



Westinghouse
Electric Corporation

Energy Systems

Box 355
Pittsburgh Pennsylvania 15230-0355

AW-93-410

February 8, 1993

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ATTENTION: MR. R. W. BORCHARDT

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

SUBJECT: SLIDES FROM THE FEBRUARY 10, 1993 NRC MEETING ON AP600
CONTAINMENT VESSEL TEMPERATURES

Dear Mr. Borchardt:

The application for withholding is submitted by Westinghouse Electric Corporation ("Westinghouse") pursuant to the provisions of paragraph (b)(1) of Section 2.790 of the Commission's regulations. It contains commercial strategic information proprietary to Westinghouse and customarily held in confidence.

The proprietary material for which withholding is being requested is identified in the proprietary version of the subject report. In conformance with 10CFR Section 2.790, Affidavit AW-92-419 accompanies this application for withholding setting forth the basis on which the identified proprietary information may be withheld from public disclosure.

Accordingly, it is respectfully requested that the subject information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10CFR Section 2.790 of the Commission's regulations.

Correspondence with respect to this application for withholding or the accompanying affidavit should reference AW-93-410 and should be addressed to the undersigned.

Very truly yours,

P. J. Moir / for

N. J. Liparulo, Manager
Nuclear Safety And Regulatory Activities

/nja

cc: M. P. Siemien Office of the General Counsel, NRC
L. Barnett NRC (12H5)

078-4A

9302230249 930208
PDR ADOCK 05200003
A PDR

COPYRIGHT NOTICE

The reports transmitted herewith each bear a Westinghouse copyright notice. The NRC is permitted to make the number of copies of the information contained in these reports which are necessary for its internal use in connection with generic and plant-specific reviews and approvals as well as the issuance, denial, amendment, transfer, renewal, modification, suspension, revocation, or violation of a license, permit, order, or regulation subject to the requirements of 10 CFR 2.790 regarding restrictions on public disclosure to the extent such information has been identified as proprietary by Westinghouse, copyright protection not withstanding. With respect to the non-proprietary versions of these reports, the NRC is permitted to make the number of copies beyond those necessary for its internal use which are necessary in order to have one copy available for public viewing in the appropriate docket files in the public document room in Washington, D.C. and in local public document rooms as may be required by NRC regulations if the number of copies submitted is insufficient for this purpose. The NRC is not authorized to make copies for the personal use of members of the public who make use of the NRC public document rooms. Copies made by the NRC must include the copyright notice in all instances and the proprietary notice if the original was identified as proprietary.

PROPRIETARY INFORMATION NOTICE

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with requests for generic and/or plant specific review and approval.

In order to conform to the requirements of 10CFR 2.790 of the commission's regulation concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets and where the proprietary information has been deleted in the non-proprietary versions on the brackets remain, the information that was contained within brackets and where the proprietary information has been deleted in the non-proprietary versions only the brackets remain, the information that was contained within the brackets in the proprietary versions having been deleted. The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) contained within parentheses located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Section (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10CFR2.790(b)(1).

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF ALLEGHENY:

Before me, the undersigned authority, personally appeared Peter J. Morris, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Corporation ("Westinghouse") and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

Peter J. Morris

Peter J. Morris, Manager

Strategic Safety and Regulatory Issues

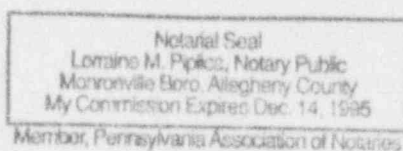
Sworn to and subscribed

before me this 9th day

of February, 1993

Lorraine M. Pipico

Notary Public



- (1) I am Manager, Strategic Safety and Regulatory Issues, in the Nuclear and Advanced Technology Division, of the Westinghouse Electric Corporation and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rulemaking proceedings, and am authorized to apply for its withholding on behalf of the Westinghouse Energy Systems Business Unit.
- (2) I am making this Affidavit in conformance with the provisions of 10CFR Section 2.790 of the Commission's regulations and in conjunction with the Westinghouse application for withholding accompanying this Affidavit.
- (3) I have personal knowledge of the criteria and procedures utilized by the Westinghouse Energy Systems Business Unit in designating information as a trade secret, privileged or as confidential commercial or financial information.
- (4) Pursuant to the provisions of paragraph (b)(4) of Section 2.790 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.
 - (i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.
 - (ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

- (a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.
- (b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.
- (c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.
- (d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.
- (e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.
- (f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

- (a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.
- (b) It is information which is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

- (c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.
 - (d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.
 - (e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.
 - (f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.
- (iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10CFR Section 2.790, it is to be received in confidence by the Commission.
- (iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.
- (v) Enclosed is Letter ET-NRC-93-3818, February 1993, being transmitted by Westinghouse Electric Corporation (W) letter and Application for Withholding Proprietary Information from Public Disclosure, N. J. Liparulo (W), to Mr. R. W. Borchardt, Office of NRR. The proprietary information as submitted for use by Westinghouse Electric Corporation is in response to questions concerning the AP600 plant and the associated design certification application and is expected to be applicable in other licensee submittals in response to certain NRC requirements for justification of licensing advanced nuclear power plant designs.

This information is part of that which will enable Westinghouse to:

- (a) Demonstrate the design and safety of the AP600 Passive Safety Systems.
- (b) Establish applicable verification testing methods.
- (c) Design Advanced Nuclear Power Plants that meet NRC requirements.
- (d) Establish technical and licensing approaches for the AP600 that will ultimately result in a certified design.
- (e) Assist customers in obtaining NRC approval for future plants.

