3/4.5.4 BORON INJECTION SYSTEM

BORON INJECTION TANK ≥350°F

LIMITING CONDITION FOR OPERATION

3.5.4.1.1 The boron injection tank shall be OPERABLE with:

* a. A minimum contained volume of 900 gallons of borated water,

+* b. Between 2,000 and 7,700 ppm of boron, and

#* c. A minimum solution temperature of 120°F.

* 1 hour deviation is permitted to correct the out of specification condition.

\+ To permit adequate recirculation and sampling following actions taken to correct the boron concentration, 4 hours is allowed for verification of the sample results providing corrective action was taken within the first hour.

\# With the Boron Injection Flow Path temperature <120°F but >65°F, verify Recirculation Flow Path temperature and stagnant piping temperature by local monitoring of the ambient air temperature in the 1) Blender Cubicle (722 elevation PAB), and 2) Safeguards Penetration Area A (722 elevation Safeguards building) hourly.

APPLICABILITY: MODES 1, 2, 3

ACTION:

With the boron injection tank inoperable or <65°F, be in HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to 1% Δk/k at 200°F within the next 6 hours; restore the tank to OPERABLE status within the next 7 days or be in HOT SHUTDOWN within the next 12 hours.

SURVEILLANCE REQUIREMENTS

4.5.4.1.1 The boron injection tank shall be demonstrated OPERABLE by:

a. Verifying the water level in the surge tank at least once per 7 days.

b. Verifying the boron concentration of the water in the surge tank at least once per 7 days.

c. Verifying the water temperature and recirculation flow at least once per 24 hours, and

d. Verifying that the injection flow path temperature is >120°F (no low temperature alarms or by local monitoring of temperature) each shift.

NOTE: This specification applicable for N & N-1 loop operation with all Loop stop valves open.

BORON INJECTION SYSTEM (Continued)

The analysis of a main steam pipe rupture is performed to demonstrate that the following criteria are satisified:

1. Assuming a stuck rod cluster control assembly, with or without offsite power, and assuming a single failure in the engineered safeguards, there is no consequential damage to the primary system and the core remains in place and intact.

2. Energy release to containment from the worst steam pipe break does not cause failure of the containment structure.

3. Radiation doses are not expected to exceed the guidelines of the 10CFR100.

The limits on injection tank minimum volume and boron concentration ensure that the assumptions used in the steam line break analysis are met.

Verification of 120°F in the injection flow path assures an 8-hour margin to the time at which precipitation of a 7700 ppm boric acid solution would occur without benefit of the building heating system.

Verifying the recirculation flow path and stagnant piping temperatures, when the Boron Injection Flow Path temperature is <120°F and >65°F, by monitoring the ambient air temperatures in the building areas containing that piping provides assurance that boron precipitation will not occur.

3/4.5.5 REFUELING WATER STORAGE TANK (RWST)

The OPERABILITY of the RWST as part of the ECCS ensures that a sufficient supply of borated water is available for injection by the ECCS in the event of a LOCA. The limits on RWST minimum volume and boron concentration ensure that 1) sufficient water is available within containment to permit recirculation cooling flow to the core, and 2) the reactor will remain subcritical in the cold condition following mixing of the RWST and the RCS water volumes with all control rods inserted except for the most reactive control assembly. These assumptions are consistent with the LOCA analysis.

ATTACHMENT B

SAFETY EVALUATION

Proposed Change Request No. 79 amends the Beaver Valley Power Station, Unit No. 1 Technical Specifications, Appendix A to reduce the boron concentration requirements for the Boron Injection Tank (BIT).

