Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226
(313) 237-8000

June 5, 1981
EF2 - 53471

Mr. L. L. Kintner
Division of Project Management
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Kintner:

Reference: Enrico Fermi Atomic Power Plant, Unit 2
NRC Docket No. 50-341

Subject: Responses to Miscellaneous NRC Questions and Requests for Information.

Please find enclosed several items responding to NRC questions. This information will be included in a forthcoming FSAR amendment as appropriate.

Item 1

RSB Position S/RV EVALUATION PROGRAM

Detroit Edison has reviewed the submitted page of the Shoreham SER related to a surveillance program for safety/relief valves. Our response to this item is included as Attachment 1.

Item 2

SEB 130.6A FERMI INTERIM PUA

Detroit Edison's responses to these questions are contained in Attachment 2.

Item 3

Halaptz Verbal 6/1/81 SGTS

Detroit Edison's response to this question is enclosed as Attachment 3.

Item 4

\- Verbal 6/3/81 SECONDARY CONTAINMENT PRESSURE RESPONSE

Detroit Edison's response to this question is enclosed as Attachment 4.

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1/1

Letter to: L. L. Kinter

June 5, 1981
EF2-53471

Item 5

RSB H.II.K.3.13 HPCI/RCIC LEVEL TRIP - RCIC AUTO RESET

Please see Attachment 5 for Detroit Edison's response on this item.

Item 6

ASB Draft Question 5/11/81 HIGH DENSITY SPENT FUEL STORAGE

Detroit Edison's response to Question #1 of these draft questions submitted May 11, 1981 is enclosed as Attachment 6. The remainder of the responses have been filed previously.

Item 7

CPB - FUEL CLADDING RUPTURE - LOCA

Detroit Edison's response to this item is enclosed as Attachment 7.

Item 8

\- Verbal 6/4/81 AMENDED PAGE 5A-4

Detroit Edison has revised page 5A-4 as requested by NRC. Refer to Attachment 8.

Item 9

RSB Non-TMI #7 POST - LOCA LEAKAGE

Detroit Edison's response is enclosed as Attachment 9.

Item 10

GB Draft Position OBE RETURN PERIOD

Please refer to Attachment 10, Weston Geophysical draft report, for this response.

Sincerly,

William F. Colbert

William F. Colbert
Technical Director
Enrico Fermi 2

RMB
Attachments

bcc: L. W. Schuerman
F. E. Gregor
J. Honkala
E. Lusis
A. E. Wegele
R. M. Berg
Document Control

GED/16/3.0-3.2

ATTACHMENT 1
EF2-53471

Detroit Edison

ENRICO FERMI UNIT 2 PROJECT
ENGINEERING

May 29,1981

To: L.E.Schuerman
Licensing Engineer

From: D.F.Lehnert
System Engineer

Subject: SRV Plant Performance Evaluation Program

The attachment requests that Edison commits to partcipate in a program to establish and mantain an SRV "surveillance" program. The contents of such a program were provided in draft form to the LRG for comment by GE in an April 24, 1981 meeting. This document was reviewed by Nuclear Operations. One of their comment was a request to change the title of the program/document to "Plant Performance Evaluation for Safety/Relief Valves". The terminology "surveillance" implies a Tech. Spec. item and is therefore in-appropriate.

Our response to the attached NRC request should be as follows:

> "Edison will participate in the utility program and maintain a performance evaluation program for the Fermi - 2 safety/relief valves."

DHL/slm
Attachment
cc: W. Colbert
E. Lusis
J. Nyquist
G. Overbeck
Doc. Control

RSB Position FROM Shoreham SER dno.
Fermi 2 5/14/81

The safety valve manufacturer tests the valve hydrostatically at ANSI specified test conditions, for seat leakage, for set pressure and for response time prior to shipment to certify that design and performance requirement have been met. Specified manual and automatic actuation (ADS) modes of the circuitry for each safety/relief valve are verified during the pre-operational test. This complies with the pre-operational testing requirements of regulatory guide 1.68 "Initial Test Programs for Water-Cooled Reactor Power Plants".

