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June 7, 1993

U.S. Nuclear Regulatory Commission
Mail Station P1-37
Washington, D.C. 20555

Attention: Document Control Desk

Subject: Grand Gulf Nuclear Station
Docket No. 50-416
License No. NPF-29
Response to NRC Bulletin 93-02

GNRO-93/00070

Gentlemen:

This submittal provides the Grand Gulf Nuclear Station (GGNS) response to NRC Bulletin (NRCB) 93-02, "Debris Plugging of Emergency Core Cooling Suction Strainers". The Bulletin requested licensees to identify fibrous air filters or other temporary sources of fibrous material, not designed to withstand a LOCA, which are installed or stored in containment and to take prompt action to remove this material.

A review of drywell and containment ventilation design in conjunction with interviews, containment walkdowns, and a record review confirmed that fibrous material is not used in the ventilation systems during power operation in a manner which could be dislodged during a LOCA. A brief summary of our actions in this regard is included as Attachment 1. Additionally, GGNS does not routinely use fibrous temporary filters on drywell and containment ventilation systems during outages. In the event that fibrous material was used for temporary filtering the material was removed as verified by the GGNS drywell closeout procedure. This procedure includes a visual check to ensure the drywell ventilation suction screens are clear as well as a general cleanliness inspection. Also a suppression pool inspection and cleaning is performed at the end of each refueling outage which provides added assurance that significant debris is not in the suppression pool.

The drywell closeout documentation, the suppression pool cleaning and inspection, and an historical review of ECCS suction pressure test results provide assurance that fibrous material is not an immediate safety concern. Based on these documents and reviews, GGNS has reasonable assurance that non-design fibrous material or other obvious hazards to ECCS suction strainer performance are not present in the GGNS drywell or containment, and that the actions requested in NRC Bulletin 93-02 have been satisfied.

Nonetheless, GGNS has formed a task force to look beyond the concerns stated in NRCB 93-02. The purpose of the task force is to analyze the industry information obtained from the Perry event, scrutinize our present controls and processes, and apply any pertinent insights obtained.

This information is being submitted under oath and affirmation (Attachment 2) in accordance with 10CFR50.54(f). Please contact C. A. Bottemiller at 601-437-6299 should you have any questions or require additional information regarding this matter.

Yours truly,

CRH/CAB/be
attachments: 1. Actions Concerning NRC Bulletin 93-02
2. Affirmation per 10CFR50.30
cc: Mr. R. H. Bernhard (w/a)
Mr. H. W. Keiser (w/a)
Mr. R. B. McGehee (w/a)
Mr. N. S. Reynolds (w/a)
Mr. H. L. Thomas (w/o)

Mr. Stewart D. Ebneter (w/a)
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101 Marietta St., N.W., Suite 2900
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ACTIONS CONCERNING NRC BULLETIN 93-02

All dates are approximate.

February 1993	Assessment started on GGNS concerning Barseback event.
April 14 - 15	Compiled information on ECCS suction pressure history and suppression pool chemistry and FAXed to NRC.
April 15	Based on preliminary information from Perry, the GGNS containment was walked down by Safety Assessment personnel. The focus was general cleanliness as well as material which could impede ECCS operation. No unauthorized material was found of a significant nature.
April 16	Conference call between Perry, River Bend, Clinton, Region II, Region III, NRR, and GGNS.
April 30	NS&RA issued report on Barseback event. The report recommended the addition of suppression pool inspection to operator rounds and the reinforcement in contractor training of the need to report items dropped or seen in the suppression pool.
May 5	Conference call between Perry, River Bend, Clinton, and GGNS.
May 7	GGNS person visited Perry site to observe their activities and material conditions.
April 15 - May 10	Compiled historical data on ECCS suction pressures, strainer cleaning and pool cleaning since 1988. Reviewed video tape of suppression pool ECCS strainer inspection conducted on 05-07-93, results satisfactory.
May 11	Created task force on suppression pool/ECCS strainer issues.
May 11 - 13	Viewed the replacement parts for installed ventilation systems. All filters found to be of the rigid metal cartridge type.

ACTIONS CONCERNING NRC BULLETIN 93-02
(Continued)

May 13	Verified through interviews and drywell closeout documentation that no filter material was in place over the drywell cooler suction at the end of RFO5.
May 27, 1993	Video taped/observed suppression pool general area to verify no debris. Some minor amount of material found.
May 28, 1993	Accessible debris removed from pool.

Tentatively Scheduled Activities

Forced outage or RFO6	Inspect drywell and annulus area.
By RFO6	Implement task force recommendations.

BEFORE THE

UNITED STATES NUCLEAR REGULATORY COMMISSION

LICENSE NO. NPF-29

DOCKET NO. 50-416

IN THE MATTER OF

MISSISSIPPI POWER & LIGHT COMPANY
and
SYSTEM ENERGY RESOURCES, INC.
and
SOUTH MISSISSIPPI ELECTRIC POWER ASSOCIATION
and
ENTERGY OPERATIONS, INC.

AFFIRMATION

I, C. R. Hutchinson, being duly sworn, state that I am Vice President, Operations GGNS of Entergy Operations, Inc.; that on behalf of Entergy Operations, Inc., System Energy Resources, Inc., and South Mississippi Electric Power Association I am authorized by Entergy Operations, Inc. to sign and file with the Nuclear Regulatory Commission, this response to NRC Bulletin 93-02 for the Grand Gulf Nuclear Station; that I signed this response as Vice President, Operations GGNS of Entergy Operations, Inc.; and that the statements made and the matters set forth therein are true and correct to the best of my knowledge, information and belief.

C. R. Hutchinson

STATE OF MISSISSIPPI
COUNTY OF CLAIBORNE

SUBSCRIBED AND SWORN TO before me, a Notary Public, in and for the County and State above named, this 4th day of June, 1993.

(SEAL)

Elizabeth L. Laug
Notary Public

My commission expires:

December 28, 1995

NUCLEAR LICENSING NRC SUBMITTAL INFORMATION VERIFICATION/CERTIFICATION FORM

Response to NRCB 93-02, Debris Plugging of Emergency Core Cooling Suction Strainers

Information Being Certified: Cover Letter

Verification

Verification Method: (X) Objective Evidence (X) Peer Review (Cover Letter - part)

COVER LETTER

Section/Location of Information Being Verified	Verifying Document ID
Paragraph 1, Sentence 1 & 2	NRCB 93-02
Paragraph 2, Sentence 1	IN 93-34 & S1 Draft Document Review Summary
Paragraph 2, Sentence 2	Action Concerning NRC Bulletin 93-02
Paragraph 2, Sentence 3	Interviews
Paragraph 2, Sentence 4 & 5	03-1-01-1, Data Sheet III
Paragraph 2, Sentence 6	SIMS, Task Card 19151, 07-S-14-375
Paragraph 3, Sentence 1	IN 93-34 & S1 Draft Document Review Summary
Paragraph 3, Sentence 2	Peer Review
Paragraph 4, Sentence 1 & 2	GIN 93-02248

Originator: George W. Yee 6-3-93
Name/Date

Peer Review Performed by: [signature] 6/3/93
Name/Date

Supervisor: [signature] 6-4-93
Name/Date

Certification

In light of the information provided above, the contents of the listed GNRO as defined by the above comments section are hereby certified to be complete, true and accurate.

[signature] 6/4/93
Responsible Manager/Date

DOCUMENT REVIEW SUMMARY SHEET

Document Number: IEN 93-34 and IEN 93-34 Supplement 1 Inv Engr: GHL

Subject: Potential for Loss of Emergency Cooling Function Due to a Combination of Operational and Post-LOCA Debris in Containment

Date Due: 5/30/93 Priority: 3

References: NRC Bulletin 93-02; IEN 92-71; NS&RA Report OA 93-09

Applicable to GGNS?	Yes	X	No	
Transmitted to Training?	Yes		No	X
NPRDS Review Performed?	Yes		No	X
GGNS/Industry OE Review?	Yes	X	No	
RPTS Update Required?	Yes		No	X

SUMMARY OF ACTIONS TAKEN:

NRC Information Notice 93-34 and 93-34 Supplement 1 describe events that occurred at Perry Nuclear Plant concerning clogging of ECCS suction strainers in the suppression pool due to grit, grime and fibrous materials. IEN 93-34 addresses the assurance of maintaining an adequate NPSH to the ECCS pumps throughout the long-term cooling phase. It specifically addresses the threat to NPSH by the clogging of the strainers from excessive deposits of foreign material on the surfaces of the strainers.

