Commonwealth Edison
1400 Opus Place
Downers Grove, Illinois 60515

April 19, 1994

Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: Document Control Desk

Subject: Dresden Station Units 2 and 3
LaSalle County Station Units 1 and 2
Quad Cities Station Units 1 and 2

Commonwealth Edison Company Response to NRC Bulletin 93-02 Supplement 1, February 18, 1994, "Debris Plugging of Emergency Core Cooling Suction Strainers"

NRC Dockets 50-237 and 50-249
NRC Dockets 50-373 and 50-374
NRC Dockets 50-254 and 50-265

Reference: BWR Owner's Group Report (BWROG-94029), March 15, 1994, "Operator Guidance for Potential Blockage of ECCS Pump Suction Strainers"

This letter provides Commonwealth Edison Company's response to NRC Bulletin 93-02 Supplement 1 for our Dresden, LaSalle and Quad Cities Nuclear Power Stations. Specific responses are provided as Attachments 1,2, and 3.

Commonwealth Edison Company (CECo) has initiated a significant coordinated response to the issues identified in the original Bulletin and this supplement. A generic project team has been formed with members from all six CECo power stations, Corporate Engineering, and Licensing. Additionally, CECo is represented on the BWR Owner's Group currently trying to develop a coordinated industry response to this issue.

The Commonwealth Edison Task Force is currently reviewing potential engineering solutions to this problem such as; additional screening in the downcomer regions, larger area debris strainers, automatic backflush capabilities, and replacement of existing insulation with forms less susceptible to transportation as debris.

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In the interim, Commonwealth Edison Boiling Water Reactors have implemented training for plant personnel relating to events which have already occurred and recognition of similar events should they occur at Commonwealth Edison facilities. Short-term awareness training on the event will be provided to Licensed Operators and other appropriate emergency response personnel. Long-term training will be provided to Licensed Operators to address the specifics recommended by the bulletin.

Existing procedures have been reviewed to ensure operator actions are properly directed to mitigate such an event. Procedural guidance already exists for the primary symptom indicative of strainer blockage, which is low reactor level, and for the establishment of alternate water sources (which would function independently of clogged strainers) in the event of continued level decrease. The Stations are currently investigating existing capabilities of the simulators to model ECCSs Suction Strainer Clogging for inclusion in simulator based training.

To the best of my knowledge and belief, the statements contained in this document are true and correct. In some respects these statements are not based on my personal knowledge, but on information furnished by other CECo employees, contractor employees, and/or consultants. Such information has been reviewed in accordance with company practice, and I believe it to be reliable.

Sincerely,

L.O. DelGeorge

L.O. DelGeorge
Vice President

"OFFICIAL SEAL"
NADINE M. ESPISITO
NOTARY PUBLIC, STATE OF ILLINOIS
My Commission Expires 10/19/97.

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Attachments:

1) Attachment A; Dresden Station Submittal
2) Attachment B; LaSalle Station Submittal
3) Attachment C; Quad Cities Station Submittal

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Attachment 1

Dresden Station Response

NRC Bulletin 93-02, Supplement 1

Summary of Actions:

1) Short-term awareness training on the event will be provided to Licensed Operators by May 19, 1994.

2) Long-term training will be provided to Licensed Operators to address the specifics recommended by the bulletin by July 11, 1994.

3) Methods of backwashing the ECCS strainers will be investigated by Site Engineering.

4) Permanent insulation repair and replacement, potential enhancement of drywell closeout inspections, strainer cleanliness inspections, and Torus desludging are planned by Site Engineering for the current Unit 3 Refuel Outage to provide added assurance of ECCS operability. These actions have been (Torus desludging performed during D2R13) or will be performed for Unit 2 during the next Unit 2 Refuel Outage, D2R14.

Dresden Station's specific responses to the items addressed in Bulletin 93-02 Supplement 1 are as follows:

Requested Action 1

Provide training and briefings to apprise operators and other appropriate emergency response personnel of the information contained herein and in the referenced information notices regarding the potential for suppression pool strainer clogging.

Response to Requested Action 1

The entire bulletin supplement was added to Required Reading Package 94-03 for Licensed Operating personnel, thereby providing summaries of the previously issued documents, Information Notices 88-28, 90-07, 92-71, 93-34 and 93-34 Supplement 1, and providing the new information contained in Supplement 1 to Bulletin 93-02. This package is scheduled to be completed by May 19, 1994 (NTS #237-101-93-00201S1).

