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CERTIFIED

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ACRS FLUID DYNAMICS SUBCOMMITTEE
MEETING MINUTES
JULY 29-30, 1982
SAN JOSE, CA

PURPOSE: The purpose of the meeting was to discuss potential safety concerns raised by Mr. Humphrey, a former GE employee, regarding the General Electric (GE) pressure suppression containment design and in particular, the Mark III containment.

ATTENDEES: Principal attendees of the meeting included:

ACRS
M. Plesset, Chairman
J. Ebers e, Member
H. Ether gton, Member
J. Ray, Member
S. Bush, Consultant
I. Catton, Consultant
K. Garlid, Consultant
V. Schrock, Consultant
Z. Zudans, Consultant
P. Boehnert, Staff*
*Designated Federal Employee

GE
H. Townsend
M. Davis
A. Smith
C. Cameron
G. Sherwood

Cleveland Electric Illuminating
R. Pender

NRC
W. Butler
J. Kudrick
M. Fields

Humphrey Engineering
J. Humphrey

Mississippi Power & Light
J. McGaughy
J. Richardson
S. Hobbs

Bechtel
R. Trickovic

Illinois Power
E. Aant

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DESIGNATED ORIGINAL

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MEETING HIGHLIGHTS, AGREEMENTS, AND REQUESTS

1. Dr. Plesset, in opening remarks, said the Subcommittee should determine if there are any potential safety concerns raised by Mr. Humphrey that would prevent issuance of full-power Operating Licenses for the Grand Gulf, Clinton, or Perry plants. He also said that the Subcommittee should reach definitive conclusions on the importance of these issues at this meeting.

2. Mr. J. Humphrey of Humphrey Engineering provided an overview of potential Mark III containment interface issues he has raised with NRC and Mississippi Power & Light (MP&L). Key points of his presentation included:

   ° The Mark I Containment Reevaluation Program was necessary because many containment interfaces were missed in the original design effort. Because of their operating status, the redesign options were limited and Program costs were increased. The lesson to be learned is that we should diligently pursue early understanding and resolution of all potential design interface issues.

   ° The Mark III containment is a significant evolution in BWR containment design but there are many more interfaces between GE and the Customer/AE than for Mark I plants. The TVA-STRIDE work identified many unresolved issues such as: design features or changes with unidentified interfaces, carryover of Mark I & II analysis assumptions, and disconnects between GE and the Customer/AE. Cancellation of the TVA-STRIDE Project terminated most work on the above issues.

   ° Near-term objectives should include: an understanding and evaluation of all Mark III containment issues, to minimize impact on plant startup and operation, provide maximum flexibility to industry for resolution of these issues.

   ° Mr. Humphrey provided a preliminary matrix of the issues he has rasied that are arranged by category, (pool encroachment, additonal steam discharge paths, suppression pool temperature response, drywell leakage,

containment pressure response, upper pool dump) and source (design feature, analysis, or technical specification or procedure) - Attachment 1.

° While it is disconcerting that so many open issues exist this late in the product cycle, none appear to threaten the fundamental design basis and should be resolved by operating procedure or minor design modification. There should be little impact on the Mark I & II plants.

2. Messrs. W. Butler, J. Kudrick and M. Fields (NRC Staff) discussed the background, problem definition, and approach to resolution of the issues raised by Mr. Humphrey. Mr. Butler said NRC action on these items began in early May upon initial notification of Mr. Humphrey's concerns. The Staff has completed their preliminary assessment and has laid out a program to resolve the issues. Board Notifications have been issued for all potentially affected BWR plants. Three items are of note:
   1. Most of the issues raised are beyond NRC's normal review scope.
   2. Most issues are of minor safety significance.
   3. Two issues are believed to warrant closer examination. These are: (1) the effects of local encroachments on pool swell loads and (2) potential hydrodynamic effects from RHR heat exchange relief valve actuation.

Mr. Butler solicited the Subcommittee's advice on the NRC Program for resolution of these items.

Mr. Kudrick provided an overview of the hydrodynamic loads issue including the Humphrey concerns. He noted that the Mark III program had closed on all hydrodynamic load definitions just prior to the last ACRS Fluid Dynamics Subcommittee meeting on this topic (January 22, 1982). A NUREG closing out the Mark III Program is scheduled for issuance in December 1982. Implementation of the Mark I Program requirements is proceeding, and for Mark II plants a recent problem encountered with the vacuum breaker valve loads is proceeding to an orderly resolution. A report detailing closure of this item will be issued in the near future. [Note: this item will be discussed with the ACRS in conjunction with the WPPSS-2 OL review now scheduled for September 1982.]