Supplement 1 further amplifies this concern and discusses the introduction of fibrous material into the suppression pool. The fibrous material becomes attached to the suction strainer and acts as a filter screen that collects the finer materials in the pool causing a degradation in the ECCS suction pressure.

An investigation into the ECCS suction strainer clogging issue ensued following the Perry event at GGNS. The following pages contain the data obtained throughout the investigation.

<u>History of Perry Events</u>

In May 1992, the Perry Nuclear Plant experienced high dp on the RHR A&B suction strainers located in the suppression pool. The cause of the increased differential pressure was the accumulation of primarily dirt and grime. The dp would increase from 1 psid to approximately 6 psid during a run of the RHR pump. When the pump was secured and restarted the dp would return

to normal and then increase as the RHR pump run length increased. This indicated that material was accumulating during a pump run then falling off when the pump was secured. A chemical analysis showed the material on the strainer consisted of fiberglass strands and dirt with the majority of the material consisting of dirt. Additionally, inspections with an underwater camera showed that the strainers were partially collapsed and that the strainer had a buildup of dirt and grime. Perry cleaned the suppression pool and replaced the strainers.

In March 1993, Perry had a loss of service water which caused a scram. Several SRV were manually lifted to control pressure and the RHR "B" system was placed in suppression pool cooling. A low suction pressure was indicated on the suction of the RHR pump after a short period of time. An investigation showed that the strainer was fouled with a fibrous material similar to the filters used on their drywell coolers.

Discussions were held with Perry on 5/4/93 concerning the impending issuance of an NRC Emergency Bulletin on fibrous materials in the suppression pool. The debris found on the "B" RHR strainer in March 1993 was analyzed by GE and consisted of a fibrous type material that matched the "roughing filters" used on the Perry drywell coolers. A diver took a putty knife and "peeled" the material off of the strainer. It came off as a sheet. The Perry drywell cooler filters are 2' x 2' x 1" and are held in place between two pieces of 6" wire mesh.

Further discussions, conference call with Perry, River Bend, Clinton and GGNS, indicated that the most probable cause of the filter material entering the suppression pool was due to it being dropped into the suppression pool. Perry changes the filters every outage and they were changed during RFO3 and again during the January 1993 mid-cycle outage. An additional filter of the same type was found inside the weir wall during the subsequent cleaning of the suppression pool. I specifically asked Perry if, in their opinion, the fibrous material could have been blown into the pool due to normal ventilation flow. They stated that it was very improbable that could have happened. They additionally stated that the chemist in charge of the diver said that the material taken from the "B" RHR strainer appeared to be one large piece. The remaining strainers were inspected and no evidence of fibrous material was found on them.

Perry has plans for implementing a material accountability program for the containment and drywell with special emphasis on fibrous materials. They have additionally increased the physical size of their ECCS suction strainers from a 20 sq. ft. surface area to 42.2 sq. ft. and have enlarged the holes from .07 to .095.

GGNS Investigation

The original Perry suction strainers consist of one conical shaped strainer per loop. Each strainer is 40" in diameter and 48" long. The strainer contains an internal cruciform shaped stiffener plate and is covered with 18 gauge stainless steel wire screen. The hole size of the wire screen is .07". The strainers also have several 3/8 inch external protection rings around the circumference of the strainer.

In contrast, the GGNS ECCS suction strainers consist of two per loop and are connected in a "T" arrangement. The strainers are located approximately 8 1/2 feet from the floor of the suppression pool. Strainer fabrication consists of a No. 8 mesh stainless steel wire cloth screen welded over a

steel cone perforated with 5/8-inch holes. The square holes in the screen are designed to prevent the passage of particles larger than 0.10 inch. To ensure that system function is maintained, the strainers are oversized to minimize pressure drop and flow velocities as the strainer removes suspended debris and becomes partially clogged. Each strainer provides 450 square inches of open flow area, or 900 square inches total for each 24-inch suction pipe. The strainer's flow area is 219 percent of the suction pipe flow area. Actual flow test data, at maximum system flow, indicates a pressure drop across the strainer of 0.22 psi when clean and 0.35 psi when 50 percent clogged. Flow velocity through clean strainers at a maximum design flow of 9100 gpm is 3.2 feet per second.

The NRC, Paul O'Connor, contacted GGNS to determine the types of problems that we had experienced in this same area. Mr. O'Connor indicated that a significant emphasis was being placed on this issue due to the potential concern for a common mode failure of the ECCS suction strainers.

An investigation determined that two separate events involving clogging of the suction strainers had occurred. A Notice of Violation resulted because SERI failed to adequately control the repetitive task deferral process for safety significant tasks. The following information is taken from the GGNS response to the NRC on NOTICE OF VIOLATION 89-17-02.

> On March 18, 1988, during performance of Surveillance 06-OP-1E12-Q-0023, LPCI/RHR Subsystem A Quarterly Functional test, the RHR A pump before-start suction pressure failed below the Inservice Inspection (ISI) acceptance criteria of 2.5 psig. Material Nonconformance Report (MNCR) #0078-88 was initiated to document and resolve this non-conformance.
>
> It was determined during troubleshooting activities that the low suction pressure was caused by clogging of the suction strainer which takes suction from the Suppression Pool. As a result, the strainers for RHR A, B, C, LPCS and HPCS were cleaned. Subsequent testing of the RHR A, B, C, LPCS and HPCS revealed suction pressures well above the minimum requirements for operability. The surveillance (06-OP-1E12-Q-0023) was performed with satisfactory results.
>
> On June 15, 1988 the Plant Safety Review Committee (PSRC) met to discuss specific radiological and personnel safety concerns associated with the Suppression Pool cleaning operation. During this meeting the committee stated that the removal of sludge would be accomplished at the end of the next outage (Refueling Outage Number 3).
>
> MNCR #0078-88 was further dispositioned to require periodic cleaning of the Suppression Pool to minimize the probability of future clogging of the suction strainers. In response to the disposition, the Suppression Pool was mapped by video tape per maintenance work instructions, accessible floating debris was removed from the pool using grapple devices and a maintenance Task Card, task card #19151, was initiated to clean the Suppression Pool and remove debris at the end of each Refueling Outage.
>
> During RF03 the Task Card was issued to clean the Suppression Pool. Underwater divers were contracted to remove debris and sludge from the floor of the pool and on the water surface, i.e., large floating debris, plastic, large tools, herculite, etc. A Work Instruction/ Inspection Record (WI&IR) was initiated to facilitate cleaning activities. A step was included in the WI&IR to vacuum sludge from the Suppression Pool floor but this activity was deferred during the review process.

On July 2, 1989 the RHR A pump before-start suction pressure again failed its quarterly surveillance (06-OP-1E12-Q-0023). It was determined that the reduction in suction pressure was caused by clogging of the pump suction strainer. MNCR #0250-89 was written to document this non-conformance. Pump suction strainers for the RHR A, B, C, LPCS and HPCS were cleaned. Surveillance 06-OP-1E12-Q-0023 was performed with satisfactory results and the system restored to service.

The following corrective actions were taken in response to this violation:

1. Material Nonconformance Report #0250-89 was written to document the failed surveillance. As an immediate action, the suction strainers for the RHR A, B, C, HPCS and LPCS were cleaned using a high pressure water supply to remove the buildup of sludge on the suction strainers. Surveillance 06-OP-1E12-Q-0023 was satisfactorily performed and the system restored to service.

