the applicant's facility will be designed and constructed in accordance with appropriate standards and that the fire protection program will be adequate to protect the health and safety of the workers and public and the environment. License conditions may be proposed to impose requirements where the application is deficient. The following kinds of statements and conclusions will be included in the staff's SER:
The applicant has committed to an acceptable Fire Protection Program based upon the results of the ISA and that meets the acceptance criteria of SRP Chapter 7. Fire safety measures address significant fire hazards, suitable fire protection features are proposed as items relied on for safety to control these hazards and the applicant commits to maintain such controls and management measures to ensure the overall adequacy of facility fire safety. In addition, the applicant has provided commitments and information relating to the fire safety organization and conduct of operations, fire protection measures and manual fire fighting capability.

The staff concludes that the applicant's capabilities meet or exceed the guidance provide in SRP Chapter 7. The staff concludes that the applicant's proposed equipment, facilities and procedures provide a reasonable level of assurance that adequate fire protection will be provided and maintained for those items relied on for safety to meet the safety performance requirements and baseline design criteria of 10 CFR 70.

7.7 REFERENCES

Fed. Reg. 57 (No. 154) 35607-35613, "*Guidance on Fire Protection for Fuel Cycle Facilities*," 1992

NFPA Standard 801, "*Standards for Facilities Handling Radioactive Material*", National Fire Protection Association, Inc.

National Fire Protection Association, "National Fire Codes."