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SUBJECT: Application for amends to licenses DPR-58 & DPR-74,allowing filling of ECCS accumulators w/o declaring ECCS equipment inoperable.

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August 11, 1997

AEP:NRC:1265
10 CFR 50.90

Docket Nos.: 50-315
50-316

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Donald C. Cook Nuclear Plant Units 1 and 2
TECHNICAL SPECIFICATION 3.5.2
CHANGE REQUEST FOR ACCUMULATOR FILL

This letter and its attachments constitute an application for amendment to the technical specifications (T/Ss) for Cook Nuclear Plant units 1 and 2. This amendment will allow the filling of the emergency core cooling system (ECCS) accumulators without declaring ECCS equipment inoperable. The reasons for the proposed changes and our analyses concerning significant hazards considerations are contained in attachment 1 to this letter. Attachment 2 contains the current T/S pages, marked-up to reflect the proposed changes. The proposed revised T/S pages are contained in attachment 3.

This submittal proposes changes to unit 2 T/S pages 3/4 5-3 and B 3/4 5-1a. Please note other changes to these pages were proposed in our submittal AEP:NRC:1223, dated July 11, 1996. These changes are in addition to and do not supercede the previous changes.

We believe the proposed changes will not result in: 1) a significant change in the types of effluents or a significant increase in the amounts of any effluents that may be released offsite; or 2) a significant increase in individual or cumulative occupational radiation exposure.

These proposed changes have been reviewed by the plant nuclear safety review committee and will be reviewed by the nuclear safety and design review committee at their next regularly scheduled meeting.

In compliance with the requirements of 10 CFR 50.91(b)(1), copies of this letter and its attachments have been transmitted to the

A001

Michigan Public Service Commission and the Michigan Department of Public Health.

Sincerely,

E. E. Fitzpatrick
Vice President

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 11 DAY OF August, 1997

Janice M. Bickers
Notary Public

JANICE M. BICKERS
Notary Public, Berrien County, MI
My Commission Expires Feb. 16, 2001

My Commission Expires 2/16/2001

vlb

Attachments

c: A. A. Blind
A. B. Beach
MDEQ - DW & RPD
NRC Resident Inspector
J. R. Padgett

ATTACHMENT 1 TO AEP:NRC:1265

REASONS AND 10 CFR 50.92 ANALYSES FOR
CHANGES TO TECHNICAL SPECIFICATIONS

Description of Amendment Request

This change will affect technical specification (T/S) 3.5.2, "ECCS Operability", for both units. The change will consist of an asterisked footnote, the asterisk to appear after 3.5.2.b, "One OPERABLE Safety Injection Pump*". The footnote for the asterisk shall state, "*During accumulator fill evolutions, the safety injection pumps do not have to be declared inoperable." Text will be added to the bases section to provide additional information relevant to the footnoted statement.

Background and Reason for Change

This change is being implemented to simplify the accumulator fill evolution. The operations staff is currently required to perform complicated valve manipulations involving the emergency core cooling systems (ECCS) cross-tie valves and declare the in-service safety injection (SI) pump inoperable during the fill evolution. Licensee event report (LER) 315/97-001-00 was submitted in February 1997 to report the temporary loss of four loop injection capability on unit 1 during an accumulator fill evolution. This event occurred when the SI pump discharge cross-tie train B shutoff valve was closed to support filling the SI system accumulators. The east and west residual heat removal (RHR) pump discharge cross-tie valves were already closed at this time. With the unit in this configuration, all four loop injection was lost and T/S 3.0.3 was entered. The complex valve manipulations associated with this evolution not only take some time to complete, but as can be seen from the LER submitted, carry the risk of a loss of four loop injection if not performed in a precise order to achieve the desired configuration.

At Cook Nuclear Plant, the ECCS contains two low-head RHR pumps, two SI pumps, and two high head centrifugal charging pumps. The RHR and SI piping systems contain cross-tie valves such that, with the cross-tie valves open, each pump injects to all four reactor coolant system (RCS) loops versus two loops with the cross-tie valves closed. This results in more flow reaching the core in the event of a loss-of-coolant accident (LOCA), especially under the scenario of a single failure of one pump with the break location in one of the two loops associated with the remaining pump.