Further this information has substantial commercial value as follows:

- (a) Westinghouse plans to sell the use of similar information to its customers for purposes of meeting NRC requirements for advanced plant licenses.
- (b) Westinghouse can sell support and defense of the technology to its customers in the licensing process.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar advanced nuclear power designs and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended for developing analytical methods and receiving NRC approval for those methods.

Further the deponent sayeth not.

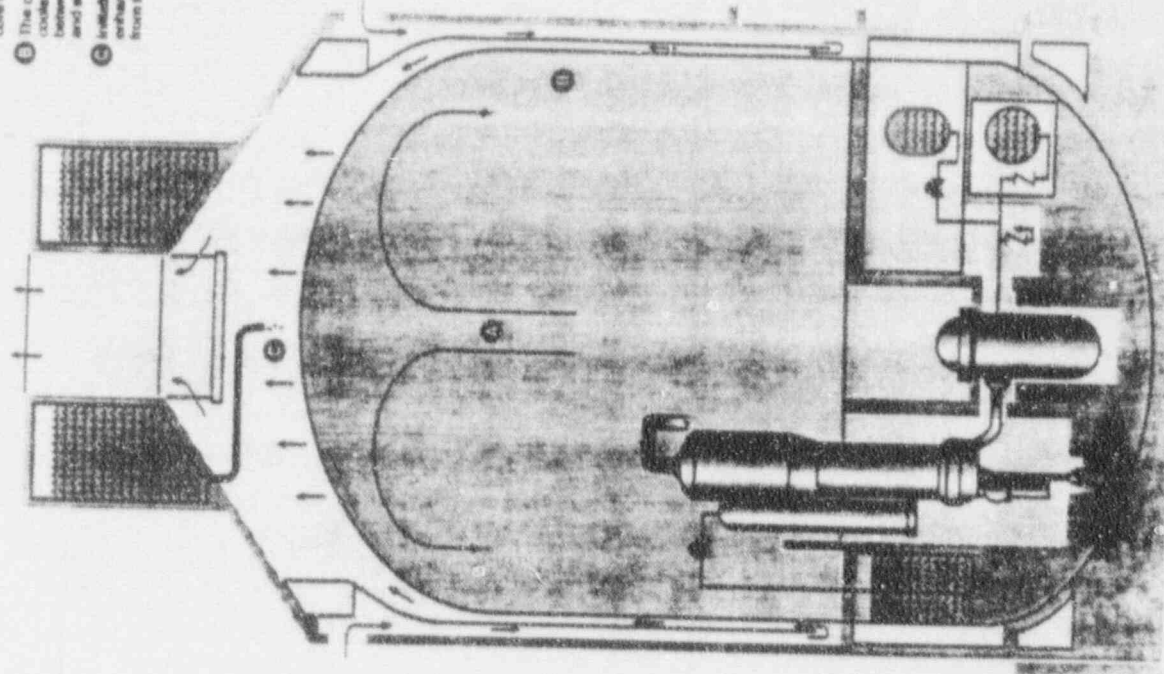
NRC/WESTINGHOUSE MEETING AGENDA 2-10-93

CONTAINMENT VESSEL TEMPERATURES FOR AP600 PASSIVE CONTAINMENT

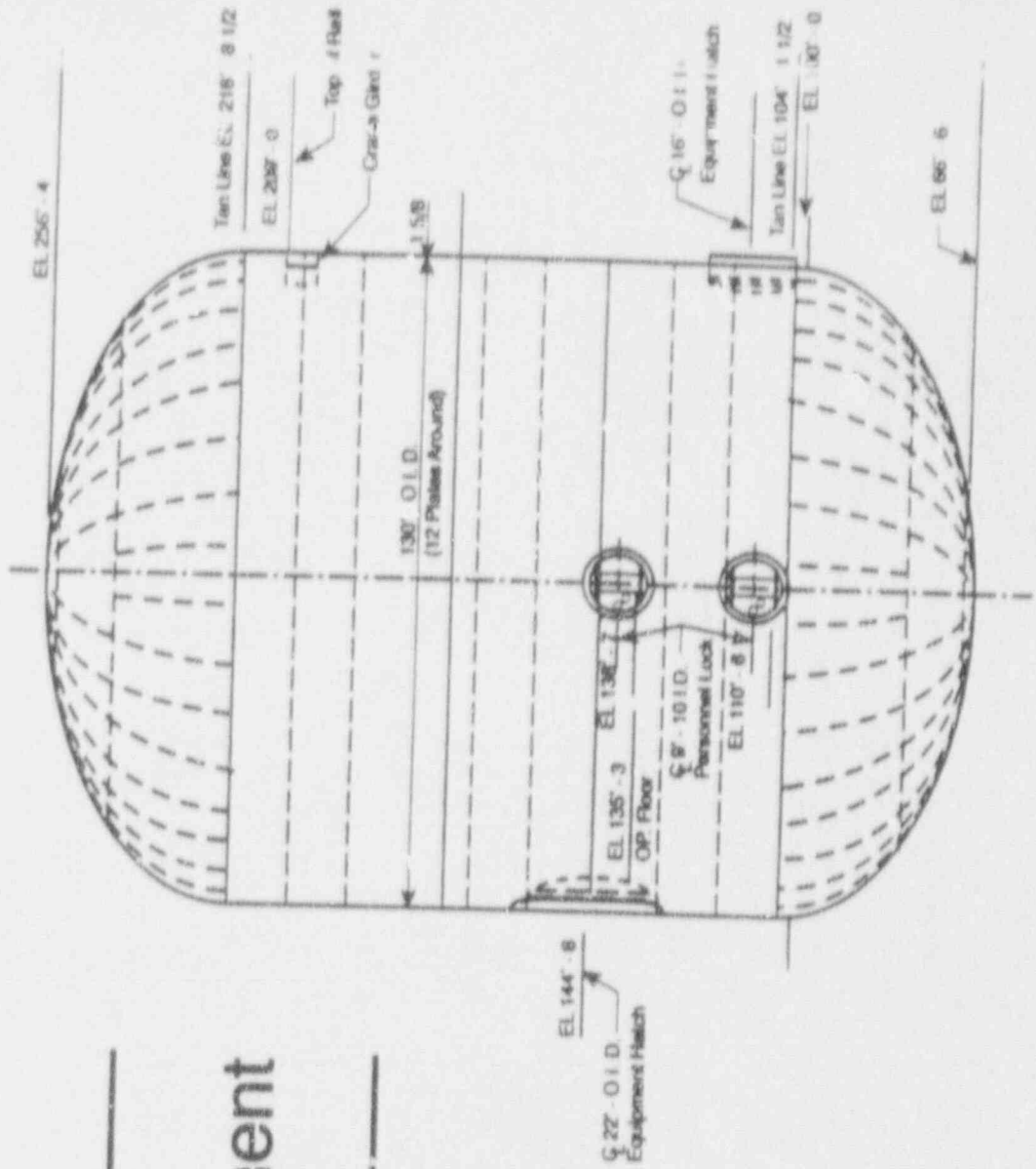
1. Passive Containment Cooling - Water Distribution Weirs
 - Water distribution tests
 - Considered vessel construction tolerances
 - With and without weir
 - Weir configuration tested —
 - Weir configuration to be tested
2. Containment pressure and temperature conditions
 - Normal
 - Abnormal (PRHR, ADS, Small break)
 - Design Basis Accident (LOCA, MSLB)
 - Severe Accident
3. Containment vessel shell temperatures
 - GOTHIC analyses
 - Through thickness at center of dome
4. Thermal loads and stress evaluations
 - Normal, abnormal, design basis and severe accidents
 - Axisymmetric
 - Asymmetric
 - Through thickness
5. Containment buckling
 - BOSOR-5 analysis of top head
 - Effect of thermal stresses
 - Welding residual stresses
6. Fracture Mechanics Material Properties
 - Charpy Test Data

