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U. S. Nuclear Regulatory Commission
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Quad Cities Nuclear Power Station, Unit 1
Renewed Facility Operating License No. DPR-29
NRC Docket No. 50-254

Subject: Request for Enforcement Discretion
Technical Specification 3.1.7, "Standby Liquid Control (SLC) System"

On October 13, 2006, Exelon Generation Company, LLC (EGC) verbally requested a Notice of Enforcement Discretion (NOED) associated with Technical Specification (TS) 3.1.7, "Standby Liquid Control (SLC) System," for Quad Cities Nuclear Power Station (QCNPS) Unit 1. The need for the NOED arose when on October 12, 2006, at 2236 hours it was determined that a small (i.e., pinhole) leak in the QCNPS Unit 1 SLC tank rendered both SLC subsystems inoperable.

The requested NOED was to temporarily extend the completion time of Required Action C.1 of TS 3.1.7 for an additional 72 hours. The NOED was designed to avoid a plant shutdown as a result of compliance with TS 3.1.7, Required Action C.1, which required Unit 1 to be placed in Mode 3 operation (i.e., hot shutdown) on or before 1836 hours on October 13, 2006. As discussed during the NOED conference call, if the SLC system could not be made operable during the requested enforcement discretion period, QCNPS Unit 1 would be required to be placed in Mode 3 operation on or before 1836 hours on October 16, 2006.

The NOED was verbally granted by the NRC at 1130 hours (CDT) on October 13, 2006. In accordance with the guidelines provided in Regulatory Issue Summary 2005-01, "Changes to Notice of Enforcement Discretion (NOED) Process and Staff Guidance," and NRC Inspection Manual Part 9900, "Operations – Notices of Enforcement Discretion," the attachment to this letter provides EGC's written NOED request. During the enforcement discretion period, station Operators received a shift briefing covering the expected operator response to a postulated Anticipated Transient Without Scram (ATWS) event with SLC unavailable.

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As discussed during the NOED teleconference, two parallel paths were pursued; option one was to conduct an external repair while option two involved an internal repair with the selection being based on the results of an initial external NDE examination.

Following the initial examination, the decision was made to drain the Unit 1 SLC tank to facilitate internal tank inspections and weld repairs in accordance with the second option. Internal tank inspections revealed two aligned linear indications in the proximity of the leak that measured approximately 0.2 and 0.125 inches long and were located approximately 2.4 inches above the tank floor. The indications were not associated with pitting or general corrosion. Following the SLC tank repairs, the system was made available at 0413 hours and fully operable at 1122 hours on October 15, 2006.

If you have any questions concerning this letter, please contact Mr. Wally Beck at (309) 227-2800.

Respectfully,

Timothy J. Tulon
Site Vice President
Quad Cities Nuclear Power Station

Attachment: Request for Enforcement Discretion -Technical Specification 3.1.7 (Standby Liquid Control System)

cc: NRC Regional Administrator, Region III
NRC Senior Resident Inspector, Quad Cities Nuclear Power Station

ATTACHMENT

Quad Cities Nuclear Power Station, Unit 1

Docket No. 50-254

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Request for Enforcement Discretion
Technical Specification 3.1.7 (Standby Liquid Control System)

Request for Enforcement Discretion
Technical Specification 3.1.7 (Standby Liquid Control System)

1. The TS or other license condition that will be violated.

Quad Cities Nuclear Power Station (QCNPS) is requesting enforcement discretion from Technical Specification (TS) 3.1.7 Standby Liquid Control (SLC) System.

TS 3.1.7 Required Action B.1 requires:

> With two SLC subsystems inoperable, restore one subsystem to OPERABLE status within 8 hours.

If one subsystem is not restored within eight hours, then Required Action C.1 requires:

> Be in Mode 3 (HOT SHUTDOWN) within the next 12 hours.

The basis of these requirements is that given the low probability of a Design Basis Accident (DBA) or transient occurring concurrent with the failure of the control rods to shut down the reactor, operation of the reactor is permitted to continue for short periods of time with the SLC system inoperable.

At 2236 hours on October 12, 2006, it was determined that a pinhole leak in the Unit 1 SLC tank rendered both SLC subsystems inoperable. This placed Unit 1 in TS 3.1.7 Condition B, "Two SLC Subsystems Inoperable." The eight hour Completion Time of TS 3.1.7 Required Action B.1 expired at 0636 hours on October 13, 2006. At the expiration of this Completion Time, action was required to place QCNPS, Unit 1 in Hot Shutdown within the following 12 hours (i.e., 1836 on October 13, 2006). QCNPS is requesting an extension to the Completion Time for Required Action C.1 for an additional 72 hours in order to implement repairs. This request for Enforcement Discretion is being made to avoid an unnecessary plant transient as a result of compliance with TS 3.1.7, Required Action C.1. If the SLC system cannot be made operable during the requested enforcement discretion period, Unit 1 will be placed in Mode 3 operation on or before 1836 on October 16, 2006.

