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December 21, 2000
JAFP-00-0311

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop O-P1-17
Washington, D.C. 20555-0001

Subject: James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333

Verbal Request for Additional Information Related to the James A. FitzPatrick Suppression Pool

Reference: 1. JPN-00-039, Response to Request for Additional Information Related to the James A. Fitzpatrick Suppression Pool, dated October 12, 2000

Dear Sir:

By letter dated August 23, 2000, your staff requested information regarding the electrical power configuration for certain pumps and valves in the James A. FitzPatrick (JAF) Low Pressure Coolant Injection (LPCI) and Core Spray systems. This request also asked for information relating to calculations performed for the JAF suppression pool.

Reference 1 was the response for this request for information. Subsequent to the submittal of Reference 1, your staff requested additional information via teleconference on November 8, 2000. Specifically your staff asked for:

1. JAF's response to GE SIL 630.

2. JAF's position on electrical separation of control circuits for the pumps and valves addressed by SIL 630.

3. The basis for the statement made on the teleconference that the minimum complement of low pressure emergency core cooling systems required by JAFs design basis was a single Core Spray (CS) Pump and a single Residual Heat Removal (RHR) pump in the LPCI line-up.

A response to question 3 above was submitted to your staff via electronic mail. This response identified that the information requested under question 3 had been previously provided via docketed correspondence. Your staff then submitted a follow-up question also via electronic mail, regarding the interpretation of this information.

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Attachment 1 provides additional information required to interpret the response to question 3. This attachment also provides JAF's final response to SIL 630 (question 1). The information provided in this SIL response also answers question 2 above.

Very truly yours,

Michael J. Colomb
Site Executive Officer

MJC:MA:las

STATE OF NEW YORK
COUNTY OF OSWEGO
Subscribed and sworn to before me
this 21 day of Dec. 2000.

Nancy B. Czerow

NANCY B. CZEROW
Notary Public, State of New York
Qualified in Oswego County #4884611
Commission Expires 1-26-03

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Questions 1 & 2 - SIL 630 Response

GE SIL 630 recommends owners of GE BWR 3/ and 4/ plants review special electrical separation requirements resulting from the implementation of the "LPCI" modification.

The justification for the GE recommended review is that the "LPCI" modification imposed the need for physical separation of redundant circuits that may have been overlooked if physical separation was only based on divisional separation.

Electrical Circuits Physical Separation And Single Failure:

The basic principal and intent of maintaining physical separation or divisional separation of electrical circuits is to provide a method of meeting the single failure criteria. Another method is to analyze the installation to demonstrate that the existence of a single failure that could disable redundant safety functions is not credible.

The physical separation requirements between redundant safety related circuits and between safety related and non safety related circuits at JAF are based on proven and accepted industry standards commensurate with the plant's license. Implementation of physical separation eliminates the need for single failure analysis on a case by case bases. The use of physical separation, as the preferred method to safeguard the independence of redundant safety functions, does not eliminate the ability of performing engineering analysis to accomplish the same objective. The objective of the analysis is to demonstrate compliance with the single failure criteria given the absence of physical separation of functionally redundant circuits.

Cable Design and Installation at JAF:

In UFSAR section 8.5.4.2 "Cables and Raceways" the following is stated.

"Cables are sized and installed so as to limit the temperature rise of conductors to within the emergency temperature rating of the cable for any expected overload condition. All main feeds from supply transformers and emergency generators are sized and insulated to carry short circuit current capability of these devices without loss of life, until protective devices disconnect the source feeding the short circuit."

While the above quoted statement primarily relates to power cable, it is also applicable to control and instrumentation cables. Control and instrumentation cables at JAF are protected in accordance with their size.

Safety Related cables that make up circuits routed through Primary Containment penetrations have at least one level of safety related short circuit and overload protection. The JAF licensing basis assumes circuit failure as the first failure for safety related circuits. The non-safety related cables routed through primary containment have two levels of protection where needed. Therefore, short circuit fault currents resulting from loads failing inside containment, due to a LOCA event, will be cleared by the circuit's protective device and no damage will result to the containment penetration or the cables.

Cables that make up control and instrumentation circuits totally routed outside the containment are designed to be protected by at least one device. The short circuit or overload protective devices are of the same form fit and function, irrespective of whether

they protect safety related or non-safety related cables. The JAF FSAR, 7.1.9 Section D, allows routing non-safety related cables with safety related cables.

For a cable to fail in a raceway, two active failures are required to occur. First the failure of the load creating an electrical short circuit and second, the failure of a protective device. The need to consider two failures to cause a cable failure is beyond the scope of the single failure criteria and JAF licensing basis.

The "LPCI" Modification And Functionally Redundant Cables:

The implementation of the "LPCI" modification resulted in changing the divisional power source for two of the four RHR pumps. Functionally redundant power cables do not share common raceway and they meet the required physical separation. Functionally redundant control and instrumentation cables may share common wireways. These cables provide control signals for the RHR and Core Spray pumps and respective injection valves hence it is important to ensure that the configuration is not susceptible to a single failure. The specific concern is the destruction of the shared wireway as a result of an internal failure within the wireway in conjunction with the postulated recirculation pipe break. The concern could have been resolved by rerouting of cables in dedicated raceways or by evaluating the installation to determine if the existence of a single failure that can destroy the shared raceway was credible.