MR: KITNER

PL CONVEY THIS REQUIREMENT TO EF-2 PEOPLE.

It is noted that the General Electric Company has agreed to work with the staff and their utility customers to maintain a surveillance program once new safety-relief valves become operational on [redacted] boiling water reactor (NUREG-0152). Information to be reported will include all abnormalities ranging from minor wear observed during normal inspection to complete failures, including failure to open or close and inadvertent operation. We ~~will require the applicant to~~ request a commitment that Detroit Edison will participate in this program.

To reduce the effects of safety-relief valve discharge to the suppression pool, the applicant has changed the safety-relief valve discharge device from a ramshead to a quencher design. The applicant has stated that the overpressure protection will not be affected by this change. From a transient standpoint, the safety-relief valve discharge critical flow is the flow of interest. The applicant has stated that the change from a ramshead to a quencher does not affect the critical flow and, therefore, does not affect the overpressure calculations. On this basis, we find the change is acceptable with regard to the overpressure protection function. In addition, a startup test will be performed to demonstrate expected safety-

Rimy Thomas 7/13/81

ATTACHMENT 2
EF2-53471

Detroit
Edison

ENRICO FERMI UNIT 2 PROJECT
ENGINEERING

June 1, 1981
EF2-53425

To: L. Schuerman
Licensing Engineer

E. LUSIS

From: D.F.Lehnert
System Engineer

JUN 3 1981

Subject: Revised Suggested Responses to NRC Questions on Fermi Interim Plant Unique Analysis

Attached please find the revised suggested responses to the latest NRC-SEB questions (item "B" attachments to memorandum L.E.Schuerman to D.F.Lehnert, June 1, 1981) on the Fermi Interim Plant Unique Analysis. As requested by the NRC, the May 20, 1981 presentation material that relates to the condensation oscillation loads, pool swell impact loads, and fatique has been expanded and incorporated into the suggested response to the NRC questions on these subjects.

DFL/slm
Attachments
cc: W.F.Colbert
E. Lusis
F. Gregor
A. Lim
T.D.Martin (NUTECH)
Doc. Control

SUGGESTED RESPONSES TO NRC QUESTIONS

QUESTION

1. In your response to question 5, it is indicated that with the exception of downcomer lateral loads, the condensation oscillation (CO) loads have not been considered in the interim structural evaluation, and will be included in your confirmatory review. It is requested that the torus shell, the vent system and the supports should be evaluated for the CO loads and on the bases as described in the summary of the meetings held on March 4, 1981 with the Mark I Owner's Group, issued on March 16, 1981.

RESPONSE

As you indicate, consideration of CO loads in the interim report was limited to evaluation of lateral loads on downcomers. Complete CO loading definitions were not available at the time that the interim report was prepared.

As new loading definitions have emerged, preliminary evaluations of the effects of these loads on the Fermi containment structures have been performed. In some cases, these evaluations have resulted in the design and implementation of additional structural modifications. The preliminary evaluation for the effects of CO loads on the Fermi containment structures and the additional structural modifications are discussed in Appendix A.

A comprehensive evaluation of all aspects of the CO loading definition has been held up by such issues as; results of additional FSTF testing, revised downcomer definition, and final resolution of the fluid structure interaction (FSI) effects on submerged structures. However, modification plans have been developed on the basis of estimates of the effects of these unresolved issues on the Fermi containment. A complete evaluation of CO loads will be included in the Fermi Plant Unique Analysis which is now under way.

QUESTION

2. In your response to question 9 it is indicated that the single post supports are used to link the water mass to the torus beam elements. Provide a discussion on how the fluid-structure interaction is taken into consideration in your analysis by such an idealization.

RESPONSE

The analytical model in question is a beam and column type model which is used to evaluate gross lateral loading effects on the torus supporting system. Fluid structure interaction is judged to be unimportant in evaluating the effects of loads of this type on the torus.

Fluid structure interaction is being addressed in other analytical models used to evaluate the effects of hydrodynamic loadings on the suppression chamber shell and supporting structures. (See response to Question 4.)

