November 19, 1999

FACILITY: Entergy Operations, Inc.

LICENSEE: Arkansas Nuclear One, Unit No. 2

SUBJECT: ARKANSAS NUCLEAR ONE , UNIT NO. 2 RE: SUMMARY OF NOVEMBER 9, 1999, MEETING WITH ENTERGY OPERATIONS, INC.

On November 9, 1999, representatives of the U. S. Nuclear Regulatory Commission (NRC) and Entergy Operations, Inc. (the licensee), met to discuss a license amendment request to increase the design pressure of the containment for Arkansas Nuclear One, Unit No. 2 (ANO-2). The licensee proposed this amendment request in conjunction with the ANO-2 steam generator replacement planned for Fall 2000. This meeting was held at NRC Headquarters in Rockville, Maryland. A notice of this meeting was issued on October 29, 1999. Enclosure 1 is a list of attendees. Enclosure 2 is the licensee's handout used during the meeting.

The licensee requested this meeting to provide a technical presentation to supplement their license amendment request which was submitted on November 3, 1999. The licensee discussed the impact of the replacement steam generators on the existing containment analysis, the results from the re-analysis, and the impact of these new conditions on existing systems, structures, and components. The licensee described the applicable features of the original licensing basis for ANO-2 and presented a summary of the computer codes utilized to support their evaluation. This presentation closely followed the structure of the November 3, 1999, application and was designed as an introduction to facilitate the staff's review.

ORIGINAL SIGNED BY

M. Christopher Nolan, Project Manager, Section 1
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-313 and 50-368
Enclosures: As stated (2)
cc w/encls: See next page

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ATTENDANCE LIST

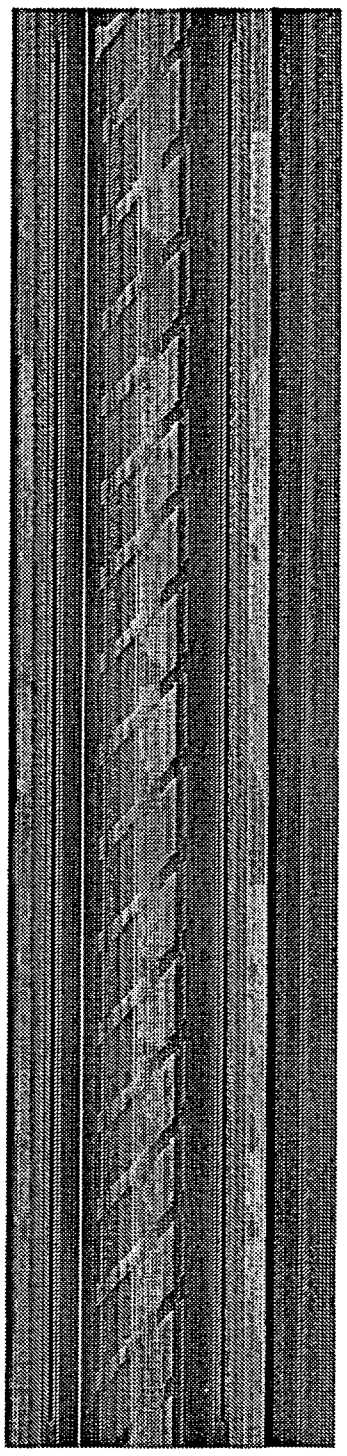
PUBLIC MEETING HELD NOVEMBER 9, 1999

Name	Organization	Telephone No.
Chris Nolan	NRC/NRR	301-415-1320
Bob Gramm	NRC/NRR	301-415-1302
George Hubbard	NRC/NRR	301-415-2870
Yong Kim	NRC/NRR	301-415-2729
Richard Lobel	NRC/NRR	301-415-2865
Kamal Manoly	NRC/NRR	301-415-2765
Cheng-Ih Wu	NRC/NRR	301-415-2764
Frank Orr	NRC/NRR	301-415-1815
Chu-Yu Liang	NRC/NRR	301-415-2878
Dale James	Entergy Operations, Inc.	501-858-4619
Dennis Boyd	Entergy Operations, Inc.	501-858-4616
Jim McWilliams	Entergy Operations, Inc.	501-858-4797
Stan Haynes	Entergy Operations, Inc.	501-858-4658
Doyle Adams	Entergy Operations, Inc.	501-858-4319
Al Buford	Entergy Operations, Inc.	501-858-4335
Larry Humphery	Entergy Operations, Inc.	501-858-5347
Roger Wilson	Entergy Operations, Inc.	501-858-4305

Enclosure 1

Meeting with NRR to Discuss ANO-2 Containment Uprate

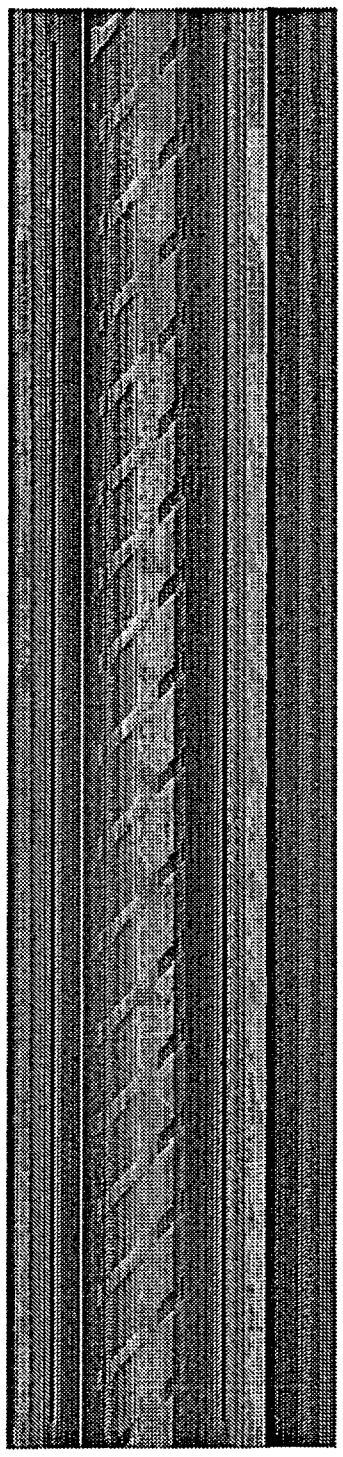
November 9, 1999



ANO-2 Containment Uprate

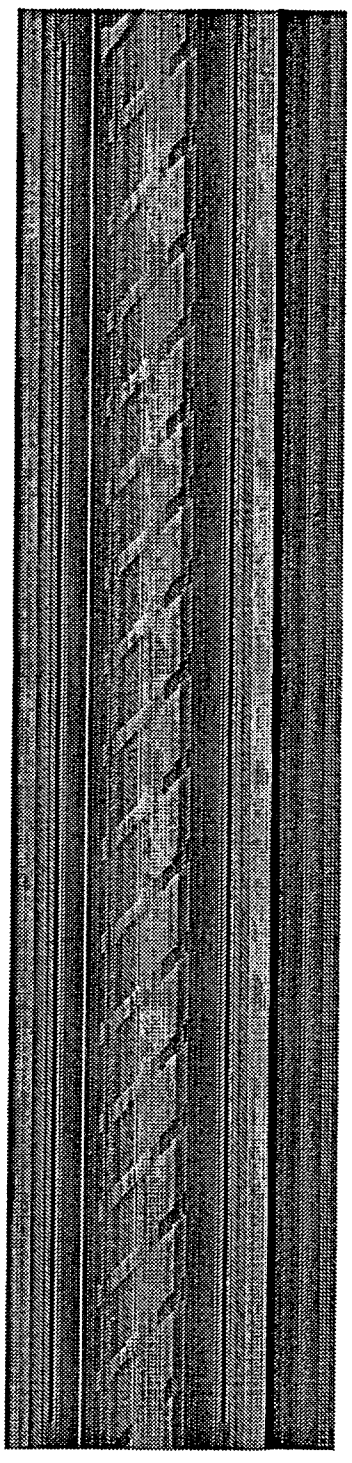
- **Meeting Purpose - Discuss Containment Uprate Submittal Package**
- **Agenda**

Introduction	**Larry Humphrey**
Safety Analysis Impact	**Stan Haynes**
Structural Analysis Impact	**Doyle Adams**
Impact on Components	**Roger Wilson**
Closing Remarks	**Larry Humphrey**



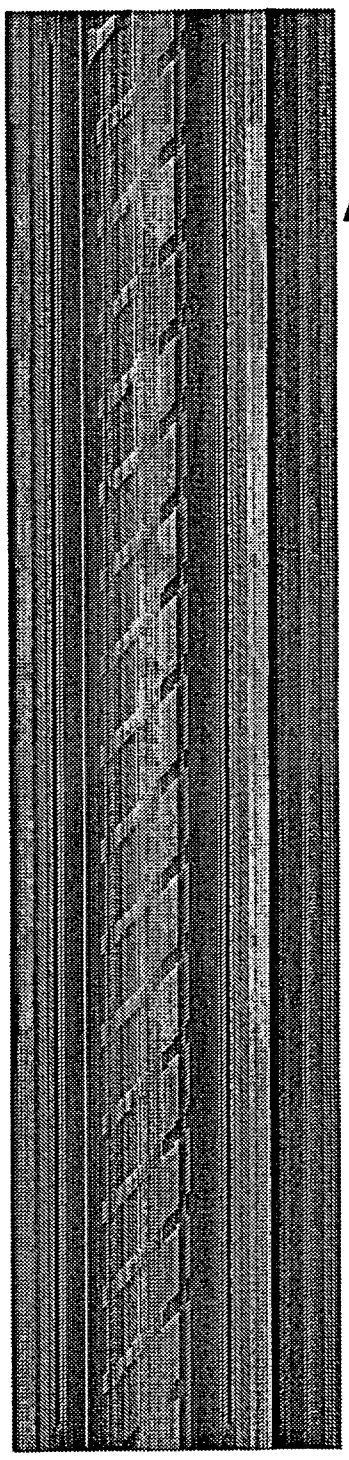
ANO-2 Containment Uprate

- **Containment Uprate due to Replacement Steam Generators**
  - **supplier - Westinghouse**
  - **safety analysis - ABB-CE**
  - **changeout services - Bechtel**
- **Replacement During RFO 2R14 - September 15, 2000**
- **Operate One Cycle at Current Licensed Power Level Following 2R14**



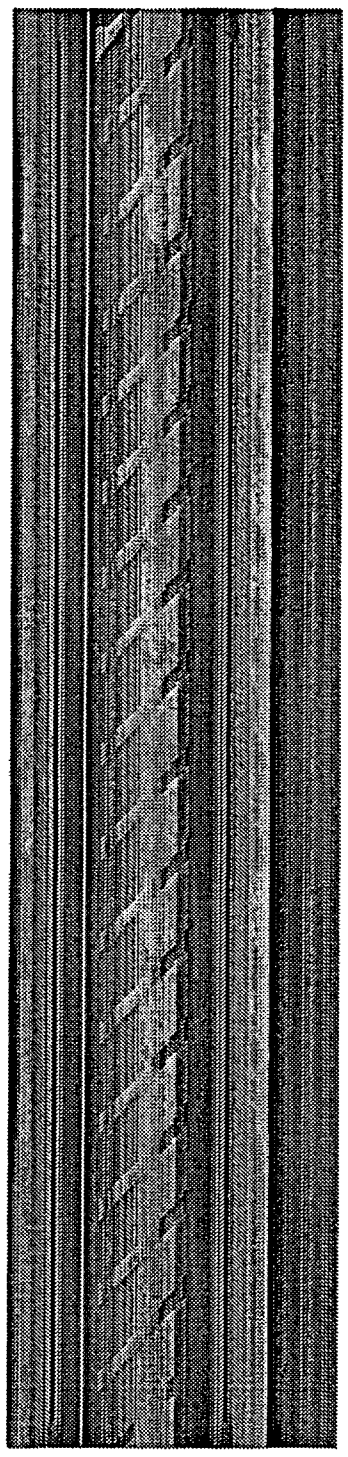
ANO-2 Containment Uprate

- **Power Uprate (7-1/2%)**
  - **objective during design/analysis of RSGs**
  - **2R15 (Spring 2002)**
- **RSGs have Larger Primary and Secondary Inventory**
  - **containment post accident peak pressure response increase**



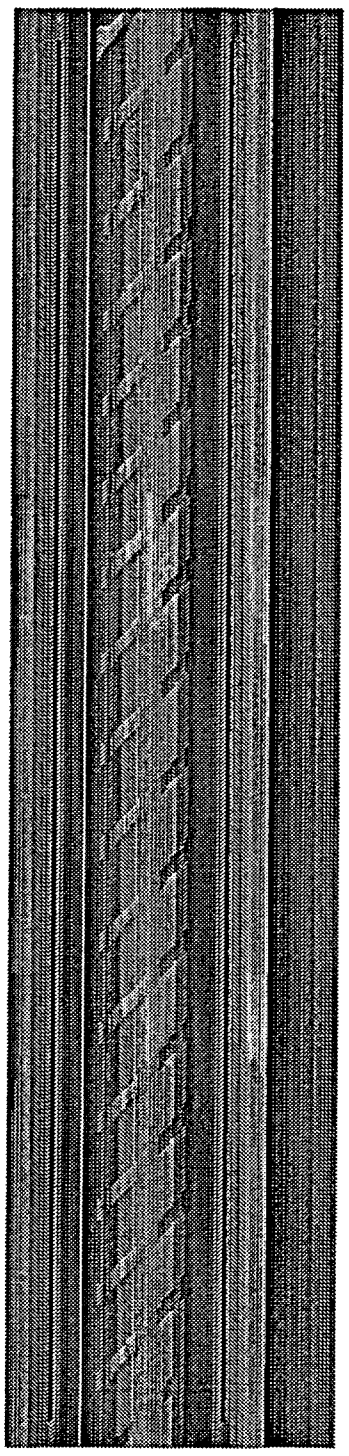
ANO-2 Containment Uprate

- **Containment Design Pressure Increase from 54 psig to 59 psig**
  - **change to licensing basis**
  - **concluded to result in USQ (reduction in the margin of safety as described in the bases of the technical specifications)**



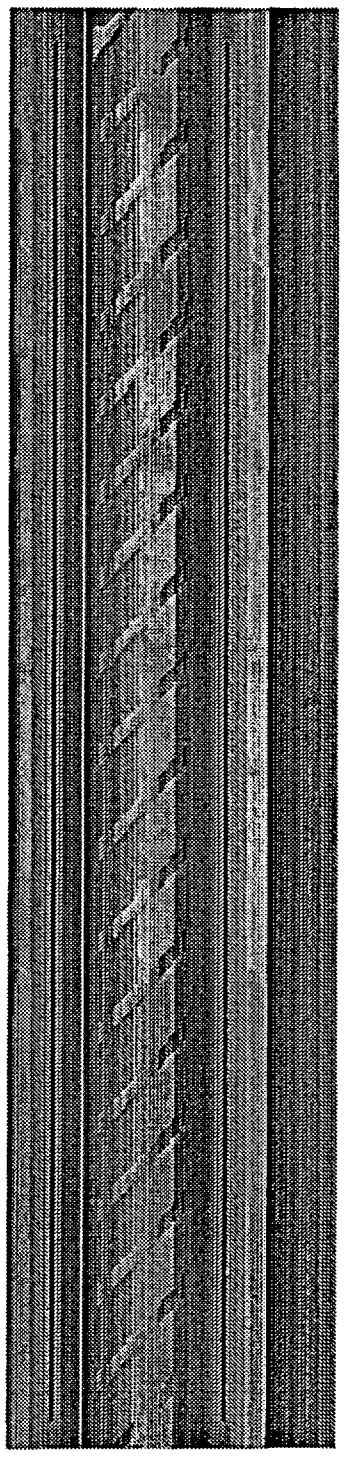
Overview of Submittal

- **Cover Letter & 18 Page Attachment**
- **Enclosure 1 - Proposed TS Changes**
- **Enclosure 2 - Proposed SAR Changes**
- **Enclosure 3 - Safety Analysis Summary**
- **Enclosure 4 - Structural Analysis Summary**
- **Enclosure 5 - Impact on Components**
- **Enclosure 6 - OSG/RSG Design Comparison**



Safety Analysis Summary

Stan Haynes



Safety Analysis Impact

- **Enclosure 3**
  - **details impact of safety analysis on containment uprate**
- **The Safety Analysis Meets the Acceptance Criteria for Containment Design**

Safety Analysis Impact

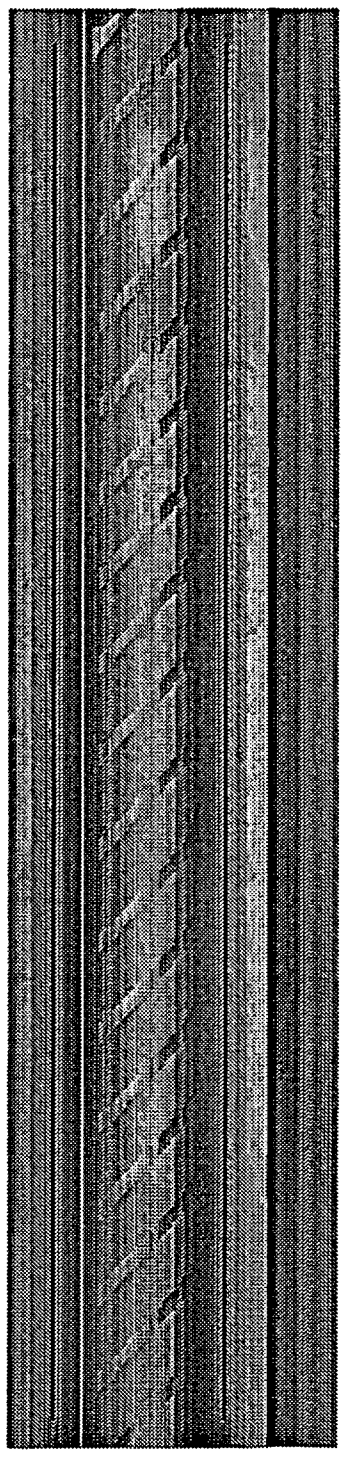
- **Design Basis**
- **Scope**
- **Acceptance Criteria**
- **Methodology**
- **Conservatism**
- **Single Failure**
- **EQ**
- **Results**

Safety Analysis Impact

- **Current Design Basis**
  - **ANO designed per GDC criteria**
  - **specifically GDC 38 and 50 as they apply to containment**
  - **intent of the safety analysis is to remain consistent with current design basis**

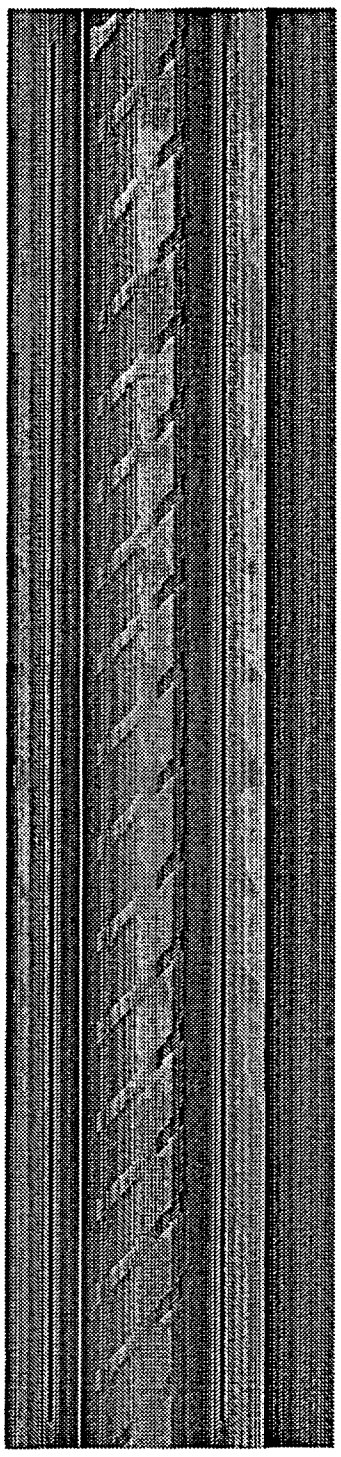
Safety Analysis Impact

- **Scope**
  - **all analyses performed at proposed 107.5% uprated thermal power**
  - **postulated limiting design basis accidents**
    - **LOCA**
    - **MSLB**
  - **design evaluation**
    - **containment spray system performance**
    - **containment air cooler performance**