The bulletin supplement was also presented to initial Operator licensing class on March 21, 1994, as part of the training module on DEOP 100, Reactor Control.

The Equipment Attendants (i.e., 'other emergency response personnel' referred to in the bulletin) have already been trained in the actions required to line-up the alternate injection systems. No further training is required.

Site Engineering, Systems Engineering, Site Quality Verification, and Regulatory Assurance personnel received training on the original bulletin in Engineering Support Personnel Continuing Training (ESPT) in the fourth quarter of 1993 (ESPT Module 93-4).

These actions satisfy the above requirement.

In addition, a new lesson plan will be developed for Continuing Licensed Operator training to address the following areas recommended for training in Reference 1:

- Ensure plant operators are familiar with the expected performance of ECCS systems when operated in the RPV injection mode and, where applicable, suppression pool cooling and containment spray modes. This includes recognition of nominal system parameters such as discharge flows and pressures, motor current indications, suction pressure, pump noise and vibration, minimum flow valve opening and closing flow rates, etc.

- Ensure operators are familiar with expected performance of Alternate Injection Subsystems and requirements for placing them in service. This includes recognition of maximum RPV injection pressures, expected RPV injection flow rates (including reduction to delay clogging), sources of injection, injection flowpaths, resource and time limitations impacting subsystem lineup, etc.

- Ensure plant operators are cognizant of the latitude provided in DEOP decisions and actions related to the operation of RPV injection systems, Subsystems, and Alternate Injection Subsystems. This includes recognition of:

  - the option to augment RPV injection with Alternate Injection Subsystems while controlling level in the water level control section of the EOP, and

  - the need to enter the DEOP developed from EPG Contingency #1, Alternate Level Control, when the determination is made that RPV water level cannot be maintained above the top of the active fuel (i.e., the transition to Contingency #1 need not be delayed until RPV water level reaches TAF).

This material will be taught in Licensed Operator Continuing Training Cycle 3. This item will be completed by July 11, 1994 (NTS #237-101-93-00202S1).

Lesson Plan 295L-S1, DEOP 100 Reactor Control, which is taught to initial license trainees has been revised to discuss indications of strainer clogging, use of alternate injection sources and minimizing ECCS flow when not required to delay strainer clogging. This material was taught in the March 21, 1994, class.

Requested Action 2

Assure that the emergency operating procedures make the operator aware of possible indications of ECCS strainer clogging and provide guidance on mitigation

Response to Requested Action 2

At Dresden, the only Control Room indications that would detect strainer clogging would be the flow and pressure indications for the respective ECCS systems, High Pressure Coolant Injection (HPCI), Low Pressure Injection (LPCI) and Core Spray. Pump motor current indications are at the switchgear. There are no pressure indications for the strainers.

In accordance with Reference 1, specific guidance on pressure/flow indications of clogging and mitigating actions (such as flow reduction) will not be addressed by the DEOPs. The DEOPs are intended to be symptom based as opposed to event based. As such, the plant symptoms for entry are not component-based as in loss of pump suction pressure or loss of system flow, but in the case of clogged ECCS strainers, a low vessel level would be indicative of a clogging problem and would direct the Operator into the applicable DEOP flowchart for selection of an alternate source of water. It should also be noted that the DEOPs supersede all other procedures; therefore, it would not be appropriate to add this type of guidance to the normal operating procedures.

Operators will be alerted to the specific indications and mitigating actions through training. As discussed in the response to Requested Action 1, guidance has been added to the initial license training lesson plan and will be added to the continuing training lesson plan (tracked under NTS #237-101-93-00202S1).

Requested Action 3.a

Institute procedures and other measures to provide compensatory actions to prevent, delay, or mitigate a loss of available NPSH margin under LOCA conditions. Such measures should be consistent with providing the design basis emergency system functions for core and containment cooling. Actions to assure sufficient core and containment cooling may include:

Reduction of flow (consistent with delivering the required ECCS flow) through the strainers to reduce head loss and the time for debris deposition

Response to Requested Action 3.a

Reference 1 does not recommend a revision to the DEOPs. The existing system flows specified in the DEOPS are utilized to maintain suppression pool temperature and pressure within the Technical Specification limits. Guidance on injection flow minimization to reduce debris deposition (within the existing DEOP guidelines) has been added to initial Operator license training module 295L-S1, DEOP 100 Reactor Control, as discussed in the response to Requested Action 1. Guidance will also be added to the lesson plan to be developed for Continuing Operator License Training, also discussed in the response to Requested Action 1 (tracked under 237-101-93-00202S1).