2. In order to detect clogging before operability is affected, more restrictive pump suction pressure limits were established for RHR A, B, C, HPCS and LPCS suction strainers. These limits were developed from preoperational data analysis, pump performance curves and past surveillance data. Plant procedures were changed to reflect these limits to ensure suction strainers are cleaned when pump after-start pressures reach the indicated values.

3. Following the July 2, 1989 occurrence, a remote control vacuuming unit was used to clean the Suppression Pool floor. In addition to Suppression Pool sediment, other forms of debris were removed during this effort. The Suppression Pool was cleaned more thoroughly using a hydrolaser during the forced outage that occurred August 14 through 21, 1989, which allowed divers to enter the pool to perform extensive cleaning activities.

4. Programmatic controls, procedure 07-S-14-375 - Inspection and Cleaning of the Suppression Pool, were developed to establish cleanliness criteria for future Suppression Pool cleaning activities.

5. Plant Administrative Procedure 01-S-17-11, Repetitive Task Identification, was issued to identify and control plant activities that are required to be performed on a repetitive basis. This procedure includes appropriate evaluation, engineering reviews and a management escalation process which is required to justify deferral of scheduled tasks.

6. The Material Non-conformance Program was reviewed and revised, as necessary, to strengthen the guidelines on determining root cause and corrective action to preclude recurrence for significant conditions adverse to quality.

7. Administrative Procedure 01-S-01-3, Plant Safety Review Committee, was revised to designate appropriate responsibility and assign a response due date for action items originating during PSRC meetings. This change ensures timely resolution of all items identified by the PSRC requiring followup actions.

In addition to the above the following actions are performed on a continuing basis:

* The responsible system engineers follow the ISI data for static before-start and after-start pump suction pressures to ensure that the suction strainers are cleaned on an as needed basis between refueling outages.

* Task Card 19151 was assigned a frequency to ensure that it is performed each refueling outage. The suppression pool and ECCS strainers were cleaned in RFO4 and RFO5. During RFO4 the inspection report indicated that a silt coating was on the strainers which was wiped off. The condition of the strainers was not documented during the RFO5 inspection.

* The Chemistry department samples the suppression pool on a weekly basis and analyzes the sample for conductivity, chlorides, sulfates, insoluble iron, total organic carbons (TOC), Ph, silica, and gross activity. The limits and sample frequencies are controlled by Chemistry Procedure 08-S-03-10, Chemistry Sampling Program. The limits consist of a recommended limit, normal operating limit, and a maximum allowed limit, limit above which action is required to reduce to less than the maximum allowed limit. The Suppression Pool chemistry limits are as follows:

Chloride	10 ppb	200 ppb
Sulfate		200 ppb
Conductivity	2 μmho/cm	5 μmho/cm
Silica		200 ppb
TOC		.4 ppm
Ph		5.3 - 8.6
Iron	1 ppm	5 ppm

When the max limits are approached or exceeded Chemistry notifies the Control Room Shift Superintendent that the Suppression Pool Cleanup System should be placed in service in the event it is not already cleaning the suppression pool.

* Conversations with the Chemistry, Operations, and Radwaste Departments disclosed that the Suppression Pool Cleanup System is in operation 80% to 95% of the time during power operations. They indicated that the only time that it was not in service was for preventative or corrective maintenance, or for filter media changeout. This has been a standard operating practice for the last 2 to 3 years during power operations.

* The Suppression Pool Cleanup system remains in operation during those time periods when the Suppression Pool Cooling System is in operation. The Suppression Pool Cooling utilizes either RHR A or B and their associated heat exchanger for cooling the pool. The turbulent flow created by the RHR system, approximately 9000 gpm, aids in mixing any dirt and particles in the Suppression Pool. This action increases the amount of particles that can be removed by the cleanup system.

ECCS Suction Pressure Data Compilation

The before start and after start suction pressures are recorded as part of the ISI data for the ECCS quarterly functional tests for all of the ECCS pumps. Before start and after start suction pressures were obtained for the ECCS pumps and the data was compared to the dates that scrams occurred in which one or more safety relief valves (SRV) lifted. The data indicates that no noticeable change in pump suction pressure can be attributed to SRV lifts. Attachment 1 is a compilation of ECCS suction pressure data and contains the following information:

* Table 1 - Before Start and After Start Suction Pressure for ECCS Pumps. The data for Table 1 was taken from the respective quarterly functional surveillances.

* Seven graphs that plot the ECCSs pump suction pressure from 3rd quarter 1987 through 1st quarter 1993. The data for the graphs were taken from Table 1.

* Table 2 - Historical Event Sequence for ECCS Suction Strainers. The information in Table 2 corresponds to the numbers 1 through 11 on the seven graphs and shows events that are significant to the ECCS suction strainers.

From discussions with the NRC, part of their concern following the March 1993 Perry suction strainer clogging event was the effects of SRV lifts on suction strainer clogging. Based on the GGNS data collected and analyzed with respect to ECCS pump suction pressures it is reasonable to assume that while Perry performed a cleaning evolution on their suppression pool a more thorough cleaning may be needed. It is very doubtful that any appreciable debris, such as that found on the suction strainers, came from the SRV discharge piping. A more likely scenario is that the SRVs discharging into the suppression pool dislodged dirt and grime in areas that were insufficiently cleaned and caused them to mix in the suppression pool where it then had the opportunity to deposit on the strainers either through a settling action or being pulled onto the strainers due to flow.

The graphs and Table 1 data show that since the March 1988 occurrence, GGNS has not had any additional instances of before start or after start suction pressures falling below the minimum requirements of 2.5 psig. Additionally, there have been no instances of any ECCS suction pressure falling below the administrative limit since 4th quarter 1991.

Fibrous Material Investigation

Following discussions with Perry concerning the fibrous filter material found on their RHR "B" suction strainer a rapid investigation into the type of filters used at GGNS on the Drywell coolers and Containment Cooling system commenced. Research indicates that no filters are used on any of the ventilation components inside the drywell. For those fans inside the containment that have installed filters (not all use filters), the filter media is a cartridge type enclosed in a rigid metal case. No loose or temporary fibrous filters are used in the drywell or containment.

The following Containment Cooling System ventilation components are located inside the Containment:

1. Containment Cooling Coolers - M41-B001A, B001B, & B001C

   a. All are located inside the containment and are designed with no filter material.
   b. Verification documentation includes P&ID M-1100B; Carrier Vendor Drawing 9645-M-612.0-39EA20-B773-1 Rev. 6; Mechanical Specification 9645-M-612.0, Appendix S data sheet 5, Rev. 16.

2. Inside Containment Steam Tunnel Cooler - M41-B004

   a. Located inside the Containment Steam Tunnel and is designed with no filter material.
   b. Verification documentation includes P&ID M-1100B; Carrier Vendor Drawing 9645-M-612.0-39EA30-B773-2, Rev. 4; Mechanical Specification 9645-M-612.0, Appendix S data sheet 23, Rev. 15.

3. Containment Cooling System Charcoal Filter Trains - M41-D002A & D002B

   a. Located inside the containment and contains a prefilter in each HEPA filter train. The prefilters are a one piece enclosed assembly consisting of fire-retardant cell sides, glass mat media and aluminum separators with neoprene-base adhesive and are mounted in corrosion-resistant unpainted stainless steel frames.
   b. Verification documentation includes P&ID M-1100A; Vendor drawing M621.2-N1M41D002AN-1.1-001 Revision F; Mechanical Specification 9645-M-621.2 page 11 Rev. 11, and Appendix T sheet 2 Rev. 4.
   c. Visual inspection of a spare prefilter located in the Bechtel Warehouse. The filter assembly is constructed as identified in 3.a above.

4. Reactor Water Sample Station Filter Train - M41-D006

   a. Located inside the containment and contains a prefilter as a component part of the HEPA filter train. The prefilter is a one piece cartridge type filter of similar construction as the one described in 3.a above.
   b. Verification documentation includes P&ID M-1100A; DCP 82/666, Rev. 0;
   c. Visual inspection of a spare filter located in the GGNS ware house.