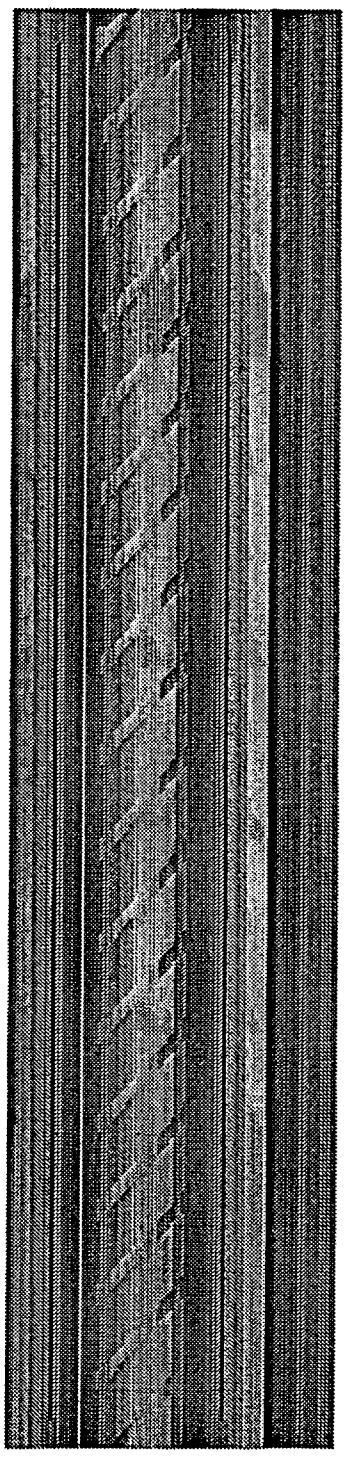
Safety Analysis Impact

- **Acceptance Criteria**
  - **maximum post-accident containment pressure shall be less than design pressure**
  - **maximum post-accident containment liner temperature shall be less than design temperature**
  - **containment heat removal system shall reduce post-accident containment pressure and temperature to an acceptably low level following an accident**



Safety Analysis Impact

- **Impact of RSG on Containment Analysis**
  - **larger surface area**
  - **smaller tube diameter**
  - **larger primary inventory**
  - **larger secondary inventory**
  - **integral flow restricting steam nozzle**



Safety Analysis Impact

- **Methodology**
  - **ABB-CENP (NSSS vendor) supplied blowdown data**
    - **used approved methodology for blowdown and reflood calculations**
  - **Bechtel/Entergy Performed Containment Analysis**
    - **original containment analysis code used**

Safety Analysis Impact

● Computer Codes Used for LOCA

CODE	Application	Date of NRC SER
CEFLASH-4A	LOCA Blowdown	July 31, 1986
FLOOD3	Reflood/Post Reflood	December 31, 1975
CONTRANS	Sensible Energy Additions to Containment	April 6, 1976

Safety Analysis Impact

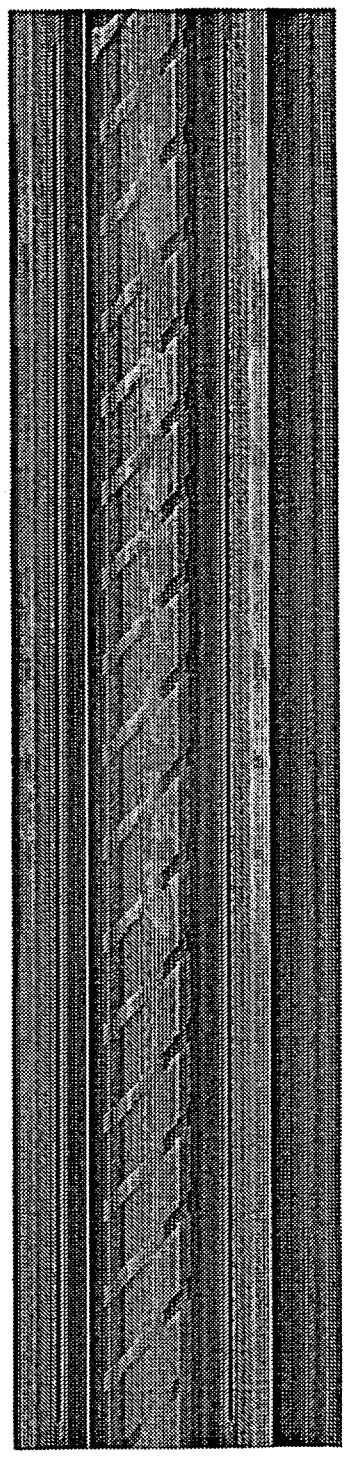
- **Computer Codes Used for MSLB**

CODE	Application	Date of NRC SER
SGNIII	MSLB Blowdown	NUREG-0800, Rev 1
RELAP5 MOD3	Feedwater Addition to SG	March 12, 1998 Letter 2CNA039802

Safety Analysis Impact

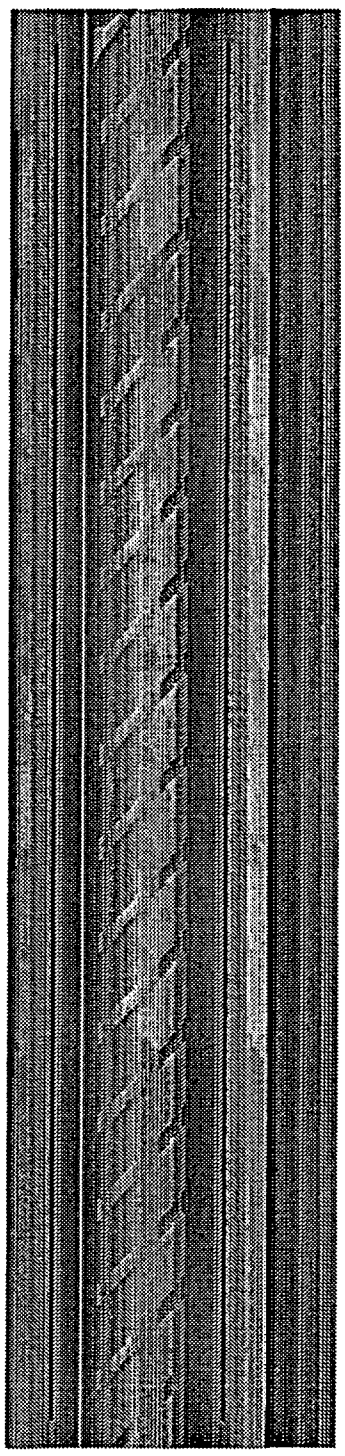
- **Computer Code Used for Containment Response Analysis**

CODE	Application	Date of NRC SER
COPATTA	Containment Response Analysis	Original ANO-2 SER



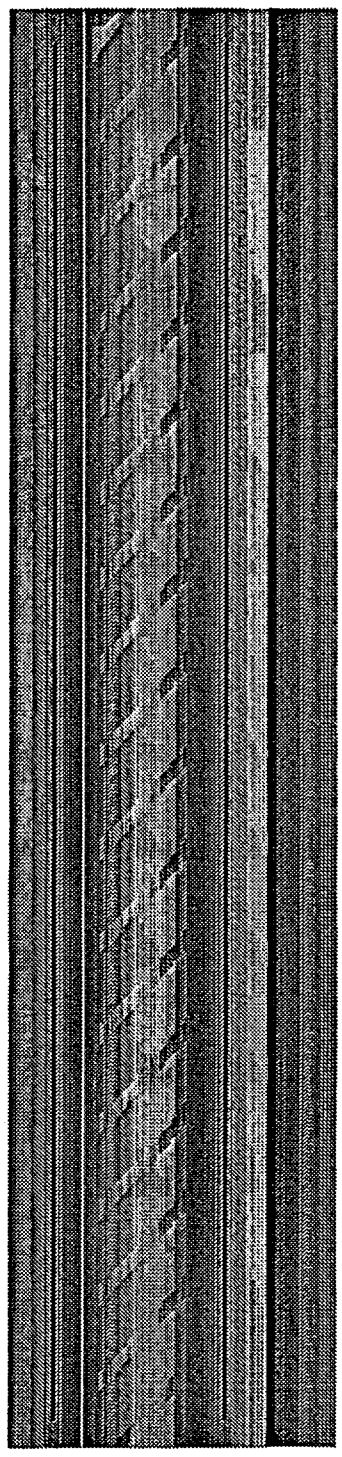
Safety Analysis Impact

- **Break Spectrum - LOCA**
  - **102% uprated power**
  - **double ended slot breaks in:**
    - **hot leg**
    - **suction leg**
    - **discharge leg**



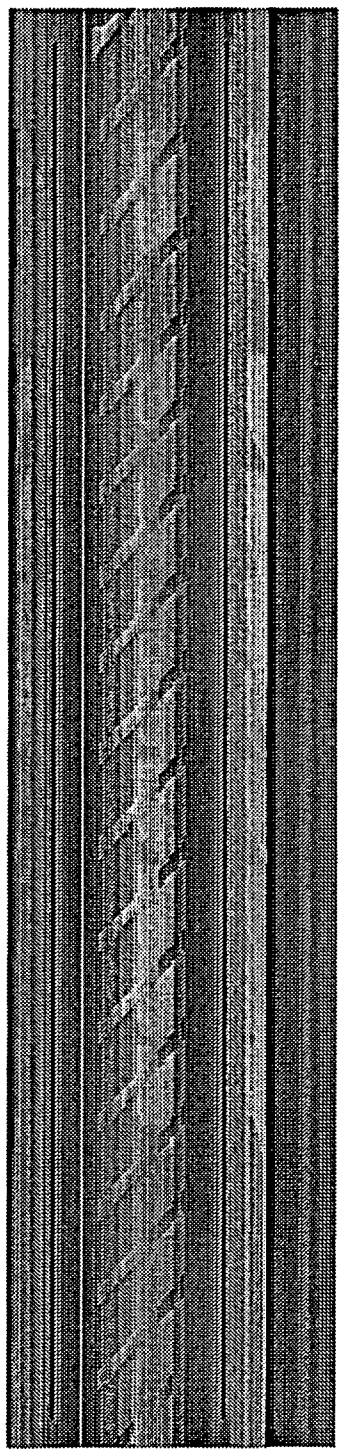
Safety Analysis Impact

- **Break Spectrum - MSLB**
  - **power range - 0% to 102% uprated thermal power**
  - **guillotine break considered for all power levels except 0%**
  - **for 0% power break size reduced to prevent moisture carryover**



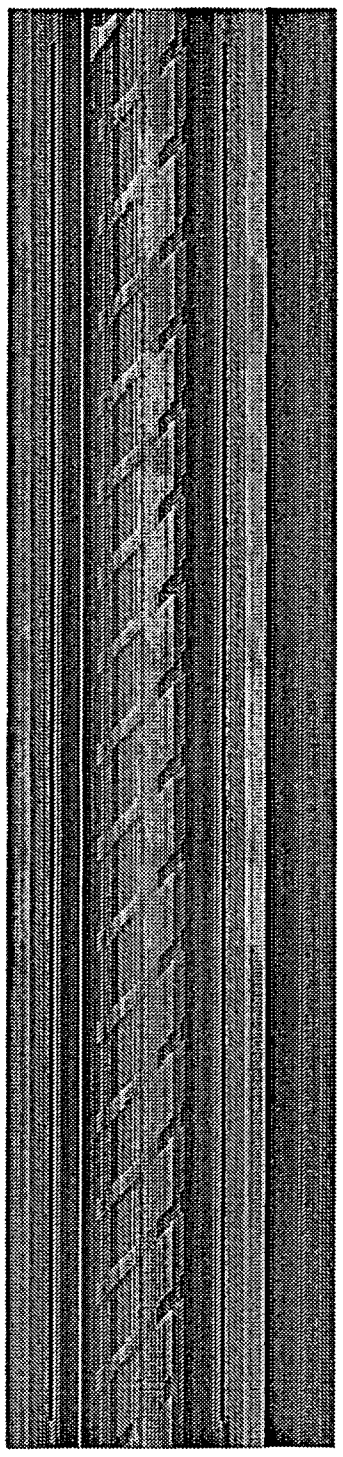
Safety Analysis Impact

- **LOCA Methodology**
  - **mass and energy analysis**
    - **blowdown phase**
    - **reflood and post-reflood phase**
    - **long-term cooldown**
  - **containment response**
- **MSLB Methodology**
  - **mass and energy analysis**
  - **containment response**



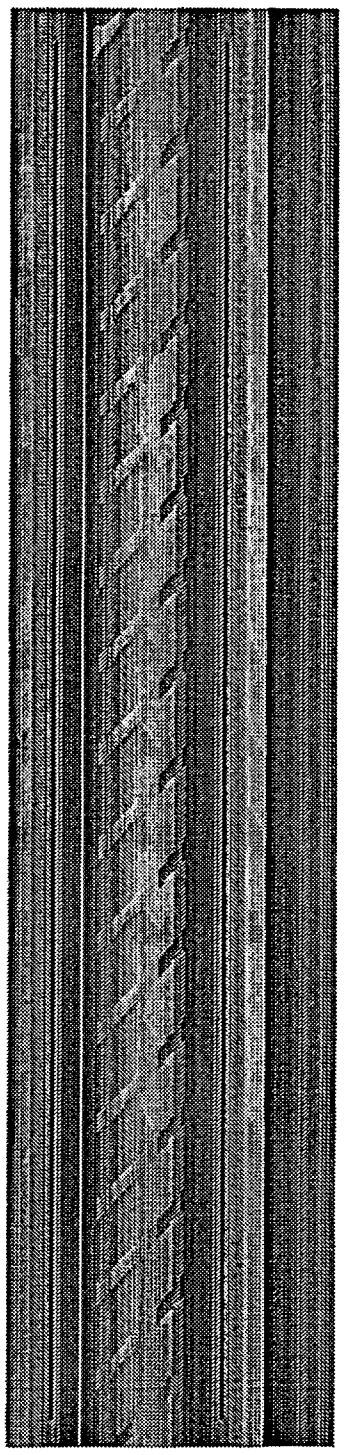
Safety Analysis Impact

- **LOCA Blowdown**
  - **CEFLASH-4A replaces CEFLASH-4**
  - **several assumptions have changed from those used in current SAR analysis**
  - **a discussion of changes in methodology is provided in enclosure 3 of submittal package**



Safety Analysis Impact

- **Reflood and Post Reflood**
  - **FLOOD3 replaces FLOODMOD2 and froth calculations**
  - **this methodology has been reviewed by NRC in other applications**
  - **ANS/ANSI 5.1-1979 +2σ decay heat**

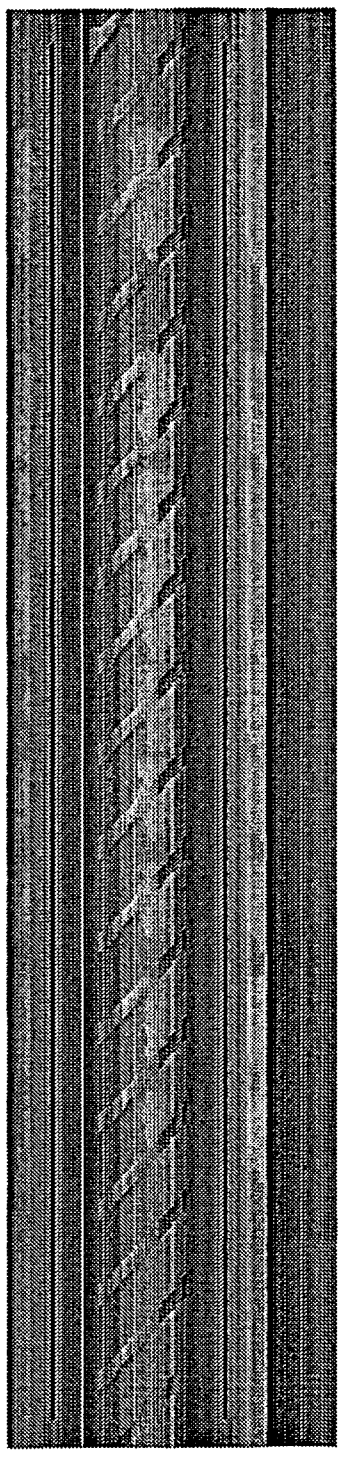


Safety Analysis Impact

- **Long-Term Cooldown**
  - **CONTRANS used to develop heat addition from:**
    - **reactor vessel**
    - **fuel**
    - **internals**
  - **CONTRANS used to develop residual energy additions from RCS/SG**

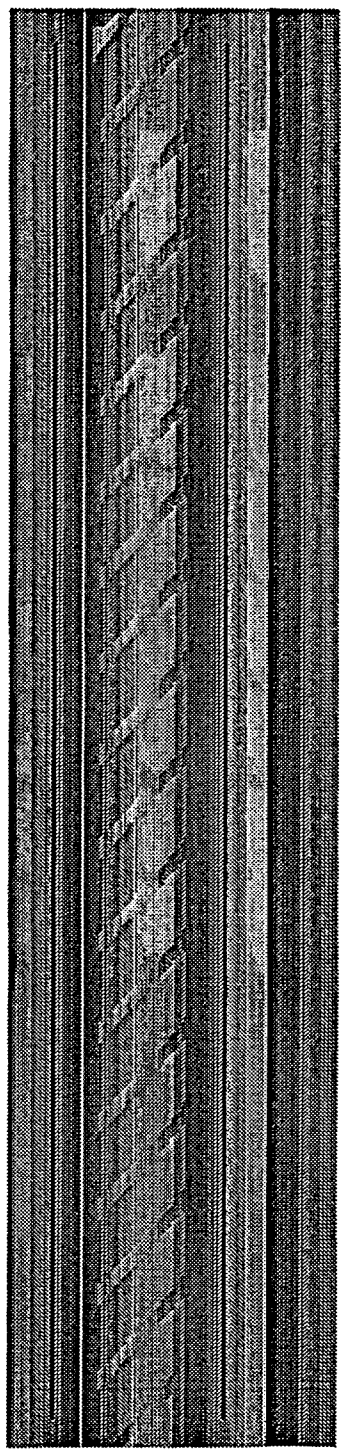
Safety Analysis Impact

- **LOCA Containment Analysis**
  - **COPATTA used to determine containment pressure and temperature response**
    - **variable service water temperature used**
    - **Branch Technical Position ASB 9-2 decay heat**



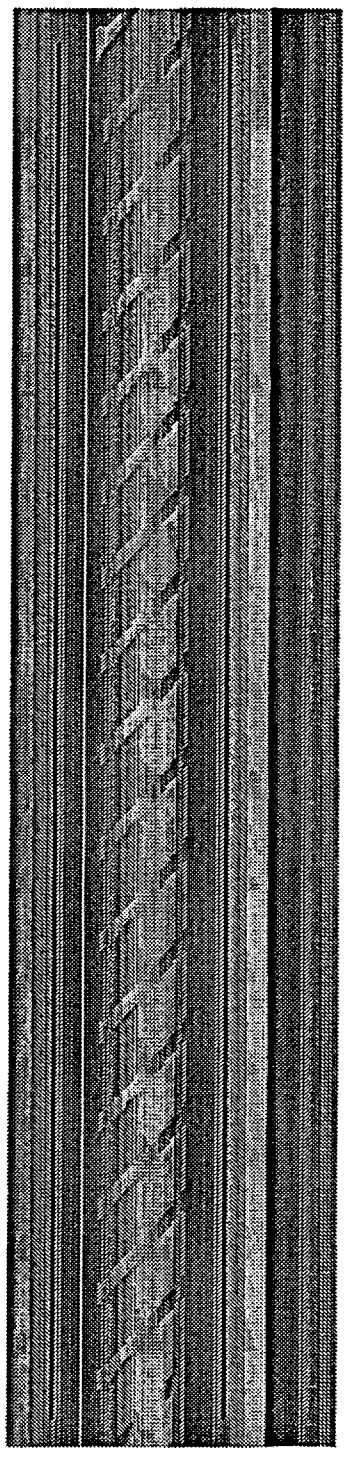
Safety Analysis Impact

- **MSLB Mass and Energy Analysis**
  - **used previously documented methodology**
  - **CSAS used for main feedwater isolation**
  - **RELAP5/MOD3 used for FW addition**
- **MSLB Containment Response**
  - **COPATTA used as in LOCA analysis**



Safety Analysis Impact

- **Single Failure Consideration - LOCA**
  - **loss of offsite power assumed**
  - **limiting single failure - loss of EDG**
  - **considered failures of:**
    - **containment spray train**
    - **containment air cooler train**