QUESTION

3. In your response to question 18 it is stated that sample computations will be provided only for specific areas of the structures. The following are such areas:

a. In Table 6.1.1-6 the computer upward load is 498 kips but the allowable is only 410 kips. Indicate the contributions of each of the loads in the load combination considered, and for the dynamic loads how the responses are combined, SRSS or ABS. If, by using the loads and criteria established from the Long Term Program, there is still no reduction in such high level of overstress, it is staff's position that a modification of the design of the tie down base plate should be made so that the allowable will not be exceeded.

RESPONSE

The exceeded allowable in the referenced table has been addressed since issuance of the interim document. As part of the on-going evaluation for the effects of new loads on the support system, it has been determined that an additional modification to the torus support system is required. The modification (saddle support) has been designed and is now in the preliminary stages of construction (see Appendix A).

QUESTION

3. b. In Tables 6.2.1-3 and 6.2.1-4 indicate the contributions of each load in the load combination to the computed total stress intensities of 18 ksi and 22 ksi respectively. Indicate how the dynamic responses are established and combined. The computed stress intensity of 22 ksi is greater than the allowable value of 19.3 and you justify it on the basis that the magnitude of impact pressure in the computation is conservative. A reassessment should be made on the basis of more realistic load magnitude and the stress criteria as established by the Long Term Program.

RESPONSE

Contributions of the loads as determined in the interim evaluation are as follows:

Table	Stress/Area	Total Stress (Ksi)	D.L. (%)	Seismic (%)	Pool Swell (%)	SRV	V.S. Disc. Thrust (%)	Int. Pressure (%)
6.2.1-3	Membrane/ Vent Line	18.0	0.5	3	15	61	9	12
6.2.1-4	Membrane/ Vent Header Near Vent Line	22.0	1	3	53	29	10	4
6.2.1-4	Membrane/ Vent Header Near Mitered Joint	22.0	3	2	63	17	13	2

Dynamic responses in the evaluation were determined by absolute summation of peak responses from individual loads.

The overstress cited (22 ksi vs. 19.3 ksi allowable) has been addressed since completion of the interim analysis by the addition of a vent header deflector device to the Fermi vent system design. A preliminary assessment of the LTP pool swell impact loads and the vent header deflector modification are discussed in Appendix B.

QUESTION

3. c. In Table 6.2.1-5, indicate the contributions of each load in the load combination to the computed total column compression load of 72 kips and total column tension load of 104 kips, and specify the allowable for each.

RESPONSE

Contributions of loads as determined in the interim evaluation are as follows:

Total Column Load (K)	DL (%)	Seismic (%)	Pool Swell (%)	SRV (%)	V.S. Discharge Thrust (%)
72 (comp.)	10	2	53	29	0
104 (tens.)	(-) 7	1	70	20	16

The referenced table indicates only output vent header column reactions from the vent system computer models. Results of the support column calculations with appropriate allowables are shown in interim table 6.2.3-1 on page 6.133.

QUESTION

3. d. For the torus, its internal structures and its supports, fatigue should be included in the evaluation.

RESPONSE

Fatigue effects were not addressed in the interim evaluation since complete load definitions were not available. Also, the emphasis of the evaluation was to address short term safety rather than long term effects such as fatigue. A preliminary assessment of fatigue is contained in Appendix C. Fatigue will be fully addressed in the Fermi unique analyses now under way.

QUESTION

4. As mentioned before you plan to use the alternate criteria in NUREG-0661 Appendix A, Article 2.13.9 for assessment of the Safety Relief Valve Load, this approach involves in-plant tests and the establishment of a coupled load-structure analytical model. Provide a description of such a model which you are going to calibrate together with the basis for the analytical model adopted.

RESPONSE

The basis for use of the alternate criteria in NUREG-0661 for assessment of SRV loads is the observation that the original analytical approach which employed a decoupled forced vibration analysis was prod_cing unrealistically amplified torus response when compared to data 'rom actual in-plant tests. The revised approach is based on the recognition that torus response to SRV loads is limited by the air bubble energy introduced into the suppression pool during a discharge event.