Under normal operations, the RHR cross-tie valves are maintained closed to preclude the possibility of a strong pump/weak pump interaction phenomena (reference NRC bulletin 88-04). The SI cross-tie valves are maintained open.

The large break loss-of-coolant accident (LBLOCA) analyses support operation with either the RHR or SI cross-tie valves open, but not both. Additionally, the current unit 2 small break analyses do not support operation with the SI cross-ties closed unless power is reduced from the licensed power level of 3411 MWt to less than or equal to 3250 MWt (reference unit 2 T/S 3.5.2.f).

During power operation, an SI pump is used to maintain level in the accumulators when level decreases below an administrative limit. This is in accordance with design of the system. Section 6.2.2 of the UFSAR indicates that accumulator levels are maintained at power by use of an SI pump.

Past operating practice was to not declare an SI pump inoperable while the pump was being used for accumulator fill. Recently, however, this practice was questioned by an operating shift. The concern involves the effect of the flow diverted by the fill operation on the SI flow balance and the SI pump runout limit. Specifically, the concern is if the loop flow requirements or the SI pump runout limits in the T/Ss could be exceeded if a LOCA were to occur while an accumulator fill operation was in progress. Subsequent analysis by Westinghouse demonstrated that the SI pump runout limit may be exceeded under certain conditions.

The flow requirements for the SI pumps are based on ECCS requirements for LOCA (minimum flow limit) and for protection against pump runout (maximum flow limit). These requirements are reflected in T/S 3.5.2 for a single SI pump as a minimum flow of 300 gpm for each header, 600 gpm total, and a maximum flow of 640 gpm for both headers, plus 60 gpm for the minimum flow line, 700 gpm total. This leaves a maximum possible margin of 40 gpm for a single SI pump to remain between its minimum and maximum injection flow requirements of 600 and 640 gpm, respectively. By opening the accumulator fill line, an additional flow path is introduced which would cause the affected SI pump to exceed the runout limit if a demand on the SI system, i.e., a large break LOCA, were to occur coincident with a failure of one SI pump. If the runout limit is exceeded, then the remaining SI pump could be operating outside of its original design envelope. This was documented in LER 315/97-003-00 and 315/97-003-01, submitted in March and April of 1997, respectively.

With the SI cross-ties open, accumulator fill operation would result in both SI pumps being inoperable due to runout concerns. This would place the unit in T/S 3.0.3, which would require a shutdown be commenced within one hour. Thus, it is necessary to close the SI cross-ties in order to fill an accumulator, such that inoperability is limited only to the pump being used to fill the accumulator. However, as discussed above, this means the RHR cross-tie valves must be opened in order to comply with the assumptions of the LOCA analyses. Additionally, with the present unit 2 T/Ss, power would have to be reduced to less than or equal to 3250 MWt. A proposed T/S change and accompanying analyses are currently under NRC review that would eliminate this requirement for unit 2, as part of the unit 2 uprate program.

Justification For Change

There is a certain set of conditions that must simultaneously exist for an SI pump to exceed the runout limit.

The accumulator fill operation is in progress.

This procedure is performed to restore accumulators to above administrative limits. This evolution is performed approximately twice a year per unit, with the actual fill having a typical duration of five minutes. Therefore, the total exposure time is approximately twenty minutes per year.

The SI discharge cross-ties are open.

Open is the normal operating position for the SI pump discharge cross-ties. If the cross-ties are closed, the pumps cannot approach the runout limit.

While the accumulator fill operation is in progress, a LBLOCA occurs.

A LBLOCA will quickly reduce the RCS pressure to the point where the SI pump runout may occur. A small break loss-of-coolant accident (SBLOCA) does not pose a problem with respect to runout because the RCS pressure remains elevated, providing a high back pressure on the SI system and thus reducing the SI pump flow.

One of the SI pumps must fail to start or fail to run.

