Consumers Power

POWERING MICHIGAN'S PROGRESS

Big Rock Point Nuclear Plant, 10269 US-31 North, Charlevoix, MI 49720

Patrick M Donnelly
Plant Manager

April 15, 1994

Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

DOCKET 50-155 - LICENSE DPR-6 - BIG ROCK POINT PLANT - RESPONSE TO NRC BULLETIN 93-02 SUPPLEMENT 1: DEBRIS PLUGGING OF EMERGENCY CORE COOLING SUCTION STRAINERS.

By letter dated May 11, 1993, the NRC transmitted to Consumers Power Company (CPCo) NRC Bulletin 93-02: DEBRIS PLUGGING OF EMERGENCY CORE COOLING SUCTION STRAINERS. The bulletin notified licensees of a previously unrecognized contributor to the potential loss of net positive suction head (NPSH) for the Emergency Core Cooling Systems (ECCS) for Light Water Reactors, during the recirculation phase of a Loss-of-Coolant Accident (LOCA). A response was required and submitted to the NRC by CPCo/BRP in a letter dated June 4, 1994.

By a letter dated February 18, 1994, the NRC transmitted to CPCo Supplement 1 to the original NRCB 93-02. The supplement was issued:

(1) to inform the Action and Information addressees about the vulnerability of emergency core cooling system suction (ECCS) strainers in boiling-water reactors (BWRs) and containment sumps in pressurized-water reactors (PWRs) to clogging during the recirculation phase of a loss-of-coolant accident (LOCA).

(2) to request that Action addressees take the appropriate actions to ensure reliability of the ECCS in view of the information discussed in the bulletin supplement regarding the vulnerability of the ECCS strainers to clogging.

(3) to require that Action addressees report to the NRC whether and to what extent the requested actions will be taken and to notify the NRC when actions associated with this bulletin supplement are complete.

IE11

The NRC has requested that pending final resolution of this issue, Action addressees take the interim actions discussed in the supplement to enhance the capability to prevent or mitigate loss of the ECCS following a LOCA due to strainer clogging.

A written report (attached) is to be completed within 60 days of the date of the bulletin supplement, and submitted under oath or affirmation under the provisions of Section 182a, Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f).

By the transmission of this letter, CPCo considers that the appropriate actions have been taken with respect to this matter.

Patrick M Donnelly
Plant Manager

CC: Administrator, Region III, USNRC
NRC Resident Inspector - Big Rock Point

ATTACHMENT

CONSUMERS POWER COMPANY

Big Rock Point Plant
Docket 50-155 License DPR-6

NRC Bulletin 93-02; Supplement 1

At the request of the Commission and pursuant to the Atomic Energy Act of 1954 and the Energy Reorganization Act of 1974, as amended, and the Commission's Rules and Regulations thereunder, Consumers Power Company submits a response to NRC Bulletin 93-02, Supplement 1; dated February 18, 1994, entitled "DEBRIS PLUGGING OF EMERGENCY CORE COOLING SUCTION STRAINERS". Consumers Power Company's response is dated April 15, 1994.

The statements made above, to the best of my knowledge, information and belief, are truthful and complete.

CONSUMERS POWER COMPANY

By: Robert A. Fenech

Robert A Fenech, Vice President
Nuclear Operations Department

Sworn and subscribed before me this 15th day of April, 1994.

LeAnn Morse

LeAnn Morse, Notary Public
Berrien County, Michigan
(Acting in Van Buren County)

My commission expires February 4, 1997.

(SEAL)

ATTACHMENT

CONSUMERS POWER COMPANY
BIG ROCK POINT PLANT
DOCKET 50-155

RESPONSE TO NRC BULLETIN 93-02; SUPPLEMENT 1
DEBRIS PLUGGING OF EMERGENCY CORE COOLING SUCTION STRAINERS

Submitted April 15, 1994

5 Pages

ATTACHMENT
BULLETIN 93-02, SUPPLEMENT 1

REPORTING REQUIREMENTS

Consumers Power Company, Big Rock Point Plant, is required to submit the following written reports:

(1) Within 60 days of the date of this bulletin supplement, a report indicating whether or not the addressee intends to comply with the actions requested below, description of planned actions, and the schedule for completing them. If an addressee chooses not to take the requested actions, the report shall contain a description of a proposed alternative course of action, the schedule for completing this alternative course of action, and a justification for any deviations from the requested actions.