Requested Action 3.b

Institute procedures and other measures to provide compensatory actions to prevent, delay, or mitigate a loss of available NPSH margin under LOCA conditions. Such measures should be consistent with providing the design basis emergency system functions for core and containment cooling. Actions to assure sufficient core and containment cooling may include:

Operator realignment of existing systems to allow back flushing of clogged strainers

Response to Requested Action 3.b

The initial station review has identified that, due to the existing strainer location, piping configuration and system design, this action would create the potential for the Condensate Storage Tanks (CSTs) to be drained to the Torus or a release of Torus water to the CSTs. The CST inventory would be better used for injection. Additionally, the effectiveness of backwashing by this method is unknown. Therefore, no action will be taken at the present time. As a long term action (to be completed beyond the 90 day bulletin time frame), however, Site Engineering will investigate methods of backwashing (237-101-93-00203S1).

Requested Action 3.c

Institute procedures and other measures to provide compensatory actions to prevent, delay, or mitigate a loss of available NPSH margin under LOCA conditions. Such measures should be consistent with providing the design basis emergency system functions for core and containment cooling. Actions to assure sufficient core and containment cooling may include:

Operator realignment of existing systems to allow injection to the core from water sources other than the suppression pool

Response to Requested Action 3.c

DEOP 0500-03, Alternate Water Injection Systems, provides guidance for aligning the systems listed below for injection into the Reactor Pressure Vessel. With the exception of the ECCS Fill System being lined up to the Torus via the Core Spray System (denoted below by an asterisk), all of the alternate line-ups would function independently of clogged strainers.

Standby Coolant Supply (system water supply - service water system)

Standby Liquid Control (SBLC) Boron Tank - Power supplied by Emergency Busses

SBLC Test Tank - Power supplied by Emergency Busses
(system water supply - demineralized water)

ECCS Fill System - Supplied by Emergency Busses
(system water supply - *Torus via the Core Spray System; or the CSTs via the Condensate Transfer System)

Control Rod Drive Crosstie
(system water supply - other Unit's hotwell via the CRD System; or the CSTs)

Reactor Head Cooling
(system water supply - Condenser hotwell)

Service Unit Back Flush

Condensate Transfer
(system water supply - 2/3A CST)

Fire System

Low Pressure Coolant Injection Crosstie - Power supplied by Emergency Busses (system water supply - other Unit's Torus)

Condensate Storage Tanks

Requested Action 3.d

Institute procedures and other measures to provide compensatory actions to prevent, delay, or mitigate a loss of available NPSH margin under LOCA conditions. Such measures should be consistent with providing the design basis emergency system functions for core and containment cooling. Actions to assure sufficient core and containment cooling may include:

Intermittent operation of the containment sprays, when possible, to reduce the transport of debris to the strainers

Response to Requested Action 3.d

Reference 1 does not recommend a revision to the DEOPs. The DEOPs define the upper and lower bounds of when sprays should be operated. Operation outside of these boundaries could endanger the integrity of the containment. The procedure defines, by existence of the band, the conditions under which sprays are required to protect the containment and the operator will intermittently operate sprays within the context of that direction. The intermittent spraying, though not intended to limit transport of debris to the strainers, could delay clogging. If, however, strainer plugging were to occur and subsequently the sprays were lost, the DEOPs will still provide the direction that will protect the integrity of the containment by providing the criteria for containment venting.

Requested Action 3.e

Institute procedures and other measures to provide compensatory actions to prevent, delay, or mitigate a loss of available NPSH margin under LOCA conditions. Such measures should be consistent with providing the design basis emergency system functions for core and containment cooling. Actions to assure sufficient core and containment cooling may include:

Other plant-specific measures which assure availability of sufficient core and containment cooling to meet the design basis of the plant

Response to Requested Action 3.e

Administrative controls in place to provide assurance that loose debris is removed are Dresden Operating Surveillance (DOS) DOS 1600-10, Drywell Closeout Inspection Plan (Reference 3), and Dresden Technical Surveillance (DTS) 1600-11, Torus, Drywell and Drywell Head Coating Inspection (Reference 4). DOS 1600-10, which is performed at the time of drywell closure at the end of a refuel outage, includes a check for foreign material; DTS 1600-11 is performed every refuel outage to assure that any loose or delaminated surface coating is identified and removed to prevent blockage of the ECCS strainers. DTS 5750-01, Unit 2(3) Drywell Cooling System Line Up Checklist, verifies that there is no foreign material in the drywell cooler intakes.