Mr. Humphrey has to date identified 22 concerns which include 68 individual comments. Mr. Kudrick grouped the issues into 6 major categories: (1) pool dynamic loads, (2) use of all phenomena in DBA calculations, (3) validity of using bulk conditions in DBA calculations, (4) interface issues, (5) incorporation of DBA analysis in emergency conditions, and (6) technical specification values versus analytical assumptions. Dr. Zudans asked if NRC believes any of the issues have the potential of violating design margin assumptions. Mr. Kudrick replied in the negative. Mr. Ebersole said NRC should look into the pool stratification potential for Mark I & II plants. Dr. Catton requested test reports dealing with pool temperature response measurements.

Mr. Fields discussed the applicability and resolution approach for the Humphrey issues. For the Mark I and II plants, the applicable issues will be addressed generically for Mark I's and on a plant specific basis for Mark II's (with the exception of the RHR issue). For the Mark III plants, Grand Gulf is pursuing an independent approach. The MP&L action plan was presented to NRC on July 14, 1982. The STRIDE and other Mark IIIs will, to the extent possible, incorporate the results of the Grand Gulf review as well as participate in an independent Peer Review Panel review of the issues. The resolution schedule calls for receipt by July 30, 1982 of the schedule for Mark I plant resolution. Mark II plant evaluation will be tied to the plants' licensing schedules. Resolution for Grand Gulf includes an August 19, 1982 submittal for full power justification with refined analyses submitted in October and November. The resolution schedule for the other Mark IIIs and STRIDE plants is under development.

NRC's preliminary evaluation of the issues has not resulted in any new safety concerns for Mark I and II plants, and to date no major safety concerns have surfaced for the Mark III plants.

3. Mr. Fields discussed Humphrey's concerns by grouping them into 21 common technical areas (Figure 1). For each area, NRC described the concern, its appliability to different containment designs, NRC's review approach, and the Staff's current assessment of the safety significance. For Grand Gulf, the emphasis will be on the encroachment issue. NRC is requiring a

comprehensive analytical and, if necessary, test program to resolve all issues. The tests, if required, would address pool thermal mixing capability of the RHR system and/or subscale tests designed to evaluate the effects of encroachments. For Grand Gulf, sufficient margin is believe to exist vis-a-vis the encroachment issue but this must be confirmed.

NRC provided detailed discussion of the 21 technical areas and RHR issues. Analyses are expected to confirm that the issues are not of safety significance, however additional work may be required for the two issues noted above. Questions/comments noted by the Subcommittee included:

° Mr. Etherington asked if NRC examined the potential of water hammer in the RHR steam discharge lines. No response was received from NRC or GE on this item.

° There was discussion centering on the margin available to avoid thermal stratification of the suppression pool. GE believes substantial margin exists. Dr. Catton requested any available test reports that address the topic.

° Mr. Ebersole expressed concern over possible disabling of pumps due to debris in the journal and seal cooling water.

° In response to Dr. Zudans, NRC said the conclusion that the above issues are not safety concerns is primarily based on engineering judgment, but the Staff wants confirmation of the associated available data.

4. Mr. Townsend (GE) provided General Electric prospective on the Humphrey issues. Key points of his presentation include:

° When Humphrey first raised issues in the fall of 1981 while employed at GE, most were judged second-order effects and are covered by existing margins. Nine issues (Figure 2) were ongoing design actions on STRIDE/GESSAR and will be pursued to resolution in connection with this overall effort. GE formalized responses to each issue after Humphrey resigned from GE.

° GE believes ample margin exists to envelope the estimated effects of the Humphrey concerns (Figure 3 & 4). GE specified overall margin factors of between 6 and 24. The Subcommittee expressed skeptism of these margin values, particularly the upper value.

5. Messrs. J. McGaughy, J. Richardson, and S. Hobbs detailed Mississippi Power and Light's (MP&L) response to the Humphrey concerns. MP&L was the initial contact by Mr. Humphrey relative to his issues. Initial evaluation by MP&L showed no impact on plant safety; however a comprehensive program has been undertaken to quantify the effects of the concerns.

An Owners Group will take action to resolve these issues generically for Mark III plants. This Group will include a Peer Review Panel to review the generic action plans and assure the issues are properly closed. Of the originally defined 22 issues, 6 have been resolved. Mr. Ebersole asked MP&L if they have an activity that would play "devils-advocate" and raise issues similar to what Mr. Humphrey has done. MP&L said that there will be continual review of the plant design, and others will study incident reports from NRC, INPO, etc. Dr. Bush said that the above Peer Review Panel can be very useful if properly staffed and if it functions in an interactive mode.