The remaining components of the Containment Cooling System are physically located in the Auxiliary Building. This includes the Containment Ventilation Exhaust Fans and their related exhaust charcoal filter train, the Containment Ventilation Supply fans, and the Drywell/Containment Purge Fans.

The Drywell Cooling System is comprised of six drywell coolers (M51-B001A, B002A, B003A, B004A, B005A, and B006A) and two drywell recirculation fans (M51-C001 & C002). The design of these components does not utilize fibrous filters of any type.

All components of the Drywell Cooling Systems are located inside the drywell. The verification documentation includes P&ID M1101, Carrier Vendor Drawing 9645-M-612.0-39EA45-B783-1, and Mechanical Specification 9645-M-612.0, Appendix S, Data Sheet 8, Rev 15.

I talked with Richard Benson, HP Shift Supervisor, concerning temporary filters used on portable HEPA filter units. He stated that it is not a normal practice to used temporary filters on the HEPA units. He also stated that a temporary prefilter was used on a job in the Turbine Building to prevent plugging of the HEPA unit due to the high amount of dirt and metal filings generated during the job. He additionally stated that no such configuration has been utilized in the containment or drywell in his knowledge.

The portable HEPA units are similar in construction to the permanently installed HEPA filter trains in that they use an installed prefilter that is a cartridge design similar to those described in 3.a and 4.a above. The only time that the portable units are used in the drywell or containment is during outage situations.

CONCLUSIONS

NS&RA concludes that the concerns of ECCS suction strainer clogging and the effect on long-term cooling as described in Information Notice 93-34 and Information Notice 93-34 Supplement 1 have been adequately addressed. However, a task force has been formed that will address any further issues concerning fibrous material and the potential clogging of ECCS suction strainers. This document will remain open pending the outcome of the task force.

Completed: _____ / _____

Investigating Engineer — Date

Approved: _____ / _____

OEG Supervisor — Date

Closed: _____ / _____

OER Coordinator

TABLE 1 - Before Start and After Start Suction Pressure for ECCS Pumps

(Data compiled from respective quarterly surveillances)

06-OP-1E12-Q-0023 - RHR "A"				06-OP-1E12-Q-0024 - RHR "B"				06-OP-1E12-Q-0025 - RHR "C"		
DATE (Qtr)	B/S	A/S		DATE (Qtr)	B/S	A/S		DATE (Qtr)	B/S	A/S
10/11/87 (4)	6.8	3.6		12/3/87 (4)	5.9	5.2		12/4/87 (4)	5.8	4.8
12/17/87 (4)	7.9	4.6		3/3/88 (1)	6.3	4.8		3/4/88 (1)	6.4	5.3
3/18/88 (1)	6.3	1.1		6/3/88 (2)	6.9	5.7		6/2/88 (2)	5.8	5.1
3/22/88 (1)	6.4	5.0		8/29/88 (3)	7.0	6.2		8/28/88 (3)	6.8	5.8
6/17/88 (2)	6.4	4.0		11/29/88 (4)	6.3	5.4		11/27/88 (4)	6.7	5.6
9/17/88 (3)	6.3	3.9		2/28/89 (1)	6.4	5.4		2/25/89 (1)	7.2	6.0
12/16/88 (4)	6.7	4.0		4/22/89 (2)	6.0	5.1		4/25/89 (2)	6.9	5.9
4/2/89 (1)	5.5	3.8		7/21/89 (3)	6.2	5.4		7/29/89 (3)	6.2	5.2
7/3/89 (2)	6.4	5.1		10/21/89 (4)	6.4	5.4		10/29/89 (4)	6.6	5.8
10/1/89 (4)	6.7	3.4		1/19/90 (1)	6.4	5.7		2/3/90 (1)	6.4	5.3
10/5/89 (4)	6.5	5.4		4/25/90 (2)	5.8	4.9		5/3/90 (2)	6.5	5.7
1/2/90 (1)	6.4	3.4		8/9/90 (3)	6.1	5.5		8/10/90 (3)	6.2	5.3
4/2/90 (2)	6.9	5.6		11/12/90 (4)	7.05	5.3		11/20/90 (4)	7.6	6.5
7/3/90 (3)	6.9	5.6		2/14/91 (1)	6.6	5.2		2/20/91 (1)	5.7	5.6
10/23/90 (4)	6.6	5.8		5/15/91 (2)	6.3	5.4		5/10/91 (2)	5.9	5.5
1/26/91 (1)	6.7	4.4		8/14/91 (3)	6.4	5.2		8/8/91 (3)	6.6	5.6
4/29/91 (2)	6.4	4.5		11/14/91 (4)	6.4	5.3		11/17/91 (4)	6.3	6.0
7/31/91 (3)	6.9	5.6		2/13/92 (1)	6.7	6.1		2/6/92 (1)	6.4	5.4
10/29/91 (4)	6.5	5.8		5/8/92 (2)	6.0	5.9		5/10/92 (2)	7.7	6.8
1/29/92 (1)	6.4	5.6		8/21/92 (3)	6.4	5.3		8/8/92 (3)	7.3	6.5
3/31/92 (1)	6.0	6.3		11/12/92 (4)	6.4	5.4		11/7/92 (4)	6.4	5.4
5/30/92 (2)	6.8	7.0		2/11/93 (1)	6.9	6.0		2/11/93 (1)	7.0	5.9
9/2/92 (3)	6.9	6.7								
12/1/92 (4)	6.7	5.9								
3/2/93 (1)	6.6	6.0								

TABLE 1 - Before Start and After Start Suction Pressure for ECCS Pumps

(Data compiled from respective quarterly surveillances)

06-OP-1E21-Q-0006 - LPCS				06-OP-1E22-Q-0005 - HPCS		
DATE (Qtr)	B/S	A/S		DATE (Qtr)	B/S	A/S
9/4/87 (3)	4.1	3.9		10/16/87 (4)	6.4	5.5
12/21/87 (4)	5.0	4.25		11/24/87 (4)	6.2	5.0
3/23/88 (1)	6.4	5.5		2/24/88 (1)	6.3	5.0
6/23/88 (2)	5.0	4.5		5/24/88 (2)	6.2	4.8
9/23/88 (3)	3.0	3.0		8/24/88 (3)	6.7	5.5
12/20/88 (4)	2.9	1.0		11/24/88 (4)	6.2	5.3
12/23/88 (4)	6.3	5.2		2/24/89 (1)	5.5	4.3
3/31/89 (1)	9.0	8.0		4/5/89 (2)	6.5	5.1
7/1/89 (2)	7.0	6.5		7/7/89 (3)	6.3	5.1
9/30/89 (3)	6.0	5.0		10/6/89 (4)	6.4	5.2
* (4)	*	*		1/5/90 (1)	6.5	5.1
1/1/90 (1)	4.0	3.0		4/5/90 (2)	5.1	5.2
1/3/90 (1)	7.0	6.0		7/6/90 (3)	7.6	5.4
3/31/90 (2)	6.5	5.9		10/18/90 (4)	6.0	4.72
7/3/90 (3)	7.0	6.0		1/18/91 (1)	6.75	5.14
10/22/90 (4)	8.0	7.0		4/19/91 (2)	6.3	4.95
1/27/91 (1)	8.5	7.8		7/19/91 (3)	5.98	5.3
4/28/91 (2)	8.0	7.2		10/21/91 (4)	6.2	4.9
7/22/91 (3)	6.5	6.0		10/22/91 (4)	6.37	5.18
10/23/91 (4)	6.5	5.75		1/21/92 (1)	6.5	5.3
1/22/92 (1)	6.5	5.5		5/6/92 (2)	6.3	5.3
4/12/92 (2)	6.5	5.5		7/26/92 (3)	6.2	5.0
5/24/92 (2)	5.5	5.0		11/2/92 (4)	6.2	5.2
5/29/92 (2)	6.5	5.8		2/1/93 (1)	6.5	5.4
8/26/92 (3)	6.5	5.5				
11/24/92 (4)	6.5	5.5				
2/23/93 (1)	6.5	5.5				

