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Department of Nuclear Energy

(516) 345-2144

June 24, 1980

Mr. Robert L. Ferguson Chemical Engineering U.S. Nuclear Regulatory Commission Washington, D.C. 20555

RE: St. Lucie, Fire Protection Review, Items 3.1.4, 3.9, 3.12.7, 3.13.3, and 3.14.5.

Dear Bob:

Attached is Brookhaven National Laboratory's fire protection review of Items 3.1.4, Upgrading Existing Fire Pumps, 3.9, Cable Spreading Room, Fire Barrier, 3.12.7, Smoke Detectors, 3.13.3, Reactor Coolant Pump Oil Collection System, and 3.14.5, Automatic Sprinkler System for the St. Lucie facility.

If you have any questions, please do not hesitate to call.

Respectfully yours,

Robert E. Hall, Group Leader Reactor Engineering Analysis

REH:EAM:sd attachment cc.: V. Benaroya wo/att. W. Kato " M. Levine " E. MacDougall

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## ST. LUCIE

#### Fire Protection Review

#### Item 3.1.4 - Upgrading Existing Fire Pumps

Item 3.1.4 of the St. Lucie SER indicates the licensee's proposed modification of upgrading the existing fire pumps. As described in the SER, the existing two electric fire pumps are to be modified to (1) automatically start upon a drop of pressure in the fire water distribution system, (2) be capable of automatic operation during normal operation and upon loss of offsite power, and (3) removal of the capability to stop the fire pumps from the control room.

By letter dated March 6, 1980 Florida Power and Light Company provided additional information concerning this SER item. Their submittal outlines the design requirements for the three required modifications for upgrading the St. Lucie Unit 1 fire pump. These modifications are described in their letter as:

I. The first modification will provide the capability for the two fire pumps to automatically start upon a loss of offsite power and a drop of pressure in the fire water distribution system.

The existing installation with the fire pumps on safety related 480 volt load centers (1A2 and 1B2) has the capability of starting automatically upon a drop of pressure in the fire water distribution system but has only manual start capability upon loss of offsite power.

The design requirements to be met for this modification are:

- 1. Upon loss of offsite power, a specified diesel generator loading sequence is followed. The modification will be designed to accomodate proper diesel generator load sequencing.
- 2. Whenever possible, additional equipment and/or material will be similar to that which was used for the existing installation. This will simplify construction and maintenance, and will help ensure that functional requirements previously considered (such as design, environmental, and material requirements) will not be affected.
- 3. Equipment and material will be procured to qualification criteria at least as good as the "surrounding environment or circuitry."
- II. The second modification provides for installation of a pressure switch for each fire pump such that if there is a drop of pressure in the distribution system in close proximity to the fire pump, the appropriate fire pump start circuitry will be engaged.

The existing installation utilizes two pressure switches (PS-15-3&4) to sense pressure for the plant fire header and transformer deluge system. Either pressure switch has the capability to start both fire pumps simultaneously.

The design bases for this modification are:

- 1. In addition to the requirements of items I.(2) and I.(3) mentioned above, a setpoint will be used for the pressure switch such that a true drop of pressure is detected, and not surges which may cause false starts.
- III. The third modification provides for the removal of the capability to stop the fire pumps from the control room.

This capability presently exists through the use of CS-852-2 and CS-853-2 (control switches on the RTGB).

The design basis for this modification is to insure that stop capability is removed without affecting other circuitry.

Paragraphs I, II and III appear to address the requirements of the SER but the design criteria included for each of the three modifications are vague, raising some uncertainty if, in fact, the modifications proposed by the licensee will meet the intent of the SER requirements. Paragraph I states that the modification requires that the fire pumps will autmomaticaly start upon a drop of pressure in the fire water distribution system including the loss of offsite power. The design requirements indicate that during loss of offsite power, a specified diesel generator loading sequence will be followed in order to accommodate the loads imposed by the electric motors driving the fire pumps. It does not specifically say, however, if this sequencing will be accomplished automatically, and in a timely manner.

Paragraph II of the licensee's submittal provides for the installation of pressure switches to start the fire pumps upon a drop in pressure in the fire protection water distribution system located in close proximity to the fire pumps. The design criteria does not indicate exactly where these pressure switches will be located, the pressure settings that will be used and the technical specifications describing the type, quality and operating characteristics of the switches. In our evaluation of Florida Power and Light Company's submittal concerning "Fire Pump Controller (4.3.1.2, 9.0) under cover letter dated January 7, 1980, we indicated that without the provision of a diesel engine driven fire pump, the arrangement of starting the electric motor driven fire pumps not employing listed fire pump controllers was unacceptable. Our opinion on this matter still holds.

Paragraph III provides for the removal of the capability to stop the fire pumps from the control room. The submittal goes on to state that this capability presently exists through the use of control switches on the RTGB panel. It is not clear from this description, however, if the capability to shut off the fire pumps from the control room will be physically removed and the provisions for stopping the fire pumps will only exist at a panel adajacent to or within sight of the fire pumps.

Based on the considerations discussed above, we find the submittal for upgrading the fire pumps, SER item 3.1.4 unsatisfactory. We recommend that the staff require that the licensee clearly state that the two electric fire pumps can automatically start and operate during the loss of offsite power. This procedure should not require any operator actions and should require no delay greater than 30 seconds from the time the low pressure signal is initiated to start up of the fire pump(s). In accordance with our previous recommendation, we recommend that the (fire pump controller 4.3.1.2., 9.0), licensee provide U.L. listed fire pump controllers located near the fire pumps and installed in accordance with NFPA 20. When this criteria is followed the concern raised in the evaluation of the licensee's submittal paragraph II will be satisfied. The concerns with paragraph III of the licensee's submittal will be mitigated by the physical removal of the fire pump stop capability from the control room and the provision of the fire pump controllers described above.