(2) Within 30 days of completion of the requested actions, a report confirming completion.

Discussion

The NRC considers the interim actions below to be adequate based on the low probability of the initiating event.

Actions Requested

The NRC requests that pending final resolution of this issue, Action addressees take the following interim actions to enhance the capability to prevent or mitigate loss of ECCS (Emergency Core Cooling System) following a LOCA (Loss of Cooling Accident) due to strainer clogging.

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.

Plant Specifics-System Description

The Big Rock Point Containment is a spherical steel vessel, 130 feet in diameter that extends 27 feet below grade level and 103 feet above grade. The plant is designed so that operating personnel may enter the sphere and remain inside as necessary during normal operation, shutdown and refueling. The approximate free volume in the sphere is 940,000 cubic feet, and lacks a "suppression pool" or "torus" as is normal in most other Boiling Water Reactor (BWR) designs. Primary Coolant System (PCS) level control, depending on the transient, is primarily controlled by the Condensate-Feedwater Systems, the Control Rod Drive System, and/or Core Spray System, whose source of water comes from the Fire Protection System, which is fed directly from Lake Michigan.

The Post Incident System (PIS) incorporates the Core Spray Recirculation System or Low Pressure Recycle. The Core Spray Recirculation System is provided to prevent excessive water buildup in the containment sphere, and to provide for long-term, post accident cooling. The system consists of two full

capacity pumps (400 gpm each), piping, and a heat exchanger. The pumps take suction from strainers located in the lower levels of containment (see Figure 1) and discharge through the core spray heat exchanger to the core and containment spray headers. The (5) strainers are located in the following areas:

(1) - Control Rod Drive Pump Room
(1) - Immediately below the reactor vessel (Control Rod Drive Room)
(2) - Accumulator Room
(1) - Recirculation Pump Room

NOTE: Only three of the five strainer inlets are required to maintain adequate NPSH on the core spray pump(s) for full flow.

The suction strainers drain into a common header through two locked-open 6" valves into the suction side of the core spray pumps through an 8" locked-open valve. To protect the strainers from gross debris blockage during post-LOCA long-term recycle, four screen doors have been installed in areas that access the strainers:

- Spent Fuel Pool Heat Exchanger Room
- East Upper Accumulator Room
- West Upper Accumulator Room
- West Lower Accumulator Room

Core spray recirculation, or Low Pressure Recycle using the PIS, is the preferred method of safety-related equipment protection and long term core cooling following a LOCA; and is required by emergency operating procedures to be manually established when: (1) the containment water level has reached the 587 foot mark, and (2) the primary coolant system pressure is less than 65 psig (see Figure 2). The 587-foot level will be achieved between 6 to 24 hours operation of one core spray and one containment spray system.

Licensee Response

Consumers Power Company is complying with the NRC requested action. IN 93-34, Potential for Loss of Emergency Cooling Function Due to a Combination of Operational and Post-LOCA Debris in Containment, is included in the current (Cycle 2) Industrial Experience and Modification Training program that started March 2, 1994, and ended March 23, 1994. Cycle 3, which will start on March 29, 1994, and end April 29, 1994, will include the information contained within NRCB 93-02, Supplement 1, and in the referenced information notices regarding the potential for suppression pool strainer clogging.

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

Licensee Response

The Big Rock Point Emergency Operating Procedures (EOPs) address the operation of low pressure recycle; and contain compensatory actions if low pressure

recycle can not be established (i.e., clogged strainers). No additional action should be required.

Reference: Containment Control - EOP-2

- (CN/L-5): Asks if Low Pressure Recycle is in service. If the answer is yes, core cooling is maintained in (CN/L-6) by Standard Operating Procedure (SOP) 8, PIS. If the answer is no, this could be indicative of clogged strainers. The EOPs direct the operators to line up the Core Spray trains.