Regarding strainer blockage, the recently installed hardened vent system allows for primary containment venting in the event of a loss of ECCS systems.

Additionally, Site Engineering will perform the actions listed below during the present Unit 3 Refuel Outage, to obtain information that could support future evaluations of primary containment in support of ECCS Suction Strainer evaluation (NTS #249-101-93-00201S1).

1. Perform walkdown of all insulation in the drywell

   Determine types and quantities of non-MRI insulation
   Evaluate material condition and make repairs

2. Gather information from the Torus Desludging Project

   Attain video and stills of the as-found condition of the strainers

   Attain samples of the sludge for analysis and identify any debris

   Quantify the amount of sludge removed from the torus

   Clean the ECCS strainers as required

3. Improve Drywell Cleanliness

   Increase working groups' awareness of drywell cleanliness throughout the outage to minimize the effort associated with final drywell closeout

   Prepare for and perform a more extensive drywell closeout cleanup

These actions have been (Torus desludging performed during D2R13) or will be performed for Unit 2 during the next Unit 2 Refuel Outage, D2R14, which is scheduled for March 1995 (NTS #237-101-93-00204S1).

Attachment 2

LaSalle Station Response

NRC Bulletin 93-02, Supplement 1

Summary of Station Actions:

1) Short-term awareness training (General Information Notice 94-21) on NRC Bulletin 93-02, Supplement 1 and the potential for ECCS suction strainer clogging will be provided to licensed operators, personnel qualified as Station Director, Operations Director, Technical Director, and Maintenance Director of the Generating Stations Emergency Plan (GSEP), and certain other engineering and maintenance support personnel by May 19, 1994.

2) A new LaSalle Operating Abnormal procedure (LOA-PC-06), Suppression Pool Suction Strainer Clogging, will be written. The procedure will provide potential symptoms of ECCS strainer clogging as well as actions that can be taken to reduce the clogging of the strainer. The procedure will be approved by May 19, 1994.

3) Licensed operators will receive awareness training on LOA-PC-06 by May 19, 1994.

4) Licensed operators will receive additional training on LOA-PC-06 during requalification module 4-94. This will be completed by July 29, 1994.

5) LaSalle simulator software personnel are investigating the feasibility of a remote function that will provide the simulator with the capability of simulating a clogged ECCS suction strainer. The remote function will be made available for simulator use by June 6, 1994 to enhance operator training at the simulator.

6) The Initial License Training program will be revised to include training on the suction strainer clogging phenomenon and actions related to LOA-PC-06. Analysis of the new task and related training materials are scheduled to be in place prior to the Abnormal/Emergency operations module of initial license training scheduled for April 1995.

LaSalle Station's specific responses to the items addressed in Bulletin 93-02 Supplement 1 are as follows:

Requested Action 1

Provide training and briefings to apprise operators and other appropriate emergency response personnel of the information contained herein and in the referenced information notices regarding the potential for suppression pool strainer clogging.

Response to Requested Action 1

Licensed operators have received training on the Perry event (INPO OE 5974) during requalification module 4-93. Summaries of NRC Bulletin 93-02, Supplement 1, and Information Notices 88-28, 90-07, 92-71, 93-34, and 93-34 Supplement 1, have been included in General Information Notice (GIN) 94-21, which was issued on March 9, 1994. The GIN distribution list includes licensed operators, personnel qualified as Station Director, Operations Director, Technical Director, and Maintenance Director of the Generating Stations Emergency Plan (GSEP), and certain other engineering and maintenance support personnel. This GIN will provide training on the potential for ECCS suction strainer clogging and the need to avoid the introduction of foreign materials to the suppression pool. This training will be completed by May 19, 1994.

Requested Action 2

Assure that the emergency operating procedures make the operator aware of possible indications of ECCS strainer clogging and provide guidance on mitigation

Response to Requested Action 2

No changes to the Emergency Operating Procedures (EOPs) are planned at LaSalle County Station. The Station's EOPs are based on the BWROG Emergency Procedure Guidelines (EPG) which are symptom based procedures addressing a full spectrum of initial plant conditions and possible transients.