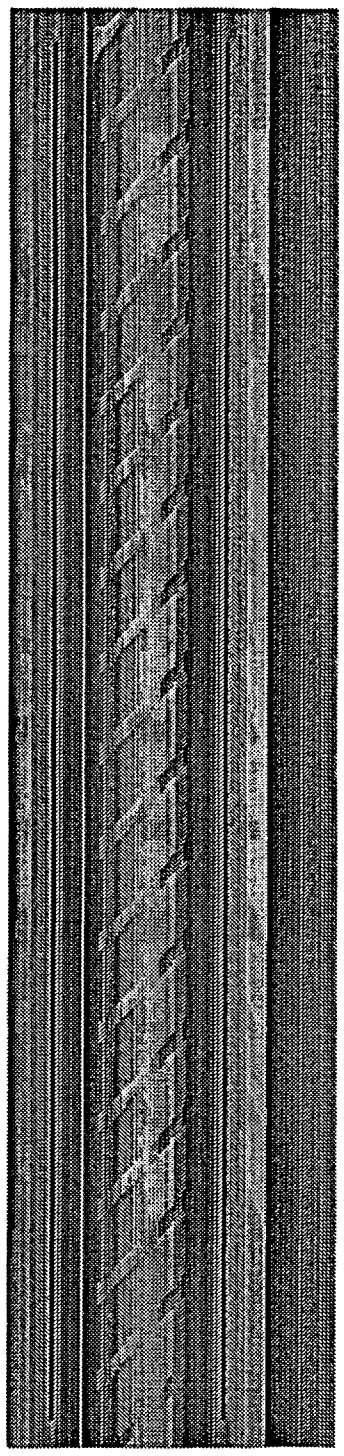


Safety Analysis Impact

- **Single Failure Consideration - MSLB**
  - **offsite power considered available**
  - **single active failure - loss of containment spray at 0% power**
  - **considered failures of:**
    - **MFIVs to close**
    - **backup MFIVs to close**
    - **condensate pump to trip**
    - **heater drain pump to trip**
    - **main feedwater pump to trip**
    - **containment air cooler train**
    - **containment spray train**

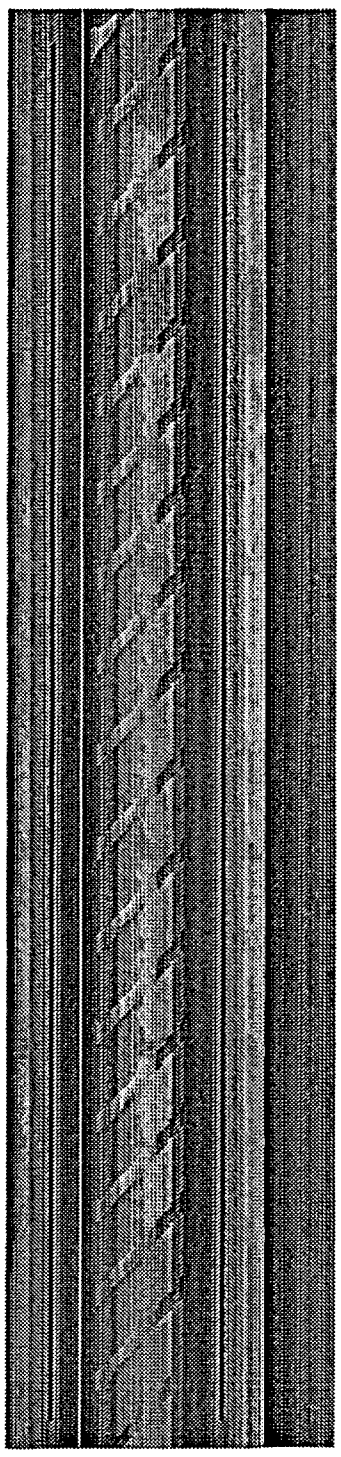
Safety Analysis Impact

- **EQ Considerations**
  - **results of DBA used for development of EQ requirements**
  - **DBA is double ended discharge leg slot (DEDLS) break with single failure of EDG**
  - **EQ program has been evaluated to reflect new DBA**



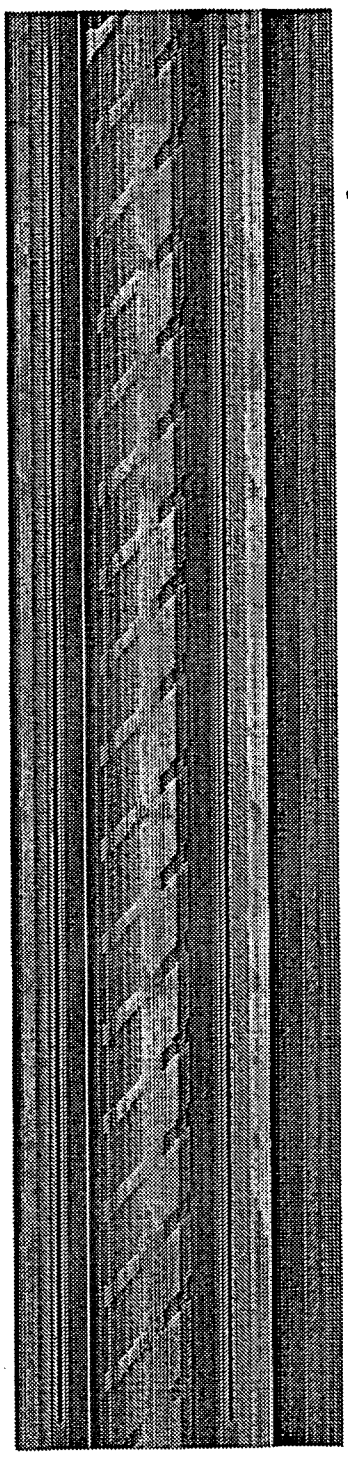
Safety Analysis Impact

- **Results**
  - **LOCA**
    - **DBA is DEDLS break with single failure of EDG**
    - **peak pressure of 57.7 psig**
  - **MSLB**
    - **limiting break at 0% power**
    - **single active failure of containment spray**
    - **peak pressure 57.7 psig**



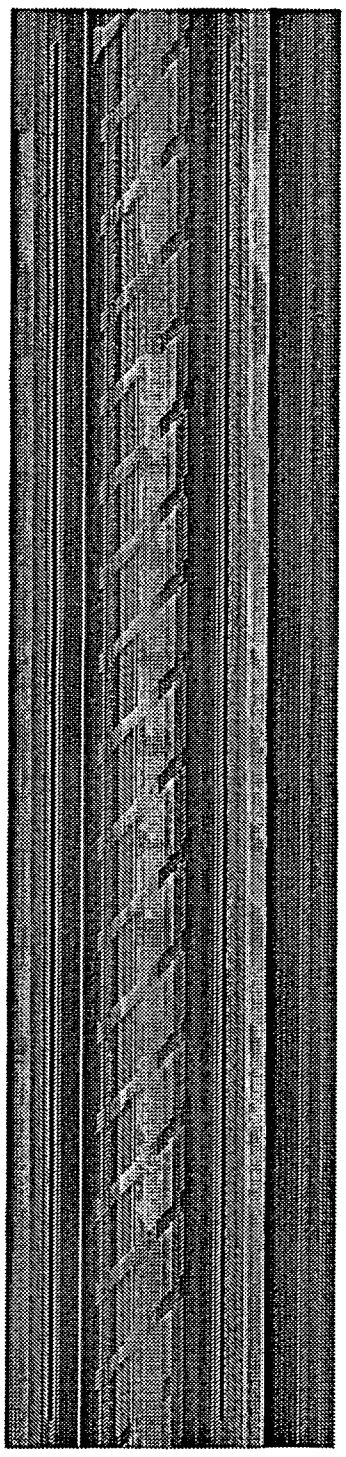
Safety Analysis Impact

- **CSAS Actuation (Containment Pressure High-High)**
  - **extended to provided parallel actuation of selected MSIS (SG pressure low) actuated components**
  - **necessary to keep peak pressure within design limits**
  - **credited only in MSLB and LOCA containment analysis**



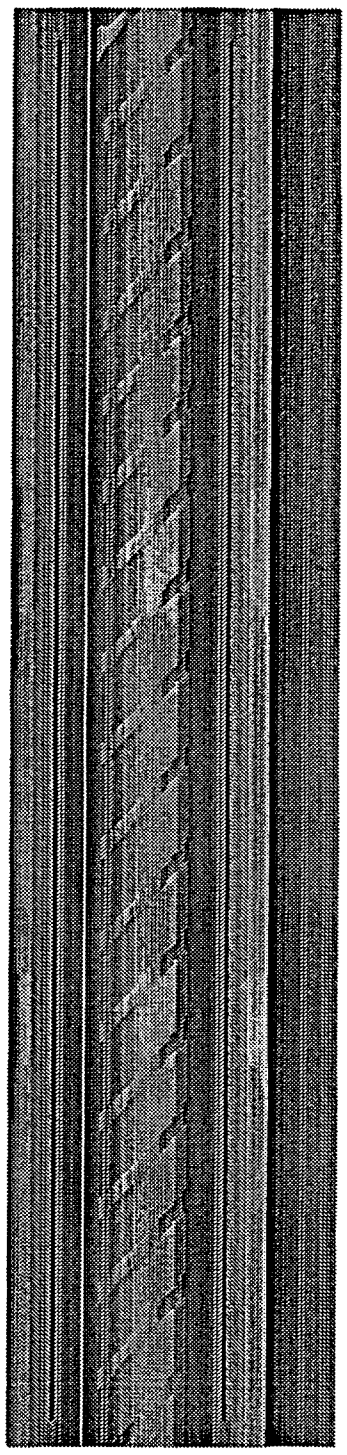
Safety Analysis Impact

- **CSAS Actuation**
- **Evaluations Demonstrate:**
  - **event analyses not crediting CSAS actuation, which might result in containment pressures reaching CPHH setpoint, are not adversely affected**
  - **extension of the CSAS actuation does not adversely affect any accident analyses**
  - **inadvertent CSAS during power operations produces no unacceptable transient conditions**



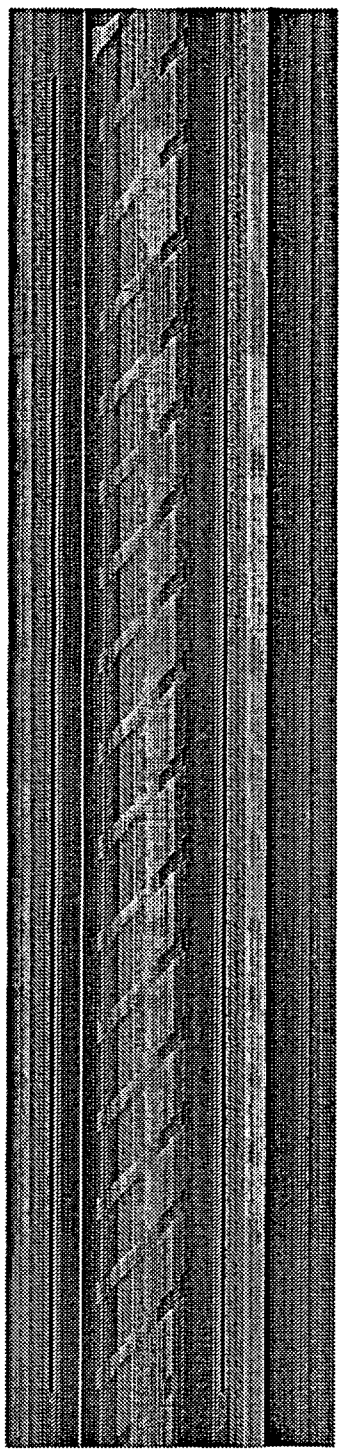
Safety Analysis Impact

- **SAR Changes**
  - **Section 6.2.1 - Containment Functional Design**
    - **rewritten**
    - **documents new design basis**
    - **renumbered**
  - **cross reference table provided**
  - **all SAR packages except for 6.2.1 will be markups of current SAR**



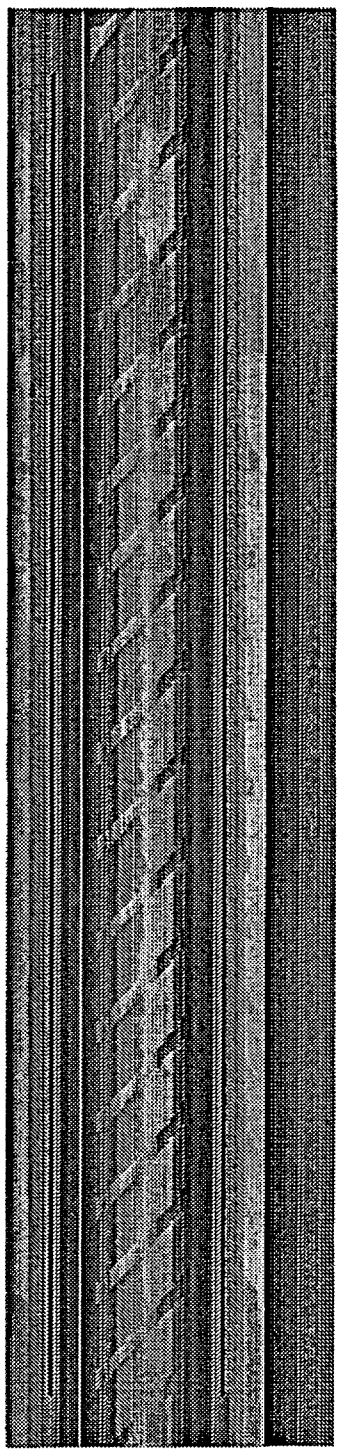
Structural Analysis Summary

Doyle Adams



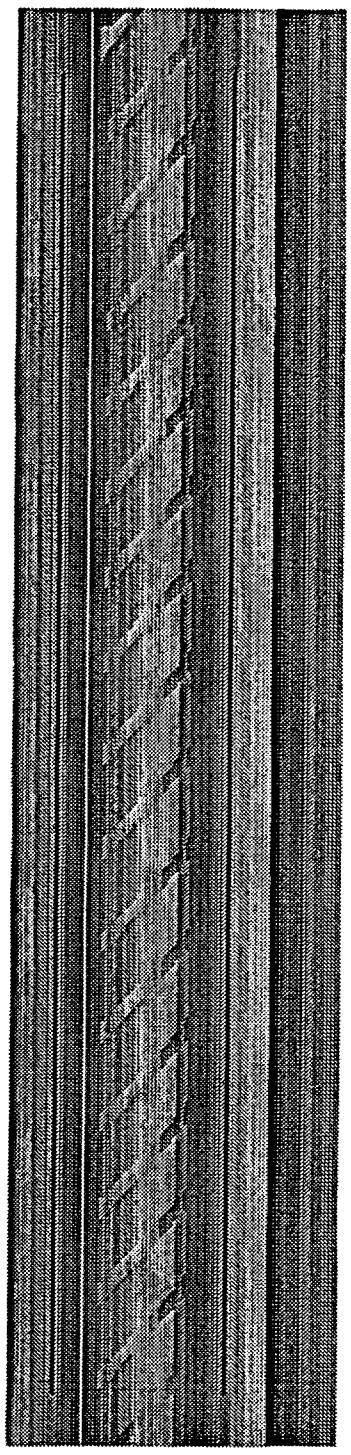
Structural Analysis Impact

- **Enclosure 4**
  - **Details Impact of Uprate on Containment Structural Analysis**
- **Outline**
  1. **Containment Design**
  2. **Comparison to ANO-1 containment building**
  3. **Computer Codes Used**
  4. **Methodology Used**
  5. **Structural Acceptance Test**
  6. **Comparison to other containment designs**



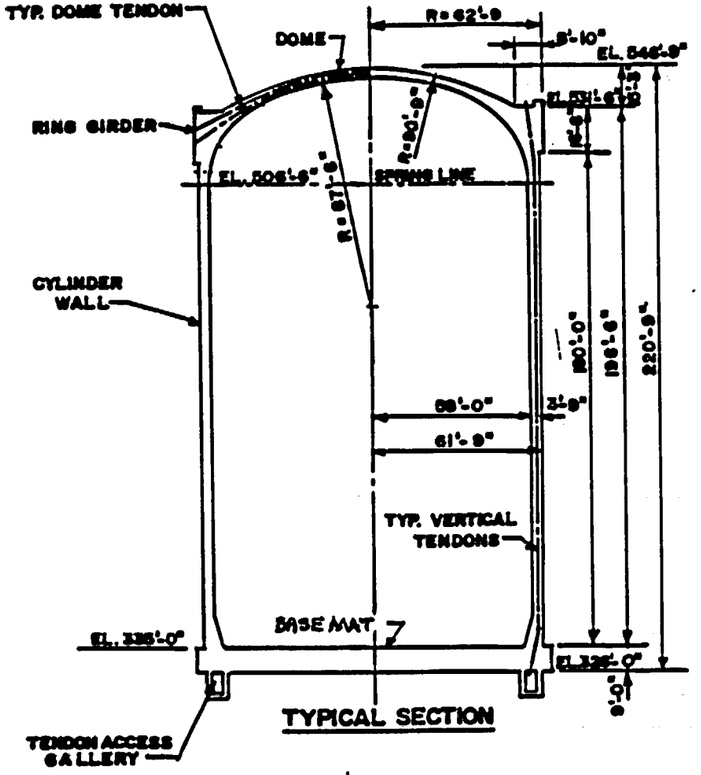
Structural Analysis Impact

- **Containment Design**
  - **Design Team**
    - **Doyle Adams, PE, Entergy**
    - **Eric Dietrich, PE, Entergy**
    - **Bill Hovis, PE, Entergy**
    - **Amjid Qureshi, PE, Contractor**
    - **Ted Johnson, PE, Contractor involved with original design**
    - **Tom Kohli, PE, Contractor involved with writing BSAP computer code**
    - **Gunnar Harstead, PE, Contractor as Independent Reviewer**

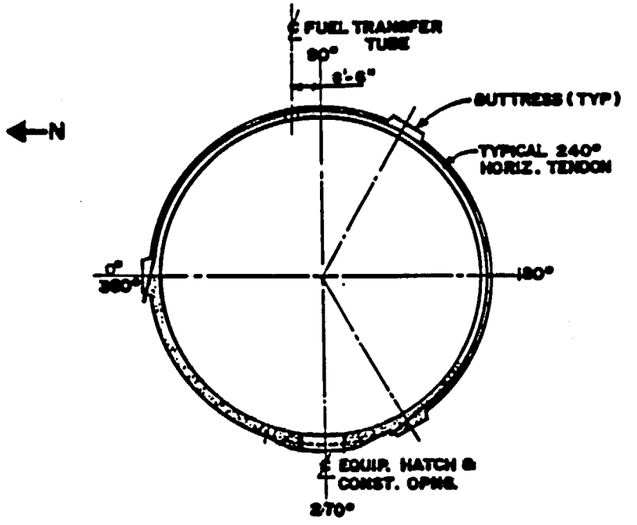


Structural Analysis Impact

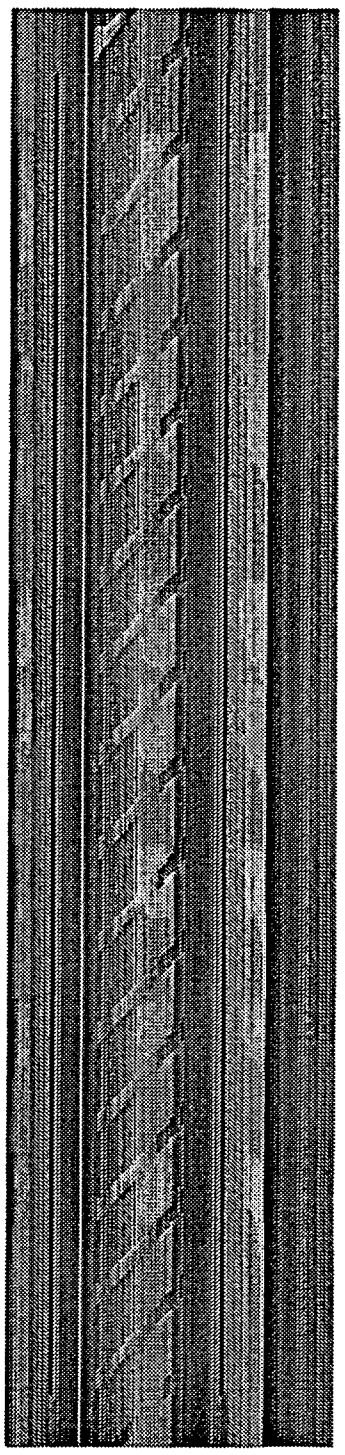
- **Containment Design**
  - **Bechtel design (see slide)**
  - **sphere / torus dome, 3'-3" thickness**
  - **three buttress cylindrical shell, 3'-9" thickness**
  - **basemat, 9'-0" thick**
  - **1/4" thick steel liner plate**
  - **post tensioned with 1/4" diameter wire, 186 wire tendons**
  - **rock site**