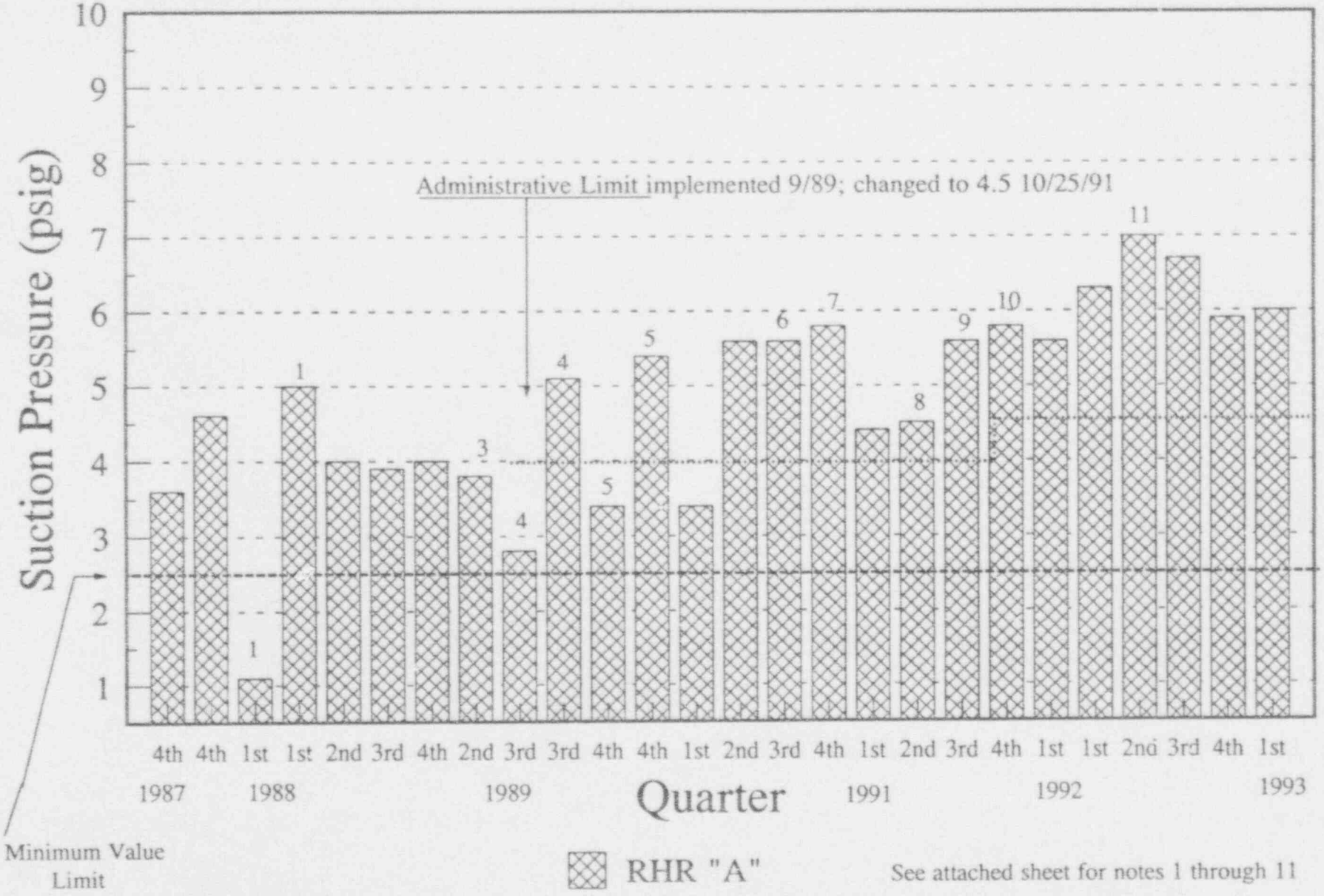
TABLE 2 - HISTORICAL EVENT SEQUENCE FOR ECCS SUCTION STRAINERS

1.	**1st Quarter 1988**
2/24/88	HPCS Quarterly Functional Test - satisfactory
3/03/88	RHR B Quarterly Functional Test - satisfactory
3/04/88	RHR C Quarterly Functional Test - satisfactory
3/18/88	RHR A Quarterly Functional Test - A/S suction pressure <2.5 psig
3/21/88	Cleaned all ECCS suction strainers
3/22/88	RHR A Quarterly Functional Test - satisfactory
5/24/88	HPCS Quarterly Functional Test - satisfactory
2.	**4th Quarter 1988**
12/20/88	LPCS Quarterly Functional Test - A/S suction pressure <2.5 psig
12/22/88	Cleaned LPCS suction strainer
12/23/88	LPCS Quarterly Functional Test - satisfactory
3.	**2nd Quarter 1989**
4/02/89	RHR A Quarterly Functional Test - satisfactory (A/S suction pressure 3.8 psig)
4/05/89	HPCS Quarterly Functional Test - satisfactory
4/10/89	Cleaned all ECCS suction strainers
4/22/89	RHR B Quarterly Functional Test - satisfactory
4/25/89	RHR C Quarterly Functional Test - satisfactory
6/30/89	LPCS Quarterly Functional Test - satisfactory
4.	**3rd Quarter 1989**
7/02/89	RHR A Quarterly Functional Test - A/S suction pressure <4.5 psig
7/03/89	Cleaned all ECCS suction strainers
	Cleaned Suppression Pool of debris and cleaned floor using a remote vacuum
	RHR A Quarterly Functional Test - satisfactory
7/07/89	HPCS Quarterly Functional Test - satisfactory
7/21/89	RHR B Quarterly Functional Test - satisfactory
7/29/89	RHR C Quarterly Functional Test - satisfactory
8/14/89	Multiple SRV lifts (Scram #56)
8/14-21/89	Forced Outage
	Cleaned all ECCS suction strainers
	Hydrolased suppression pool and vacuumed
9/30/89	LPCS Quarterly Functional Test - satisfactory
5.	**4th Quarter 1989**
10/1/89	RHR A Quarterly Functional Test - A/S suction pressure <4 psig (admin limit)
10/5/89	Cleaned all ECCS suction strainers
	RHR A Quarterly Functional Test - satisfactory
10/6/89	HPCS Quarterly Functional Test - satisfactory
10/21/89	RHR B Quarterly Functional Test - satisfactory
10/29/89	RHR C Quarterly Functional Test - satisfactory
12/30/89	Multiple SRV lifts (Scram #58)

TABLE 2 - HISTORICAL EVENT SEQUENCE FOR ECCS SUCTION STRAINERS

6.	**3rd Quarter 1990**
9/16/90	Multiple SRV lifts (Scram #61)
7.	**4th Quarter 1990**
10/18/90	HPCS Quarterly Functional Test - satisfactory (A/S suction pressure 4.72 psig)
10/21/90	Cleaned HPCS suction strainer
10/22/90	HPCS Quarterly Functional Test - satisfactory
	LPCS Quarterly Functional Test - satisfactory
10/23/90	RHR A Quarterly Functional Test - satisfactory
11/26/90	RFO-4 (9/30/90 - 11/26/90)
	Cleaned all ECCS suction strainers
	Cleaned Suppression Pool
11/12/90	RHR B Quarterly Functional Test - satisfactory
11/20/90	RHR C Quarterly Functional Test - satisfactory
8.	**2nd Quarter 1991**
6/17/91	Multiple SRV lifts (Scram #67)
9.	**3rd Quarter 1991**
y	
7/28/91	Multiple SRV lifts (Scram #68)
10.	**4th Quarter 1991**
10/21/91	HPCS Quarterly Functional Test - A/S suction pressure <5 psig
10/22/91	HPCS Quarterly Functional Test - satisfactory
11/19/91	Multiple SRV lifts (Scram #70)
11.	**2nd Quarter 1992**
5/06/92	HPCS Quarterly Functional Test - satisfactory
5/08/92	RHR B Quarterly Functional Test - satisfactory
5/10/92	RHR C Quarterly Functional Test - satisfactory
5/24/92	LPCS Quarterly Functional Test - A/S suction pressure <5 psig
5/29/92	LPCS Quarterly Functional Test - satisfactory
5/27/92	RFO 5 (4/17/92 - 6/9/92)
	Cleaned all ECCS suction strainers
	Cleaned Suppression Pool
5/30/92	RHR A Quarterly Functional Test - satisfactory