The analytical model used in the torus SRV load evaluation consists of a 1/32 sector finite element model. Fluid structure interaction effects are accounted for through the use of a fluid added mass matrix which is merged with the structure mass matrix in computing response to applied loads. Loads applied to the analytical model are determined using the methodology given in the Mark I Load Definition Report (LDR) with the resulting pressure waveforms modified to be more characteristic of those observed in in-plant tests.

A modal transient response analysis is performed using the coupled fluid structure model and the loads described above. Modal correction factors are computed on the basis of the limited bubble energy available in the suppression pool and are applied to the structural response from the transient analysis.

The approach has been verified by comparison of predicted vs. measured results for in-plant tests performed at the Monticello plant. Predicted response results envelope those measured in the Monticello test. In addition, the approach is able to accurately predict trends observed in structural response between cold pipe and hot pipe SRV actuations. An in-plant test is planned to confirm that the predicted response of the Fermi 2 torus envelops that which occurs during an actual SRV discharge.

Question

5. Since there is a c ange in the seismic response spectra, the reassessment of the Mark I containment should take the effect of this change into consideration.

Response

An evaluation of the torus supports for a change in the seismic input response spectra was provided as part of the Supplementary Seismic Evaluation Report, EF2-53331, Article 4.5, transmitted to the NRC on May 29, 1981. The evaluation of the torus design under normal operating loads plus the SSE will be conducted as part Mark I Containment LTP-PUA using criteria commensurate with the suppl-ementary seismic evaluation criteria.

DFL/slm

APPENDIX A

FERMI CONDENSATION OSCILLATION LOADS ASSESSMENT

(EXPANDED PRESENTATION OUTLINE USED FOR MEETING HELD WITH NRC ON MAY 20, 1981)

CONDENSATION OSCILLATION LOADS ASSESSMENT - OVERVIEW

O INTERIM ANALYSIS LIMITED TO DOWNCOMER LATERAL LOADS

A COMPLETE C.O. LOAD DEFINITION WAS NOT AVAILABLE AT THE TIME THE INTERIM PUA WAS PERFORMED. THE INTERIM PUA FOR C.O. LOADS WAS LIMITED TO DOWNCOMER LATERAL LOADS.

- LOAD DEFINITION ONLY RECENTLY FINALIZED

NUREG-0661 LISTS THE C.O. LOAD DEFINITION AS AN OPEN ITEM REQUIRING ADDITIONAL FSTF TESTING BY THE MARK I OWNERS. THE ADDITIONAL FSTF TESTING HAS BEEN PERFORMED SINCE NUREG-0661 WAS ISSUED AND THE FINAL LOAD DEFINITION DEVELOPED. THE FINAL LOAD DEFINITION WAS REVIEWED AND APPROVED BY THE NRC IN MARCH OF THIS YEAR. THE NRC PLANS TO INCLUDE THEIR REVIEW IN A SUPPLEMENT TO NUREG-0661.

O LTP DEFINITION OF THE SUPPRESSION CHAMBER C.O. LOAD HAS BEEN ASSESSED

SINCE THE INTERIM PUA WAS COMPLETED A PRELIMINARY ASSESSMENT OF THE FERMI SUPPRESSION CHAMBER FOR C.O. LOADS HAS BEEN PERFORMED.

- USING ANALYSIS RESULTS FROM OTHER SIMILAR MARK I PLANTS

THE RESULTS OF ANALYSES FOR C.O. LOADS PERFORMED FOR OTHER MARK I SUPPRESSION CHAMBERS WITH SIMILAR GEOMETRIES AND DYNAMIC CHARACTERISTICS HAVE BEEN REVIEWED AND USED IN THE ASSESSMENT OF THE EFFECTS OF C.O. LOADS ON THE FERMI SUPPRESSION CHAMBER.