Mr. S. Hobbs provided detailed discussion of 15 of the original 22 major categories of Humphrey issues (Figure 5). For each issue, MP&L defined the concern(s), listed the potential effects, and discussed the proposed action plan for resolution. MP&L will perform analyses to confirm that these issues are not major safety concerns.

On the issue of the potential effect of local encroachments, MP&L noted that they will make use of the 2-dimensional SOLA code. Drs. Plesset and Catton urged caution in the use of SOLA for this application since some developmental work will be required. Dr. Schrock suggested MP&L could buy a "ready-to-go" code for use on this item. The Action Plans for all these issues will be complete by November 1, 1982 at the latest.

6. Messrs. C. Cameron and H. Townsend discussed the GESSAR/STRIDE containment design and the approach for resolving the Humphrey issues for this design. The STRIDE Program included a detailed BWR/6 Mark III design by GE and A. E. Braun for TVA. The scope included all plant safety related systems and structures. GESSAR is the FSAR for STRIDE. The GESSAR final design approval is expected in April 1983.

   GE's basic approach for resolution of the Humphrey issues is to respond on those issues not resolved by the Grand Gulf (GG) responses. GE sees six issues where GESSAR action directions will be different from GG and six issues that while resolved for GG are not yet resolved for GESSAR (Figures 6-11). GE will finalize a detailed action plan and schedule by September 3, 1982.

7. The handling of the NSSS/AE interface items was discussed by Mr. A. Smith (GE). He noted that interface information is communicated to the customer in the form of mandatory requirements, recommendations, and informal documentation. This information covers such items as nuclear and personnel safety, plant operability, and warranty and contract considerations. The interface documents include specifications of varing levels of importance (mandatory, for information, etc.) plus design drawings and other software.

   GE detailed the design interface process. Referring to a required yearly GE/AE interface review, Dr. Catton asked what changes GE has made to prevent another design error such as was seen at Browns Ferry which caused a partial failure to scram. Extensive discussion disclosed that GE relies on AE audits to catch such design problems, i.e. no substantive changes have been made in the process since the Browns Ferry incident. Dr. Plesset inquired as to how interface problems are handled in Japan. Mr. Smith said the same process applies, but the application differs. There is a more rapid decision making process in Japan due to the work ethic employed.

8. Mr. R. Trickovic (Bechtel) discussed the design interface process from an AE's standpoint. Key points of his presentation were as follows:

   ° Design review audits of the Grand Gulf plant conducted by Cygna and NRC did not uncover any interface related problems (Bechtel is the AE for Grand Gulf).

° Design interface is composed of three main elements: document control, document review and coordination, and interface control verification (audits, independent design review, interface review meetings with GE, etc.).

The Subcommittee raised a number of questions on the details of Bechtel QA/QC practices, including what, if any, procedures are available to prevent a Browns Ferry-type of design error. The Subcommittee was not convinced that procedures existed to prevent such design errors in the future.

During the above discussion, Mr. Ebersole asked if the functionability of check valves is assured, given an upstream pipe break. NRC said they would check on this issue and report back in the near future.

9. Mr. J. Richardson (MP&L) briefly discussed the interface issue from the utility prospective. The grist of his remarks was that the Mark III Owners Group has provided an excellent forum for discussion/resolution of interface issues.

10. In summary remarks, Mr. G. Sherwood (GE) cited the large effort spent by GE and Grand Gulf to resolve the Humphrey issues. Mr. Sherwood said that the effort spent on these issues must be tempered in light of all the other post-TMI items required of GE and the licensees.

11. Mr. Humphrey, in closing remarks, said that progress has been made on these issues; the MP&L Program is impressive and thorough and the proposed changes discussed will address a number of issues raised. Mr. Humphrey also recaped a few items that he said should be examined.

12. Messrs. A. Aant (Illinois Power) and R. Pender (Cleveland Electric Illuminating - CEI) briefly discussed their utility's response to the Humphrey concerns for the Clinton and Perry plants, respectively. Illinois Power will submit a resolution Program in mid-August, and CEI will resolve all issues prior to fuel load in early 1983.

13. Dr. Plesset surveyed the Subcommittee regarding two points: (1) granting a full-power license to Grand Gulf, and (2) the adequacy of Programs discussed to address Humphrey's concerns. The consensus of the Subcommittee was that Grand Gulf should not be prevented from getting a full power license on the basis of the Humphrey concerns and that the Humphrey issues are being adequately addressed by NRC, GE, and MP&L. Dr. Plesset directed comments to NRC to the effect that these issues appear to have received more attention than deserved, and the Staff must carefully husband its resources to effectively address all public health and safety issues. Mr. W. Butler (NRC) took note of this remark and said the Staff will be moderating their resources on this item in the future.