RHR "A" After Start Suction Pressure



See attached sheet for notes 1 through 11

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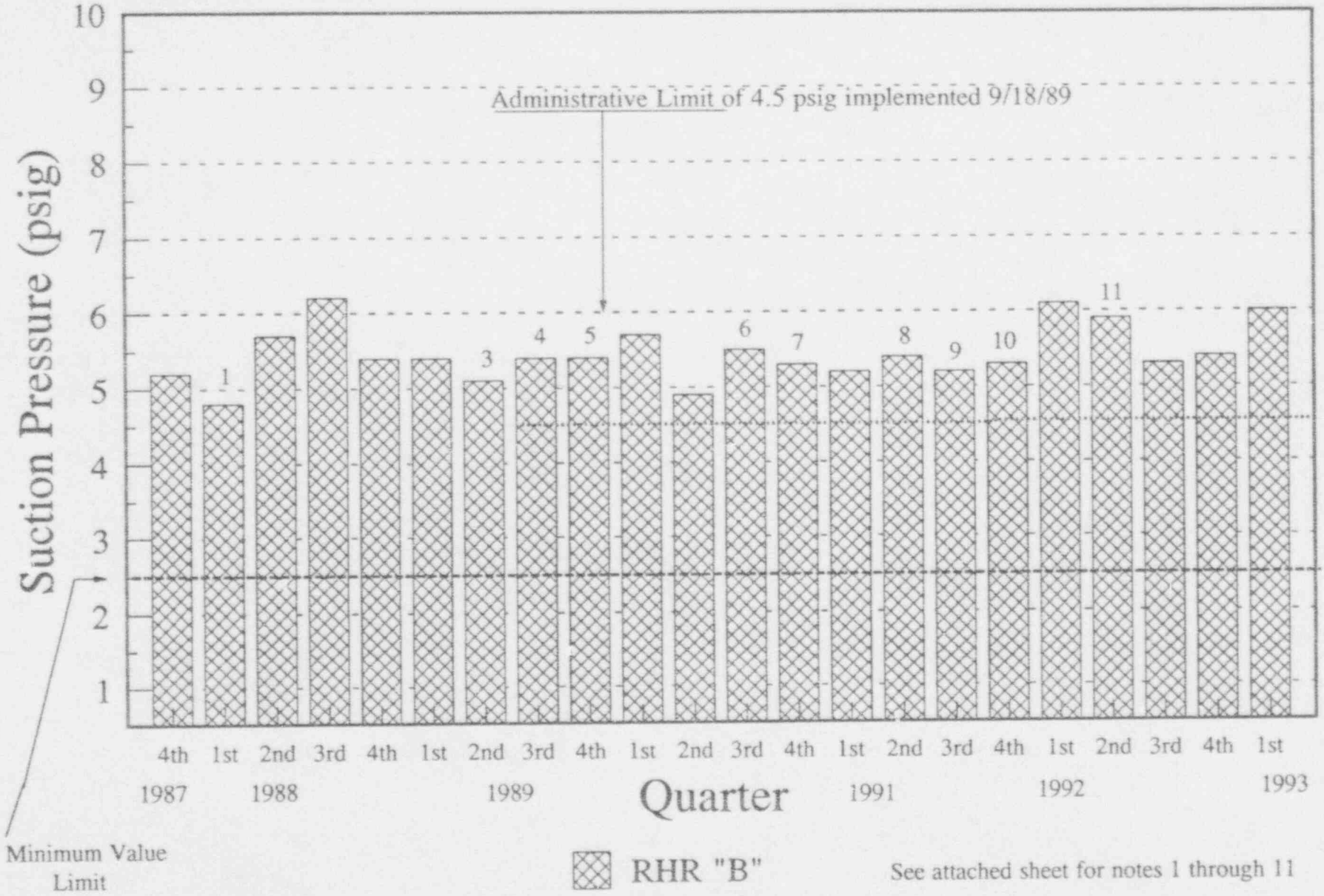
RHR "B" After Start Suction Pressure



See attached sheet for notes 1 through 11

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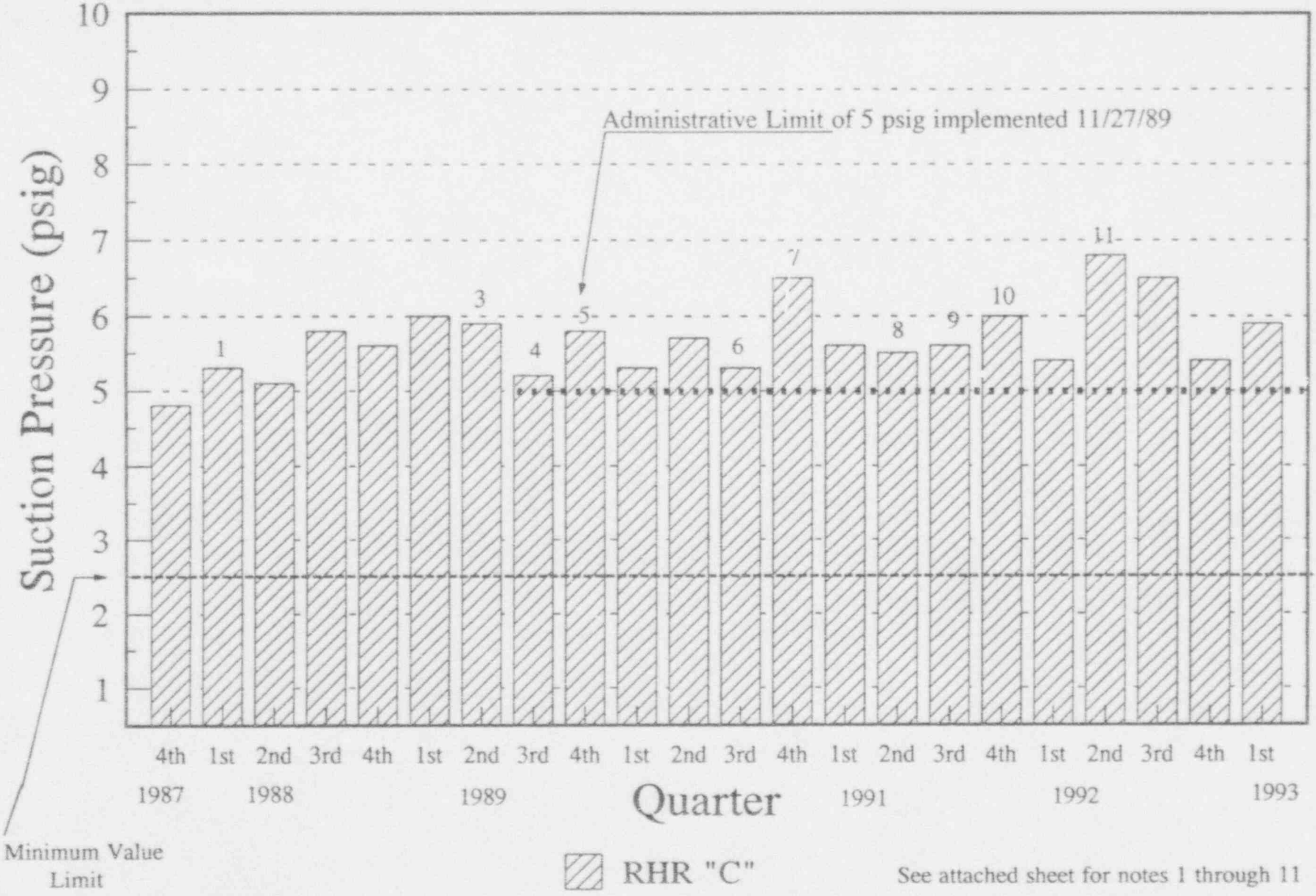
RHR "C" After Start Suction Pressure