2. The circumstances surrounding the situation, including likely causes, the need for prompt action, action taken in an attempt to avoid the need for a NOED, and identification of any relevant historical events.

While performing a periodic system walkdown, the system engineer identified a boric acid (sodium pentaborate) crystallization of about ½ inch at the bottom of the Unit 1 SLC tank at the juncture of a weld on a support bracket for the SLC tank. The SLC tank is stainless steel and the bracket is carbon steel. It is suspected that the crystallization is due to a pinhole leak at or near the weld

location. The SLC tank is a stainless steel, American Society of Mechanical Engineers (ASME) Section XI Class 2 structure that is vented to atmosphere.

QCNPS initially identified, approximately two years ago, that boric acid crystals had accumulated at this particular location on the SLC tank. This condition was documented in a condition report on May 27, 2004. It was not conclusively determined whether the crystals were from the tank, operation of the system, sampling methods, spillage, or some other source. Reviews of tank level since that period of time have not indicated any abnormal trends. Technical Specification surveillances consistently confirmed that requirements for volume (daily) and concentration (monthly) continued to be met. Walkdowns of other similar welds on the Unit 1 and Unit 2 SLC tanks have not detected any other boric acid crystals. A non-destructive ultrasonic examination (i.e., NDE UT) of the suspect area performed in May 2004 indicated no wall thinning. A visual exam, also performed in this time period, indicated that no flaws or discontinuities existed. Based on the aforementioned, the condition did not result in a structural concern. During subsequent monitoring by the system engineer, no visible liquid was observed (occasionally a small amount of boric acid crystals were found in the area). These results are formally documented on a quarterly basis.

Recent industry issues involving operational leakage in ASME Code components resulted in a heightened awareness that these crystals could be symptomatic of a tank integrity concern. Consequently, it was determined that the Code Class 2 pressure boundary is not intact and the SLC operability requirement per TS 3.1.7 is therefore not met. As a result, a repair plan is being developed that will satisfy ASME Code requirements. The required time to implement this repair is estimated to be 72 hours.

Enforcement discretion is requested to defer the required shutdown and allow continued operation of Unit 1 until repairs can be completed. If the SLC system cannot be made operable during the requested enforcement discretion period, Unit 1 will be placed in Mode 3 operation on or before 1836 on October 16, 2006. If unexpected conditions are discovered during the SLC tank inspections, Exelon will terminate the discretionary period and Unit 1 will be shutdown in a deliberate and controlled manner.

3. **Information to show that the cause and proposed path to resolve the situation are understood by the licensee, such that there is a high likelihood that planned actions to resolve the situation can be completed within the proposed NOED timeframe.**

QCNPS initially identified approximately two years ago that boric acid crystals had accumulated at this particular location on the SLC tank. This condition was documented in an issue report on May 27, 2004. As a precautionary measure, a more extensive evaluation/repair was scheduled for the next Unit 1 refueling

outage (May 2007). The most probable cause for the apparent leakage can be assigned to a weld defect induced during fabrication; however, the root cause of the leak will be confirmed through NDE analyses, or possibly by material removal for offsite analysis. The pinhole leak can readily be repaired via an ASME Code allowed internal or external repair method for Class 2 structures. This repair is estimated to take approximately 72 hours.

4. **The safety basis for the request, including an evaluation of the safety significance and potential consequences of the proposed course of action.**

Exelon Generation Company (EGC), LLC is requesting Enforcement Discretion to avoid placing QCNPS Unit 1 in Hot Shutdown (i.e., Mode 3) and cycling the unit through a thermal transient. The integrity of the reactor vessel and other components of the primary system of a nuclear plant can be adversely affected by the number of thermal transients that they are subjected to during their lifetime. As each additional thermal transient can affect this integrity, it is prudent to avoid such transients, provided the health and safety of the public is preserved. Enforcement Discretion is requested from TS 3.1.7. Unit 1 is currently operating in Mode 1 (i.e., Power Operations). A one-time, 72-hour extension is being requested to repair the SLC tank. The repair will conform with ASME Code requirements.