TYPICAL SECTION

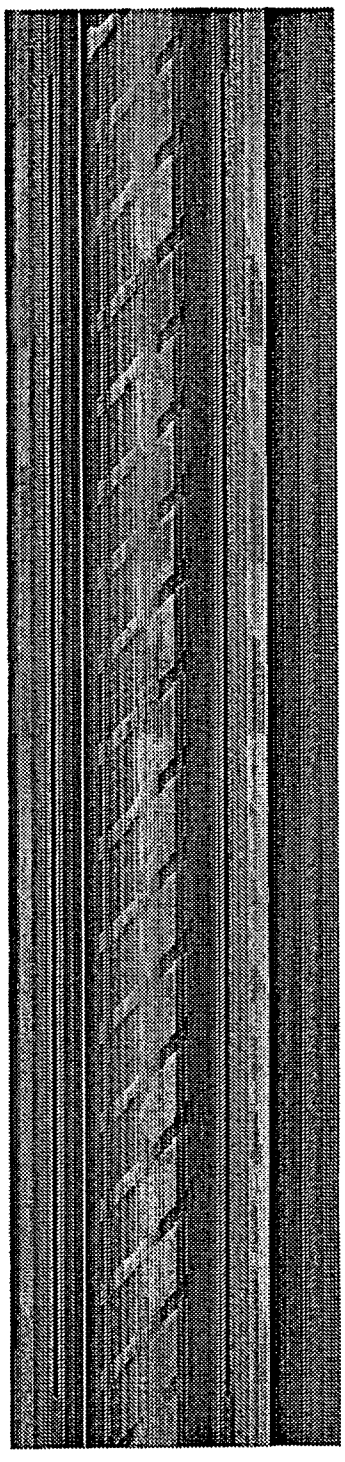


PLAN



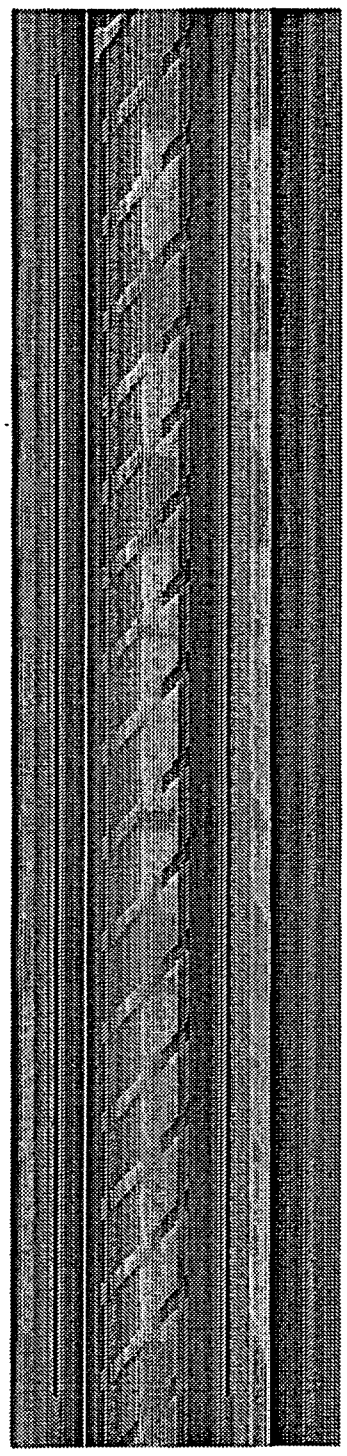
Structural Analysis Impact

- **Comparison to ANO-1 Containment**
  - **similarities**
    - **ANO-2 is compared to ANO-1 because:**
      - **containment essentially identical**
      - **same wall, dome, and basemat thickness**
      - **same penetration layout, just opposite hand**



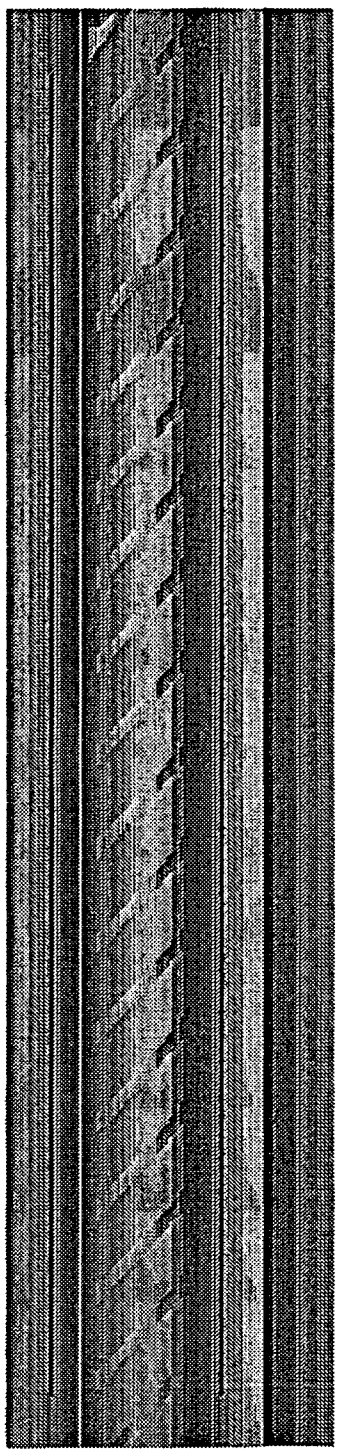
Structural Analysis Impact

- **Comparison to ANO-1 Containment**
  - **differences**
    - **original design pressure ANO-1: 59 psig, ANO-2: 54 psig**
    - **internal structure shifted east for Unit 2**
    - **concrete design strength, 5500 psi for Unit 1, 5750 psi for Unit 2**
    - **dome tendons placed slightly higher in dome concrete on Unit 2**



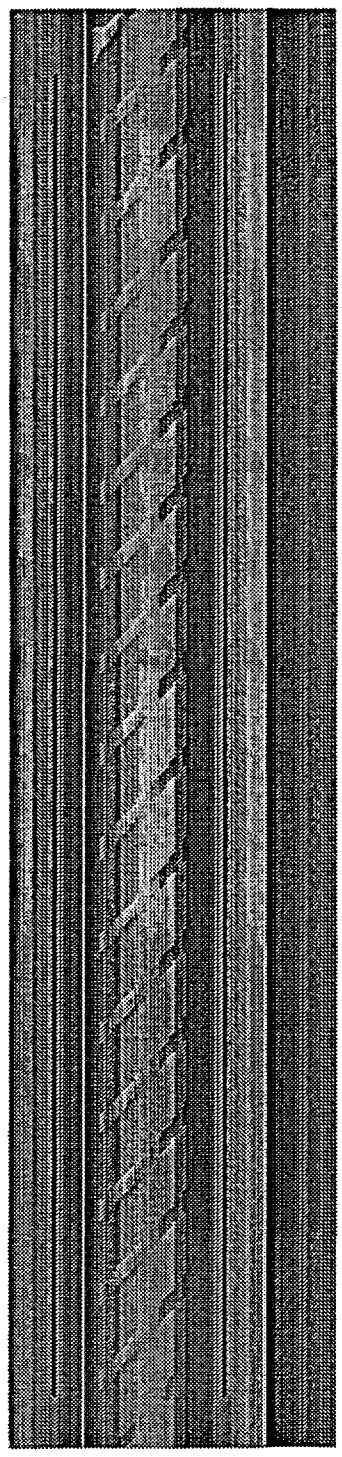
Structural Analysis Impact

- **Differences (Continued)**
  - **number of tendons in the different tendon groups reflective of design conditions for seismic and design pressure**
    - **dome- three groups of 30 for Unit 1, three groups of 28 for Unit 2**
    - **hoops- 169 for Unit 1, 159 for Unit 2**
    - **verticals- 102 for Unit 1, 115 for Unit 2**



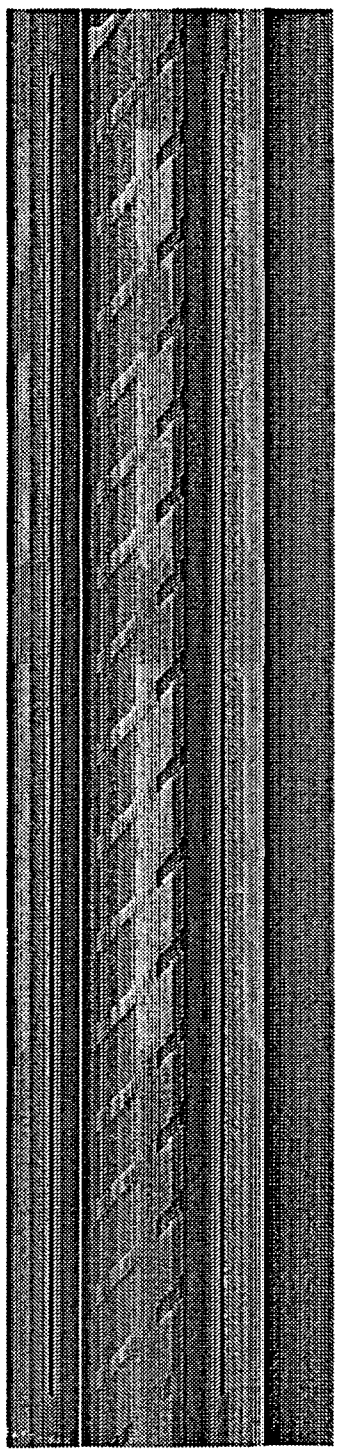
Structural Analysis Impact

- **Computer Codes Used**
  - **original code was Bechtel "FINEL" program used in axisymmetric analysis**
  - **Bechtel Structural Analysis Program (BSAP)**
    - **used in three dimensional analysis of cylindrical shell, dome, basemat, and equipment hatch**
  - **ALGOR**
    - **used to create all models**
    - **used in analysis of axisymmetric model**



Structural Analysis Impact

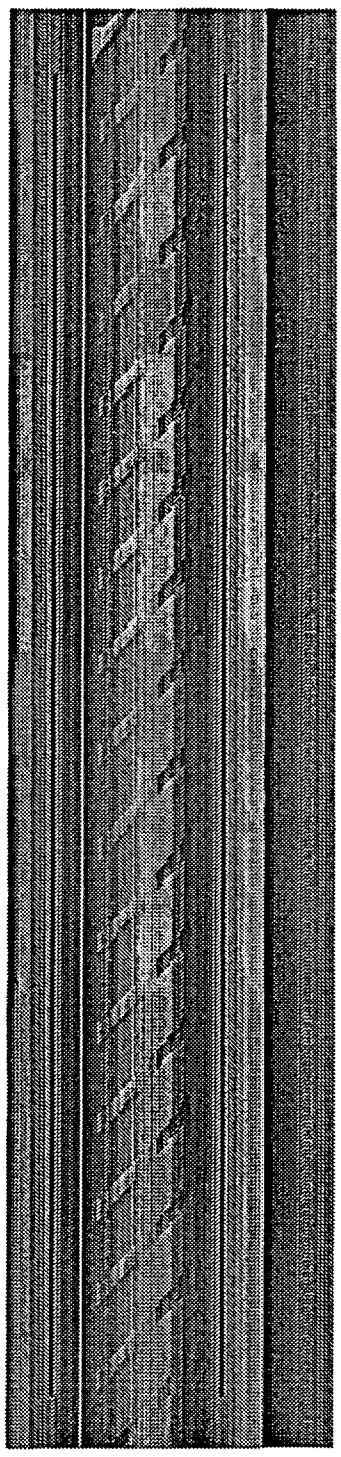
- **Computer Codes Used (Continued)**
  - **both programs are finite element programs**
  - **both programs are Appendix B and both are verified periodically by extensive sets of test problems**



Structural Analysis Impact

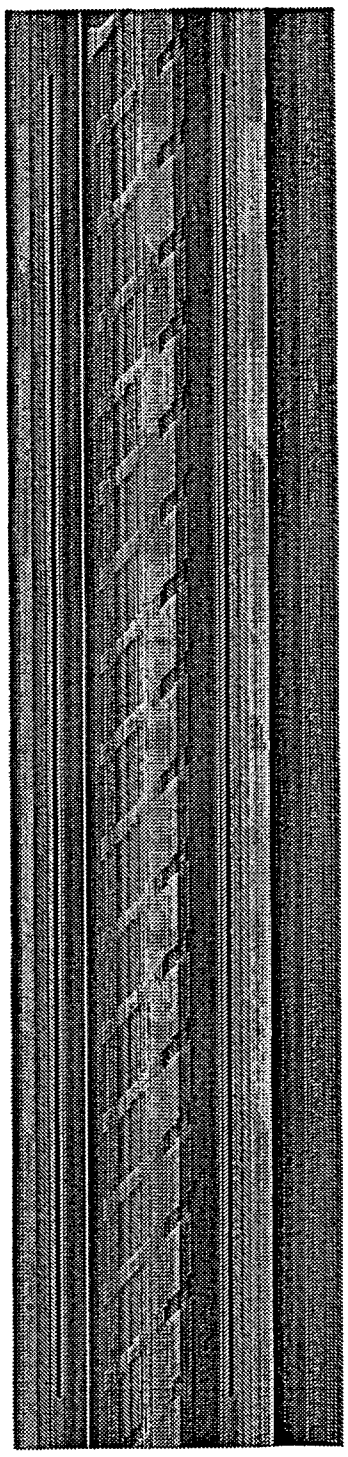
- **Computer Codes Used (Continued)**
  Finite Element Programs

  - **BSAP program used for design of Vogtle, Palo Verde, San Onofre 2 & 3**
  - **ALGOR is used regularly for design of safety related pressure vessels**



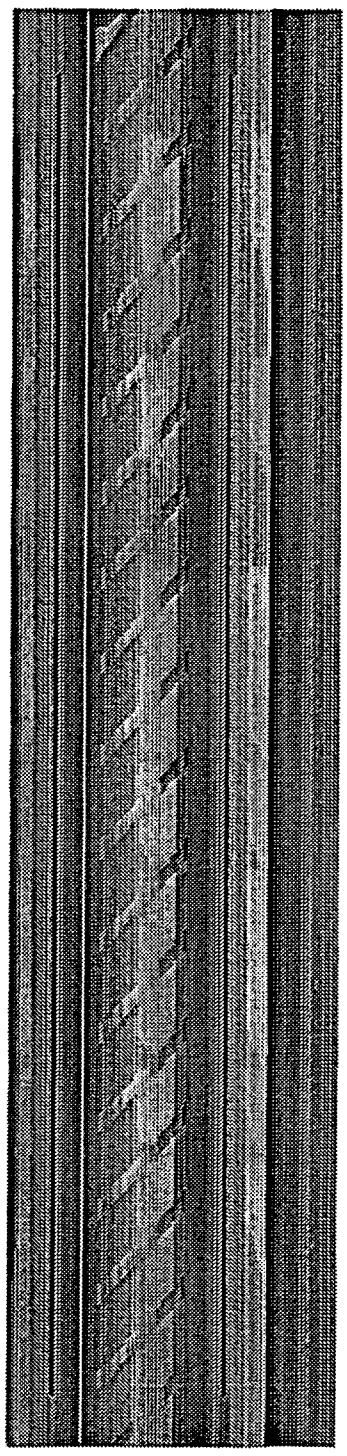
Structural Analysis Impact

- **Computer Codes Used (Continued)**
  - **Post Processing Design Programs Used**
    - **OPTCON: a subset of BSAP- takes forces and moments and checks concrete, rebar, and liner plate to code allowables**



Structural Analysis Impact

- **Methodology Used**
  - **remain committed to original design code of record ACI 318-63**
  - **computer program used ASME Section III, Div. 2, 1975**
  - **ASME Section III Division 2, 1975 is more stringent than ACI 318-63**

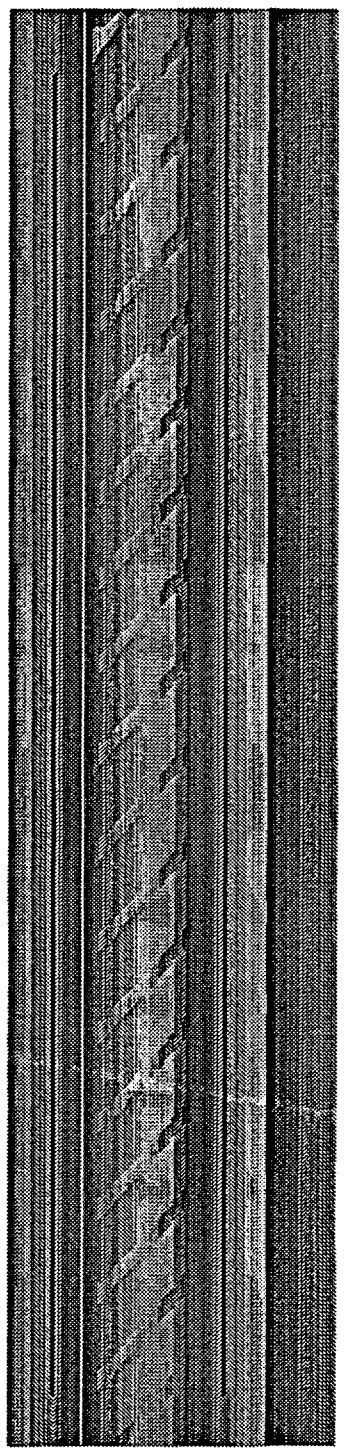


Structural Analysis Impact

- **Methodology Used (Continued)**
  - **changed the 54 psig pressure to 59 psig**
  - **liner plate T_a = 300^0 F same as original**
  - **through wall temperatures included as temperature gradient**
  - **seismic forces matched to original values as closely as possible**

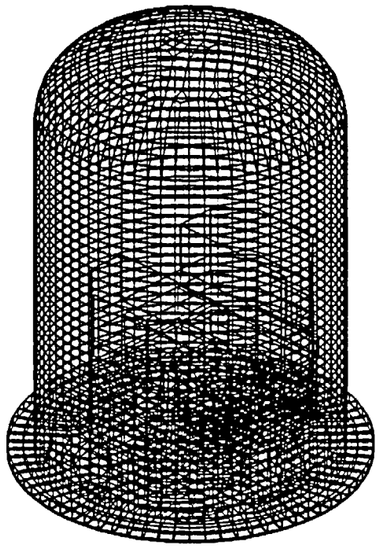
Structural Analysis Impact

- **Methodology Used (Continued)**
  - **buoyancy used more conservative level than before**
  - **overturning investigated with basemat evaluation**
  - **other load combination forces remain the same**

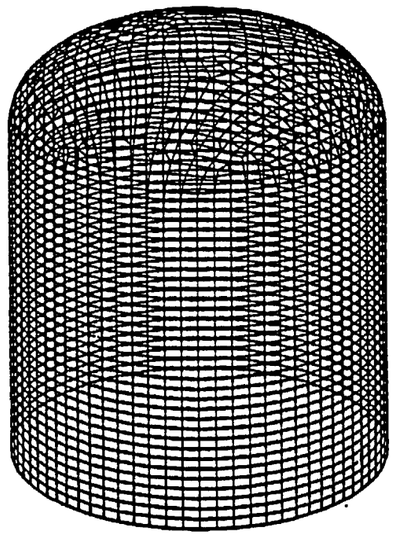


Structural Analysis Impact

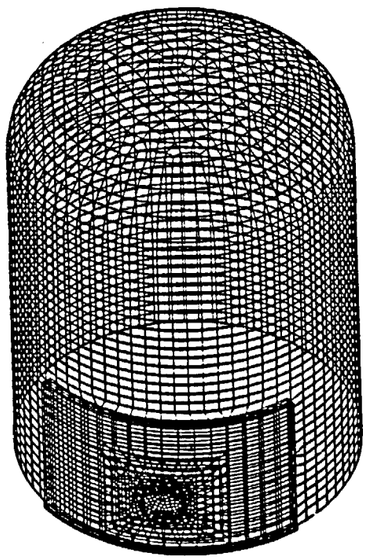
- **Methodology Used(Continued)**
  - **five models used to describe complete analysis (see slide)**
    - **dome**
    - **cylindrical shell**
    - **basemat**
    - **equipment hatch**
    - **axisymmetric**



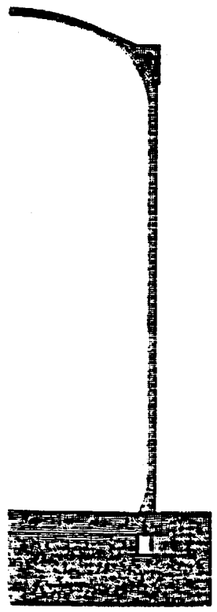
Cylindrical Shell Model
And Basemat Model