One pump is assumed to fail by single failure of the pump or its associated diesel generator if loss of offsite power occurs. If both SI pumps are delivering flow into two headers, then the flow delivered by each will be reduced compared to the case of one pump delivering flow into both headers. In this case, neither pump would approach the runout limit.

Under these conditions, a single SI pump may exceed the runout limit. Engineering evaluation, however, has determined the real response of the pump under these conditions is not so severe. The inherent rugged construction of industrial pumps, and design margin built into the pumps, are factors that support the engineering judgment that the affected pump will continue to operate for some time, at some capacity beyond the manufacturer's design limit. If the pump exceeds its design limit, it may experience some cavitation and additional wear requiring corrective maintenance, but would be expected to deliver a significant fraction of its design flow.

Even though the possibility exists that the pump in use could experience a runout condition should a LBLOCA occur during accumulator fill, the statistical probability of that event occurring is so extremely small as to not be considered credible. Due to the infrequent occurrence and very short duration of the fill operation, the exposure time to this event is very limited. According to Westinghouse, this is the reason the accumulator fill line has never been included in the SI pump runout evaluations they perform. The core damage frequency (CDF) resulting from the accumulator fill line operation with all of the conditions assumed above is approximately 3×10^{-10} per year. This is well below the Nuclear Energy Institute (NEI) guidelines of 1×10^{-6} for acceptable risk for a given evolution. On this basis alone, the LBLOCA event occurring during a fill operation with a simultaneous loss of offsite power and one train of emergency AC is not considered credible. Therefore, based on probabilistic considerations and the robust design of the pumps, we conclude the risk associated with using the accumulator fill line during power operation is negligible.

Under the proposed change, operators would be able to complete the valve lineup and accumulator fill evolution in little more than the five minutes that it now takes to perform the actual fill of the accumulator. Implementation of this proposed change would preclude the need for manipulation of the SI discharge cross-ties, the RHR discharge cross-ties, and declaring an SI pump inoperable. As discussed previously, improperly sequenced manipulation of the SI and RHR cross-ties has, in the past, led to a temporary loss of four loop injection capability.

Basis For No Significant Hazards Determination

In accordance with 10 CFR 50.92, the proposed changes do not involve a significant hazards consideration if the changes do not:

1. involve a significant increase in the probability or consequences of an accident previously evaluated;

2. create the possibility of a new or different kind of accident from any accident previously evaluated; or

3. involve a significant reduction in a margin of safety.

Criterion 1

This amendment request does not involve a significant increase in the probability or consequences of an accident previously evaluated because the proposed changes to the T/S represent the possibility of an event that has such a low probability as to not be considered credible. A calculation was performed that demonstrates the CDF resulting from the accumulator fill line operation with all of the conditions assumed above is approximately 3×10^{-10} per year. This is well below the NEI guidelines of 1×10^{-6} for acceptable risk for a given evolution. Therefore, based on probabilistic considerations and the robust design of the pumps, we conclude the risk associated with this proposed change will not result in a significant increase in the probability or consequences of a previously evaluated accident.

Criterion 2

The proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated. The change does not involve a physical change to the plant, but does involve a change in the plant operating configuration. The possibility of a LBLOCA occurring during the accumulation fill evolution has been evaluated and determined to not be credible. Westinghouse has confirmed the accumulator fill line was not modeled in the accident analyses due to the extremely short duration of the fill operation and the extremely small amount of flow that the fill line is capable of passing. The overall effect this configuration would have on the capability of the SI pump to perform its design function, should a LBLOCA occur during the extremely brief window of o portunity, is negligible and would not create a new type of accident.

Criterion 3

This proposed change does not involve a significant reduction in a margin of safety, as the risk from the postulated sequence of events is insignificant. Additionally, engineering evaluation has determined that the real response of an SI pump under the postulated conditions would not be severe. The rugged construction of the pumps, and the design margin built into them, are factors that support the engineering judgment that the affected pump would continue to operate for some time, at some capacity beyond the manufacturer's design limit. As a result of exceeding the limit, the pump may experience some cavitation and require additional corrective maintenance, but would be expected to deliver a significant fraction of its design flow.