AP600 Passive Containment

- A Internal convection and natural circulation transfer heat from the core to the steel containment
- B The containment is continuously cooled by natural circulation of air between the containment vessel and surrounding steel building
- C Gravity containment: cooling is enhanced by gravity if water from tanks above the containment



AP600 Containment Vessel



a.c

a.c

FIGURE IS PROPRIETARY

TOP AND BOTTOM HEAD LAYOUT

WCAP-13296
FIGURE 1

a.c

a.c

FIGURE IS PROPRIETARY

TEST MODEL / FACILITY OVERALL FRONTAL VIEW

WCAP-13296
FIGURE 3

a.c



a.c

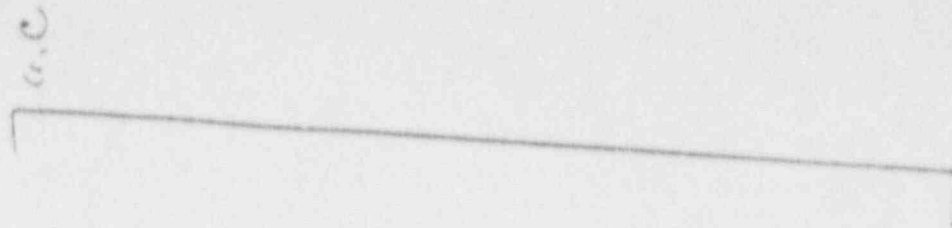
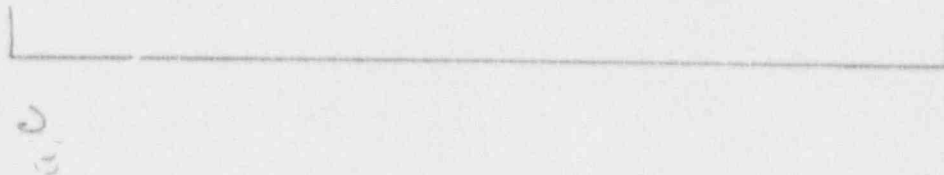