14. The meeting was adjourned at 1:40 p.m. on July 30, 1982.

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A transcript of the open portion of the meeting is available in the NRC Public Document Room at 1717 H Street, N.W., Washington, D.C., or can be obtained at cost from Alderson Reporting, 400 Virginia Avenue, S.W., Washington, D.C. 202/554-2345.

HUMPHREY ENGINEERING, INC.

BWR CONTAINMENT DESIGN AND ANALYSIS

PRELIMINARY MATRIX OF MARK III CONTAINMENT INTERFACE ISSUES AND THEIR POTENTIAL EFFECTS

REF 1	CONTAINMENT INTERFACE ISSUES	POTENTIAL EFFECTS: POOL SWELL LOADS	DRYWELL FLOODING	POOL TEMPERATURE RESPONSE	OTHER CONTAINMENT LOADS	CONTAINMENT TEMPERATURE	CONTAINMENT PRESSURE	DRYWELL TEMPERATURE	HYDROGEN CONTROL	CONTAINMENT NEGATIVE PRESSURE	OTHER NUCLEAR ISLAND EFFECTS	DRYWELL LEAKAGE CAPABILITY
1.0	LOCAL POOL ENCROACHMENTS (D)	1.1 -1.5	X	X	19.2				X			
1.0	NON-UNIFORM HCU VENTING (D)				1.6& 1.7		X					
2.0	SRVDL SLEEVE FLOW (D)	X		X	2.1- 2.3							
3.0	ECCS RELIEF LINES (D)			3.6	3.1-3.5 & 3.7							
4.1	DRYWELL POOL MIXING (A)			4.1								
4.2	EPG VESSEL LEVEL CONTROL (P) VS CONTINUOUS BREAK FLOW (A)			X	X	X	9.1 9.2	X				
4.3	UNIFORM POOL TEMPERATURE (A)			4.3		4.4 7.1	4.4 7.1					
4.7,4.10	RHR SUCTION/DISCHARGE (D)			X	X	X	X					
4.6	POOL = SERVICE WATER TEMP (A)										X	
4.8	CONTAINMENT SPRAY (D)			4.5		X				X		
4.9	SPRAY CYCLING (P)			4.9		X				X		
13.0	TWO LOOP OPERATION (D)			13						13	X	
14.0	RPV BACKFLOW (D)					X					X	
15.0	PLENUM RESPONSE (D)						X				15	
5.1	DRYWELL LEAKAGE USING SBA (A)											5.1
	NO DRYWELL LEAKAGE (A) VS ALLOWABLE TECH SPEC VALUE (P)			5.3		5.5	5.2 5.6	5.8	5.4		X	
	EARLY CGCS OPERATION (P) VS NO CGCS OPERATION FOR FSAR(A)			X		6.3 6.5	X		6.2	X		
7.2	EVAPORATIVE POOL MODEL (A)					7.2	X					
7.3	SHORT TERM EQUILIBRIUM (A)						X					

ATTACHMENT 1

HUMPHREY ENGINEERING, INC.

BWR CONTAINMENT DESIGN AND ANALYSIS

PRELIMINARY MATRIX OF MARK III CONTAINMENT INTERFACE ISSUES AND THEIR POTENTIAL EFFECTS (CONTINUED)

REF 1	CONTAINMENT INTERFACE ISSUES	POOL SWELL LOADS	DRYWELL FLOODING	POOL TEMPERATURE RESPONSE	OTHER CONTAINMENT LOADS	CONTAINMENT TEMPERATURE	CONTAINMENT PRESSURE	DRYWELL TEMPERATURE	HYDROGEN CONTROL	CONTAINMENT NEGATIVE PRESSURE	OTHER NUCLEAR ISLAND EFFECTS
8.0	CONTAINMENT AIR MASS (P)	X		X			8.1	8.3	X	8.2 8.4	
9.3	IBA, SBA AND TRANSIENTS (A)			X		X	X			X	
12.0	UPPER POOL DUMP (D & P)		10.1 10.2	4.5 12	17 19.1	X 12	X 12		5.7	X	
	LOCA SEAL IN (D)										
	NO MAX UPPER POOL VOLUME(P)		X						X		
	VESSEL LEVEL CYCLING (D)		X								
11.0	VACUUM BREAKER CONTROL OF ΔP(D)	11.0	10.1		X						
16.0	SPTMS SENSOR UNCOVERY (D)			X	X	X	X				
18.0	INSULATION DEBRIS EFFECTS (D)			18.2	18.1						
20.0	DESIGN DRYWELL REFLOOD(D)				X				X		
21.0	BACKUP PURGE MAKEUP AIR(D)								X	X	

REFERENCE 1: ATTACHMENT TWO, LETTER J.P. MC GAUGHY, MP&L TO HAROLD R. DENTON, USNRC JUNE 8, 1982.