- (CN/L-5.1): If both core spray trains are in service, the operator is directed to isolate the backup core spray train. This action will reduce the amount of extra water being added to containment, therefore slowing the water level rise in containment.

- (CN/L-5.4): If the low pressure recycle system is never engaged, the EOPs direct the operators to terminate all external sources of injection at the 630 foot elevation mark in containment. Termination is required due to the critical internal stresses placed on the containment structure by this volume of water. (Allowing the water level to rise to the 630 foot elevation enhances, but does not guarantee adequate core cooling - as defined below - by submerging the reactor vessel and connected piping).

3) 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 extend the time for debris deposition.*

Licensee Response

As discussed previously, the system consists of two full capacity pumps (400 gpm each). Only one pump is operated when the system is placed in service. This is a low pressure system versus a high pressure injection system, therefore debris deposition will occur at a slower rate than a high pressure, high flow system found in most newer Boiling Water Reactor designs.

Adequate core cooling for Big Rock Point is defined as core spray flow greater than 300 gpm, or reactor water level being maintained at 2 foot 9 inches above the fuel. To reduce flow (the margin of safety) in this case would not be consistent with delivering the required ECCS flow.

> *Operator realignment of existing systems to allow backflushing of clogged strainers*

ATTACHMENT
BULLETIN 93-02, SUPPLEMENT 1

Licensee Response

The existing systems were not designed to accomodate backflushing of clogged strainers; and cannot be realigned to do so. However, in response to the original NRC Bulletin, the Big Rock Point Engineering staff is working with the BWR Owners group to solve this concern by considering system modifications.

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

Licensee Response

To reiterate, Big Rock Points' design does not incorporate a suppression pool. Sources of water for core spray injection are well defined by plant operating and emergency operating procedures, and realignment of existing systems would not be required. These sources are:

1) Condensate-Feedwater Systems (designed to be aligned to the Fire Protection System through the condenser hotwell, if necessary).

2) Control Rod Drive System,

3) Core Spray System, whose source of water comes from the

4) Fire Protection System, which is supplied directly from Lake Michigan through underground piping and/or a dedicated fire hose, if passive piping failures are experienced. The local fire department can also send pumper trucks to supply water to the fire protection system.

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

Licensee Response

To control pressure in the containment during transients, The EOPs direct the operators to operate only one of the two containment spray systems at any given time (CN/P-3). Intermittent operation is also required to regulate containment pressure within acceptable limits (CN/P-5). The additional benefit will be the reduction of the transport of debris to the strainers.

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

Licensee Response

Procedures

The following procedures have been revised to address the issue of materials that have the potential for causing strainer blockage.

ATTACHMENT
BULLETIN 93-02, SUPPLEMENT 1

I. Administrative Procedure 1.8, Plant Housekeeping and Cleanliness:

"The containment area shall be kept free of unnecessary debris or supplies, especially those which could wash into the containment sump and hinder its operation. In addition, the four suction strainer screen doors shall remain closed when unattended during power operation. Combustibles shall be kept to the smallest amount necessary. Special care shall be taken during outages when ongoing work could create larger than normal accumulations of trash, work tools, supplies and anticontamination clothing".

II. Plant startup procedure O-TGS-1; Master Checklist (sign-offs required):

If opened during shutdown, close the following screen doors:

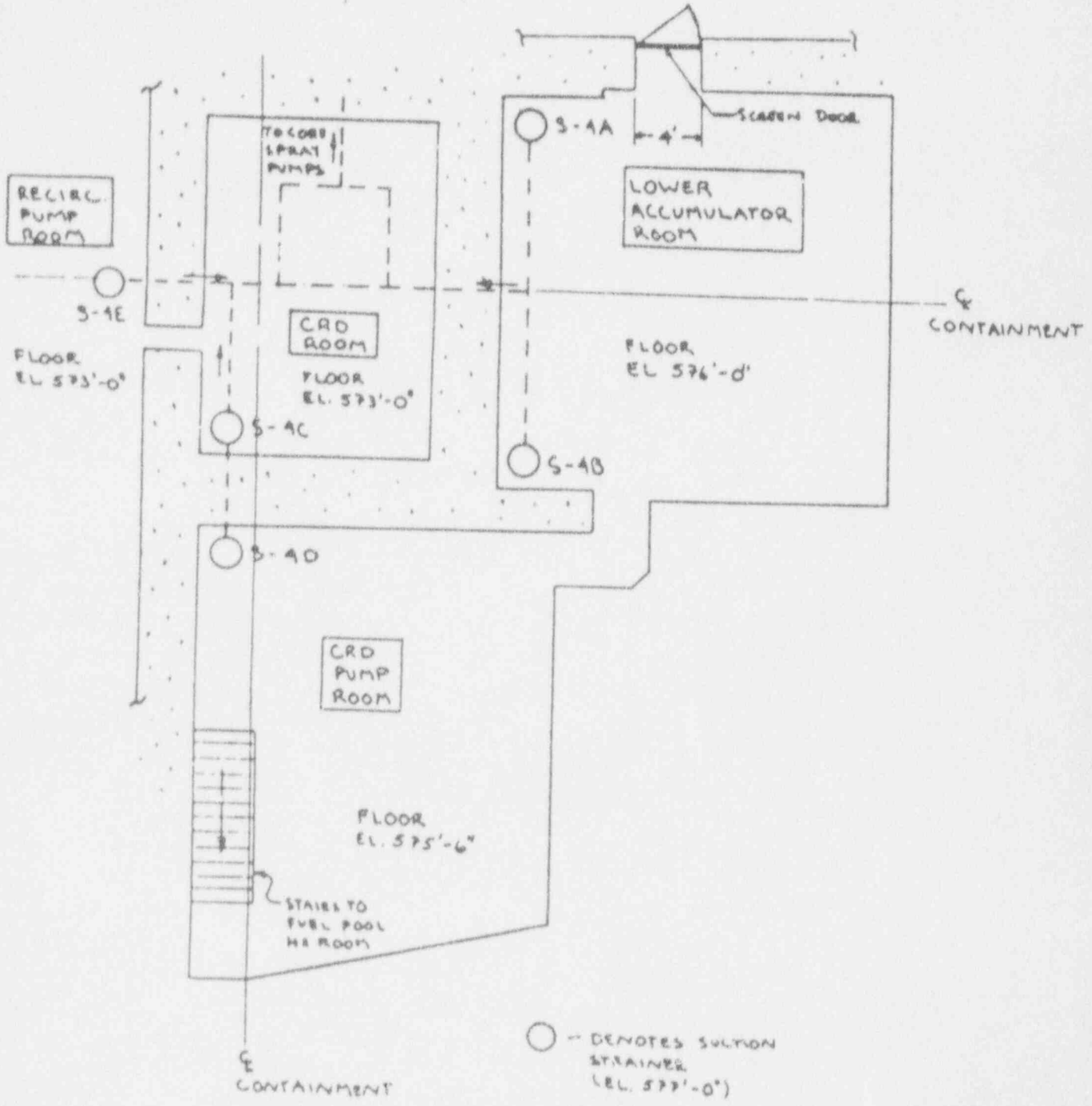
a. Spent Fuel Pool HX. Room
b. East CRD Upper Accum. Room
c. West CRD Upper Accum. Room
d. West CRD Lower Accum. Room

Ensure all loose debris (i.e., Anti-contamination clothing. plastic bags, etc.) are removed from the following areas:

a. CRD Accum. Room
b. CRD Pump Room
c. Shutdown HX. Room
d. Spent Fuel Pool HX Room

Plant specific measures

Since the Big Rock Point containment is accessible during power operation, tours performed by plant management are used to identify materials that have the potential for strainer blockage so that they may be addressed accordingly. Signs have also been posted at key entrances to containment that warn against taking and leaving loose materials inside containment.