Operators would be aware of degrading ECCS performance during an accident by recognizing adverse trends in parameters. During EOP execution, the operator is not necessarily expected to diagnose the specific cause of ECCS performance degradation, because the EOPs are symptom based. To provide the operators with consistent guidance should there be evidence of ECCS strainer clogging, a LaSalle Operating Abnormal procedure is being written (LOA-PC-06, Suppression Pool Suction Strainer Clogging). This procedure will formalize, and make plant specific, the direction given in BWROG-94029, "Operator Guidance for Potential Blockage of ECCS Pump Suction Strainers". The procedure is not an "emergency operating procedure". This LOA provides potential symptoms of ECCS suction strainer clogging including system performance parameters and control room alarms. The LOA may be entered any time the indications of strainer clogging are received. If strainer clogging is confirmed, mitigative steps are provided in the LOA. When this procedure is implemented, licensed operators will receive awareness training on the procedure. The procedure will be approved and operator training will be completed by May 19, 1994.

The licensed operators will receive additional training on this procedure and its application during requalification module 4-94. This will be completed by July 29, 1994.

A simulator work request has been written for the LaSalle Simulator. Simulator software personnel are investigating the feasibility of a remote function that will provide the simulator with the capability of simulating a clogged ECCS suction strainer. The remote function will be made available for simulator use by June 6, 1994 to enhance operator training at the simulator.

Monitoring ECCS parameters, combined with awareness and training on this LOA, shall enable operators to identify ECCS suction strainer clogging as a potential cause of the degradation. However, it is not the primary purpose of the EOPs to provide specific diagnosis instruction. The current EOPs have been developed to provide mitigation of events up to, and including, a total loss of all normal ECCS and containment cooling systems. If adequate core cooling and primary containment integrity are not assured through the use of the normal ECCS and containment cooling systems, EOPs direct utilizing systems which take a suction from outside of the primary containment.

Requested Action 3.a

Institute procedures and other measures to provide compensatory actions to prevent, delay, or mitigate a loss of available NPSH margin under LOCA conditions. Such measures should be consistent with providing the design basis emergency system functions for core and containment cooling. Actions to assure sufficient core and containment cooling may include:

Reduction of flow (consistent with delivering the required ECCS flow) through the strainers to reduce head loss and the time for debris deposition

Response to Requested Action 3.a

BWROG-94029 does not recommend revisions to the EOPs. System operation in accordance with the EOPs is based on plant parameter response. Since ranges or maximum acceptable values are stated, system flow reduction will be accomplished as plant parameters allow. The new procedure, LOA-PC-06, discussed above, will provide guidance for minimizing injection flows in affected ECCS systems in order to reduce the amount of debris deposition on the suction strainers.

Requested Action 3.b

Institute procedures and other measures to provide compensatory actions to prevent, delay, or mitigate a loss of available NPSH margin under LOCA conditions. Such measures should be consistent with providing the design basis emergency system functions for core and containment cooling. Actions to assure sufficient core and containment cooling may include:

Operator realignment of existing systems to allow back flushing of clogged strainers

Response to Requested Action 3.b

Various options have been reviewed to determine their potential use for backflushing. The current design at LaSalle does not permit backflushing of ECCS suction systems. Efforts are focused on maintaining drywell, suppression pool and suction strainer cleanliness such that a backwash system is not necessary. If strainer clogging does occur, the new LOA will recommend lower flow rates for pumps which appear to be affected, to mitigate NPSH degradation and delay loss of the affected injection source(s).

Requested Action 3.c

Institute procedures and other measures to provide compensatory actions to prevent, delay, or mitigate a loss of available NPSH margin under LOCA conditions. Such measures should be consistent with providing the design basis emergency system functions for core and containment cooling. Actions to assure sufficient core and containment cooling may include:

Operator realignment of existing systems to allow injection to the core from water sources other than the suppression pool

Response to Requested Action 3.c

Direction currently exists within the EOPs to accomplish water injection by a number of methods which do not utilize the suppression pool as a suction source and therefore would not be susceptible to the same common mode failure. The direction is provided in the EOPs for injection with systems in the Normal Injection System list and the Alternate Injection System list.

a. Normal injection systems with suction sources external to the suppression pool include:

   - Reactor Core Isolation Cooling (RCIC) with Condensate Storage Tank (CST) suction,
   - Control Rod Drive System with CST or Condenser Hotwell suction, and
   - Condensate/Feedwater System.

b. Alternate Injection Systems with suction sources external to the suppression pool include:

   - CST utilizing Residual Heat Removal (RHR) Low Pressure Coolant Injection (LPCI) injection lines,

- Fuel Pool Emergency Makeup utilizing RHR LPCI injection line,

- Fire Protection or Clean Condensate utilizing Standby Liquid Control piping, and

- Fire Protection System utilizing Feedwater piping.