FIGURE IS PROPRIETARY

CENTER BUCKET

WCAP-13296

FIGURE IS PROPRIETARY



AP600 WATER DISTRIBUTION TEST
(PHASE 2) WEIR SCALE & LEVEL
DIMENSIONS

WCAP-13296

FIGURE 32

a.c

a.c

FIGURE IS PROPRIETARY

TYPE 1 WEIR PLATE ASSEMBLIES INSTALLED

WCAP-13296

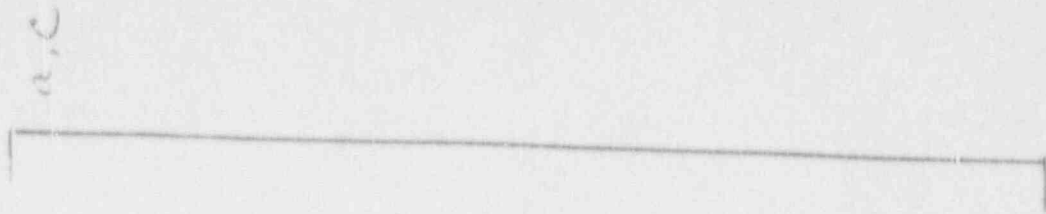
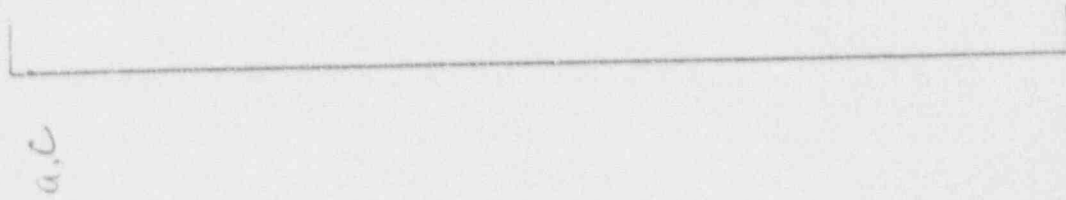
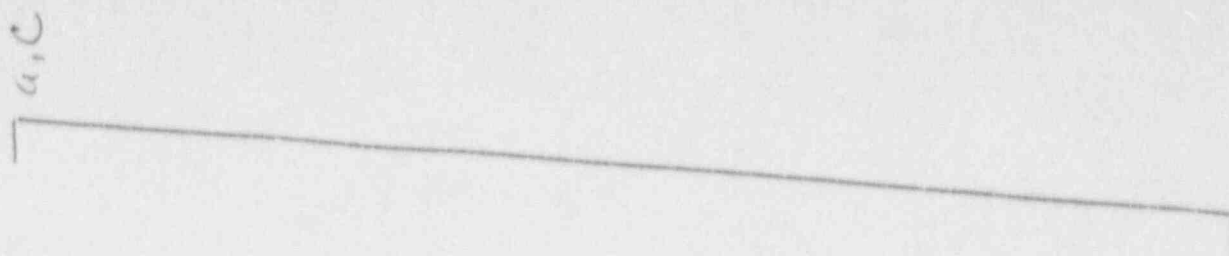


FIGURE IS PROPRIETARY

Fig. 2: Sector weirs



FIGURE IS PROPRIETARY



PLAN VIEW OF WIERS

a.c

a.c

FIGURE 15 PROPRIETARY

Fig. 3 : Typical sector of The weirs.