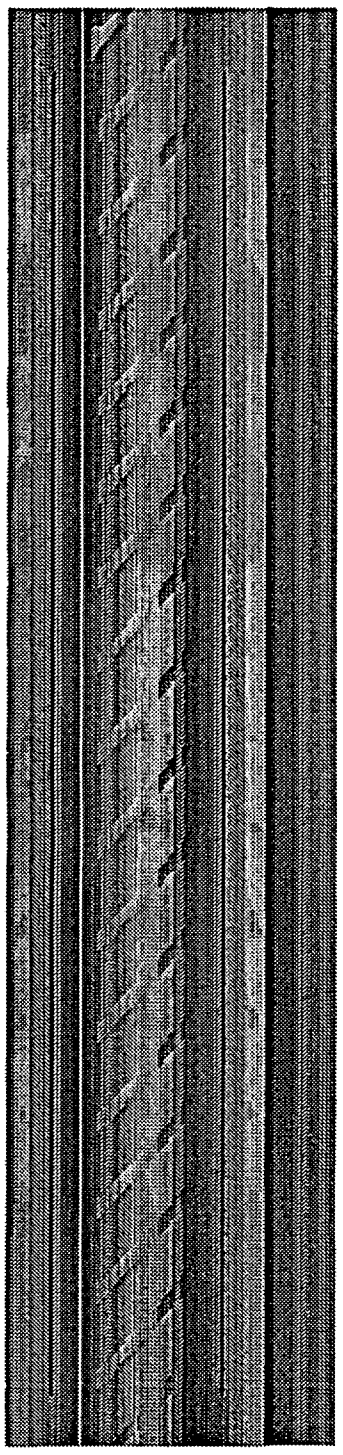
Dome Model



Equipment Hatch Model



Axisymetric Model



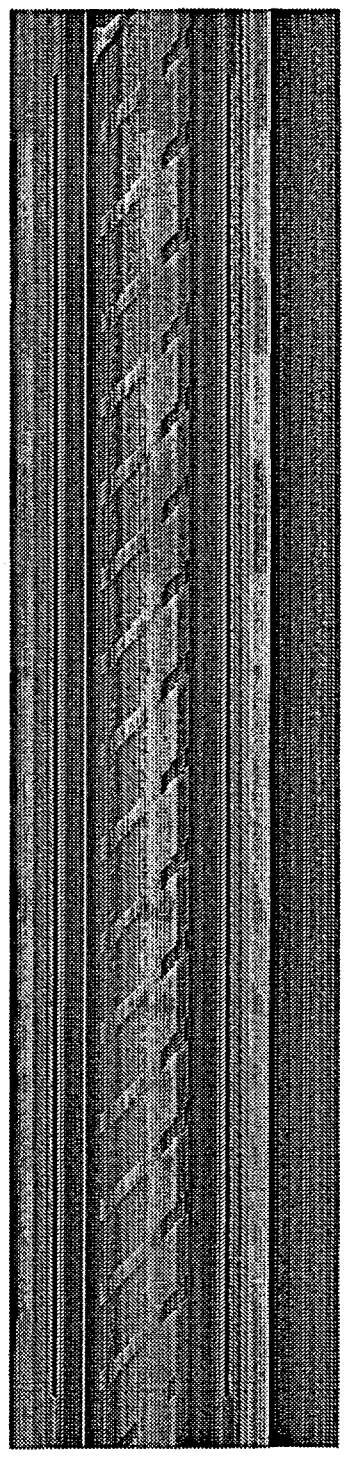
Structural Analysis Impact

- **Methodology Used (Continued)**
  - **the three dimensional cylindrical shell and basemat models include internal structural and rock foundation elements.**
  - **the three dimensional dome and equipment hatch models are fixed base at the bottom of the cylinder.**

Structural Analysis Impact

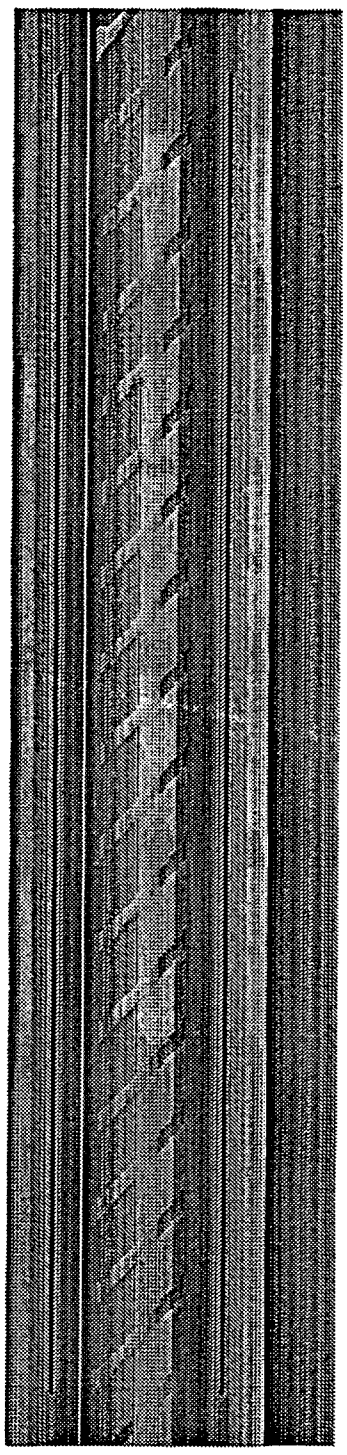
- **Methodology Used (Continued)**

  - **the axisymmetric model is a two dimensional model using axisymmetric loads (pressure) to more accurately analyze areas of stress concentration in the ring girder and the haunch area at the bottom of the cylinder.**



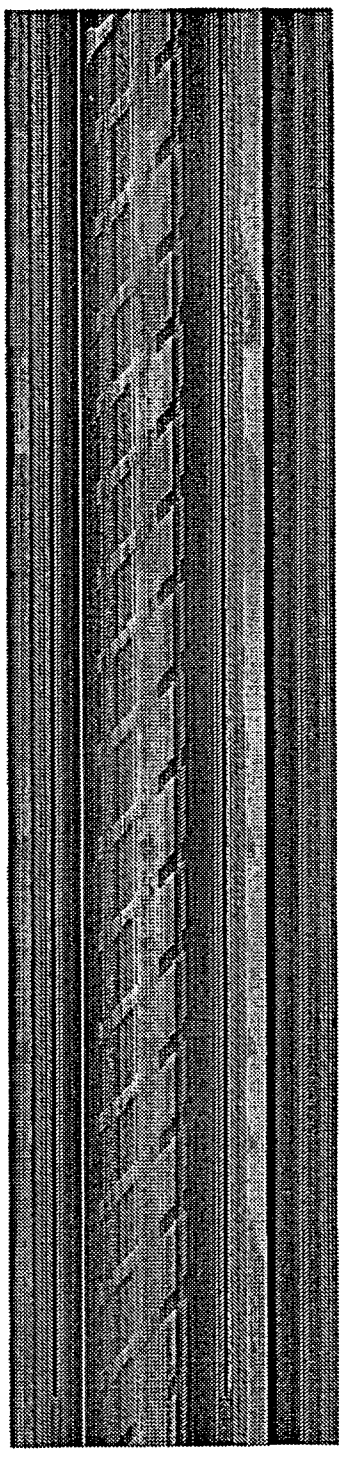
Structural Analysis Impact

- **Methodology Used (Continued)**
  - **extra capacity comes from:**
    - **lower creep value than originally used based on final creep test report and Unit 1 tendon surveillance results.**
    - **more rigorous analysis modeling**
    - **included 18 additional tendons in the analysis not credited in the original analysis (9 surveillance tendons + 9 additional tendons)**



Structural Analysis Impact

- **Design Conclusions**
  - **original pressure vessel design codes are met**
  - **concrete creep values are still conservative**
  - **actual concrete compressive strength higher than design strength**



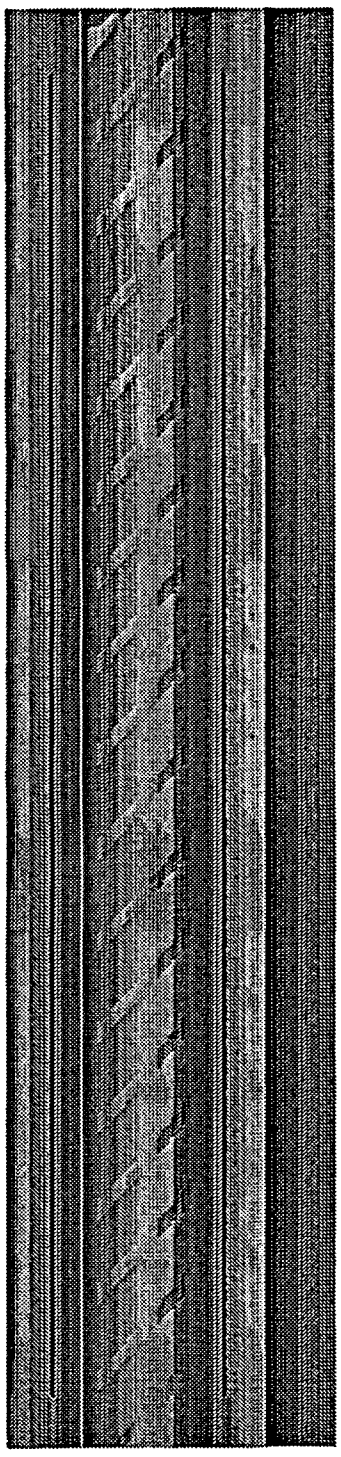
Structural Analysis Impact

- **Structural Acceptance Test**
  - **test will be performed before operation following steam generator replacement outage.**
  - **will be to 1.15 times design pressure of 59 psig.**
  - **will meet the intent of Regulatory Guide 1.18**

Comparison of Constructed Prestressed Containment Buildings Illustrating Effective Prestress-to-Design Pressure Ratios

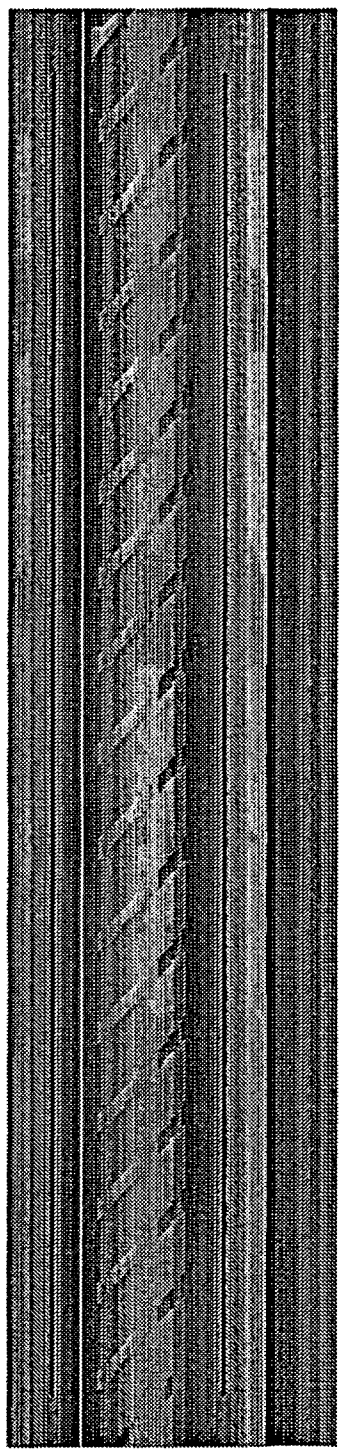
The table illustrates that even with an increased design from 54 to 59 psig there is sufficient prestress when compared to similar Bechtel designed containments. The amount of required prestress was not a set number. It was set higher than test pressure, which was 15% over design pressure. The first 4 containments had the highest level in the dome and cylinder hoop direction. Later designs realized that lower prestress could be used and still satisfy design requirements. The vertical direction was dependent on the earthquake level. ANO-2, at 59 psig, compares favorably to other similar containment buildings. In almost all cases, ANO-2, at 59 psig, has a higher prestress level than the containments designed about the same time or slightly later. It should be noted that all the other containments are either on the East Coast or Midwest except Rancho Seco in California. In all three prestressing groups, ANO-2 with 59 psig will have a larger prestress ratio than Rancho Seco. In the table below, the containments are listed in the approximate chronological order in which they were designed.

					PRESSURE FORCE			EFFECTIVE PRESTRESS			RATIO: PRESTRESS/ DESIGN PRESSURE			WALL THICK-NESS	DOME THICK-NESS	HT INSIDE
		Design	CYLIN	DOME	CYLIN	CYLIN	DOME	CYLIN	CYLIN	DOME						
		PRESS	RAD	RAD	HOOP	VERT	MEMBR	HOOP	VERT	MEMBR	CYLIN	CYLIN	DOME			
		PSI	FT	FT	PRESS	PRESS	PRESS	KIP/FT	KIP/FT	KIP/FT	HOOP	VERT	MEMBR	FT	FT	FT
	FACILITY				KIP/FT	KIP/FT	KIP/FT									
	ANO-2 @ 59 psig	59	58	87.5	492.77	246.38	247.8	670	384	355	1.36	1.56	1.43	3.75	3.25	208.5
1	PALISADES	55	58	87.5	492.77	246.38	247.8	670	384	355	1.36	1.56	1.43	3.75	3.25	208.5
2	POINT BEACH	60	52.5	80.92	453.6	226.8	233.05	662	290	360	1.46	1.28	1.54	3.5	3	147.25
3	TURKEY POINT	55	58	87.5	459.36	229.68	231	670	294	360	1.48	1.28	1.56	3.75	3.25	184.33
4	OCONEE	59	58	87.5	492.77	246.38	247.8	700	300	360	1.42	1.22	1.45	3.75	3.25	220.25
5	ANO-1	59	58	87.5	492.77	246.38	247.8	730	342	384	1.48	1.39	1.55	3.75	3.25	208.5
6	ANO-2	54	58	87.5	451.01	225.5	226.8	670	384	355	1.49	1.70	1.57	3.75	3.25	208.5
7	RANCHO SECO	59	65	94.5	552.24	276.12	267.62	642	399	344	1.16	1.45	1.29	3.75	3.5	185
8	CALVERT CLIFFS	50	65	78.67	468	234	226.8	630	300	360	1.35	1.28	1.59	3.75	3.25	194.92
9	MILLSTONE 2	54	65	94.5	505.44	252.72	244.94	630	380	330	1.25	1.50	1.35	3.75	3.25	187.58
10	FARLEY 1	54	65	94.5	505.44	252.72	244.94	620	350	320	1.23	1.38	1.31	3.75	3.25	175.3
	AVERAGE										1.37	1.37	1.48			



Structural Analysis Impact

- **Comparison to other designs**
  - **ANO-2 @ 59 psig compares favorably with other Bechtel designs of approximate time frame (see Table 1)**
    - **has higher prestress levels in almost all categories than later designs**
    - **ANO-2 @ 59 psig compares favorably with <u>average</u> ratios of prestress/design pressure**



Structural Analysis Impact

- **Comparison to Other Containment Designs (Continued)**
  - **ANO-2 @ 59 psig compares favorably to ultimate containment capacities using simplified formula (see slide Table 2)**

Table 4-1, Containment Ultimate Capacity Comparison

Parameters/ Plants	ANO-2	ANO-1	Farley 1	Millstone 2	Calvert Cliffs
Design Pressure	54 psig/59 psig	59 psig	54 psig	54 psig	50 psig
Pult – Hoop membrane (IPE)	151 psig[2]	162 psig[1]	123 psig[3]	158 psig*[5]	160 psig*[4]
Pult/Design Press. (IPE)	2.8 / ---	2.75	2.27	2.9	3.2
Pult Using Simplified Formula**	151 psig	162 psig	134.5 psig	128 psig	128.5 psig
Pult/Design Press. Using Simplified Formula**	2.8 / 2.55	2.75	2.39	2.37	2.57

* Based on 400^0 F

** $P_{ult}/P_d = (1/R_c P_d)(f_{hy} A_h + f_{ry} A_r + f_{ly} A_l)$

References for Table 4-1:

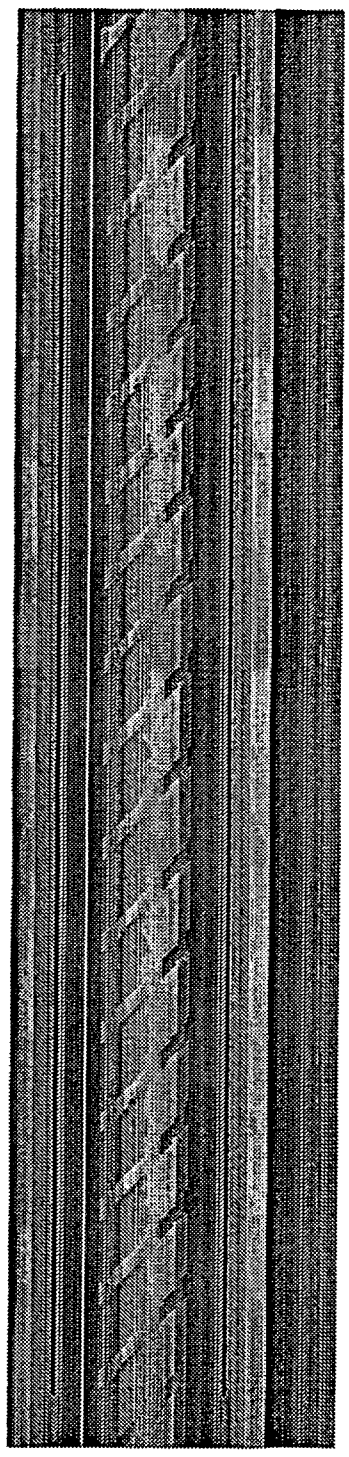
1). ANO-1 Individual Plant Examination for Severe Accident Vulnerabilities Generic Letter 88-20 submittal, Section 4.4, ANO-1 Containment Failure Characterization, dated 4/29/93 (1CAN049301)

2). ANO-2 Individual Plant Examination for Severe Accident Vulnerabilities - Generic Letter 88-20 submittal, Section 4.4, ANO-2 Containment Failure Characterization, dated 8/28/92 (2CAN089201)

3). Farley Nuclear Plants Units 1 and 2, Individual Plant Examination for Severe Accident Vulnerabilities, March 1993, (FAI/91-107)

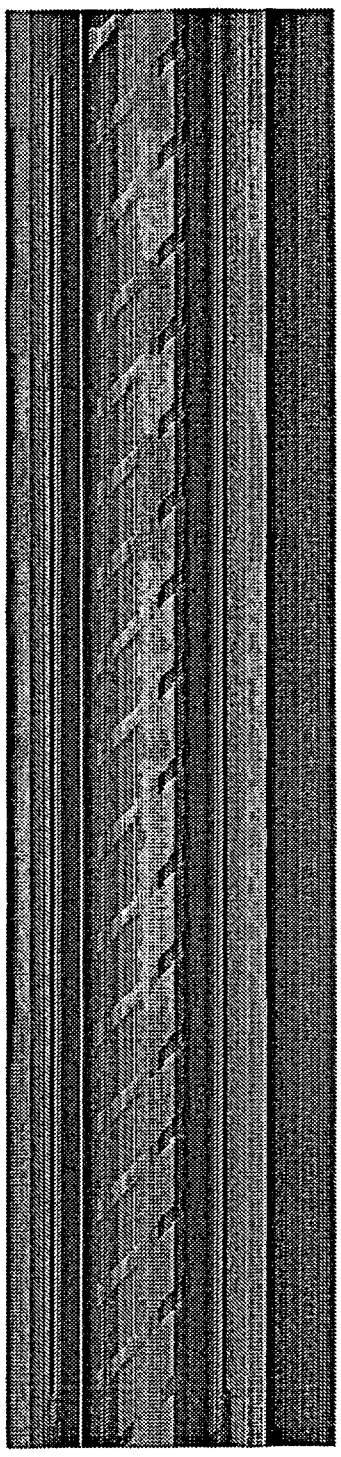
4). Technical Evaluation Report of the Calvert Cliffs Individual Plant Examination for Severe Accident Vulnerabilities Back-End Submittal, Final Report, January 1996, (ERI/NRC 95-107).