See attached sheet for notes 1 through 11

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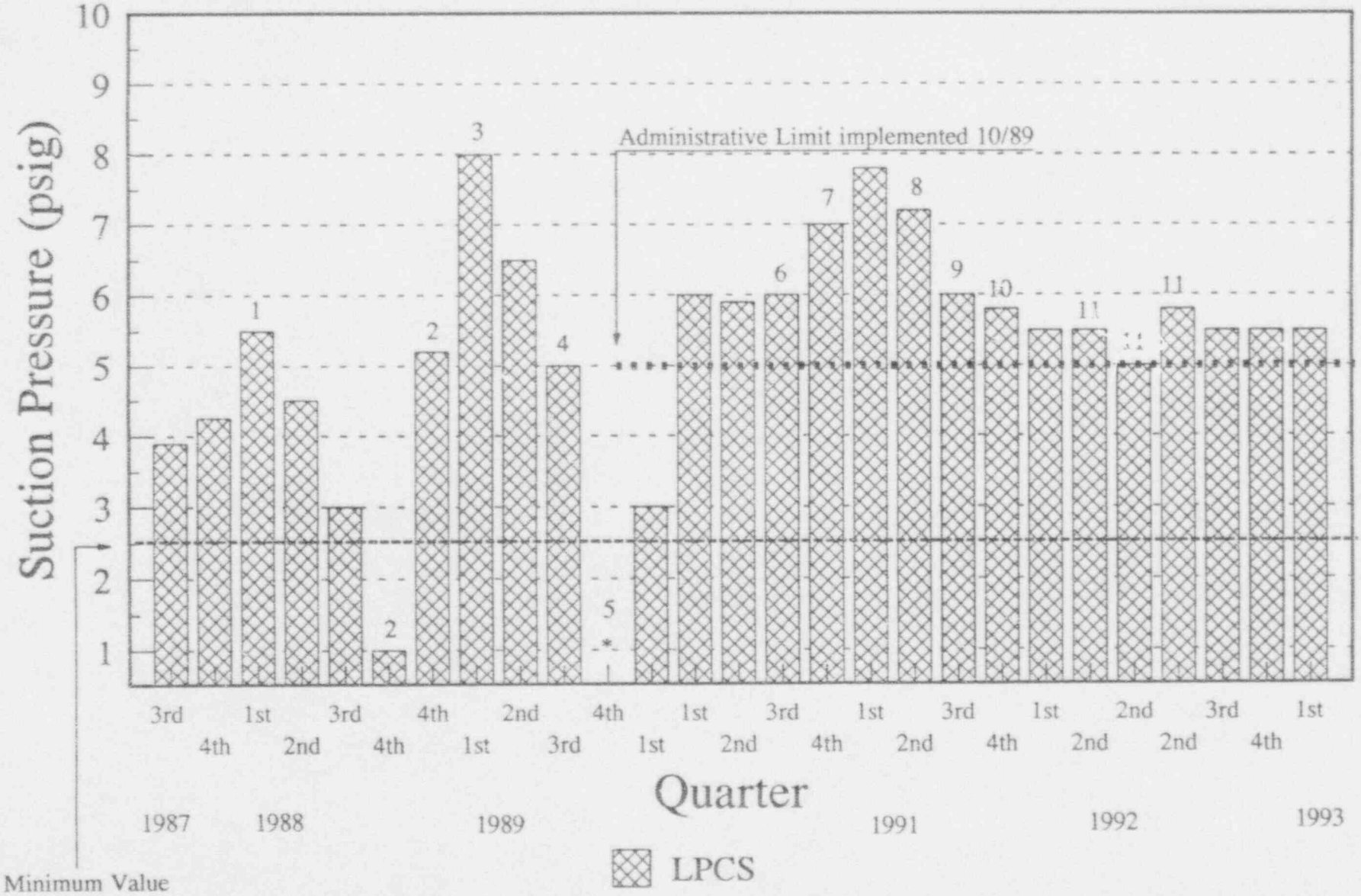
LPCS After Start Suction Pressure



See attached sheet for notes 1 through 11

* Data not avaliable

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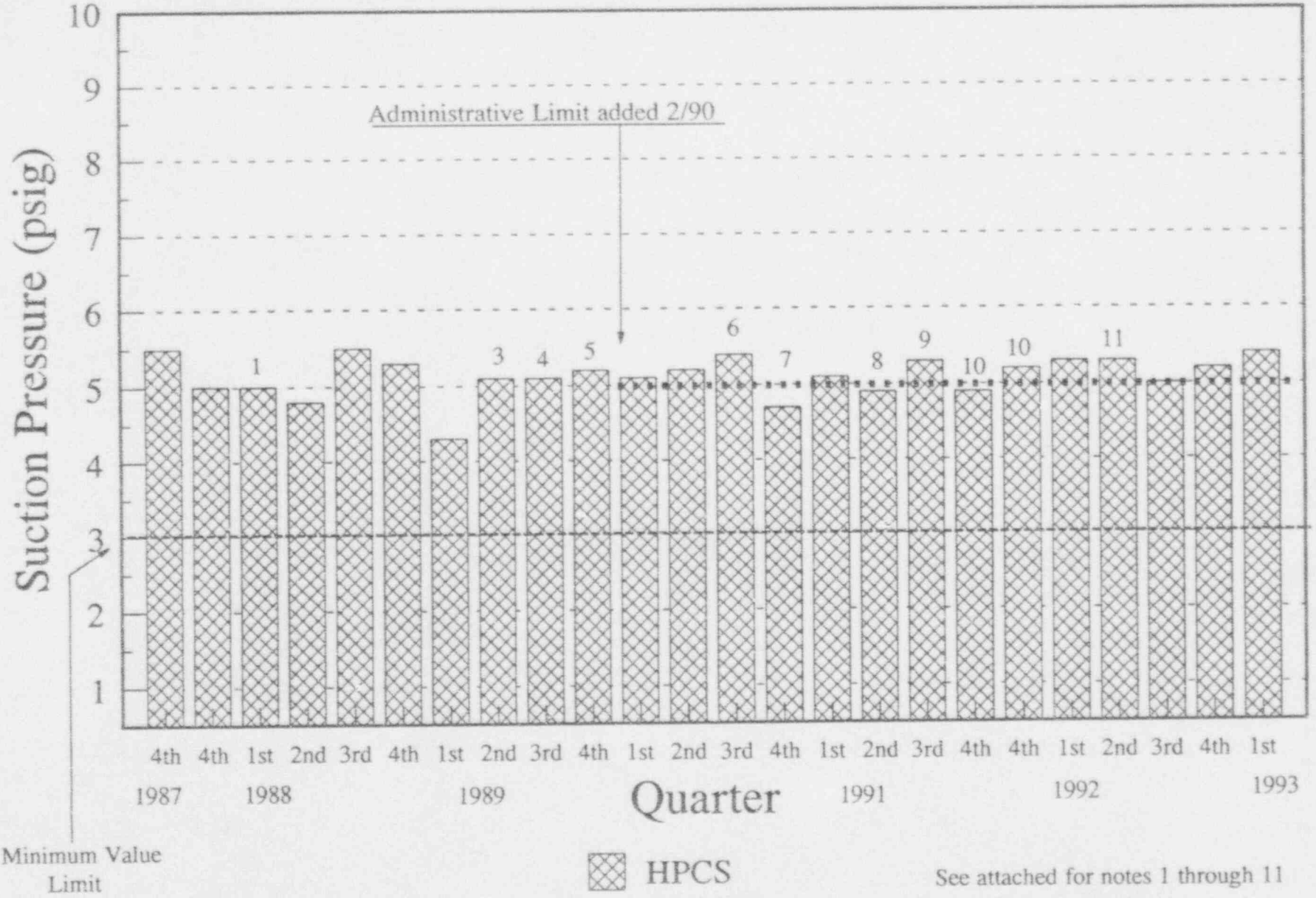
HPCS After Start Suction Pressure