DESCRIPTION AND PURPOSE OF CHANGE

This Technical Specification change will reduce the boron concentration requirements in the Boron Injection Tank from a range of 20,000 ppm to 22,500 ppm to a range of 2,000 ppm to 7,700 ppm. The minimum solution temperature requirement will be reduced to 120°F, this temperature will assure the solubility of the boron in solution. The limiting condition for operation will be revised to allow one hour for corrective action of a deviation, four hours for recirculation prior to boron concentration verification by sampling, and when the boron injection flow path temperature is less than 120°F but greater than 65°F, the building ambient air temperature will be monitored hourly. The action statement will be revised to require the plant to shutdown should the BIT solution temperature fall to less than 65°F. Two surveillance requirements will be added 1) to require verification of BIT water temperature and recirculation flow, once per 24 hours, and 2) to require verification that the injection flow path temperature is $\geq$120°F each shift. The requirements for heat tracing will be deleted. The bases will be revised to reflect changes in the analyses and the limiting conditions for operation. The purpose of these changes is to increase the reliability of the Boron Injection Tank by decreasing the likelihood of boron solidification.

BASIS

1. Is the probability of an occurrence or the consequence of an accident or malfunction of equipment important to safety as previously analyzed in the Updated Final Safety Analysis Report (UFSAR) increased? No.

   Reason: The design basis accidents for the BIT are "Accidental" Depressurization of the Main Steam System" (Section 14.1.13) and "Major Secondary System Pipe Rupture" (Section 14.2.5). The Westinghouse Boron Concentration Reduction Analysis was performed for these events assuming a boron concentration of 2,000 ppm in the BIT. The analysis shows that criticality is now attained during an accidental depressurization of the main steam system. However, the safety criteria is still met in that there will be no consequential fuel damage for this Condition II event. The results of the analysis for a major secondary system pipe rupture show that the minimum DNBR remains above 1.30 assuring no fuel damage. This provides considerable margin to the criteria of maintaining the core intact and coolable for this Condition IV event. The analysis was also performed to determine the effects of boron reduction on a "Spurious Operation of the Safety Injection System at Power" (Section 14.1.16). The consequences of this accident are not increased. The effects of a major secondary system pipe rupture on containment were not previously analyzed in the UFSAR. These are discussed later in this report.

The deletion of the requirements for redundant heat tracing on the BIT and associated piping is consistent with the reduced boron concentration. There will be no consequences as a result of a malfunction of this equipment, provided the BIT piping is maintained greater than 65°F.

Revision of the one-hour action statement will not physically change any plant equipment and the operator response to an out of specification condition will be essentially the same, that is, corrective action still must be taken within 1 hour. The four hour recirculation and sampling time should give increased assurance that the initial conditions of the bases for this Technical Specification are met.

2. Is the possibility for an accident or malfunction of a different type than previously analyzed in the Updated Final Safety Analysis Report created? No.

   Reason: Reduction of the boron concentration does not change the function or physical operation of the system and no new accidents or malfunctions are created. Deletion of the requirement for redundant heat tracing does not create the possibility of a different malfunction since heat tracing should not be required as long as the BIT piping temperature is maintained above 65°F. Verification of the flowpath temperature is required at least once per shift to provide assurance that the boron will not percipitate out of solution. The change to the action statement also provides assurance that boron precipitation will not occur.

3. Is the margin of safety, as defined in the basis for any Technical Specification reduced? Yes.

   Reason: The basis for Technical Specification 3.5.4 is the main steam line break analysis. The main steam line break is a Condition IV fault for which the Safety criteria are to maintain the core intact with coolable geometry, and limit off-site doses to permissable levels. In comparing the original analysis results (using 20,000 ppm boron) with the results of the boron reduction analysis (using 2,000 ppm boron), an increase in the resultant core heat flux is evident in cases B and D (Updated FSAR Figures 14.2.6 and 14.2.8). This may be construed as some reduction in the margin of safety, but this also indicates that the original analysis was very conservative. For all cases, the minimum DNBR remains above 1.30 and the results are well within the criteria for Condition IV events.