Requested Action 3.d

Institute procedures and other measures to provide compensatory actions to prevent, delay, or mitigate a loss of available NPSH margin under LOCA conditions. Such measures should be consistent with providing the design basis emergency system functions for core and containment cooling. Actions to assure sufficient core and containment cooling may include:

> Intermittent operation of the containment sprays, when possible, to reduce the transport of debris to the strainers

Response to Requested Action 3.d

BWROG-93029 does not recommend revisions to the EOPs. The EOPs define the upper and lower bounds of when sprays should be operated. Operation outside of these boundaries could endanger the integrity of the containment. The procedure defines, by existence of the band, the conditions under which sprays are required to protect the containment. The operator will intermittently operate sprays within the context of that direction. The intermittent spraying, though not intended to limit transport of debris to the strainers, could delay clogging. If strainer plugging were to occur and subsequently the sprays were lost, the EOPs will still provide the direction that will protect the integrity of the containment by providing the criteria for containment venting.

Requested Action 3.e

Institute procedures and other measures to provide compensatory actions to prevent, delay, or mitigate a loss of available NPSH margin under LOCA conditions. Such measures should be consistent with providing the design basis emergency system functions for core and containment cooling. Actions to assure sufficient core and containment cooling may include:

> Other plant-specific measures which assure availability of sufficient core and containment cooling to meet the design basis of the plant

Response to Requested Action 3.e

The insulation used at LaSalle is a reflective metallic design, and is not a highly fibrous material such as mineral wool. If a LOCA were to occur, the Primary Containment design at LaSalle is such that the pathway for this material, as well as other debris, to enter the suppression pool is limited.

The suppression pools at LaSalle have stainless steel liners. This minimizes the amount of corrosion buildup in the suppression pool, thereby reducing the amount of material that has the potential for clogging the ECCS suction strainers. Additionally, early in each refuel outage, the suppression pool inventory is mixed and then cycled through the condensate polisher system.

In addition, LaSalle Station has taken positive actions to prevent sources of debris from getting into the suppression pool to prevent common mode failure of ECCS systems due to strainer clogging in accordance with the response to NRC Bulletin 93-02. This included the removal of containment ventilation polyester filters, removal of temporary thermocouple insulation pads, inventory control calculation tracking (S&L), good housekeeping practices and inspections prior to closing the drywell after outages.

LaSalle Station is considering enhancements to the drywell closeout procedure, a thorough cleaning of the drywell floor on Unit 1 during the current refuel outage, quantifying the amount of sludge on the Unit 1 suppression pool floor during the current refuel outage, and filtering the suppression pool inventory prior to Unit 1 startup. Determination of actions to be taken in these areas will be made by May 19, 1994.

Longer term considerations are being given to complete draining and cleaning of the Unit 1 and Unit 2 suppression pools in their next refuel outages.

Attachment 3

Quad Cities Station Response

NRC Bulletin 93-02, Supplement 1

Summary of Actions:

Short-term awareness training on the event was provided to Licensed Operators by March 31, 1994. Follow-up training will be provided to Licensed Operators to address the specifics recommended by the bulletin by May 13, 1994. Methods of backwashing the ECCS strainers will be investigated by Site Engineering.

Permanent insulation repair and replacement, enhancement of drywell closeout inspections, strainer cleanliness inspections, and Torus desludging are planned by Site Engineering for the current Unit 1 Refuel Outage to provide added assurance of ECCS operability. These actions will be performed for Unit 2 during the next Unit 2 Refuel Outage, Q2R13.

Quad Cities Nuclear Power Station's specific responses to the items addressed in Bulletin 93-02 Supplement 1 are as follows:

Requested Action 1

Provide training and briefings to apprise operators and other appropriate emergency response personnel of the information contained herein and in the referenced information notices regarding the potential for suppression pool strainer clogging.

Response to Requested Action 1

Short term awareness training was provided in Operator License Retraining session 94-2 which was completed March 31, 1994. This included an overview of the issue and was focused on information from Information Notices 92-71, 93-34, 93-34 Supplement 1, and 93-02 Supplement 1. The same information was also presented to the Initial Licensed Operator class on March 8, 1994.

The Equipment Attendants (i.e., "other emergency response personnel" referred to in the bulletin) have line-up of Alternate Injection systems incorporated into their continuing training program. No additional training, specific to this issue, is scheduled.