FIGURE IS PROPRIETARY

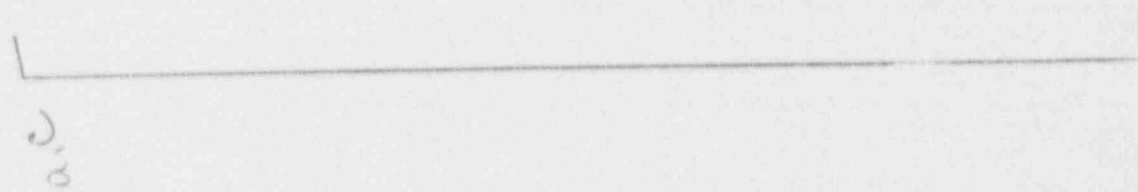


Fig 4 . Collection box detail

a.c

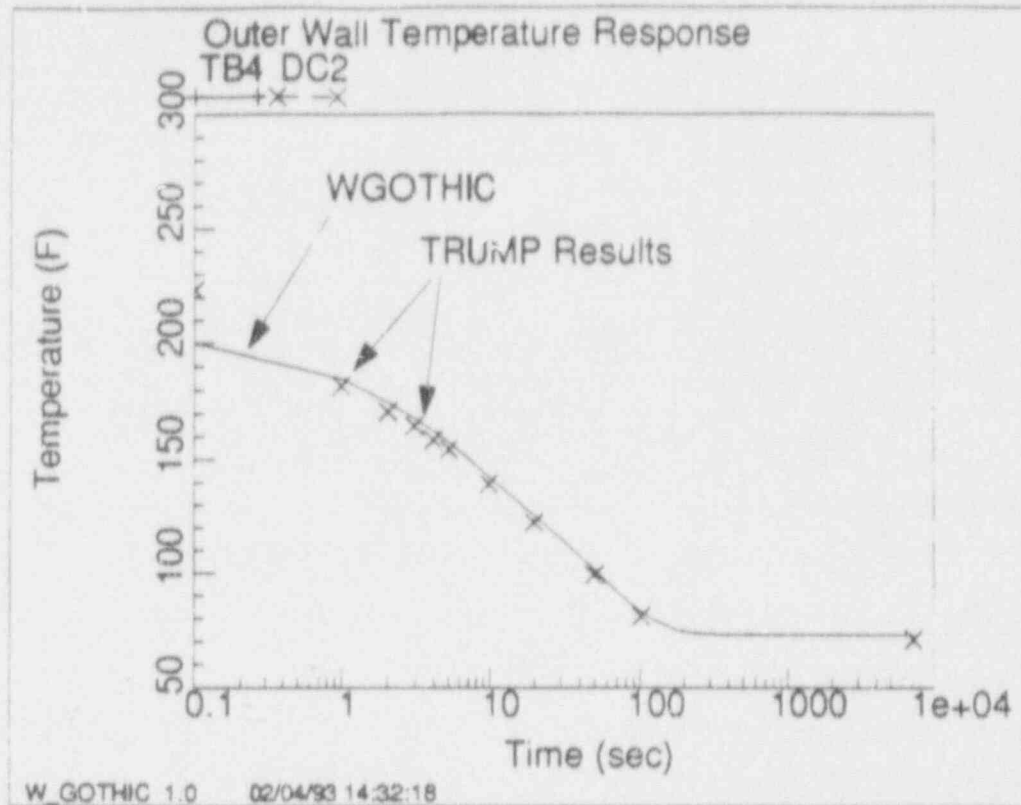
a.c

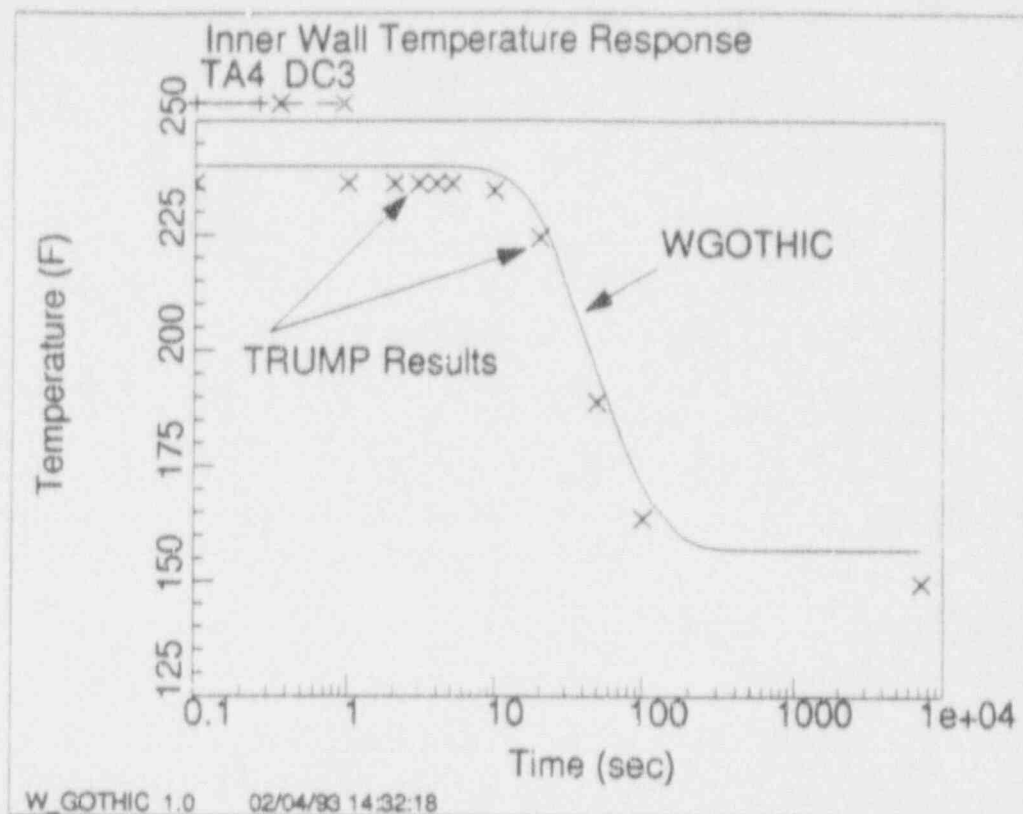
FIGURE 15 PROPRIETARY

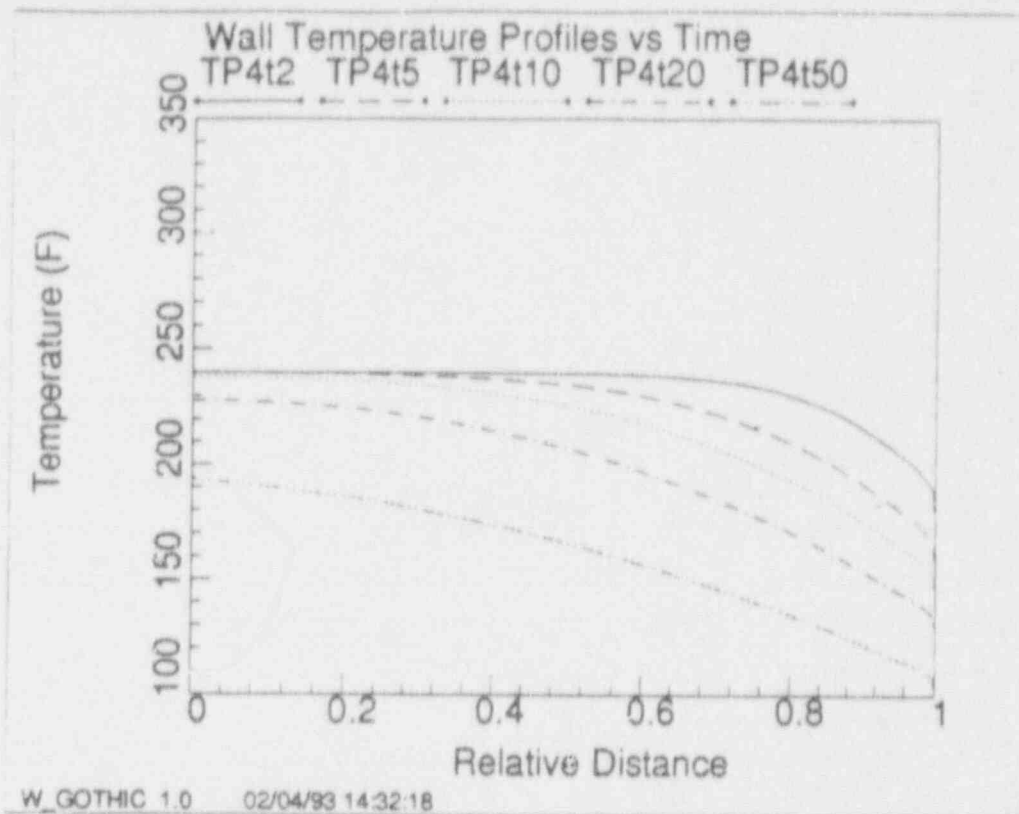