We are strongly recommending that if all of the provisions cannot be met as discussed above and in our previous evaluation of the fire pump controllers, a diesel engine driven fire pump of similar capacity as the existing electric motor driven fire pumps be provided.

#### Item 3.9 - Cable Spreading Room, Fire Barrier

Item 3.9 of the St. Lucie SER indicates that the licensee will provide a 1-1/2 hour rated fire barrier for the wall opening separating the cable spreading room from the Train B switchgear room.

Under their cover letter dated March 6, 1980 Florida Power and Light Company submitted design information pertaining to this item. The submittal states that a seismic wall having a 1-1/2 hour fire rating will be installed including a 1-1/2 hour fire door. The wall is described as being constructed with 5/8 inch gypsum board having 1 layer on one side and 2 layers on the other side. The licensee states that the wall design will meet the requirements of the American Institute of Steel Construction, the FSAR, and Regulatory Guide 1.29, Item C.2. The design of the fire door and its related components will comply with the latest requirements of the American Institute of Steel Construction, the National Fire Protection Association and the FSAR.

The licensee submittal giving design information on the 1-1/2 hour fire rated barrier is conditionally acceptable providing the design of the wall is tested in accordance with the requiremens outlined in Chapter 7 of NFPA 251. In lieu of this, a construction design for 1-1/2 hour or greater, non-bearing fire walls as designated in the 1980 edition of the Underwriters Laboratories Fire Resistance Directory may be provided. We recommend that the acceptance of the fire barrier is also contingent upon the provision of a U.L. labeled 1-1/2hour fire door, frame and hardware.

No evaluation of the seismic qualifications of the fire barrier has been made.

#### Item 3.12.7 - Smoke Detectors

Item 3.12.7 of the St. Lucie SER outlines the proposed modification of providing automatic smoke detectors for the areas containing the low pressue safety injection pumps, high pressure safety injection pumps and the containment spray pumps.

Under their cover letter dated March 6, 1980, Florida Power and Light Company submitted design information pertaining to this item. Their submittal states that ionization type smoke detectors will be installed in close proximity to

the pumps in order to detect fires in the incipient stages and will be connected to the existing fire alarm system. Enclosed with their submittal was a drawing of the area showing the placement of the detectors.

The licensee's submittal adequately describes the type and placement of the detectors in the required areas. The submittal, however, does not indicate if consideration was given to the effects of obstructions and ventilation which could result in delayed actuation.

We recommend that the licensee provide, therefore, the results of a study based on an analysis of the configuration and air flow characteristics of the areas, or data derived from smoke release tests. This study should show that the placement of the detectors is adequate for detecting a fire in its early stages.

## Item 3.13.3 - Reactor Coolant Pump Oil Collection System

Item 3.13.3 of the St. Lucie SER describes the proposed modification of providing an oil collection system for the reactor coolant pump.

Under their cover letter dated March 6, 1980 Florida Power and Light Company submitted design information pertaining to this modification. Their conceptual design criteria is based on preventing potential oil leakage from getting to the reactor coolant loop piping. This will be achieved by:

- 1. Installation of a collection system capable of removing leakage of oil to a safe location.
- 2. Insuring that insulation installed on the RCP pump casing and loop piping does not have a surface temperature in excess of 150°F.

The licensee's proposed modification is acceptable providing the design meets the following requirements:

The oil collection systems shall be capable of collecting lube oil from all potential pressurized and unpressurized leakage sites in the reactor coolant pumps' lube oil systems, and draining the oil to a vented closed container. A flame arrestor is required in the vent if the flash point characteristics of the oil present the hazard of fire flashback. Leakage points to be protected shall include lift pump and piping, overflow lines, lube oil cooler, oil fill and drain lines and plugs, flanged connections on oil lines and lube oil reservoirs where such features exist on the reactor coolant pumps. Leakage shall be collected and drained to a closed container that can hold the entire lube oil system inventory. The drain line shall be large enough to accommodate the largest potential oil leak.

To provide adequate protection for a design basis Safe Shutdown Earthquake (SSE), one of the following should be provided:

 The lube oil system components whose failure could result in leakage should be designed to withstand an SSE without leakage and the dropping of oil collection system components during an SSE should not cause loss of operability of safety-related equipment; or 2. The oil collection system should be designed to withstand an SSE and continue to be able to collect and drain leakage that may occur during an SSE. In this case the oil collection system should be adequate to collect oil from any external lube oil piping not designed to withstand an SSE in addition to leakage from points identified above.

## Item 3.14.5 - Automatic Sprinkler System

Item 3.14.5 of the St. Lucie SER indicates the licensee's proposed modification of installing an automatic sprinkler system in each diesel generator room.

Under their cover letter dated March 6, 1980 Florida Power and Light Company submitted design information on this item. The data indicated that a preaction type sprinkler system would be provided, automatically actuated by thermal detectors as well as from manual release stations. The system will be provided with alarm annunciation indicating operation of the system as well as supervisory monitoring of conditions such as loss of instrument air, voltage and closure of the control valve.

The proposed sprinkler system is considered satisfactory providing the installation conforms to the requirements of NFPA 13 including a discharge density of at least 0.30 gpm per sq. ft.

We recommend that the staff accept it on this basis.