Public Service

Public Service
Company of Colorado

2420 W. 26th Avenue, Suite 100D, Denver, Colorado 80211

August 30, 1985
Fort St. Vrain
Unit No. 1
P-85302

Regional Administrator
Region IV
U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011

RECEIVED
SEP - 5 1985

Attn: Mr. Dorwin R. Hunter

Docket No: 50-267

SUBJECT: Low Power Operation of FSV

REFERENCE: (1) NRC Letter, Martin to Lee, dated 07/19/85 (G-85288)

(2) PSC Letter, Warembourg to Martin, dated 8/20/85 (P-85293)

Dear Mr. Hunter:

In Reference 1, Public Service Company (PSC) received authorization from the NRC to operate Fort St. Vrain at a power level no greater than 15% until equipment qualification issues are resolved. In Reference 2, additional information concerning PSC's progress towards resolving these issues was submitted to the NRC. As a result of recent discussions with the NRC, PSC has been advised not to restart Fort St. Vrain until further justification is provided to the NRC. Attachment 1 to this letter contains PSC's justification to operate Fort St. Vrain at a reduced power level.

PSC requests that the NRC provide concurrence for Fort St. Vrain to be operated at power levels up to 8% for a period of time not to exceed 45 days, based on the conclusion that such operation does not pose undue risk to the health and safety of the public.

85-796

H005 1/0
Return original
to RW

PSC staff will be available to meet with the NRC in Bethesda the week of September 3.

Should you have any further questions, please contact M.H. Holmes, (303) 571-8409.

Very truly yours,

D. W. Warembourg

D.W. Warembourg, Manager
Nuclear Engineering Division

DWW:JS:jrp

Attachment

INTRODUCTION

Public Service Company has committed to and embarked upon multiple efforts to minimize moisture ingress into the PCRV. Recently, the plant has undergone extensive modifications and refurbishment programs to provide added assurance that moisture in the PCRV will not adversely effect reactor vessel internal components. Consistent with the desire to prevent moisture ingress, limiting the moisture level is also desirable. For this reason, PSC considers it prudent to continue to reduce the levels of moisture in the reactor vessel. This would ensure that in the next several months, while the reactor is shutdown to resolve 10CFR50.49 issues, the moisture will be significantly reduced from the present levels.

PSC plans to begin work in early October 1985, for the purpose of resolving technical issues associated with 10CFR50.49. Part of this work is expected to include the installation of an automatic steam line rupture detection/isolation system.

While complete moisture dry-out cannot be accomplished until higher power levels are achieved, operating the reactor at low power levels provides the diffusion mechanism by which additional moisture can be withdrawn. Low power operation during the months of September-October 1985 would minimize moisture over the subsequent outage and would pose no undue risk to the health and safety of the public. This short-term low power operation would also result in economic benefits to PSC.

The moisture level in the reactor vessel has thus far been reduced to an equilibrium value of about 300ppm by the pressurizing of the PCRV to the range of 300psia, increasing the reactor coolant flowrate, and increasing the reheat steam temperature to about 290 degrees F. The current moisture removal rate, however, has been reduced significantly due to the location of the water in the PCRV liner insulation. In order to increase the diffusion of moisture out of the insulation and into the primary coolant, for removal by the helium purification system, the coolant flow and temperatures must be increased. This will require nuclear fission power to generate higher core outlet temperatures and hence increased steam production to drive the helium circulators at increased speed.

Increasing reactor coolant temperatures through the use of core generated power will help to dry the reactor coolant system and PCRV. We have reevaluated the 15% reactor power level conditions and have determined that an 8% power level will be nearly as effective as 15% power in reducing the moisture level.

LOWER STRESS LEVELS AT 8% POWER LEVELS

The combination of the margins between actual and allowable pipe stresses and the short duration of operation at 8% power provides reasonable assurance that a significant steam leak would not occur during operation in September-October 1985.

PEAK TEMPERATURES AS A RESULT OF A STEAM LINE BREAK

A double-ended steam line break was analyzed with the Contempt-G Code for a power level of 8%. The breaks chosen were the cold reheat steam line in the reactor building and the hot reheat steam line in the turbine building, based on past determination that these were the worst cases (FSAR Section 1.4.6 and Appendix I). The peak temperatures calculated for these accidents are shown in Table 1. These temperatures are based upon isolation of the break in 4 minutes. These peak temperatures are significantly lower than those for the 100% power-level steam line breaks.