Another criteria applicable to the steam line break is that the energy released to containment from the worst steam pipe break does not cause failure of the containment structure. An analysis was performed by Stone & Webster to determine the peak containment pressure and temperature following a main steam line break. This analysis was performed using mass and energy release data generated by Westinghouse for a boron concentration of 2,000 ppm in the BIT. Various types and sizes of breaks were investigated to determine the most limiting cases resulting in the maximum peak pressure and the maximum peak temperature. The Updated FSAR lists the design conditions for containment as 45 psig and 280°F. The results of the analysis show a maximum peak pressure of 41.1 psig with a corresponding temperature of 270°F. These conditions are comparable to those generated during a LOCA. The design conditions are not exceeded for this case and therefore, the results are acceptable. The maximum peak temperature generated was 344.8°F. At the time this peak temperature was reached, the pressure was 18 psig. This peak temperature is deemed to be acceptable based on the fact that the corresponding pressure is well below the design pressure. This combination should not exceed the containment shell structural loading criteria which considers internal pressure and loads exerted by the liner when it sees the peak temperature. Also, the amount of heat transferred to the structure is comparable to that occurring during a LOCA. Therefore, it is concluded that the criteria is met in that there will be no failure of the containment structure as a result of the energy released during the worst case steam line break. A comparison between the results of this analysis and a similar analysis performed previously by Stone & Webster shows that there is no reduction in the margin of safety with respect to containment integrity as a result of this change.

The results of the Stone & Webster analysis will not have an impact on the environmental conditions assumed in the Environmental Qualification Documentation Report submitted by Duquesne Light Company for NRC IE Bulletin 79-01B. The analysis does provide verification for the statement made in the report that the MSLB temperature profiles generated for North Anna Units 1 & 2 conservatively envelope conditions at Beaver Valley Unit 1. The resultant peak temperature for the North Anna analysis was 430°F. This temperature was deemed to be acceptable based primarily on calculations which show that skin temperatures for equipment similar to that used at Beaver Valley Unit 1 do not exceed their qualification temperature. The results of the above analysis will be used to formally define the environmental conditions for equipment qualification as required by NUREG-0588 for replacement equipment.

An accidental depressurization of the main steam system is also considered a design basis event for the BIT. This is a Condition II event for which the applicable safety criteria, per General Design Criteria 10 and 26, are to assure no fuel damage and to maintain the reactor coolant pressure boundary. The criterion presently used in the Updated FSAR is more restrictive in that it allows no return to criticality.

The results of the analysis show that the core will attain criticality during this event, but no fuel damage will occur. This change will require that the criterion in the Updated FSAR be made less restrictive and this represents a reduction in the margin of safety. However, the results are acceptable in that they meet the applicable safety criteria as set forth in GDC 10 and 26.

The revision to the one hour action statement does not reduce the margin of safety for Technical Specification (3/4.5.4) since once a correction for an out of specification condition is made, the BIT will still be capable of meeting its design function, regardless of when a sample is taken for verification (1 hour vs. 4 hours). The allowance of 4 hours is within the provisions of standard Technical Specification 3.1.2.2. Should the BIT flow path temperature fall to between 120°F and 65°F the building areas containing BIT piping will be monitored to provide additional assurance that boron precipitation will not occur.

There is no reduction in the margin of safety as a result of deletion of heat tracing requirements. Maintenance of ambient temperature as well as installed tank heaters and recirculation flow will assure solubility and an equilibrium boron concentration.

4. Based on the above, does an unreviewed safety question exist? Yes.

Per 10 CFR 50.59, an unreviewed safety question does exist as some reduction in the margin of safety is evident. However, this change is deemed acceptable based on the results of the analysis performed by Westinghouse and Stone & Webster. These analyses demonstrated that all applicable safety criteria will be met during those events considered to be the bases for this Technical Specification.

CONCLUSION

It is concluded that the reduction in boron concentration in the BIT does present an unreviewed safety question as some reduction in the margin of safety is evident. However, this change is considered to be safe and acceptable based on the analysis which demonstrate that all applicable safety criteria continue to be met with a boron concentration of 2,000 ppm in the BIT. No new accidents or malfunctions are created by this change. Deletion of heat tracing requirements and revision of the action statements are considered safe and do not present an unreviewed safety question. It is noted that changes to the Updated FSAR will be required as a result of this change in addition to those identified by Westinghouse. NRC approval is required prior to implementation of these proposed Technical Specification changes.

The OSC and ORC have reviewed this proposed change, and based on the above safety evaluation, it is concluded there is reasonable assurance that the public health and safety will not be endangered by operation in the proposed manner.