WEIR DISTRIBUTION CHANNEL

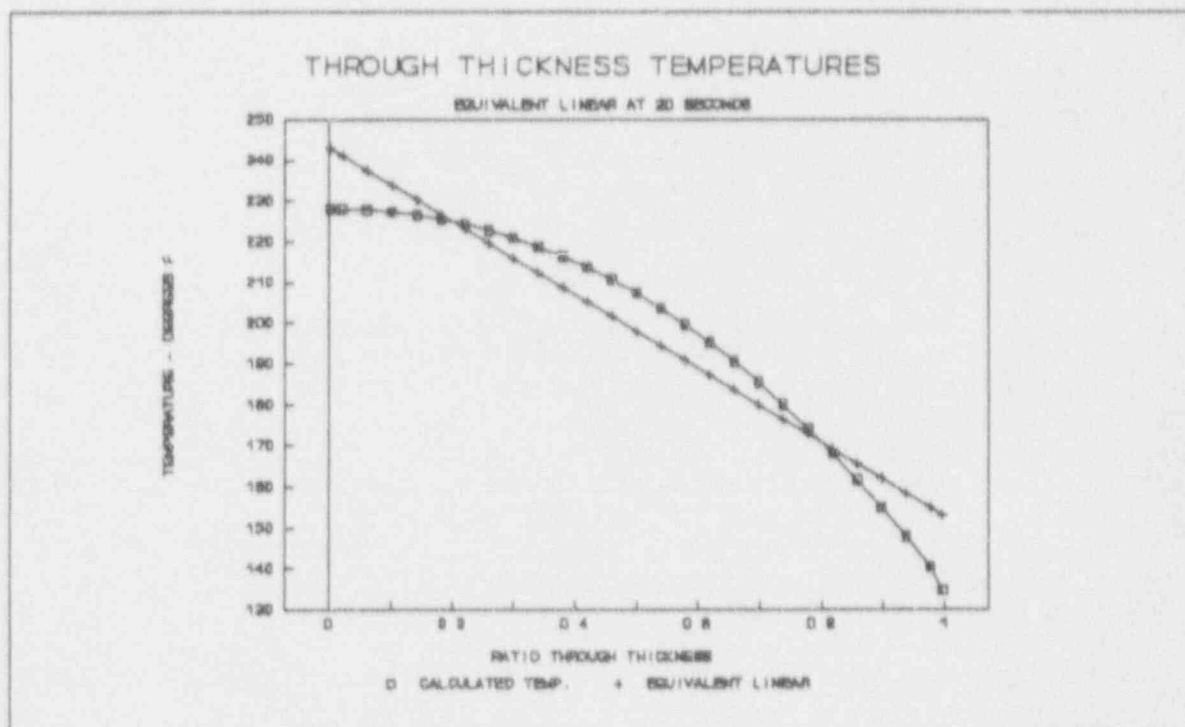
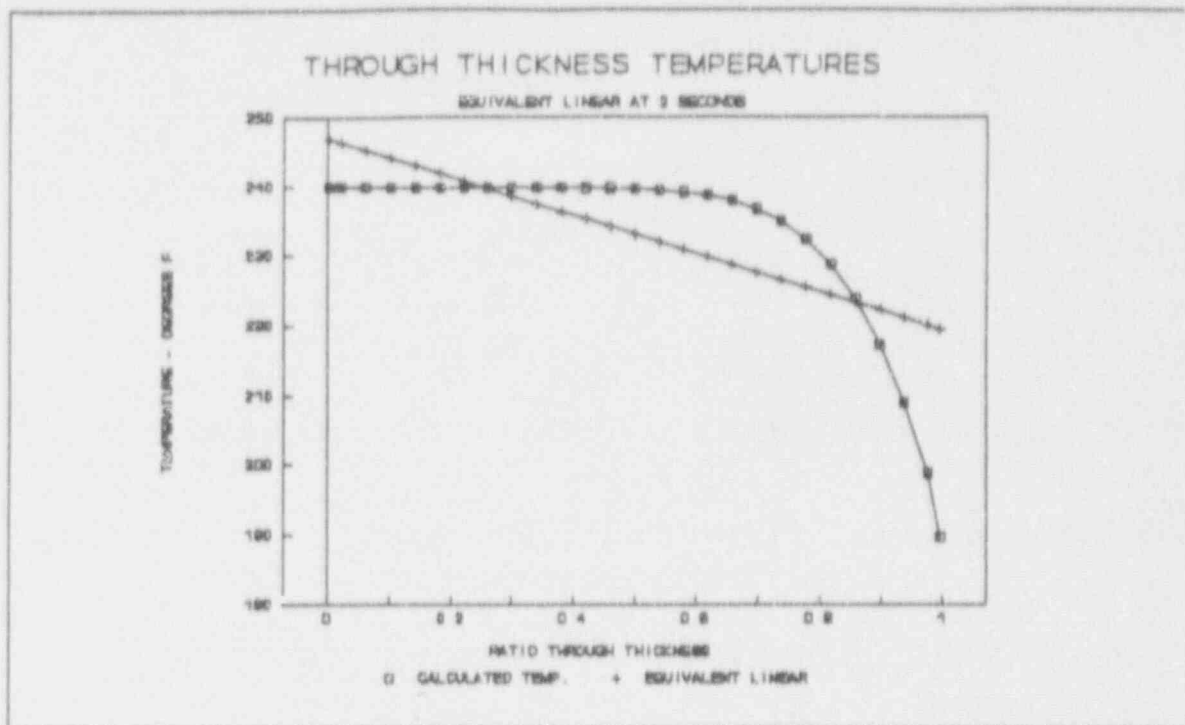
CLASSIFICATION OF CONTAINMENT PRESSURE AND TEMPERATURES FOR NORMAL, DESIGN BASIS ACCIDENTS AND SEVERE ACCIDENTS