(D) = DESIGN FEATURE

(A) = ANALYSIS ASSUMPTION

(P) = TECH SPEC OR OPERATING PROCEDURE

ATTACHMENT 1

HUMPHREY ENGINEERING, INC.

BWR CONTAINMENT DESIGN AND ANALYSIS

PRELIMINARY MATRIX OF MARK III CONTAINMENT INTERFACE ISSUES AND THEIR POTENTIAL EFFECTS

REF 1	CONTAINMENT INTERFACE ISSUES	POTENTIAL EFFECTS: POOL SWELL LOADS	DRYWELL FLOODING	POOL TEMPERATURE RESPONSE	OTHER CONTAINMENT LOADS	CONTAINMENT TEMPERATURE	CONTAINMENT PRESSURE	DRYWELL TEMPERATURE	HYDROGEN CONTROL	CONTAINMENT NEGATIVE PRESSURE	OTHER NUCLEAR ISLAND EFFECTS	DRYWELL LEAKAGE CAPABILITY
1.0	LOCAL POOL ENCROACHMENTS (D)	1.1 -1.5	X	X	19.2				X			
1.0	NON-UNIFORM HCU VENTING (D)				1.6& 1.7		X					
2.0	SRVDL SLEEVE FLOW (D)	X		X	2.1-2.3							
3.0	ECCS RELIEF LINES (D)			3.6	3.1-3.5 & 3.7							
4.1	DRYWELL POOL MIXING (A)			4.1								
4.2	EPG VESSEL LEVEL CONTROL (P) VS CONTINUOUS BREAK FLOW (A)			X	X	X	9.1 9.2	X				
4.3	UNIFORM POOL TEMPERATURE (A)			4.3		4.4 7.1	4.4 7.1					
4.7,4.10	RHR SUCTION/DISCHARGE (D)			X	X	X	X					
4.6	POOL = SERVICE WATER TEMP (A)										X	
4.8	CONTAINMENT SPRAY (D)			4.5		X				X		
4.9	SPRAY CYCLING (P)			4.9		X				X		
13.0	TWO LOOP OPERATION (D)			13						13	X	
14.0	RPV BACKFLOW (D)					X					X	
15.0	PLENUM RESPONSE (D)						X				15	
5.1	DRYWELL LEAKAGE USING SBA (A)											5.1
	NO DRYWELL LEAKAGE (A) VS ALLOWABLE TECH SPEC VALUE (P)			5.3		5.5	5.2 5.6	5.8	5.4		X	
	EARLY CGCS OPERATION (P) VS NO CGCS OPERATION FOR FSAR(A)			X		6.3 6.5	X		6.2	X		
7.2	EVAPORATIVE POOL MODEL (A)					7.2	X					
7.3	SHORT TERM EQUILIBRIUM (A)						X					

ATTACHMENT 11

HUMPHREY ENGINEERING, INC.

BWR CONTAINMENT DESIGN AND ANALYSIS

PRELIMINARY MATRIX OF MARK III CONTAINMENT INTERFACE ISSUES AND THEIR POTENTIAL EFFECTS (CONTINUED)

REF 1	CONTAINMENT INTERFACE ISSUES	POOL SWELL LOADS	DRYWELL FLOODING	POOL TEMPERATURE RESPONSE	OTHER CONTAINMENT LOADS	CONTAINMENT TEMPERATURE	CONTAINMENT PRESSURE	DRYWELL TEMPERATURE	HYDROGEN CONTROL	CONTAINMENT NEGATIVE PRESSURE	OTHER NUCLEAR ISLAND EFFECTS
8.0	CONTAINMENT AIR MASS (P)	X		X			8.1	8.3	X	8.2 8.4	
9.3	IBA, SBA AND TRANSIENTS (A)			X		X	X			X	
12.0	UPPER POOL DUMP (D & P)		10.1	4.5	17	X	X		5.7	X	
	LOCA SEAL IN (D)		10.2	12	19.1	12	12				
	NO MAX UPPER POOL VOLUME(P)		X						X		
	VESSEL LEVEL CYCLING (D)		X								
11.0	VACUUM BREAKER CONTROL OF ΔP(D)	11.0	10.1		X						
16.0	SPTMS SENSOR UNCOVERY (D)			X	X	X	X				
18.0	INSULATION DEBRIS EFFECTS (D)			18.2	18.1						
20.0	DESIGN DRYWELL REFLOOD(D)				X				X		
21.0	BACKUP PURGE MAKEUP AIR(D)								X	X	

REFERENCE 1: ATTACHMENT TWO, LETTER J.P. MC GAUGHY, MP&L TO HAROLD R. DENTON, USNRC JUNE 8, 1982.

