

## **7.0 FIRE SAFETY**

The purpose of this review is to determine, with reasonable assurance, that V.C. Summer Nuclear Station (VCSNS), Units 2 and 3 has: (1) designed a facility that provides adequate protection against fires and explosions that could affect the safety of licensed materials and thus present an increased radiological risk; (2) considered the radiological consequences of fires; and (3) instituted suitable safety controls to protect workers, the public, and the environment. This review is limited to the inspection, handling, and storage of fresh fuel elements for the initial reactor core.

### **7.1 REGULATORY REQUIREMENTS**

The regulatory basis for the fire safety review includes the general and additional contents of the application, as required by Title 10 of the *Code of Federal Regulations* (10 CFR) 70.22. In addition, the fire safety review must provide reasonable assurance of compliance with 10 CFR 70.23(a)(3) and 10 CFR 70.23(a)(4).

### **7.2 REGULATORY ACCEPTANCE CRITERIA**

The acceptance criteria that the U.S. Nuclear Regulatory Commission (NRC) uses for reviews of fire safety of licensed material are outlined in Sections 7.4.3.1 through 7.4.3.5 of NUREG-1520, Rev. 1 (NRC, 2010).

### **7.3 STAFF REVIEW AND ANALYSIS**

The fire protection review was performed relative to the guidance provided in NUREG-1520, Rev. 1 (NRC, 2010). The information to support this review was obtained from Rev. 5 of the Combined License Application (COLA) submitted by South Carolina Electric & Gas Company (SCE&G) and the South Carolina Public Service Authority (commonly referred to as "Santee Cooper") for construction and operation of two nuclear power generating plants designated as VCSNS Units 2 and 3, dated June 2011 (COLA).

#### **7.3.1 Building Construction and Facility Design**

The facility and its original fire protection systems are designed and will be constructed to industrial standards currently in effect. The licensee commits to meeting the prevailing codes whenever facilities are expanded or modified. Facilities are generally noncombustible masonry or metal construction. Lightning protection is incorporated into the facility design. Facility exit routes are posted throughout and are unimpeded by physical security requirements. In addition, workers are trained in evacuation and periodic drills are conducted to verify adequacy of egress.

#### **7.3.2 Process Fire Safety**

Within the Auxiliary Building, which is a Seismic Category I structure, new fuel bundles are brought in through the rail car bay; unloaded in the Fuel Handling Area; and transferred for storage on racks in the new fuel storage pit and the spent fuel pool within the Fuel Storage Area. The process itself utilizes methods and materials that have no fire safety concerns.

### 7.3.3 Fire Protection and Emergency Response

The fire protection equipment in the fuel handling area of the Auxiliary Building includes fire detection, portable fire extinguishers, and hose stations for manual firefighting. Additionally, wet pipe sprinklers are provided in the rail car bay.

Site procedures for the maintenance and surveillance testing of the above-listed equipment—including fire pump, fire mains, standpipes, and hoses, have been developed and will be performed as described in the Fire Protection Program (FPP). In addition, the compensatory actions described in the FPP will be used should any of the listed fire equipment become unavailable.

A license condition has been added regarding the FPP which requires:

- (e) Fire Protection Program
  - 1. The fire protection measures in accordance with Regulatory Guide (RG) 1.189 for designated storage building areas (including adjacent fire areas that could affect the storage area) implemented before initial receipt of byproduct or special nuclear materials that are not fuel (excluding exempt quantities as described in 10 CFR 30.18);
  - 2. The fire protection measures in accordance with RG 1.189 for areas associated with new fuel (including all fuel handling, fuel storage, and adjacent fire areas that could affect the new fuel) implemented before receipt of fuel onsite;
  - 3. All fire protection program features implemented before initial fuel load.

Effective handling of fire emergencies is accomplished by trained and qualified emergency response personnel. The fire response organization is staffed and equipped for firefighting activities. The fire brigade is composed of a fire brigade leader and four fire brigade members. The fire brigade does not include the shift manager or other members of the minimum shift crew necessary for safe shutdown of the unit, nor any personnel required for other essential functions during a fire emergency. Additional support is available when needed through an agreement with a local fire department.

Training ensures that the capability of the fire brigades to combat fires is established and maintained. The training program consists of initial (classroom and practical) training and recurrent training which includes periodic instruction, fire drills, and annual fire brigade training.

Firefighting equipment is provided throughout the plant. Fire emergency procedures and pre-fire plans specify actions taken by the individual discovering the fire and by the emergency response organization. A specific pre-fire plan has been prepared for the fuel receipt area and the fuel storage area. Discussion of this pre-fire plan is included in the periodic classroom instruction's training program provided for the emergency response team.

#### 7.3.4 Fire Safety Management

Combustibles are controlled to reduce the severity of a fire which might occur in a given area and to minimize the amount and type of material available for combustion. The use and application of combustible materials at VCSNS are controlled utilizing the following methods:

- instructions/guidelines provided during general employee training/orientation programs,
- the chemical control program,
- periodic plant housekeeping inspections/tours by management and/or the plant fire protection organization,
- design/modification review and installation process, and
- administrative procedures (e.g., Transient Combustible Control Program).

The use of ignition sources such as welding, flame cutting, thermite welding, brazing, grinding, arc gouging, torch applied roofing, and open flame soldering within safety-related areas are controlled through the approval and issuance of an ignition source permit. Permits are reviewed and approved by appropriate plant personnel. The ignition source permit is valid for one job. Job area inspections will be performed and documented at the start of each shift that ignition source activities are being performed.

#### 7.3.5 Fire Hazards Analysis

The Fire Hazards Analysis (FHA) is part of the FPP. The FHA results are documented on a fire area basis, broken down into separate discussions of classical fire protection features and safe shutdown analysis for each fire area. The FHA is required to be updated, prior to receipt of the new fuel, as part of the License Condition previously mentioned in Section 7.3.3. The FHA includes the following:

- a summary of the evaluation performed to determine the adequacy of the fire protection features for each fire area, and
- a discussion of the ability to achieve safe shutdown in case of a fire in each fire area.

The fire hazards and safe shutdown evaluation were performed by qualified nuclear, mechanical, electrical, and fire protection engineers.

The FHA and pre-fire plans conform to the applicable guidance provided in the National Fire Protection Association (NFPA) 801, "Standard for Fire Protection for Facilities Handling Radioactive Materials" (NFPA, 2008).

#### **7.4 EVALUATION FINDINGS**

The staff finds that the licensee's capabilities meet the applicable acceptance criteria in Chapter 7 of NUREG-1520, Rev. 1 (NRC, 2010), and that the licensee's equipment, facilities, and procedures provide reasonable assurance that adequate fire protection will be provided and maintained to meet the criteria of 10 CFR 70.23. Therefore, the applicant's fire protection program is acceptable to the staff.

#### **7.5 REFERENCES**

(NRC, 2002) U.S. Nuclear Regulatory Commission (NRC), NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," 2002.

(NFPA, 2008) National Fire Protection Association (NFPA), NFPA 801, "Standard for Fire Protection for Facilities Handling Radioactive Materials," 2008.