The performance objective of the SLC system is to provide a backup capability for reactivity control to the highly reliable control rod drive (CRD) scram system. The SLC system provides the capability of bringing the reactor from full power to a cold, xenon free shutdown condition assuming that none of the withdrawn control rods can be inserted. This is accomplished by injecting a quantity of sodium pentaborate solution, which produces a boron concentration of no less than 600 ppm in the reactor core.

A second SLC performance objective is to provide for the delivery of 80 gallons per minute of 14% concentration (minimum) sodium pentaborate solution in order to control, mitigate, and terminate certain anticipated transients with a concurrent failure of the reactor to scram (i.e., Anticipated Transient Without Scram (ATWS)).

The control rods are the primary reactivity control system for the reactor. In conjunction with the Reactor Protection System (RPS), the control rods provide the means for reliable control of reactivity changes to ensure that fuel design limits are not exceeded. Operability of the control rods is governed by TS 3.1.3, "Control Rod OPERABILITY," and the control rods are demonstrated operable by the performance of Surveillance Requirements 3.1.3.1 through 3.1.3.5. These specifications assure that the insertion capability of the control rods is maintained in the event of an accident or transient, thus meeting the assumptions used in the safety analysis.

Scram reliability is the object of a number of features in the system including:

A. There are two sources of scram energy (accumulator and reactor pressure) that complement each other for each drive whenever the reactor is operating.

B. Each drive mechanism has its own scram valves and pilot valves so that only one drive can be affected by a scram valve failure to open. A separate backup pilot valve is provided to vent the instrument air header, scramming all drives should this failure occur.

C. Under scram conditions the drive mechanism develops 6000 pounds (at zero reactor pressure) to 2800 pounds (at rated pressure) of force, providing a large margin to overcome possible friction.

D. The scram system is designed so that the scram signal overrides all other operating signals.

E. The scram valves fail open on loss of either air or electrical power. Hence, failure of the valves' air system or electric system will produce, rather than prevent, a scram. All components used in the scram hydraulic system are selected either after an extensive testing program or after many millions of accumulated operating hours in service.

F. The Alternate Rod Insertion (ARI) system provides an alternate path for reactor shutdown in the event that the normal scram path cannot be initiated by RPS. The ARI system is diverse and independent from RPS.

As noted above, operability of the trip function of the control rods is demonstrated by specific Surveillance Requirements in TS 3.1.3. Recent surveillances have demonstrated that all control rods are operable, and all surveillances are current. There are currently no TS "slow" control rods on Unit 1 and no performance issues exist that could impact the scram function of any individual control rod. This demonstrates the high reliability of the control rod scram function. For the control rod scram function to fail when a valid signal is sent, a diverse number of common mode failures would have to occur in order in prevent the scram valves from opening. Also as noted above, the ARI system would be available as a separate means for reactor shutdown in the event that the normal scram path cannot be initiated by the RPS. The ARI system is diverse and independent from RPS.

A bounding risk assessment of operating QCNPS Unit 1 with the SLC Tank unavailable has been performed.

The risk assessment approach estimated the impact on the Core Damage Frequency (CDF) and Large Early Release Frequency (LERF) base risk profile assuming that SLC is unavailable. The Incremental Conditional Core Damage Probability (ICCDP) and Incremental Conditional Large Early Release Probability (ICLERP) risk metric results from the risk assessment are summarized in the following Table.

Risk Assessment Results Summary

Risk Metric	Result	Acceptance Criteria (from NRC Regulatory Issues Summary (RIS) 2005-01)
ICCDP	3.3E-8	5E-7
ICLERP	2.1E-8	5E-8

The results of the risk assessment for operating for a short duration (i.e., a bounding 120 hours) with the SLC tank unavailable shows that there is no net increase in radiological risk to the public. This conclusion is drawn from the calculated risk metrics, specifically ICCDP and ICLERP, are within the NRC guidelines for Notice of Enforcement Discretion (NOED) requests. The following information details the risk assessment assumptions as outlined in NRC Inspection Manual Part 9900 Technical Guidance – Operations, "Notices of Enforcement Discretion."

a) *Use the zero maintenance PRA model to establish the plant's baseline risk and the estimated risk increase associated with the period of enforcement discretion.*

The baseline risk for QCNPS Unit 1 using the zero maintenance Probabilistic Risk Assessment (PRA) model yields a CDF value of 5.05E-6 and a LERF value of 4.65E-7. The estimated increase in risk for ICCDP associated with a postulated 120-hour extension is 3.3E-8. The ICCDP values for Unit 1 are less than the threshold of 5E-7 specified in RIS 2005-01. In addition, the estimated increase in risk for ICLERP is 2.1E-8. The ICLERP values for Unit 1 are also less than threshold of 5E-8 specified in RIS 2001-05. These calculated risk increases are consistent with the site's normal work control levels and therefore there is no net increase in radiological risk to the public.