(D) = D SIGN FEATURE

(A) = AN LYSIS ASSUMPTION

(P) = TECH SPEC OR OPERATING PROCEDURE

ATTACH. 1

INDEX BETWEEN TECHNICAL AREAS AND MR. HUMPHREY'S CONCERNS

#	TECHNICAL AREA DESCRIPTION	COVERS HUMPHREY CONCERN(S)
1	LOCAL ENCROACHMENTS - HYDRODYNAMIC LOADS	1.1-1.5, 1.8, 19.2
2	NON-UNIFORM VENTING AT HCU FLOOR	1.6
3	PRESSURE DROPS ABOVE HCU FLOOR	1.7
4	SRV DISCHARGE LINE SLEEVE LOADS	2.1-2.4
5	ECCS RELIEF LINE DISCHARGE LOADS	3.1-3.7
6	ISOLATION OF WATER IN DRYWELL	4.1-4.2
7	BULK POOL TEMPERATURE IN DBA ANALYSIS	4.3-4.5, 7.1
8	ASPECTS OF THE RHR SYSTEM	4.5 (PART), 4.6-4.10, 5.3, 14
9	STEAM BYPASS	5.1-5.2, 5.5, 5.8, 9.2
10	HYDROGEN CONTROL SYSTEM	5.4, 6.2-6.5
11	UPPER POOL DUMP	5.6-5.7, 10.1-10.2, 12, 19.1
12	EMERGENCY PROCEDURE GUIDELINES	6.1, 17, 22
13	CONTAINMENT ATMOSPHERE RESPONSE	7.2-7.3, 9.1
14	TECH. SPECS. VS DBA ASSUMPTIONS	8.1, 8.3, 11
15	CONTAINMENT NEGATIVE PRESSURE	8.2, 8.4, 13
16	TREATMENT OF SRV ACCIDENTS AND SBAs	9.3
17	SECONDARY CONTAINMENT NEGATIVE PRESSURE	15
18	POOL TEMPERATURE SENSER LOCATIONS	1.6
19	INSULATION DEBRIS	18.1-18.2
20	DRYWELL REFLOOD LOADS	20
21	BACKUP H_2 PURGE	21