Containment Condition	Pressure (psig)	Shell Temp.(°F)	ASME III MC, NE	SSAR/PRA Reference
1. Normal	-.2 to 1.0	120	-Service Level A	Ch. 16 - 3.6.4 Table 3D.5-1
2. Design Internal Pressure	45.0	280	-Design -Service Level A	3.8.2.1.1
3. Design External Pressure	-2.5	Ambient	-Design -Service Level A	6.2.1.1.2
4. Design Basis Accidents				
A. LOCA	40.0	270	-Service Level A	6.2
B. MSLB/FWLB	40.0	270	-Service Level A	6.2
5. Abnormal Events				
A. Group 1	Atm.	150	-Service Level A	Table 3D.5-3
B. Group 2	10.0	240	-Service Level A	Table 3D.5-3
6. Severe Accidents				
A. Sequences of CC and OKP (up to 72 hrs.)	88.0	300	Ultimate Capacity	RAI 252.1
B. LOCA + Hydrogen with 75% Fuel Clad Interaction	76.1	300	AP600 and URD -Service Level C stress intensity -FS of 1.5 for buckling	PRA 14.3.3
C. Other Severe Accidents with a Probability less than 10^{-7}	None	None	AP600 and URD -Service Level C stress intensity -FS of 1.5 for buckling	PRA App. G



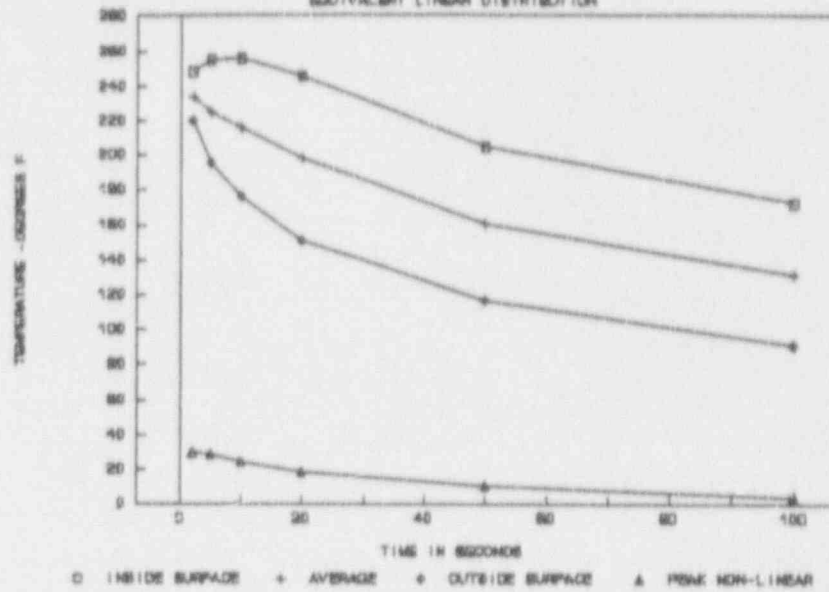






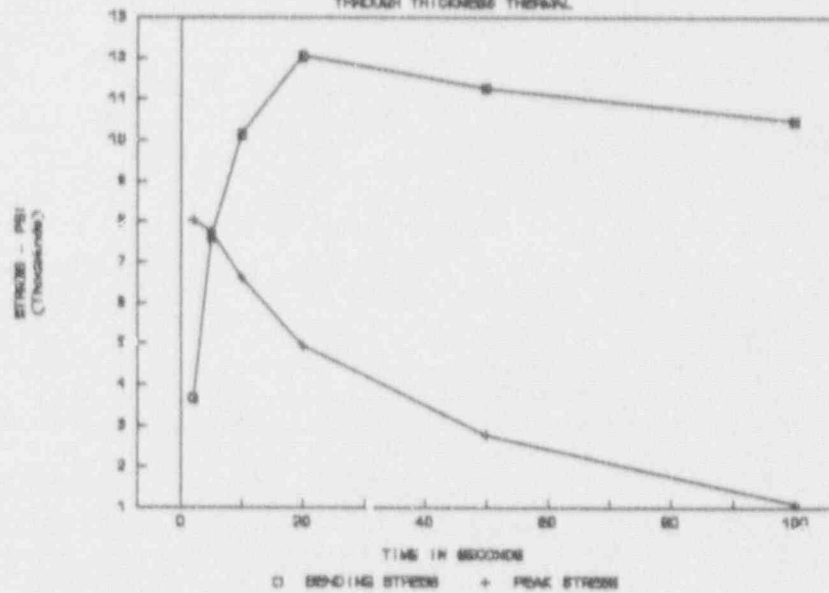
THROUGH THICKNESS TEMPERATURES

EQUIVALENT LINEAR DISTRIBUTION



TEMPERATURE STRESSES

THROUGH THICKNESS THERMAL



Containment Vessel Temperatures Axisymmetric

Location of temperature	Normal Operation		Transient or accident	
	Cold weather	Hot weather	Cold weather	Hot weather
Outside atmosphere	-40°F	115°F	-40°F	115°F
Inside Containment	50°F	120°F		280°F
Middle annulus	50°F	130°F		280°F
Vessel shell above el.132'3"	-40°F	120°F	<280°F	280°F
Crane girder	50°F	120°F	<280°F	280°F
Vessel shell below el.132'3"	70°F	120°F	<280°F	280°F
Vessel embedded below el.100'	70°F	70°F	70°F	70°F
Temp.Diff. at crane girder	90°F	0°F	0°F	0°F
Temp.Diff. at el.132'3"	110°F	0°F	0°F	0°F
Temp.Diff. at el 100'	0°F	60°F	<210°F	210°F