b) *Discuss the dominant risk contributors (cutsets/ sequences) and summarize the risk insights for the plant-specific configuration the plant intends to operate in during the period of enforcement discretion.*

An examination of dominant risk contributors that increased as a result of this NOED condition was performed. A review of the top 25 cutsets contributing toward core damage yields 12 new cutsets (combinations of potential failures)

that increased in importance with the SLC system and 1A CRD Pump unavailable versus the baseline PRA model. The common theme associated with these cutsets is related to a Turbine Trip initiating event with subsequent failure to SCRAM (i.e., an ATWS event). This result is as expected since SLC is used for mitigation in ATWS scenarios. Other failures in the elevated cutsets include various initiators combined with failures of the mechanical scram ATWS.

c) *Explain compensatory measures that will be taken to reduce the risk associated with the specified configuration. Compensatory measures to reduce plant vulnerabilities should focus on both event mitigation and initiating event likelihood. A discussion of the compensatory actions is provided below.*

1. SLC is restored to available status within the bounding 120 hour time period. This action will ensure online risk is maintained within the assessment assumptions.
2. Protection of both ATWS Recirculation Pump Trip Systems. This action will mitigate the need for SLC.
3. The RPS is protected. This action will mitigate the need for SLC.
4. Prohibit production risk activities. This action will minimize the likelihood of initiation events (i.e., plant transients) and thus minimize the need for SLC.

d) *Discuss how the proposed compensatory measures are accounted for in the PRA.*

As noted above, credit for maintaining key systems available is inherently provided by using the zero maintenance PRA model since unavailability values of all key systems modeled in this PRA are already set at zero. In addition, actions such as prohibiting production risk activities will reduce the likelihood of initiating events.

e) *Discuss the extent of condition of the failed or unavailable component(s) to other trains/divisions of equipment and what adjustments, if any, to the related PRA common cause factors have been made to account for potential increases in their failure probabilities.*

No extent of condition issues have been identified (the Unit 2 SLC tank was inspected for similar indications, no issues were identified).

f) *Discuss external event risk for the specified plan configuration.*

A qualitative assessment of external event risks was performed. A summary of this assessment is provided below:

- The seismic risk analysis for an ATWS event is judged to be quantitatively negligible. The proposed NOED discretionary period creates negligible additional seismic risk.
- The fire risk analysis for ATWS events is judged to be quantitatively negligible. The proposed NOED discretionary period creates negligible additional fire risk.
- Other external event risks such as severe weather, high winds or tornados were considered. The QCNPS Internal Events PRA addresses these risks within the Safety Function Assessment and Plant Transient assessment trees.

g) *Discuss forecasted weather conditions for the NOED period and any plant vulnerabilities related to weather conditions.*

Forecasted weather conditions for the discretionary enforcement period are favorable. No compensatory actions are needed for severe weather conditions.

In addition to the compensatory actions to minimize risk described above, the following additional actions will be taken on Unit 1 during the period of enforcement discretion:

- Provided the repair option leaves the SLC tank available, the frequency for SR 3.1.7.1, which requires verification of available SLC tank volume, will be increased from once per 24 hours to once per 8 hours.
- Systems that impact production risk will not be removed from service for preventive maintenance.
- Nuclear Oversight personnel will independently verify that all compensatory actions are being implemented.

5. The justification for the duration of the noncompliance.

Currently, two repair options are being investigated. One option involves an external repair, while the other involves an internal repair. The decision on which option to pursue will be based on detailed NDE examinations. The examination will be performed following removal of a support bracket (adjacent to the defect), which is expected to occur October 13, 2006, at approximately 2000 hours. If it is determined that the defect is a minor flaw (not crack-like), then the flaw is not expected to grow and an external repair can be conducted that meets ASME Code requirements (Option 1). If a more extensive repair is required, the SLC tank will have to be drained to support the work activities (Option 2). The NOED request is based on Option 2, the longer of the two repair options. The significant work activities included:

- NDE Examinations
- Engineering structural evaluations
- 10 CFR 50.59 and modification preparation
- Independent, third party reviews
- SLC tank draining and flush
- Weld repair and examination
- SLC tank refill and heatup/chemical sampling
- Operability testing

These activities are estimated to be completed within the 72-hour enforcement discretion period.