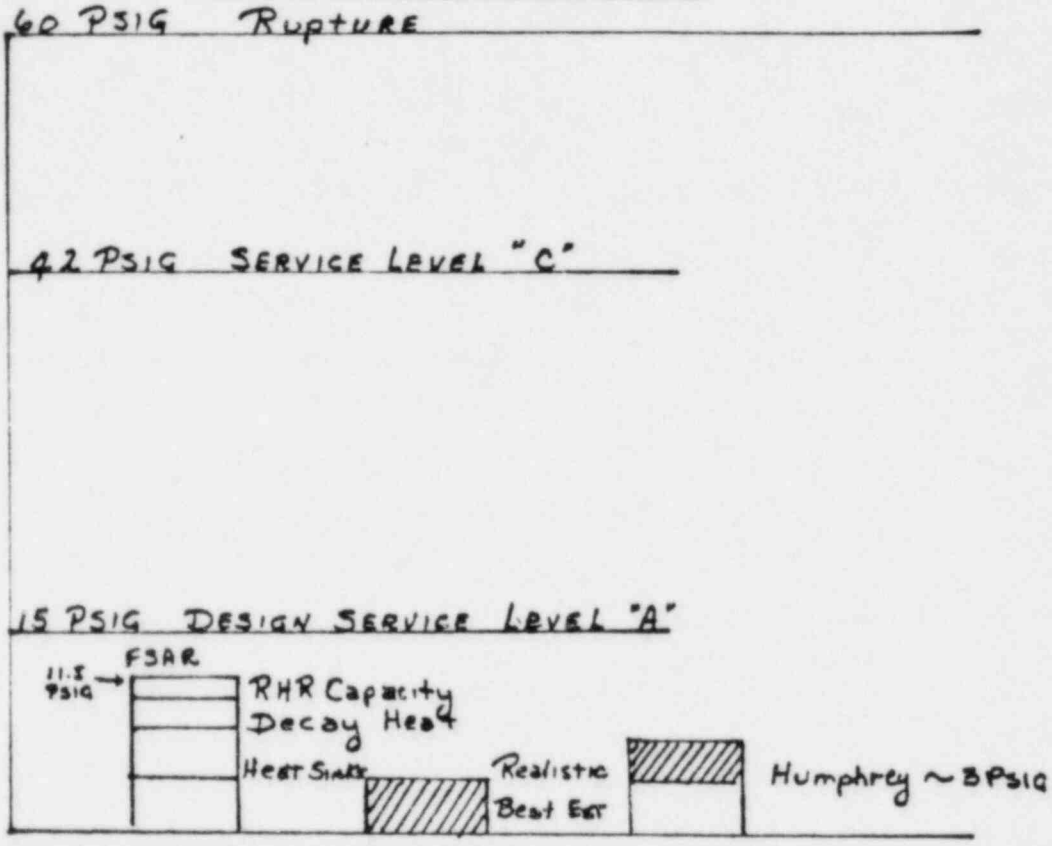
FIGURE 1

CONTAINMENT-RELATED ISSUES COMMITTED FOR RESOLUTION ON GESSAR

GE Issue Number	MP&L/NRC Issue No. (Prime;etc)	Brief Characterization of Issue/Concern
1106	4.8; 4.5 5.3	In Containment Spray Mode, RHR HX effectiveness is less than under Pool Cooling Mode.
1107	10.1	Upper Pool Dump causing overflow of weir due to pool encroachments.
1108	13.0	RHR Spray Mode 90-sec timer might allow two-loop simultaneous actuation.
1109	3.1; 3.3	Discharges from RHR relief valve line could lead to added condensation and submerged structures loads.
1110	21.0	Make-up air for Containment Backup (H_2 Control) Purge needed.
1111	15.0	Negative pressure effects in Secondary Containment under containment spray actuation.
1115	5.7; 5.6	H_2-Mixer discharge head exceeded if Upper Pool Dump occurs without suppression pool drawdown.
1120	(None)	CLR table for SBA shows assumption basis which is not consistent with FSAR assumption set.
1121	10.1; 8.2 11.0	Drywell-to-Containment ΔP effects (weir overflow; pool swell loads.)

FIGURE 2

FIGURE OF PRESSURE MARGINS



OTHER EFFECTS

- BEST ESTIMATE OF SUPPRESSION POOL TEMPERATURE ~160°F
- SAFETY GRADE CONTAINMENT SPRAYS LIMIT CONTAINMENT PRESSURE AND TEMPERATURE EVEN WITH DRYWELL LEAKAGE
- WITHOUT ACTIVE CONTAINMENT COOLING BUT CREDIT FOR STRUCTURAL HEAT SINKS, OPERATOR HAS APPROXIMATELY 40 HOURS TO ACT BEFORE RUPTURE PRESSURE IS REACHED

FIGURE 3

HUMPHREY ISSUE		ESTIMATED EFFECT	MARGIN
1.7	MINIMIM FLOW AREA ABOVE POOL	0	
3.6	POOL TEMP. DUE TO RHR SRV	$3^{o}F$	
4.1		$10^{o}F$	
4.2		3 PSI	
4.3		$3^{o}F$	11 PSI
4.4		$7^{o}F$	BEST EST.
4.5	SUPPRESSION POOL TEMPERATURE	$2^{o}F$	TO DESIGN
4.6	STRATIFICATION	0	
4.7		$3^{o}F$	$25^{o}F$
4.8		$7^{o}F$	BEST EST.
4.9		0	TO DESIGN
4.10		$3^{o}F$	
5.1		0 PSI	
5.2		0 PSI	
5.3		0 PSI	
5.4	DRYWELL TO CONTAINMENT	0 PSI	
5.5	BYPASS LEAKAGE	$5^{o}F$	
5.6		0 PSI	
5.7		0 PSI	
5.8		$0^{o}F$	
7.1	CONTAINMENT PRESSURE	$7^{o}F$	
7.2	RESPONSE	$0^{o}F$	
7.3		0.5 PSI	
8.1	CONTAINMENT AIR MASS	$3^{o}F/1$ PSI	
8.2	EFFECTS	0	
8.3		0	
8.4		0	
9.1	FINAL DRYWELL AIR MASS	3 PSI	
9.2		0	
9.3		0	
13.0	90 SECOND SPRAY DELAY	0	
14.0	RHR BACK FLOW THROUGH SPRAY	3 PSI	
15.0	SECONDARY VACUUM BREAKER PLENUM RESPONSE	-3 PSI	