Notes of Conference Dated 8/12/1974 between General Electric and Stone & Webster documents that "there was an extensive discussion of the application of the single failure criteria related to the LPCI modification. The proposed modification was reviewed to insure that no single active failure could prevent the minimum adequate low pressure core cooling capacity from being available during the "worst case" LOCA. The discussion concluded that the creation of additional divisions of cable separation will both be impractical and unnecessary to satisfy the letter and intent of AEC requirements for the modification". The conference addressed the following single failure concerns identified by Stone & Webster Eng. Corp in correspondence PAS NO 11514 dated 7/30/74:

> *"In addition to failures that have been looked at for Vermont Yankee, S&W are concerned with other failures that could affect the Core Spray and LPCI systems simultaneously. For example consideration will have to be given to any failure that could disable LPCI in the unbroken loop (during a discharge line break in the opposite loop) that could simultaneously disable a Core Spray system. Specifically, if cabling for the LPCI injection valves were in proximity to cabling for any of the Core Spray for either side a raceway failure could disable LPCI entirely and half of the Core Spray system".*

The control and instrumentation cables of concern are routed outside Primary Containment and all circuits are designed with adequate fault current limiting devices (i.e. fuses or breakers). Fuses or breakers used for the protection of safety related cables are safety related. The fuses or breakers used for the protection of non-safety related cable have the same form, fit, and function as the safety related ones. The JAF FSAR, 7.1.9 Section D, allows routing non-safety related cables with safety related cables.

With adequate fault-limiting devices protecting the cables of concern, a minimum of two independent and concurrent failures is necessary to cause a cable to fail in a wireway, which in turn could cause damage to other cables in the same wireway. The failures which could cause this damage are 1) a failure at the load end of the cable causing an

overload or short-circuit condition and 2) a failure of the fault limiting device to function. Cables are passive components that are not assumed to fail without external action. It is outside the JAFNPP licensing basis to consider two active single failures in the design of cable routing and installation.

Conclusion:

The SIL notes : "two particular scenarios may be of concern if fault-limiting devices in the affected circuits are not adequate to prevent failure propagation".

The design of the electrical system, specifically as it relates to cable protection, at the JAFNPP includes the selection of adequate fault-limiting devices irrespective of system association. Hence, considering the SIL's postulated scenarios do not result in the need for implementation of actions to address intradivisional separation, only the updating of documents to reflect the above evaluation are needed.

Question 3 - The minimum complement of low pressure emergency core cooling systems required by JAF's design basis is a single Core Spray (CS) Pump and a single Residual Heat Removal (RHR) pump in the LPCI line-up.

On November 8, 2000, JAF provided the following information via electronic mail:

> *"With regards to our discussion this morning where we indicated that JAF could satisfy the minimum required complement of Low Pressure ECCS systems with a single RHR pump (LPCI mode) and a single Core Spray pump.*
>
> *Table 4-4 "FitzPatrick Single Failure Evaluation" of NEDC-31317P Rev. 2, "SAFER/GESTR-LOCA Accident Analysis" provides this basis explicitly.*
>
> *NEDC-31317P Rev. 2 was submitted on the docket by letter dated August 17, 1993 (JPN-93-059). This was submitted in support of the JAF Power Uprate Tech Spec amendment (TSA 239)."*

On November 17, 2000, your staff requested additional information via electronic mail:

> *"We note that NEDC-31317 Rev. 2 Table 6-1 lists a recirculation suction line break with battery failure as the limiting break and failure. Table 4-4 states that for this break and failure that 5 ADS, 1 CS and 2 LPCI (1 per loop) were assumed by the licensee. We do not understand the licensee's statement that only one RHR pump (LPCI mode) with a single Core Spray pump are required."*

Response

Your staff correctly notes that NEDC-31317P, Rev. 2, Table 6-1 lists a recirculation suction line break with battery failure as the limiting break and failure. In this context, the term "limiting break and failure" refer to the postulated break location and single failure that result in the highest calculated peak fuel clad temperature (PCT).

To conform with the Loss of Coolant Accident Analysis, ADS (with 5 operable valves), 1 Core Spray subsystem and 1 RHR subsystem (with 1 pump injecting in

the LPCI mode into each RWR loop for a total of 2 LPCI pumps injecting into the RPV) must be available for a RWR suction line break with assumed single failure of a station battery or an ESW subsystem (the limiting accident with respect to PCT).

If instead, a RWR discharge line break with single failure of a station battery or ESW subsystem is postulated, the LOCA analysis requires availability of ADS (with 5 operable valves), 1 Core Spray subsystem, and 1 RHR subsystem (with 1 pump injecting into the intact RWR loop in the LPCI mode, and flow from the second pump in the RHR subsystem being lost through the break, for a total of 1 LPCI pump injecting to the RPV). From the perspective of total flow to the RPV, the total low pressure ECCS flow to the RPV will be less for the RWR discharge break than for the RWR suction line break. However, this scenario results in a lower PCT than the RWR suction line break described above (Refer to NEDC-31317P, Rev. 2, Table 5-1).