CONTAINMENT VESSEL TEMPERATURES
ASYMMETRIC

a.c



a.c

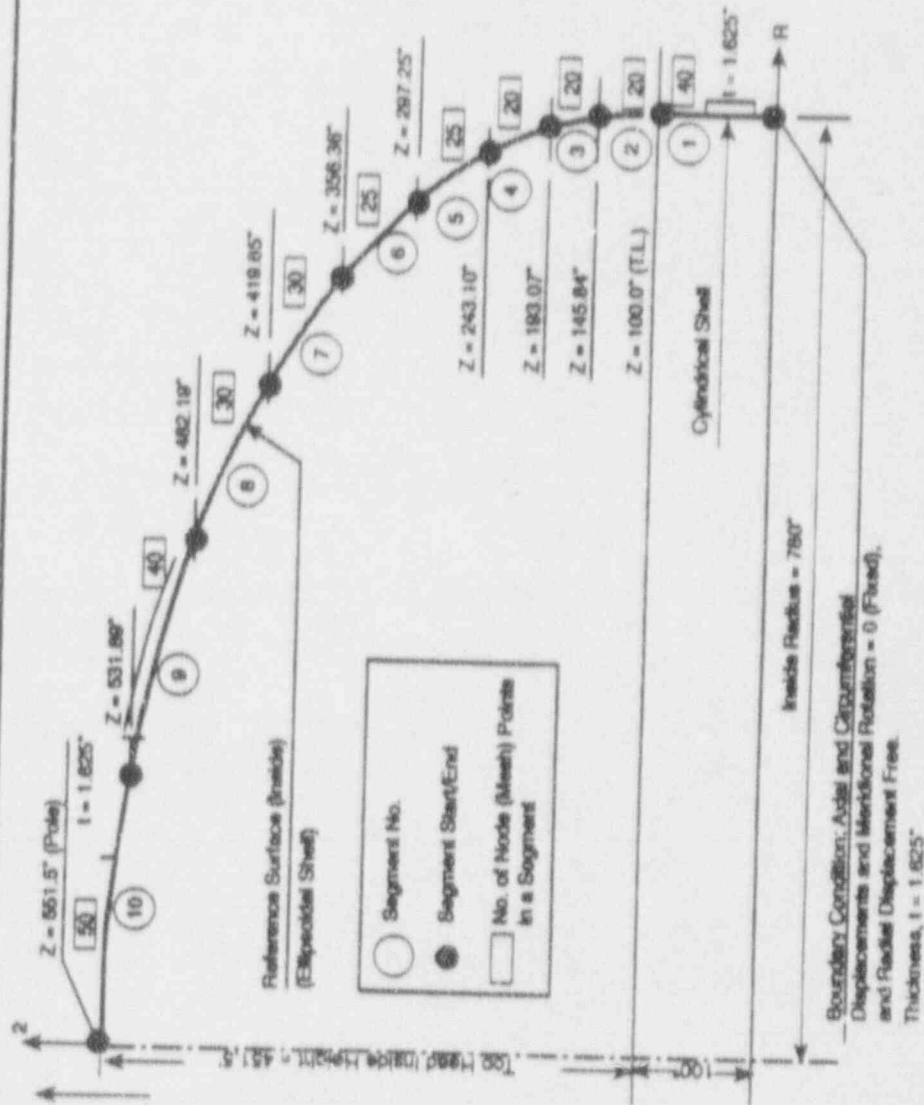


SUMMARY OF STRESSES DUE TO ASYMMETRIC TEMPERATURES
 ABOVE EL. 132'-3 (INCLUDES STIFFENER AT EL 132'-3)
 N = 100 HARMONIC, 40 F AMPLITUDE ((280-200)/2)
 (T = 40xCOS(100xTHETA), REF. TEMP. = 0 F))

STRESSES IN KSI. *THT* IN DEGREES.

ELEVATION	LOCATION	SIG PHI	SIG TH	TAU PH1TH
132'-3, THT = 0	INSIDE	-2.6	6.5	0.0
	MEMBRANE	-3.9	5.0	0.0
	OUTSIDE	-5.2	3.5	0.0
132'-3, THT = 0.9	INSIDE	0.0	0.0	4.4
	MEMBRANE	0.0	0.0	4.4
	OUTSIDE	0.0	0.0	4.4
150'-0, THT = 0	INSIDE	-6.8	-0.1	0.0
	MEMBRANE	-7.0	-0.1	0.0
	OUTSIDE	-7.2	0.0	0.0
150'-0, THT = 0.9	INSIDE	0.0	0.0	-0.2
	MEMBRANE	0.0	0.0	-0.1
	OUTSIDE	0.0	0.0	0.1
TOP HEAD KNUCKLE, THT = 0	INSIDE	-7.3	-4.8	0.0
	MEMBRANE	-5.9	0.0	0.0
	OUTSIDE	-4.4	4.8	0.0
TOP HEAD KNUCKLE, THT = 0.9	INSIDE	0.0	0.0	0.0
	MEMBRANE	0.0	0.0	0.0
	OUTSIDE	0.0	0.0	0.0

BOSOR-5 Model of Containment Vessel Head



Containment Vessel Pressure Capabilities

Containment Element	Pressure Capability at Ambient Temperature	
	Ultimate Capacity	ASME Service Level C
Cylinder	144 psig	125 psig
Ellipsoidal head	146 psig	116 psig
Equipment hatch (22 foot)	196 psig	117 psig
Equipment hatch (16 foot)	161 psig	96 psig
Personnel airlocks	>300 psig	>163 psig