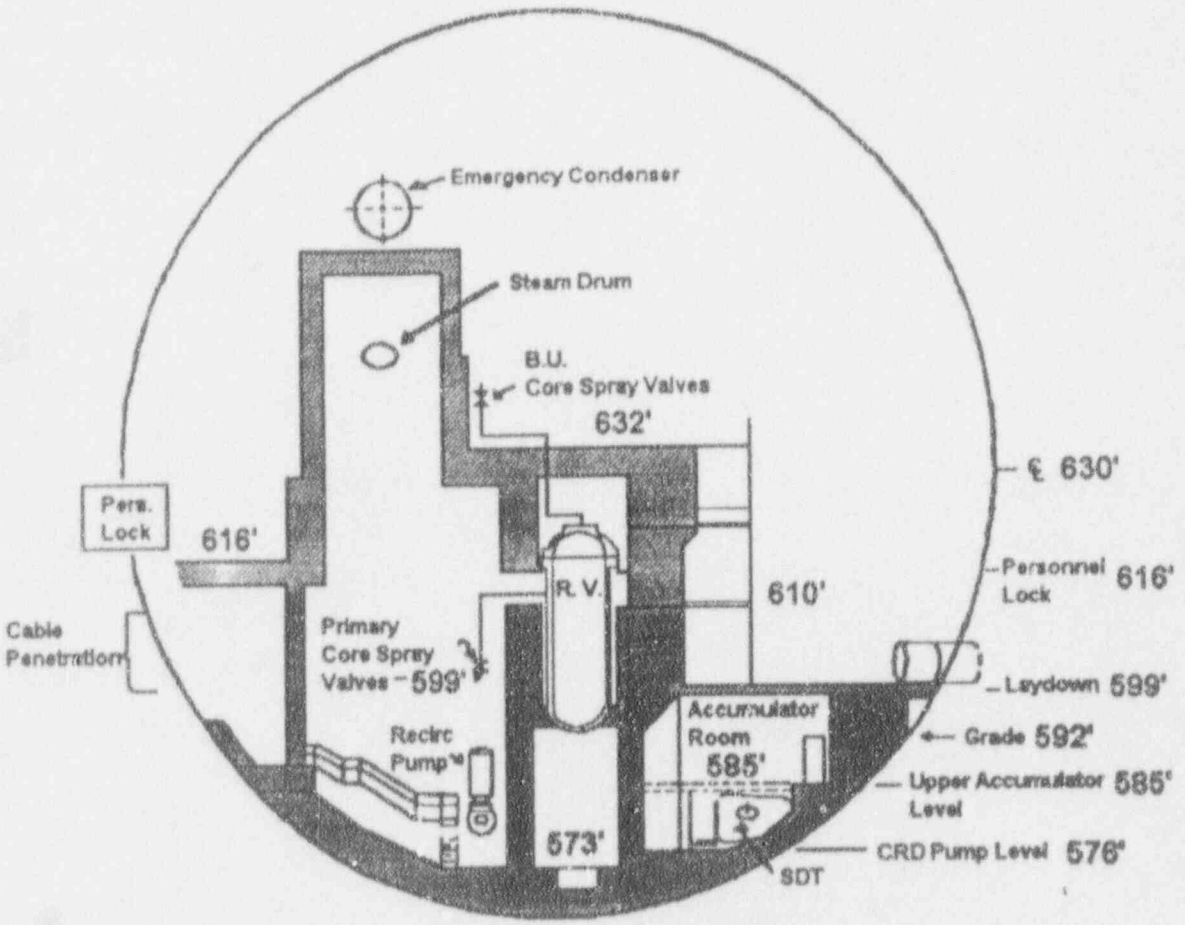


PLAN SHOWING
FLOOR EL. 573'-0"

Figure 1

VOLUME 3 OPERATING PROCEDURES
EMERGENCY OPERATING PROCEDURES
EIP-6 APPENDIX 6 - EQUIPMENT ELEVATIONS

SKETCH SHOWING EQUIPMENT ELEVATIONS



ELEVATION VOLUME - GALLONS

574'	7,780
577'	48,200
587'	260,259
590'	364,477
600.5'	1.12×10^6
630'	4.0×10^6

Figure 2