TIME AVAILABLE TO RESTART FORCED CIRCULATION COOLING BEFORE FUEL FAILURE CAN OCCUR

For the 100% reactor power case, it has been established (FSAR Section 10.3.9) that there is a time period of 1.5 hours before forced circulation core cooling must be resumed to prevent any of the fuel from reaching the minimum temperature of 2900 degrees F at which fuel failure is postulated to occur.

Operation of the FSV reactor at a power level and duration not to exceed 8% and 45 days respectively would result in a decay heat inventory which is a fraction of that for the 100% reactor power case.

Preliminary calculations indicate that a time period of approximately 70 hours is available before forced circulation core cooling must be restored for the 8% power level to avoid any fuel temperatures reaching 2900 degrees F. The harsh environment resulting from the low peak temperatures given in Table 1 are short lived. The 70-hour time period discussed above thus provides ample margin to enable personnel to both perform the manual operations necessary to align the safe shutdown cooling paths and to effect any necessary repairs. Since fuel temperatures do not reach 2900 degrees F, no release of fission products occurs and thus there are no resulting undue risks to the health and safety of the public.

ECONOMIC CONSIDERATIONS

Aside from other considerations, there would be an important economic benefit to PSC if the NRC were to authorize operation of FSV in a "dry-out" mode for the purpose of allowing the removal of moisture from the reactor vessel. Power levels not to exceed 8% reactor power, a level which is insufficient to generate electricity, would suffice for this purpose.

Without this authorization from the NRC, PSC could be exposed to an economic penalty of approximately $140,000 per day for each day that rise-to-power operations are delayed while moisture is being removed from the core. If the moisture removal process requires a month to complete, this exposure would amount to $4.2 million. The bases for these figures are presented below:

1. In August 1984, The Colorado Public Utilities Commission (CPUC) issued a decision requiring potential refunds to customers for periods when the revenues collected under base rates attributable to Fort St. Vrain exceed the value of the energy produced by the station during such period. If the CPUC decision is eventually upheld in the courts and as long as Fort St. Vrain is nonoperational, the potential refund, which began in November 1984, increases by increments of $320,000 per month up to a monthly maximum of approximately $3.8 million beginning in October 1985. Each day that moisture removal activities delay rise-to-power operations represents a refund liability of $126,667 ($3,800,000/30) to PSC.

2. In March 1985, PSC decided to delay fabrication of Segment Eleven (11) fuel because the fabricated fuel on hand was not in balance with projected fuel needs. GA Technology's fuel fabrication facility is currently in a holding mode. Each day's delay in achieving an effective full-power day translates into a day's delay in reactiviating the fuel fabrication process. Based on GA Technology's cost estimate, the average monthly charge to hold the facility and maintain security for the period August 1985 through December 1985 will be approximately $365,600 or $12,190 per day.

3. On September 30, 1985, PSC is required to pay the Department of Energy $6,613,650 for 48,990 SWUs under the terms of the Utility Services Contract. By borrowing these funds at an assumed 10% interest rate, PSC will have to pay approximately $55,000 a month (or $1,833 per day) in interest charges until the enriched uranium is utilized for fabricating Segment 11 fuel.

CONCLUSION

Based upon the discussions above, PSC has concluded that operation of FSV at 8% power, for a period of time not to exceed 45 days poses no undue risk to the health and safety of the public. Continued moisture removal is an important operational factor given the design bases of the FSV reactor. Potential environmental temperatures that might result from a postulated steam line break at low power are significantly lower than those for 100% power. There is ample time following a postulated steam line break to both perform manual operations as well as effect repairs, if required, prior to reestablishing forced circulation core cooling. Additionally, since fuel temperatures do not approach the 2900 degrees F calculated for possible fuel failure, no fission product releases occur and thus there is no resulting risk to the health and safety of the public.

PSC is continuing to agressively undertake actions to resolve 10CFR50.49 issues. In the interim, operation of the FSV reactor under conditions stated above would enhance moisture removal from the reactor vessel. This operation is prudent from design considerations, is economically beneficial and presents no undue risk to public health and safety.

TABLE 1

Peak Temperatures as a Result of a Steam Line Break.

	Peak Temperature	
	20 Feet	Building Average
Reactor Building (cold reheat steam line)	221 degrees F	170 degrees F
Turbine Building (hot reheat steam line)	207 degrees F	134 degrees F