5.) Millstone Unit 2, Individual Plant Examination for Severe Accident Vulnerabilities, December 1993, (B14702)



Structural Analysis Impact

- **Comparison to Other Containment Designs (Continued)**
  - **ANO-2 @ 59 psig ratio is 151 psig 59 = 2.55**
  - **ANO-2 has approximately the same or higher ultimate capacity to design pressure ratios of three later Bechtel containments -- Farley 1, Millstone 2, and Calvert Cliffs.**



Structural Analysis Impact

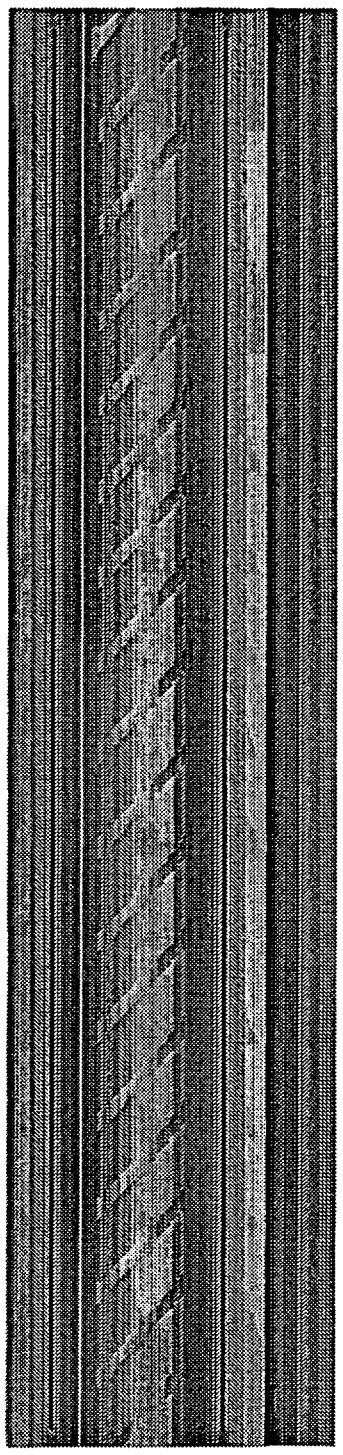
- **Conclusion**
  - **ANO-2 at 59 psig meets all the original design code allowables**
  - **ANO-2 at 59 psig compares favorably to similarly designed similar vintage containments**

Impact on Containment Components & Issues

Roger Wilson

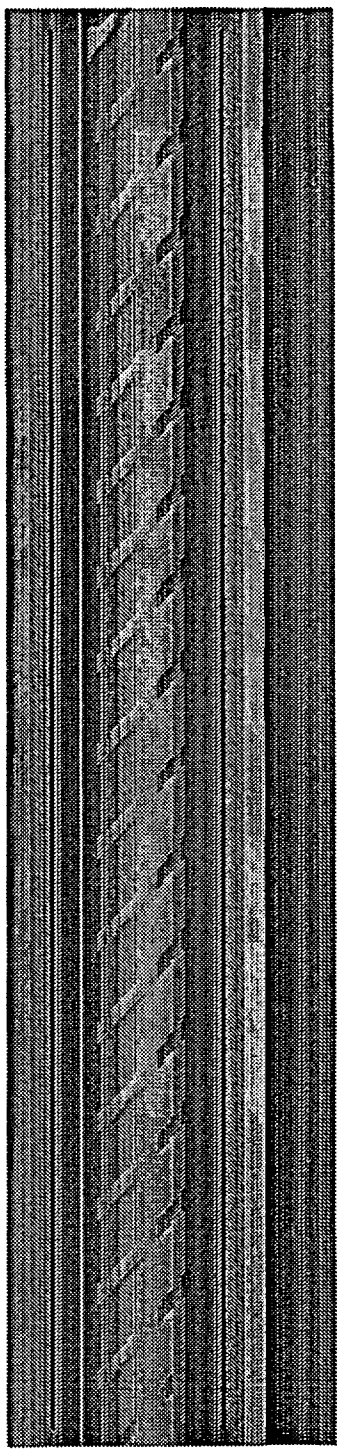
Components and Issues

- **Enclosure 5**
  - **details impact of uprate on containment components and issues**
- **Each SSC or issue evaluated**
  - **acceptable for increased containment accident conditions**
  - **or will be modified make component acceptable**



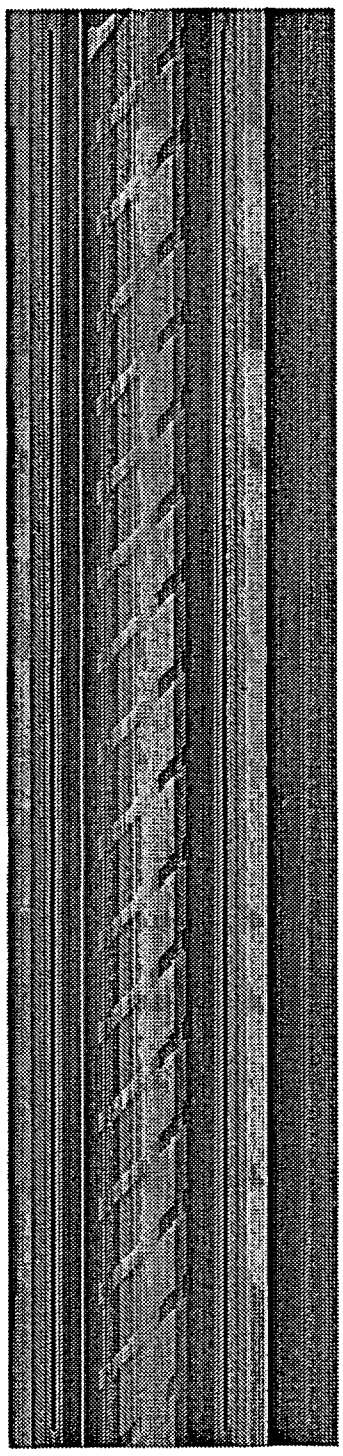
Components and Issues

- **Scoping Components and Issues**
  - **Independent Reviews**
    - **engineering and other ANO departments**
    - **independent contractor**
    - **design review committee oversight**
  - **components and issues that are not changing**
    - **fully evaluated**
    - **reviewed by various departments**
    - **multiple rounds of review**



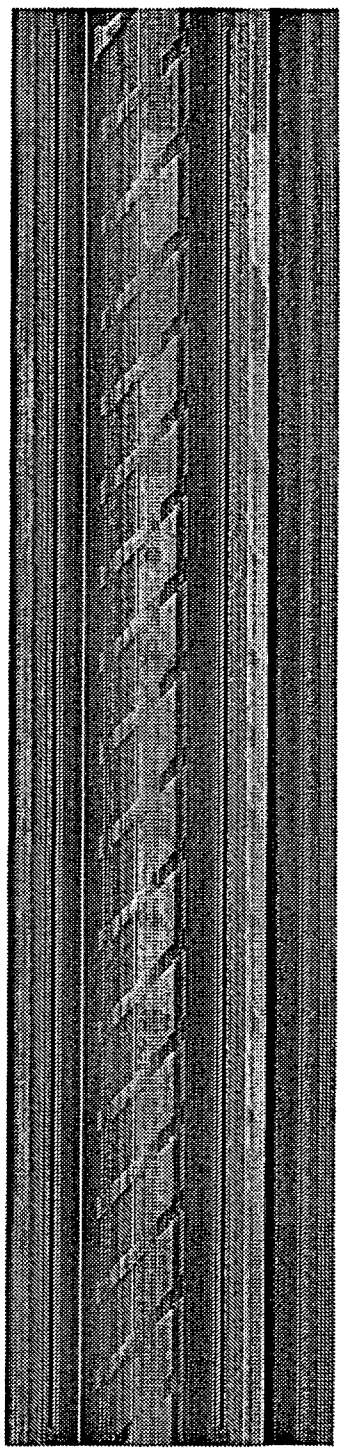
Components and Issues

- **From Attachment to Introduction**
  - **two information facts**
    - **better understand enclosure 5 presentation**
  - **offsite dose consequences <u>unchanged</u>**
  - **containment design temperature <u>unchanged</u>**



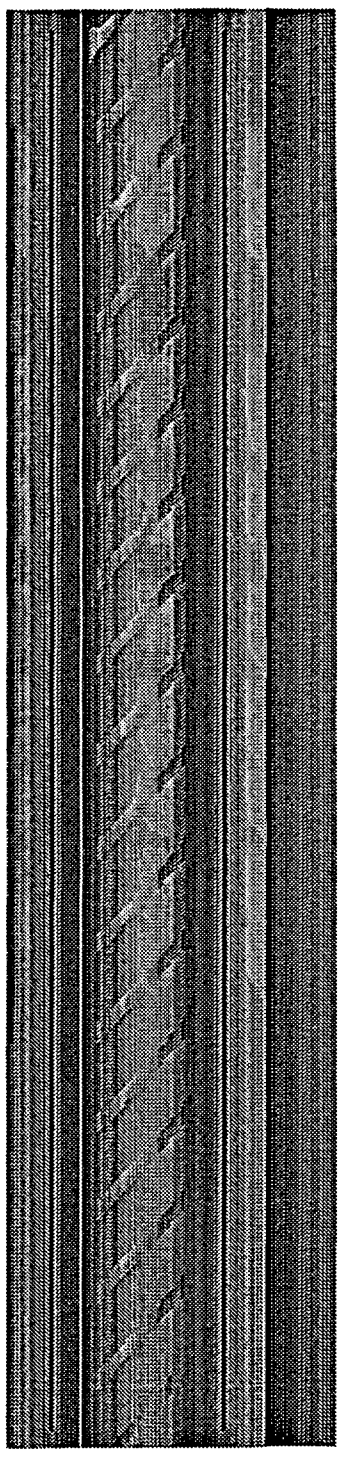
Components and Issues

- **Offsite Dose Consequences**
  - **P_a, peak accident pressure, increased from 54 to 58 psig**
  - **L_a - allowable containment leakage**
    - **allowable % of air weight leakage per day at Pa**
      - **0.1% per 24 hours for ANO-2**
    - **equivalent to allowable % per day of containment volume leakage**
  - **L_a will not change**



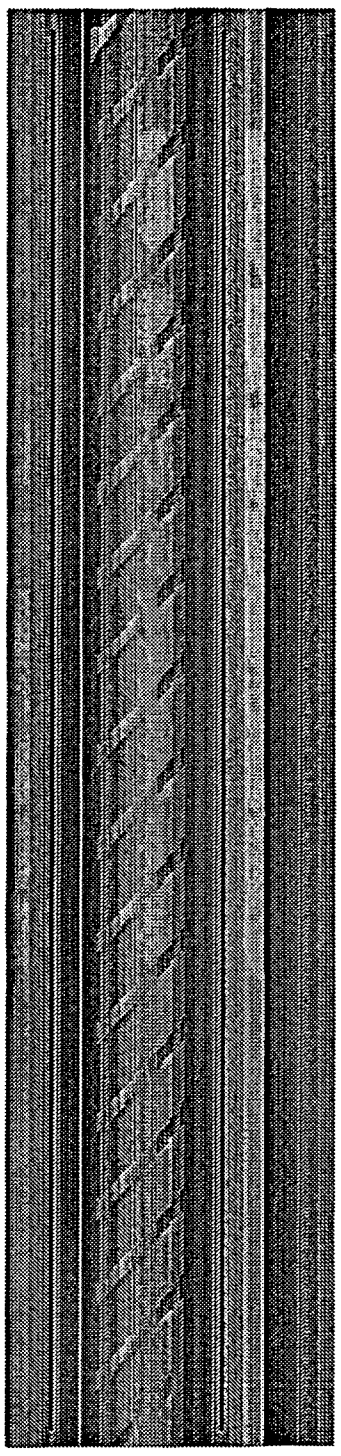
Components and Issues

- **Offsite Dose Consequences**
  - **core power at 2815 MWt is also unchanged**
    - **amount of radionuclides released in a MHA will not change**
  - **therefore, offsite dose resulting from MHA will not change**
  - **ODC for power uprate will be in power uprate submittal**



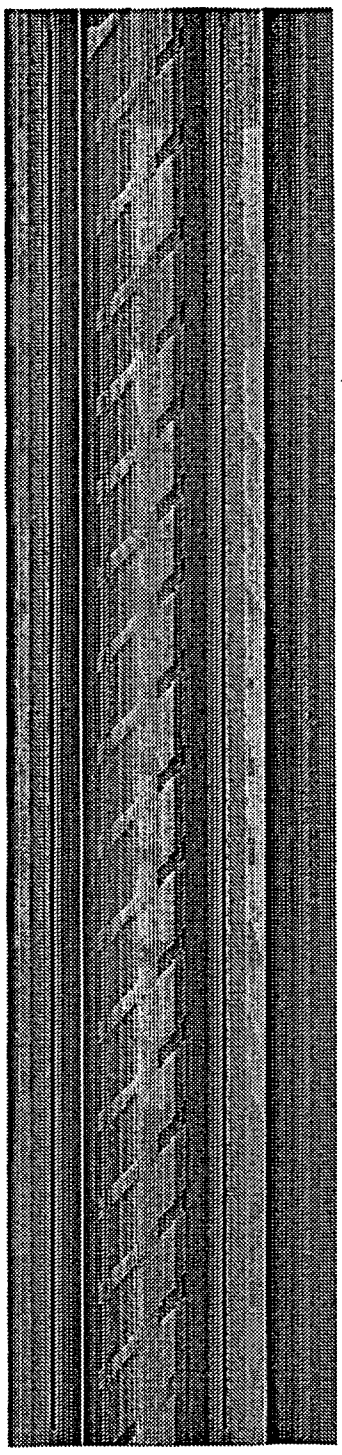
Components and Issues

- **Containment Design Temperature**
  - **remains at 300 °F**
  - **DBA**
    - **LOCA yielding highest containment pressure**
    - **temperature increased from 288 °F to 291 °F**



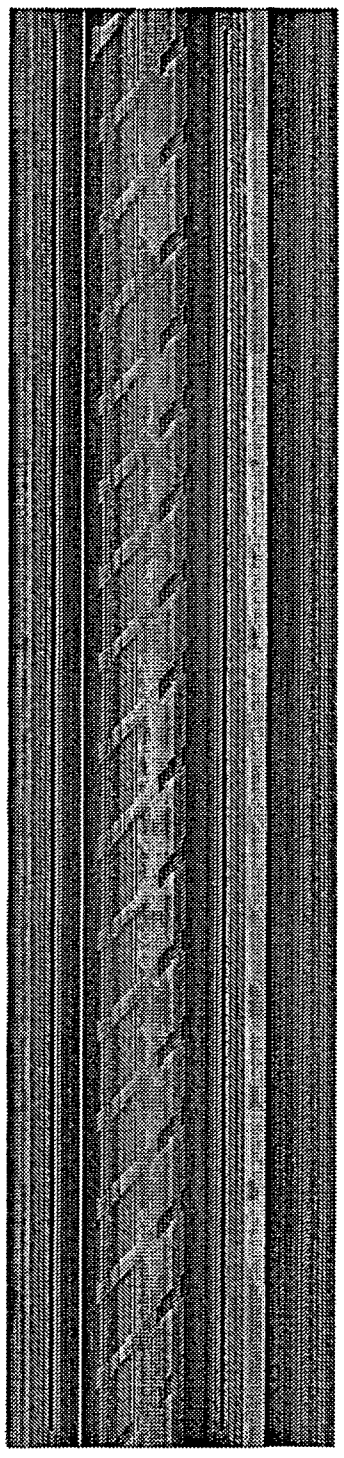
Components and Issues

- **Summary of Modifications**
  - **planned modifications**
    - **seals or modules for fifteen electrical penetrations**
      - **will be modified due to seal aging and reduced qualification margin**
    - **pitch of containment service water cooling coil fans will be reduced**



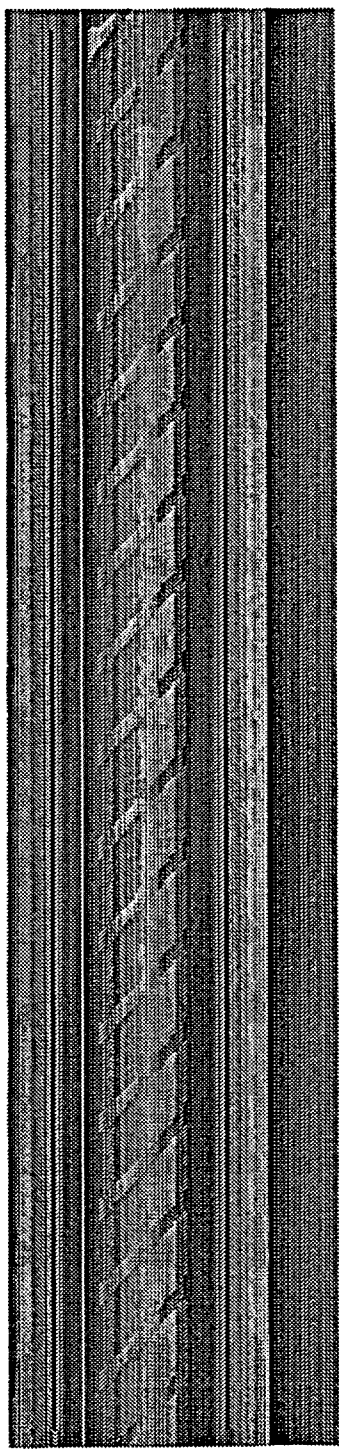
Components and Issues

- **potential modification**
  - **containment service water cooling coil drains**
    - **being evaluated**
    - **capability may be increased**
- **instrument issue discussed in enclosure 5 & below**
  - **containment wide range pressure transmitter**



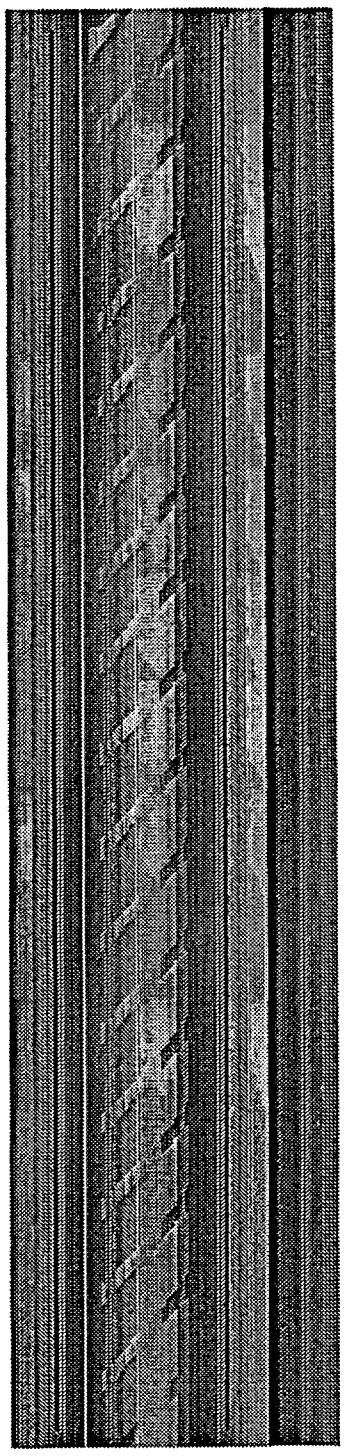
Components and Issues

- **Nine Categories of Evaluations**
  - **structural/piping/compartment pressurization**
  - **valves**
  - **ECCS subsystem**
  - **electrical and environmental qualification**
  - **post accident sampling**
  - **instrumentation**
  - **miscellaneous topics**
  - **testing**
  - **containment fan systems**



Components and Issues

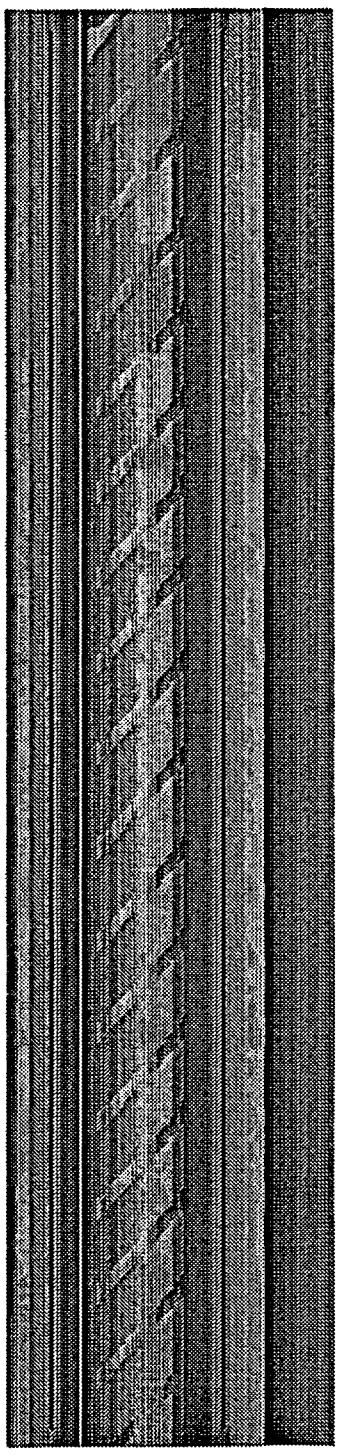
- **Structural/Piping/Compartment Pressurization**
  - **containment building piping and vessel differential pressure issues**
  - **containment piping penetrations**
  - **generic letter 96-06 issues**
  - **snubbers**
  - **equipment hatch, personnel airlock and emergency escape hatch**
  - **fuel transfer tube**
  - **polar crane**
  - **compartment pressure issues**
  - **ductwork D P issues**
- **Evaluated -- No Changes Required**