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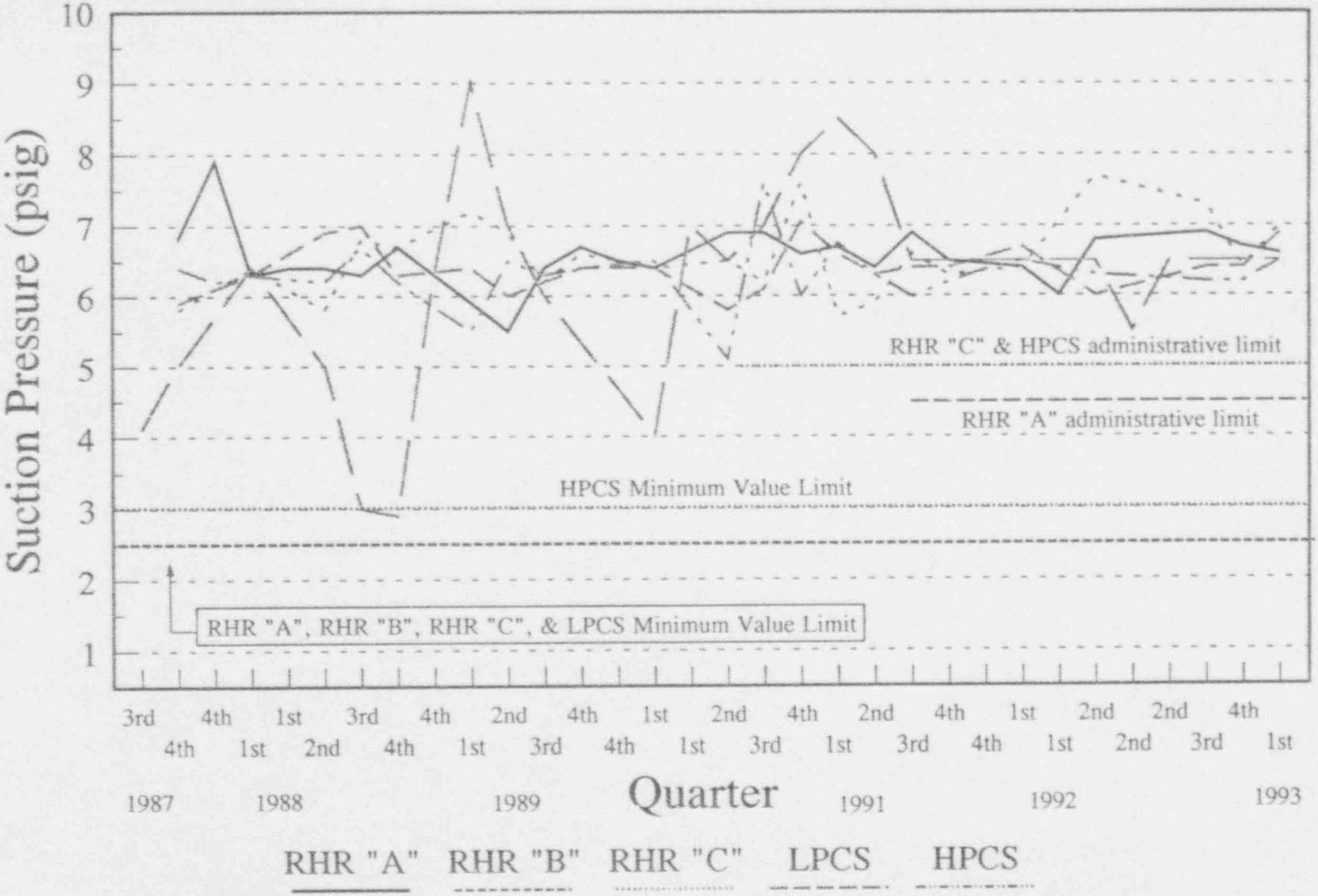
Before Start ECCS Suction Pressure Comparison



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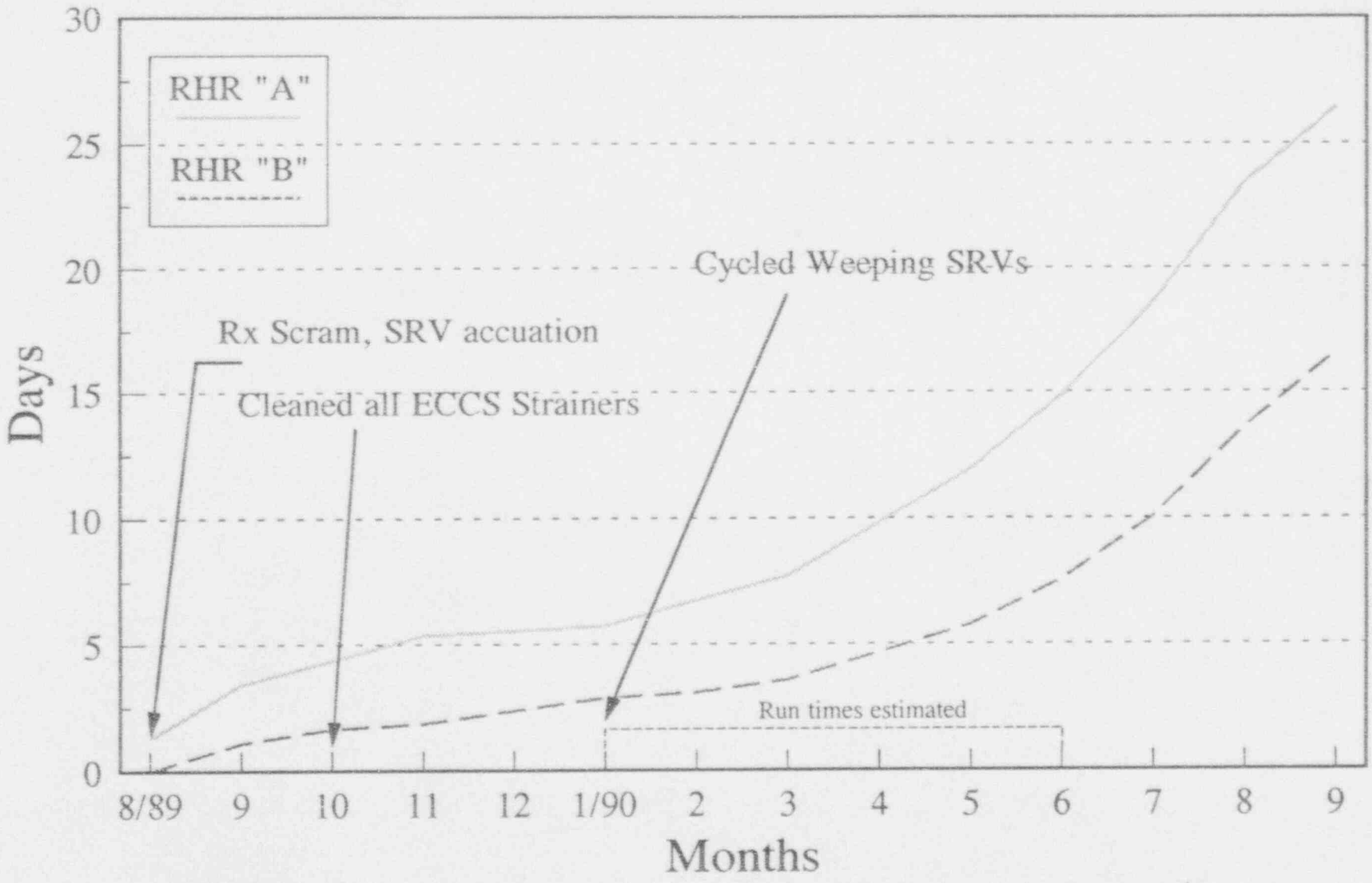
RHR "A" & "B" TOTAL RUN TIMES

August 1989 through September 1990



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