WMD:LM/8P-1
7/28/82

FIGURE 4

S. H.L.-III
Rec.-1

MAJOR CATEGORIES

I. LOCAL ENCROACHMENTS

II. PERTURBATIONS IN LOAD DEFINITION CAUSED BY ANNULAR VENTS

III. UNACCOUNTED FOR RELIEF VALVE EFFECTS

IV. SUPPRESSION POOL TEMPERATURE STRATIFICATION

V. DRYWELL TO CONTAINMENT BYPASS LEAKAGE EFFECTS

VI. RHR PERMISSIVE ON CONTAINMENT SPRAY

VII. CONTAINMENT PRESSURE RESPONSE

VIII. CONTAINMENT AIRMASS EFFECTS

IX. DRYWELL AIRMASS EFFECTS

X. WEIRWALL OVERFLOW

XI. OPERATIONAL CONTROL OF DRYWELL TO CONTAINMENT DIFFERENTIAL PRESSURE

XIV. CONTAINMENT SPRAY BACKFLOW

XVI. EFFECT OF SUPPRESSION POOL LEVEL ON TEMPERATURE MEASUREMENT

XIX. EFFECTS OF CHUGGING FROM LOCAL ENCROACHMENTS AND ADDITIONAL SUBMERGENCE

XX. LATERAL LOADS DURING D/W NEGATIVE PRESSURE TRANSIENT

WMD:LM/8L-1
7/28/82

FIGURE 5

CATEGORY: IV

ISSUE NO.: 1 7

ISSUE STATEMENT:

The vent area above the suppression pool at the HCU floor is not evenly distributed above the pool. The PSTF tests which were conducted yielded results based upon the assumption that the vent area was evenly distributed. The non-uniform distribution may create unanticipated perturbations in breakthrough height, swell height, etc.

GESSAR ACTION DIRECTION:

Provide references to applicable portions of GESSAR Appendix 3B, specifying HCU floor open-area requirement.

FIGURE 6

CATEGORY: IV

ISSUE NO: 6.2

ISSUE STATEMENT:

General Electric has recommended that an interlock be provided to require containment spray prior to starting the recombiners because of the large quantities of heat input to the containment. Incorrect implementation of this interlock could result in inability to actuate the recombiners without containment spray.

GESSAR ACTION DIRECTION:

Pursue through normal change control process to implement the proposed change (removal of interlock).

FIGURE 7

CATEGORY : IV

ISSUE NO.: 12.0

ISSUE STATEMENT:

The upper pool dumps into the suppression pool automatically following a LOCA signal with a thirty minute delay timer. If the signal which starts the timer disappears on the solid state logic plants, the timer resets to zero preventing upper pool dump.

GESSAR ACTION DIRECTION:

Revise SPMUS logic to assure automatic SPMUS actuation for all accident events for which additional suppression pool inventory is required.

FIGURE 8

CATEGORY: IV

ISSUE NO.: 13.0

ISSUE STATEMENT:

The "B" loop of the containment sprays includes a 90 second timer to prevent simultaneous initiation of the redundant containment sprays. Because of instrument drift in the sensing instrumentation and the timers, GE estimates that there is a 1 in 8 chance that the sprays will actuate simultaneously. Simultaneous actuation could produce negative pressure transients in the containment and aggravate temperature stratification in the suppression pool.

GESSAR ACTION DECISION:

Submit write-up of the analysis performed that shows negative containment pressures in excess of GESSAR design value (-0.8 psid) were not reached.

FIGURE 9

CATEGORY: IV

ISSUE NO.: 15.0

ISSUE STATEMENT:

The STRIDE plants had vacuum breakers between the containment and the secondary containment. With sufficiently high flows through the vacuum breakers to containment, vacuum could be created in the secondary containment.

GESSAR ACTION DIRECTION:

1. Define limiting negative pressure due to VB operation.
2. Confirm shield building and equipment are qualified for negative pressure, and specify condition in documents.

FIGURE 10

CATEGORY: IV

ISSUE NO.: 18.2

ISSUE STATEMENT:

Insulation debris may be transported through the vents in the drywell wall into the suppression pool. This debris could then cause blockage of the suction strainers.

GESSAR ACTION DIRECTION:

Present for NRC review completed GE analysis that showed "mirror" insulation used in GESSAR will plug less than 10% of the suction area.

FIGURE 11