Components and Issues

- **Valves**
  - **motor operated valves**
  - **air operated valves**
  - **solenoid operated valves**
  - **containment purge valves**

  - **Evaluated - - No Changes Required**

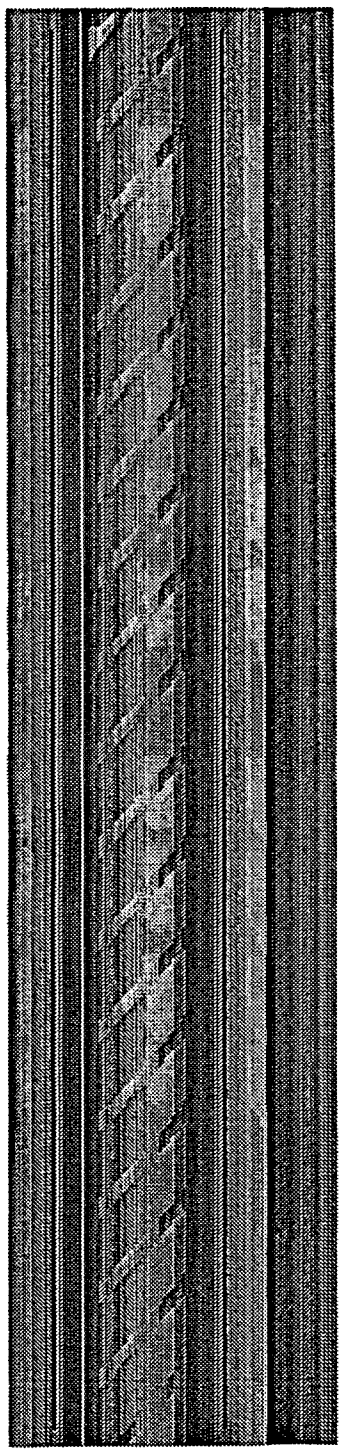


Components and Issues

- **ECCS Subsystem**
  - **Containment Spray System**
    - **reanalysis removed excessive margin**
    - **lower containment spray flow rates permit increasing allowable containment spray pump degradation from 6.3% to 10%**
      - **to be in accordance with ASME B&PV code Section XI**
    - **reduced spray flow during injection results in slightly larger mass equivalent drop size of 925 microns**

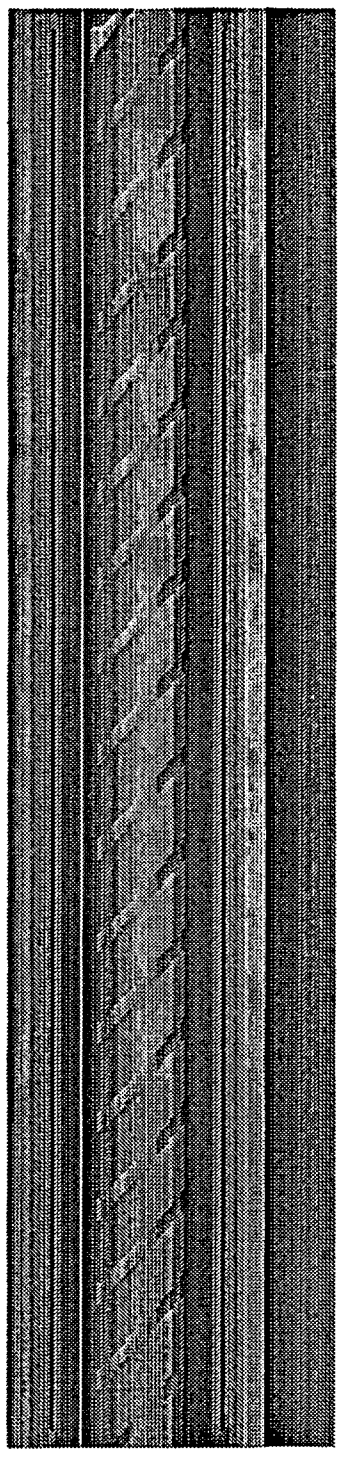
Components and Issues

- **with 10% degradation each spray train will deliver a minimum of 1875 gpm during injection mode**
- **at start of recirculation, with suction from containment sump, minimum spray flow increases to nominal design minimum of 2,000 gpm**
- **decreasing to nominal 880 microns during recirculation**
- **increased drop size has been included in determination of iodine removal efficiency during injection**



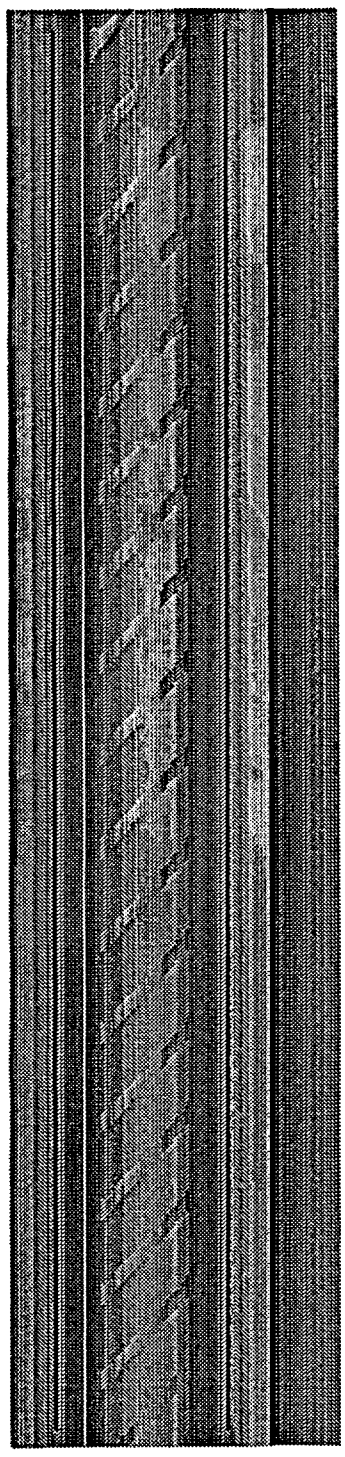
Components and Issues

- **ECCS Subsystem (con't)**
  - **HPSI & LPSI**
    - **Evaluated - - No Changes Required**
  - **NPSH considerations for ECCS pumps will not be negatively impacted**
  - **for flow from sump, vortex suppressor eliminates concerns**



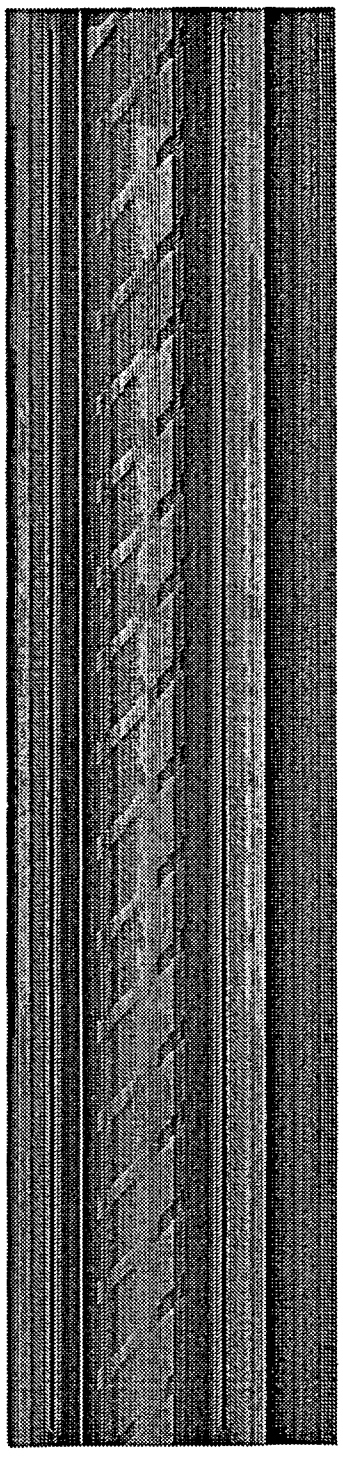
Components and Issues

- **Electrical and Environmental Qualification**
  - **containment electrical penetration qualification**
    - **qualified to accident test conditions enveloping ANO-2 increased post-accident conditions**
    - **All EQ penetrations have been replaced**



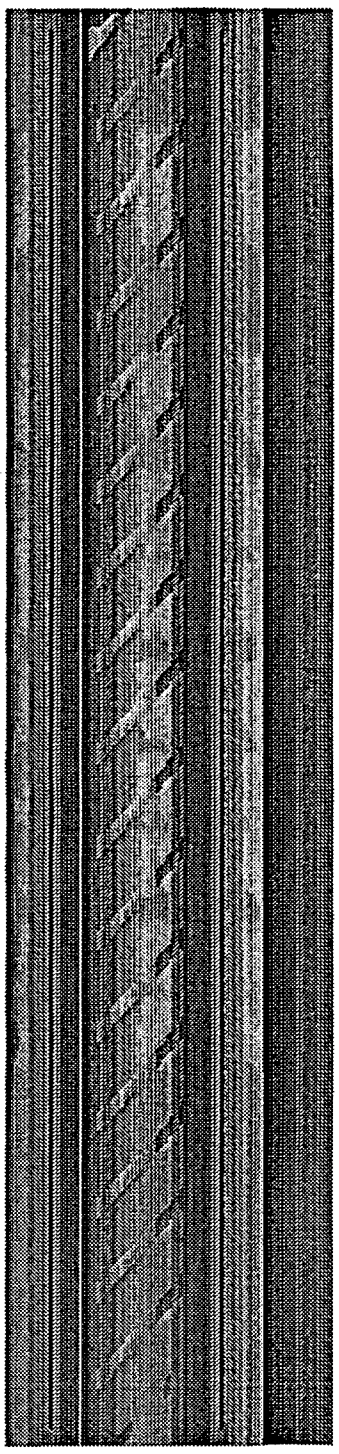
Components and Issues

- **Amphenol Sams electrical penetrations were reviewed**
  - **due to aging of module seals, remaining penetrations will be modified in 2R14:**
    - **replaced with Conax feed-through modules, or**
    - **new seals**



Components and Issues

- **EQ**
  - **equipment remains qualified for new accident conditions**
  - **evaluation included increased containment flood level (small increase)**
  - **other impacts unchanged for Cycle 15; being evaluated for power uprate**
    - **radiological, high energy line break, etc.**



Components and Issues

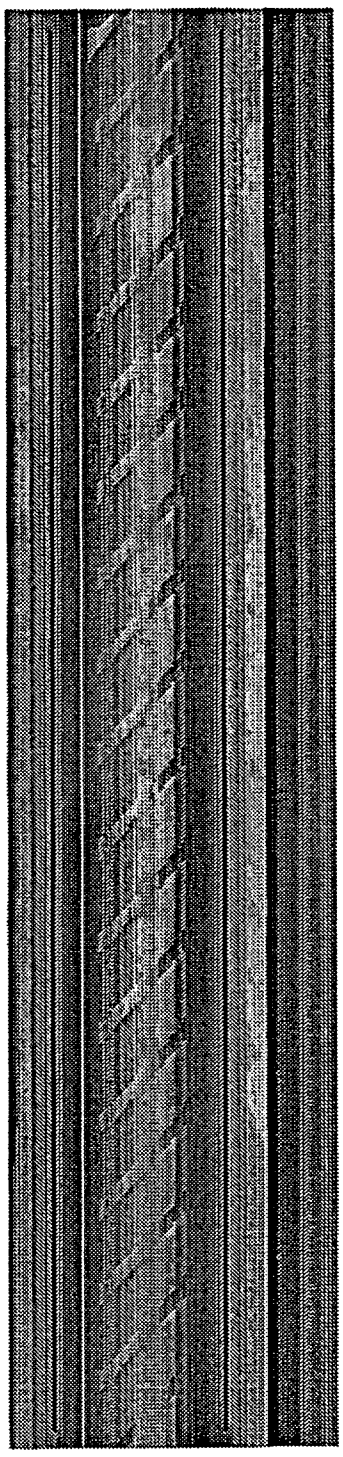
- **Post Accident Sampling**
  - **hydrogen analyzer and PASS containment air radionuclide detector**
    - **will not affect operation**
    - **isolated by containment and system isolation valves**
    - **will not be placed in service at pressures exceeding their design**

Components and Issues

- **hydrogen recombiners**
  - **time to become fully effective increases**
  - **remain functional**
  - **will operate as originally designed when 26.7 psia is reached**
  - **efficiency is restored to 95% prior to reaching 3.5% limit assumed in H_2 generation calculation**
    - **single failure assumed**

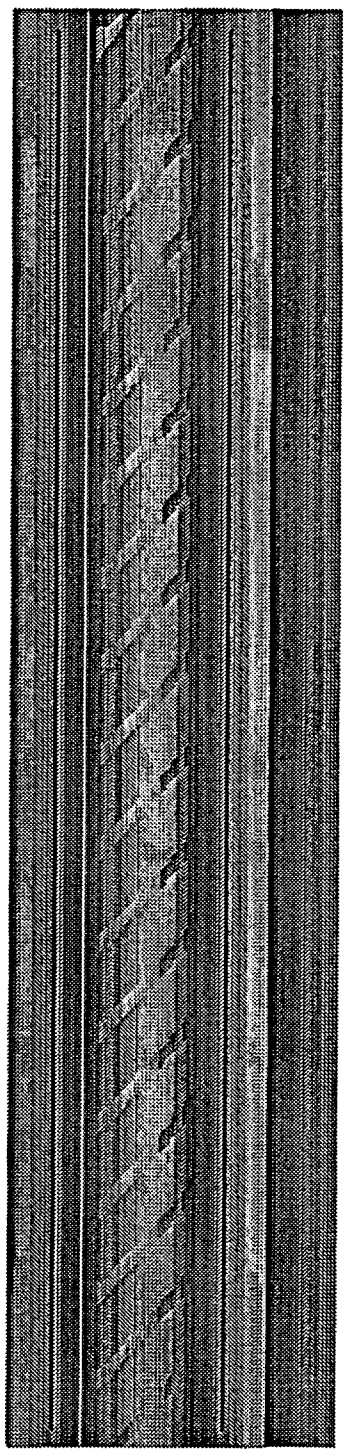
Components and Issues

- **Instrumentation Uncertainty and Setpoints**
  - **enclosure 5 discusses impact of containment uprate**
  - **no hardware modifications except those related to PPS**
  - **will be presented in separate licensing amendment request for RSG-related PPS setpoint changes**



Components and Issues

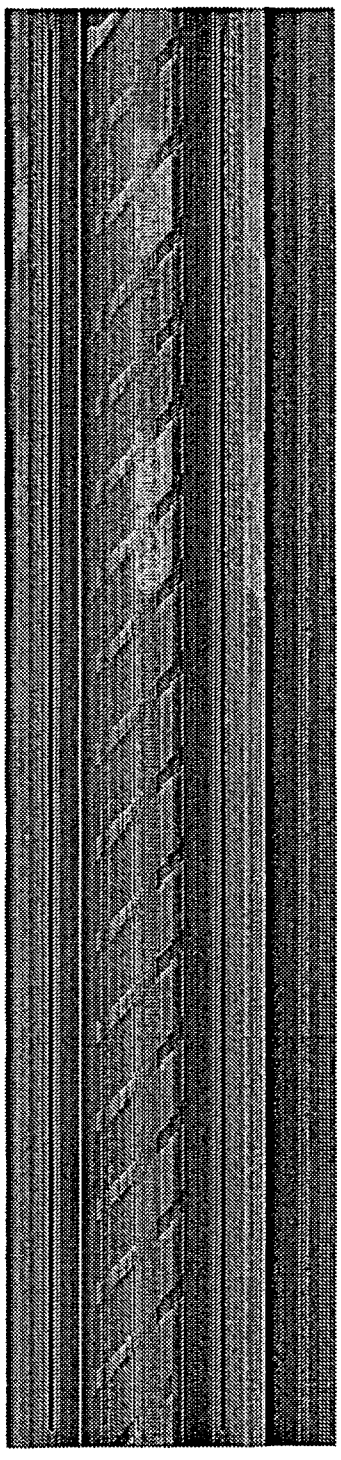
- **containment wide range pressure transmitters range**
  - **request concurrence with our conclusion that current transmitter range satisfies intent of RG 1.97 requirements**
    - **required by RG 1.97 to have range of 3 times containment absolute design pressure (74)**
    - **for uprated containment condition, upper range value would be 222 psia**
    - **current range -- 0 to 210 psia (3 x 70)**



Components and Issues

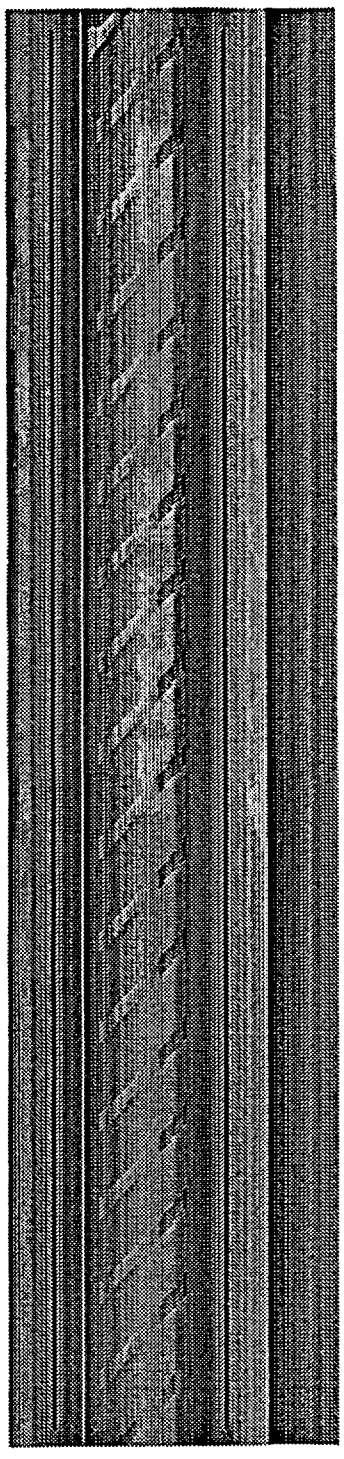
- **therefore, transmitters fall 12 psi below required range**
- **would require a modification to recalibrate existing transmitters for a wider range**
  - **corresponding replacement of indicator and recorder scales**

- **conclusion is made because:**
  - **small difference between required range and current calibrated range capability of installed instruments**
  - **current upper range value is significantly above ultimate pressure capability of containment building**