6. **The condition and operational status of the plant (including safety-related equipment out of service or otherwise inoperable).**

Both Unit 1 and Unit 2 are operating at full rated electrical power of 912 MWe. Unit 1 is at 2885 MWt and Unit 2 is at 2820 MWt (at 1034 hours on October 13, 2006, Unit 1 initiated a shutdown in accordance with T.S. 3.1.7, Required Action C.1). On Unit 1, the only safety-related equipment inoperable (other than the Unit 1 SLC system) is Startup Range Monitor 24. In addition, the 1A Control Rod Drive Pump is also inoperable due to planned maintenance. No production risk-significant activities will be conducted during the 72-hour enforcement discretion period.

7. **The status and potential challenges to off-site and on-site power sources.**

All off-site power sources are fully operational, with no maintenance planned on these systems during the 72 hour discretion period. No adverse weather is forecast, with temperatures between 31 and 60 degrees Fahrenheit, and some winds and snow flurries possible.

All on-site power sources are fully operational, including up-to-date surveillances and the required fuel reserves. No maintenance related to on-site power is planned during the 72 hour discretion period.

8. **The basis for the licensee's conclusion that the noncompliance will not be of potential detriment to the public health and safety.**

The proposed NOED provides an additional 72 hours of plant operation to implement repairs to the Unit 1 SLC tank. While the SLC system will be unavailable for certain periods during the discretionary period, this action is not detrimental to public health and safety for the following reasons.

- SLC is a backup reactivity control system; the primary RPS is operable. Other backup features are also operable including the ARI and the ATWS Recirculation Pump Trip systems.
- The SLC system is not an initiator of any analyzed design basis event. Therefore, the NOED request does not increase the probability of a plant transient (i.e., does not increase the likelihood of an ATWS precursor).
- Compensatory actions have been implemented to further minimize risk including the protection of key systems and deferring production risk activities.
- A risk assessment has determined there is no net increase in radiological risk to the public.
- If the SLC system cannot be made operable during the requested enforcement discretion period, Unit 1 will be placed in Mode 3 operation on or before 1836 on October 16, 2006. If unexpected conditions are discovered during the SLC tank inspections, QCNPS will terminate the discretionary period and Unit 1 will be shutdown in a deliberate and controlled manner.

9. The basis for the licensee's conclusion that the noncompliance will not involve adverse consequences to the environment.

The proposed NOED does not involve any adverse consequences to the environment. As noted above, the proposed action does not represent a potential detriment to the public health and safety. A bounding risk assessment determined that the calculated risk is consistent with the site's normal work control levels and therefore there is no net increase in radiological risk to the public. In addition, there is no significant change in the types or a significant increase in the amounts of any effluent that may be released offsite, since the proposed actions do not affect the generation of any radioactive effluent nor do they affect any of the permitted release paths. Finally, there is no significant increase in individual or cumulative occupational radiation exposure. The actions proposed in this request for enforcement discretion will not significantly affect plant radiation levels, and therefore do not significantly affect dose rates and occupational exposure.

10. A statement that the request has been approved by the facility organization that normally reviews safety issues (Plant Onsite Review Committee, or its equivalent).

The request for enforcement discretion has been approved by the QCNPS Plant Operations Review Committee in accordance with the EGC Quality Assurance Program.

11. The request must specifically address which of the NOED criteria for appropriate plant conditions specified in Section B (of Inspection Manual Part 9900) is satisfied and how it is satisfied.

EGC has evaluated the requested enforcement discretion against the criteria specified in the NRC Inspection Manual, Part 9900. EGC has determined that the requested actions meet the NOED criteria for an operating plant. This determination is based on the avoidance of an undesirable transient caused by the shutdown of the reactor as a result of compliance with TS 3.1.7 and, thus, minimizes potential safety consequences and operational risks associated with a plant shutdown.

12. Unless otherwise agreed as discussed in Section B, a commitment is required from the licensee that the written NOED request will be submitted within 2 working days and the follow-up amendment will be submitted within 4 working days of verbally granting the NOED.

EGC is committing to submit a formal NOED request within two working days following NRC verbal approval.

EGC has concluded a license amendment request is not warranted for the following reasons:

- The NOED will be in affect for a relatively short duration (i.e., 72 hours).
- This action represents a one-time deferral. A permanent change to the Technical Specifications is not required.

During the NOED teleconference on October 13, 2006, the NRC concurred that a follow-up license amendment request was not required.

13. In addition to items 1-12 above, for a severe-weather NOED request, the licensee must provide the additional information.

The requested NOED does not involve severe weather.