Follow-up training includes development of an additional lesson plan and simulator scenario for presentation during Licensed Operator Retraining. The lesson plan and simulator scenario will be presented in session 94-3 which will be completed by May 13, 1994. This training will reenforce the short term awareness training and focus on the information in Reference 1 which includes the following information:

- Ensure plant operators are familiar with the expected performance of ECCS systems when operated in the RPV injection mode and, where applicable, suppression pool cooling and containment spray modes. This includes recognition of nominal system parameters such as discharge flows and pressures, motor current indications, suction pressure, pump noise and vibration, minimum flow valve opening and closing flow rates, etc.

- Ensure operators are familiar with expected performance of Alternate Injection Subsystems and requirements for placing them in service. This includes recognition of maximum RPV injection pressures, expected RPV injection flow rates (including reduction to delay clogging), sources of injection, injection flowpaths, resource and time limitations impacting subsystem lineup, etc.

- Ensure plant operators are cognizant of the latitude provided in EOP decisions and actions related to the operation of RPV injection systems, Subsystems, and Alternate Injection Subsystems. This includes recognition of:

    - the option to augment RPV injection with Alternate Injection Subsystems while controlling level in the water level control section of the EOP, and

    - the need to enter the QGA developed from EPG Contingency #1, Alternate Level Control, when the determination is made that RPV water level cannot be maintained above the top of the active fuel (i.e., the transition to Contingency #1 need not be delayed until RPV water level reaches TAF).

The lesson plan for QGA 100, RPV Control, will be revised by June 30, 1994. This lesson plan is used for Licensed Operator Initial and Retraining. The revision will discuss indications of strainer clogging and the use of Alternate Injection systems to control RPV water level as directed by the QGAs.

Requested Action 2

Assure that the emergency operating procedures make the operator aware of possible indications of ECCS strainer clogging and provide guidance on mitigation.

Response to Requested Action 2

Operators would be aware of degrading ECCS performance during an accident by recognizing adverse trends in parameters which are monitored during EOP implementation to confirm that adequate core and containment cooling are being maintained. Detailed monitoring of ECCS parameters to identify the cause of these adverse trends, combined with the training described above, will enable operators to identify suction strainer clogging as a potential cause of the degradation. The only Control Room indications that would detect strainer clogging would be the flow and pressure indications for the respective ECCS systems: High Pressure Coolant Injection (HPCI), Reactor Core Isolation Cooling (RCIC), Low Pressure Coolant Injection (LPCI), and Core Spray. Pump motor current indications and pump suction pressure indications are local at the switchgear and pump rooms. There are no differential pressure indications for the strainers.

In accordance with Reference 1, specific guidance on pressure/flow indications of clogging and mitigating actions (such as flow reduction) will not be addressed by the QGAs. The QGAs are intended to be symptom based as opposed to event based. As such, the plant symptoms for entry are not component-based as in loss of pump suction pressure or loss of system flow, but in the case of clogged ECCS strainers, a low vessel level would be indicative of a clogging problem and would direct the Operator into the applicable QGA flowchart for selection of an alternate source of water.

Operators will be alerted to the specific indications and mitigating actions through training as discussed in the response to Requested Action 1.

Requested Action 3.a

Institute procedures and other measures to provide compensatory actions to prevent, delay, or mitigate a loss of available NPSH margin under LOCA conditions. Such measures should be consistent with providing the design basis emergency system functions for core and containment cooling. Actions to assure sufficient core and containment cooling may include:

Reduction of flow (consistent with delivering the required ECCS flow) through the strainers to reduce head loss and the time for debris deposition.

Response to Requested Action 3.a

System operation in accordance with the EOPs is based on plant parameter response. Since either bands or maximum acceptable values are stated, system flow reduction will be accomplished as plant parameters allow. Due to awareness of the issue, the operators, when procedurally allowed flexibility to select among various systems to accomplish a task, will select systems with a suction other than the ECCS suction header.

Requested Action 3.b

Institute procedures and other measures to provide compensatory actions to prevent, delay, or mitigate a loss of available NPSH margin under LOCA conditions. Such measures should be consistent with providing the design basis emergency system functions for core and containment cooling. Actions to assure sufficient core and containment cooling may include:

Operator realignment of existing systems to allow back flushing of clogged strainers.

Response to Requested Action 3.b

Various options have been reviewed to determine their potential use for backflushing. Each method contains some element that makes it necessary to further evaluate. This evaluation will be performed by Site Engineering as a long-term (to be completed beyond the 90 day bulletin time frame) solution to this issue. Examples of issues that require further evaluation include:

*potential for draining the CCST to the torus. Particularly significant when considering alternate injection sources that rely on the CCST for a suction.