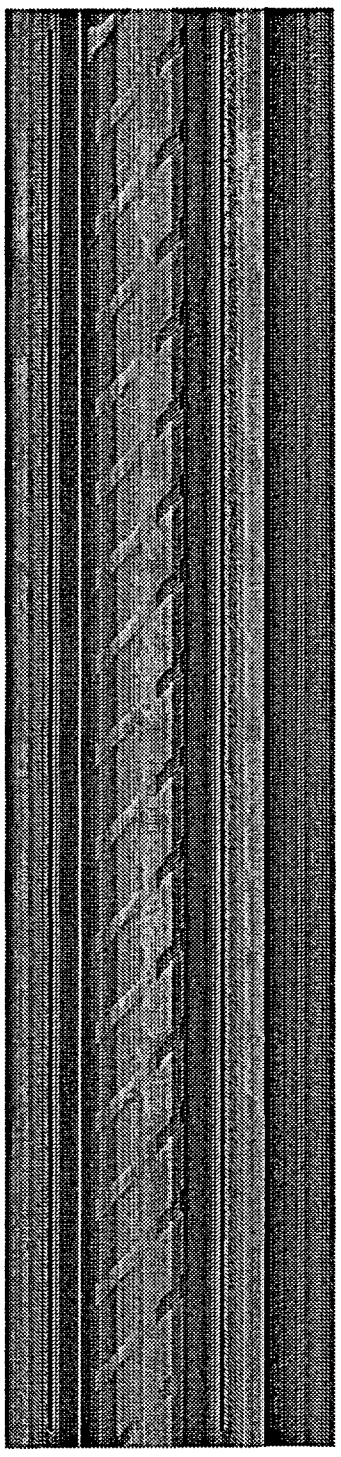
Components and Issues

- **no other instrument range modifications identified**



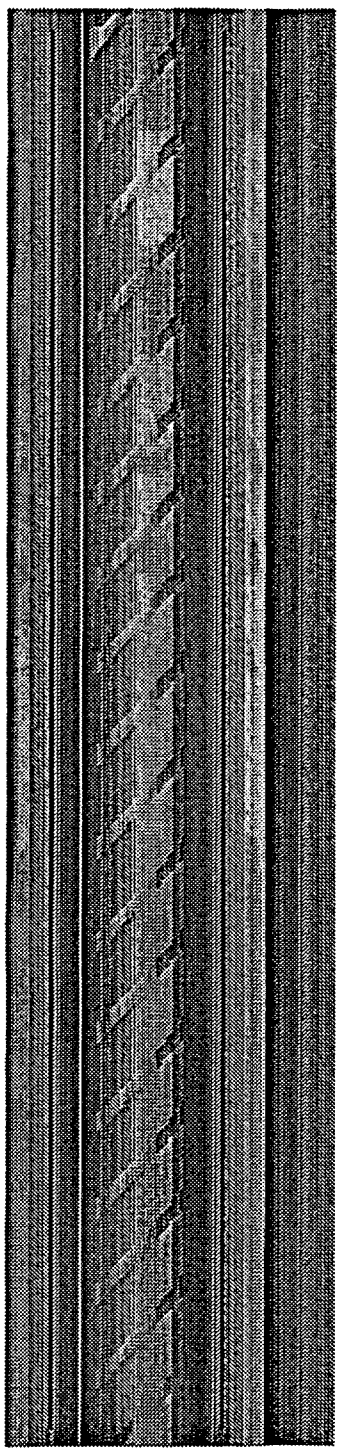
Components and Issues

- **Miscellaneous Topics**
  - **containment coatings**
    - **coatings were previously evaluated for 300 °F design temperature**
    - **no changes required**



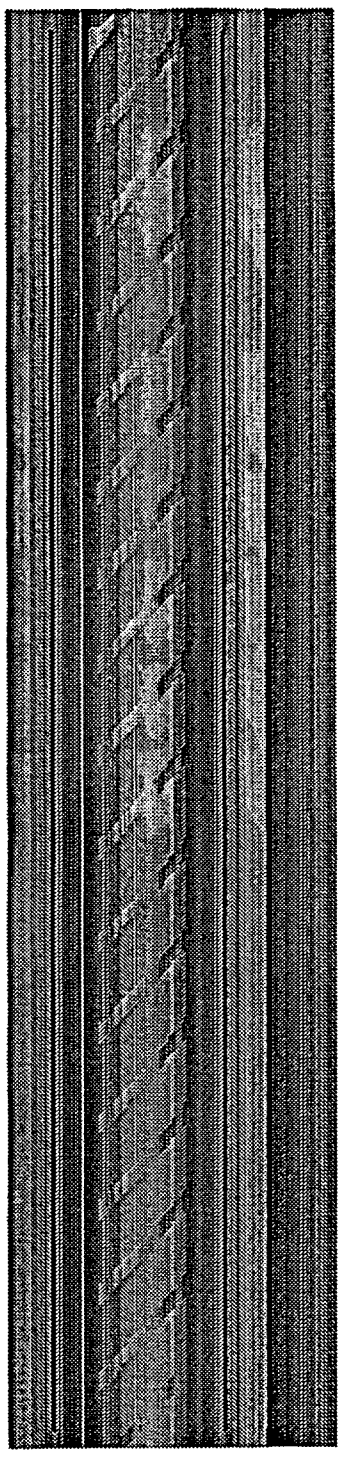
Components and Issues

- **Testing**
  - **Appendix J testing procedures**
    - **ILRT and LLRT procedures must be revised**
    - **no new test equipment will be necessary**
      - **numerous LLRTs have been performed using pressures in 59 to 60 psig range**
      - **no significant difference in leakage results**
      - **no problems are expected**



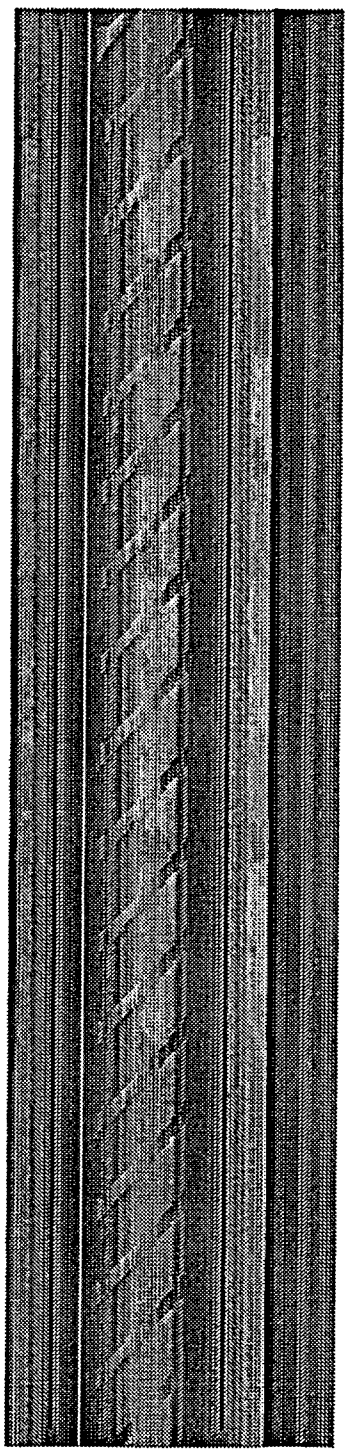
Components and Issues

- **Structural Integrity Test**
  - **enclosure 5 discusses SIT**
    - **being developed**
  - **will be performed in a manner that will not damage SSCs**



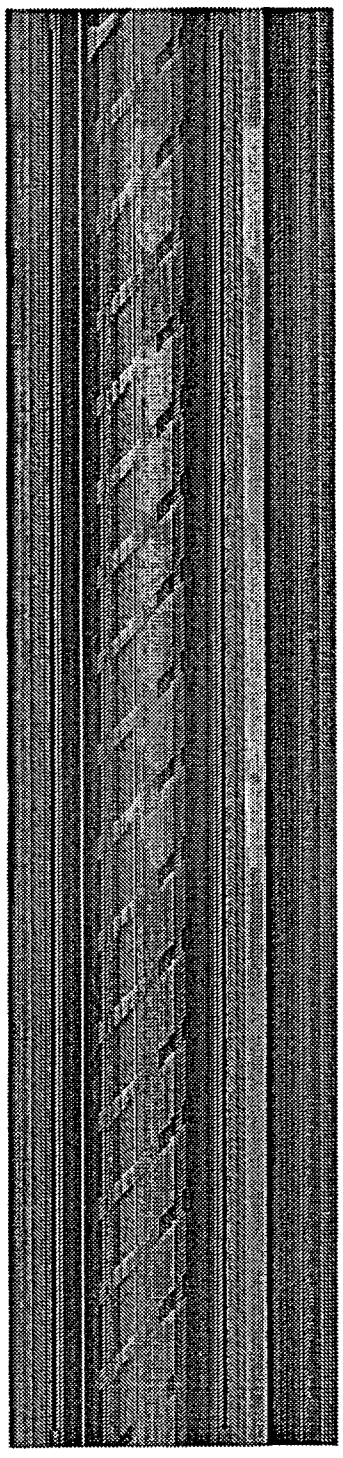
Components and Issues

- **Containment Fan Systems**
  - **Containment Service Water Cooling Coils (CSWCCs) and fan motor horse power**
    - **most complicated component evaluation**



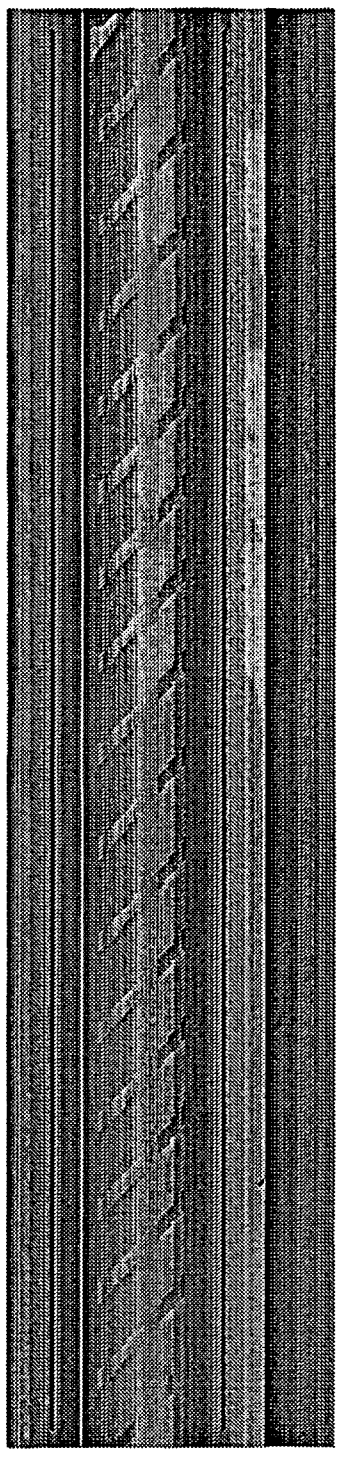
Components and Issues

- **CSWCCs and fan motor horse power**
  - **fan motor horsepower will not exceed motor nameplate rating during accident conditions**
  - **increased peak accident pressure results in increased horsepower**



Components and Issues

- **two factors will be changed to offset increased horsepower**
  - **initial containment pressure in upper left quadrant revised T/S Figure 3.6-1**
    - **reduced to 15.5 from 16.1 psia**
  - **pitch of CSWCC fans will be reduced**

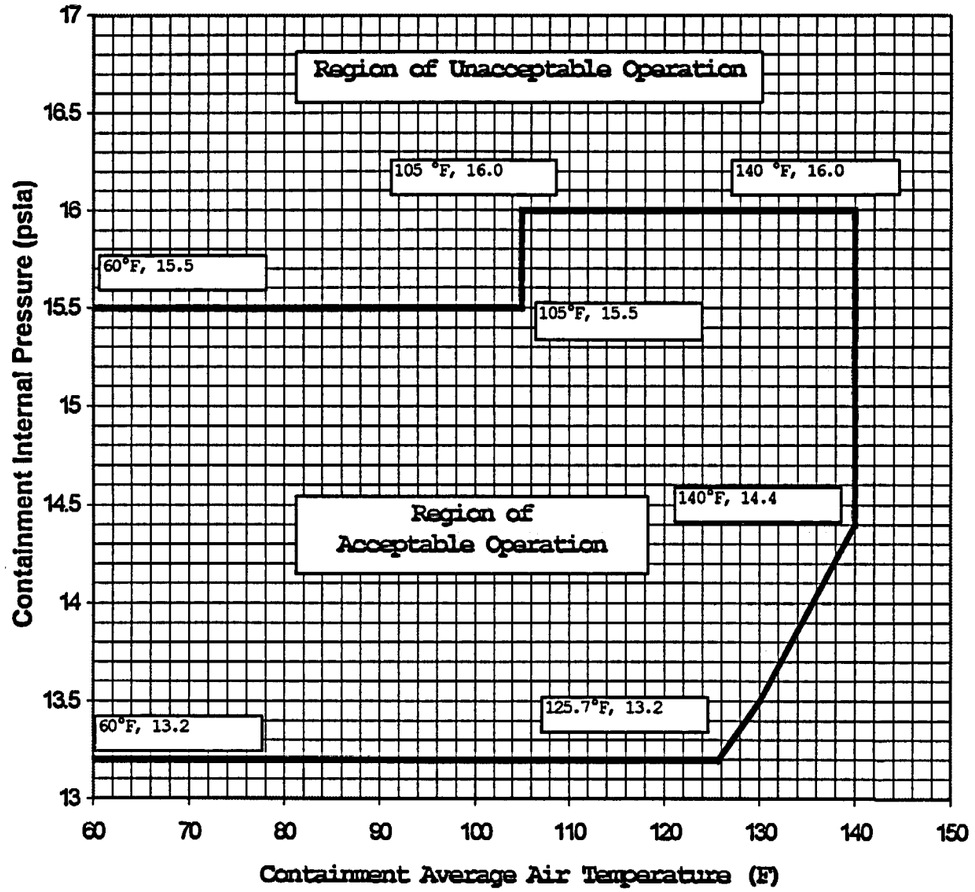


Components and Issues

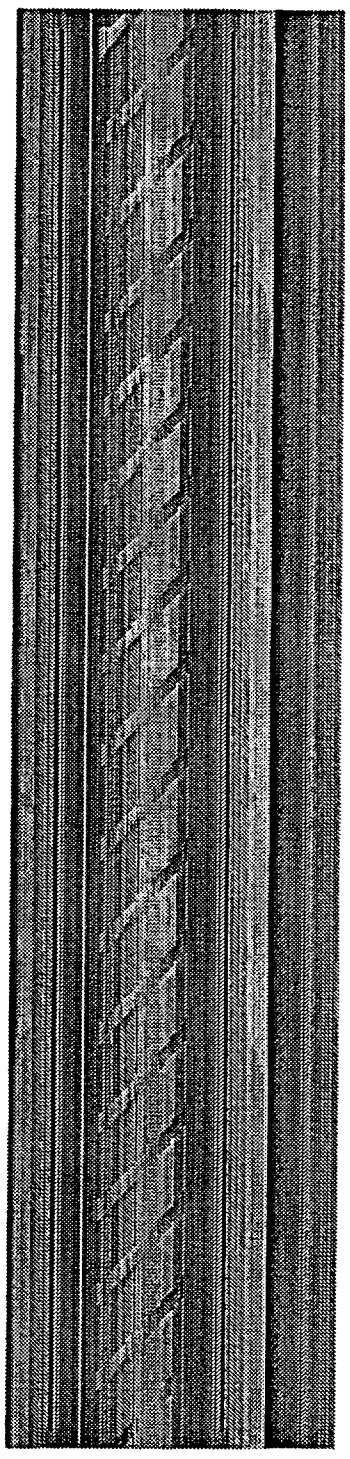
- **reducing fan horsepower by limiting containment initial air mass**
  - **T/S Figure 3.6-1 provides locus of initial containment P/T conditions for DBA**

FIGURE 3.6-1

CONTAINMENT INTERNAL PRESSURE VS. AVERAGE AIR TEMPERATURE

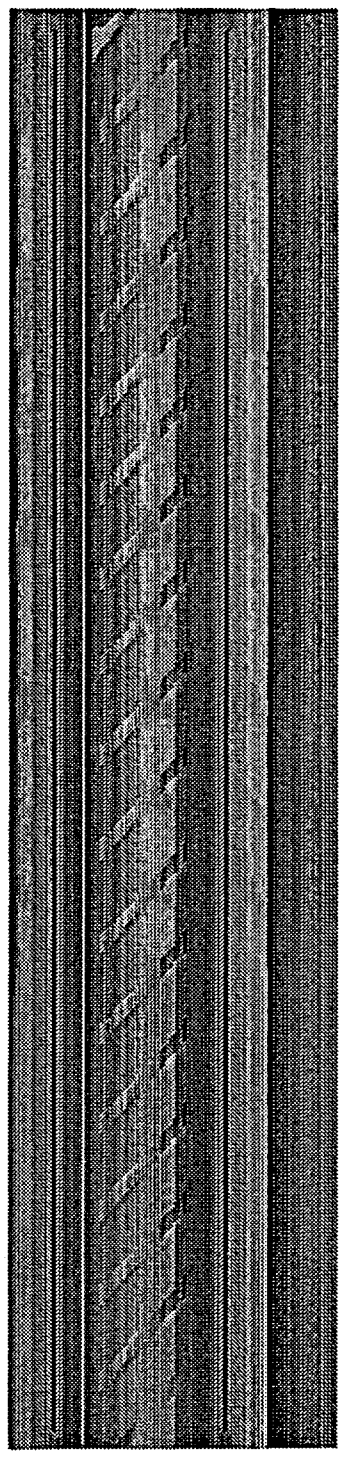


NOTE: Instrument Error is not Included on Curve



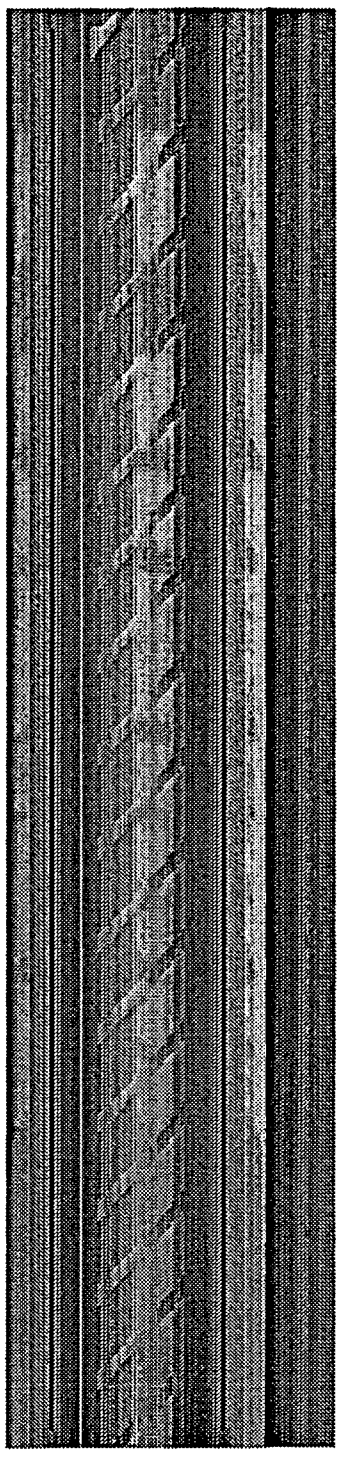
Components and Issues

- **reducing fan horsepower by reducing fan pitch**
  - **CSWCC fan horsepower is a function of ACFM flow**
  - **heat transfer is also a function of ACFM**
  - **2P99 testing will confirm that required ACFM flow is available for both DBA and normal cooling**



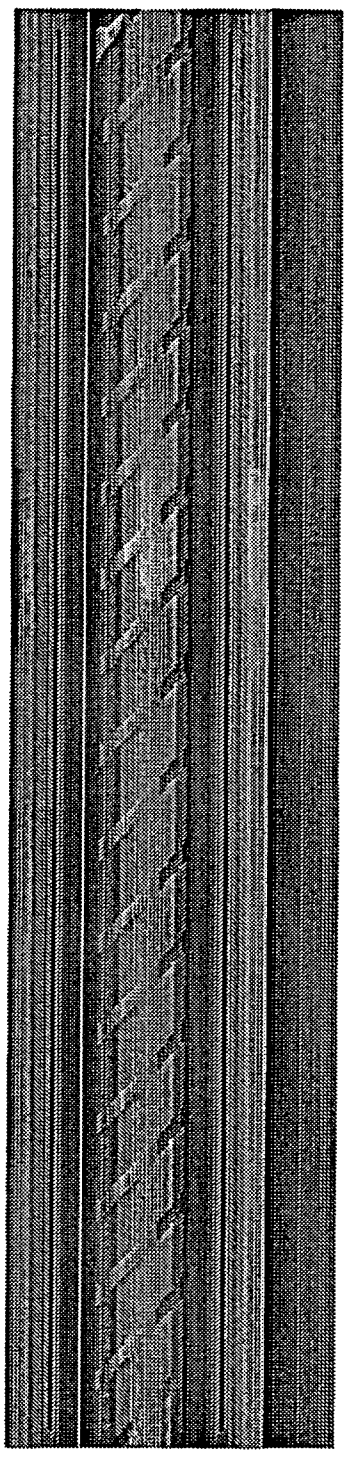
Components and Issues

- **heat removal capability reduced pitch fans will be evaluated**
  - **must be equal to, or greater than, heat removal listed in SAR table**
- **analytical results, validated by performance testing**
  - **will be inserted in SAR**



Components and Issues

- **Conclusion**
  - **Each SSC or issue evaluated was**
    - **acceptable for increased containment accident conditions**
    - **or will be modified to make component acceptable**
      - **Electrical Penetrations**
      - **CSWCC fan pitch**
      - **Perhaps CSWCC drains**



Closing Remarks