*manual valve operation in areas that are potentially high radiation areas during accident conditions.

*ability to effectively backflush 4 suction pipes that are connected to a common suction header.

Requested Action 3.c

Institute procedures and other measures to provide compensatory actions to prevent, delay, or mitigate a loss of available NPSH margin under LOCA conditions. Such measures should be consistent with providing the design basis emergency system functions for core and containment cooling. Actions to assure sufficient core and containment cooling may include:

Operator realignment of existing systems to allow injection to the core from water sources other than the suppression pool.

Response to Requested Action 3.c

Detail QGA-D6, Alternate Injection Systems, provides guidance for aligning the systems listed below for injection into the Reactor Pressure Vessel. With the exception of the ECCS Fill System being lined up to the Torus via the Core Spray System and the HPCI Cooling Water Pump being lined up to the Torus via the HPCI suction piping (denoted below by an asterisk), all of the alternate line-ups would function independently of clogged strainers.

Safe Shutdown Makeup System
(system water supply - Mississippi River through Fire System; or CCST when used as an Injection system)

Standby Coolant Supply
(system water supply - service water system)

Standby Liquid Control (SBLC) Boron Tank

SBLC Test Tank
(system water supply - demineralized water from the Well Water Tanks)

ECCS Fill System
(system water supply - *Torus via the Core Spray System; or the CSTs via the Condensate Transfer System)

Control Rod Drive Crosstie
(system water supply - other Unit's hotwell via the CRD System; or the CSTs)

Fire System
(system water supply - Mississippi River via Safe Shutdown Makeup system piping or RHR system piping)

Condensate Crosstie
(system water supply - other Unit's hotwell)

Requested Action 3.d

Institute procedures and other measures to provide compensatory actions to prevent, delay, or mitigate a loss of available NPSH margin under LOCA conditions. Such measures should be consistent with providing the design basis emergency system functions for core and containment cooling. Actions to assure sufficient core and containment cooling may include:

> Intermittent operation of the containment sprays, when possible, to reduce the transport of debris to the strainers.

Response to Requested Action 3.d

The EOPs define the upper and lower bounds of when sprays should be operated. The procedure defines, by existence of the band, the conditions under which sprays are required to protect the containment and the operator will intermittently operate sprays within the context of that direction. This is not specifically intermittent sprays to limit transport of debris to the strainers. If strainer plugging were to occur and subsequently the sprays were lost, the EOPs will still provide the direction that will protect the integrity of the containment by providing the criteria for containment venting.

Requested Action 3.e

Institute procedures and other measures to provide compensatory actions to prevent, delay, or mitigate a loss of available NPSH margin under LOCA conditions. Such measures should be consistent with providing the design basis emergency system functions for core and containment cooling. Actions to assure sufficient core and containment cooling may include:

> Other plant-specific measures which assure availability of sufficient core and containment cooling to meet the design basis of the plant.

Response to Requested Action 3.e

Administrative controls are in place to provide assurance that loose debris is removed from the Drywell and Torus during operating conditions. The routine Drywell closeout inspections which is performed at the time of Drywell closure at the end of a refuel outage, includes a check for foreign material; QCTS 320-1, Suppression Chamber/Drywell Interior Inspection is performed every refuel outage to assure that any loose or delaminated surface coating is identified and removed to prevent blockage of the ECCS strainers. QCTS 320-4, Unit 1(2) Drywell Cooling System Line Up Checklist, verifies that there is no foreign material in the drywell cooler intakes.

Regarding strainer blockage, the recently installed hardened vent system allows for primary containment venting in the event of a loss of ECCS systems.

Additionally, Site Engineering will perform the actions listed below during the present Unit 1 Refuel Outage, to obtain information that could support future evaluations of primary containment in support of ECCS Suction Strainer evaluation.

1. Perform walkdown of all insulation in the drywell.

   Determine types and quantities of non-MRI insulation.
   Evaluate material condition and make repairs.

2. Gather information.

   Attain video and stills of the as-found condition of the strainers.

   Attain samples of the sludge for analysis and identify any debris.

   Quantify the amount of sludge removed from the torus.

   Clean the ECCS strainers as required.

3. Improve Drywell Cleanliness.

   Increase working groups' awareness of drywell cleanliness throughout the outage to minimize the effort associated with final drywell closeout.

   Prepare for and perform a more extensive drywell closeout cleanup.

These actions will be performed for Unit 2 during Torus Recoat during the next Unit 2 Refuel Outage, Q2R13, which is scheduled for March 1995.