- USING ANALYSIS RESULTS FROM SIMPLIFIED FERMI ANALYTICAL MODELS

A PRELIMINARY ANALYSIS HAS BEEN PERFORMED FOR THE FERMI SUPPRESSION CHAMBER WITH THE INTERIM PUA SUPPORT SYSTEM USING A SIMPLIFIED ANALYTICAL MODEL. THE RESULTS SHOW THAT THE REACTIONS DUE TO C.O. LOADS EXCEED THE CAPACITY OF THE INTERIM PUA SUPPORT SYSTEM (ADDITIONAL ANALYSIS DETAILS ARE DISCUSSED LATER).

- ASSESSMENT RESULTED IN MODIFICATIONS TO SUPPORT SYSTEM, I.E., MITERED JOINT SADDLES

THE ASSESSMENT OF SUPPRESSION CHAMBER C.O. LOADS HAS LEAD TO THE DECISION TO ADD A MITERED JOINT SADDLE SUPPORT TO THE FERMI SUPPRESSION CHAMBER (THE SADDLE IS DESCRIBED IN MORE DETAIL LATER). THE SADDLE HAS BEEN DESIGNED AND IS PRESENTLY BEING INSTALLED.

- SUBSEQUENT ASSESSMENT WITH SADDLES SHOWED SUFFICIENT SUPPORT SYSTEM CAPACITY EXISTS

A PRELIMINARY ANALYSIS HAS BEEN PERFORMED FOR THE FERMI SUPPRESSION CHAMBER WITH THE MITERED JOINT SADDLE SUPPORT SYSTEM USING A SIMPLIFIED ANALYTICAL MODEL. THE RESULTS SHOW THAT REACTIONS DUE TO C.O. LOADS ARE LESS THAN THE ALLOWABLE CAPACITY OF THE SADDLE SUPPORT SYSTEM (ADDITIONAL ANALYSIS DETAILS ARE DISCUSSED LATER).

O ASSESSMENT OF DOWNCOMER LATERAL LOADS SHOWED INTERIM LOADS ENVELOP LTP LOADS

SINCE THE INTERIM PUA WAS COMPLETED A PRELIMINARY ASSESSMENT OF C.O. DOWNCOMER LATERAL LOADS HAS BEEN PERFORMED. THE RESULTS SHOW THAT THE C.O. DOWNCOMER LATERAL LOADS USED IN THE INTERIM PUA ENVELOP THOSE SPECIFIED BY THE LTP (ADDITIONAL ASSESSMENT DETAILS ARE DISCUSSED LATER).

CONDENSATION OSCILLATION LOADS ASSESSMENT - OVERVIEW (CONT.)

O COMPLETE EVALUATION OF C.O. INCLUDED IN PUA

A COMPREHENSIVE EVALUAT[illegible] OF THE EFFECTS OF C.O. LOADS WILL BE INCLUDED IN THE FERMI FINAL PUA WHICH IS NOW UNDERWAY.

DISCUSSION OF FIGURES ON PAGES WHICH FOLLOW

O COLUMN TO SHELL CONNECTION (PAGE A.8)

THE FIGURE SHOWS THE MODIFICATIONS WHICH HAVE BEEN MADE TO THE FERMI SUPPRESSION CHAMBER COLUMN CONNECTION SINCE THE CONTAINMENT WAS ORIGINALLY DESIGNED AND CONSTRUCTED. THE PRINCIPLE MODIFICATIONS INCLUDE COLUMN AND COLUMN CONNECTION COVER PLATES, COLUMN TO SHELL WEB PLATES AND STIFFENERS, AN UPWARD EXTENSION OF THE ORIGINAL COLUMN CONNECTION, AND RING GIRDER COVER PLATES. THE EFFECTS OF THESE MODIFICATIONS ON THE SUPPRESSION CHAMBER RESPONSE HAVE BEEN INCLUDED IN THE INTERIM PUA. A COMPLETE DISCUSSION OF THESE SUPPRESSION CHAMBER MODIFICATIONS IS CONTAINED IN SECTION 3.0 OF THE INTERIM PUA REPORT.

O SUPPRESSION CHAMBER COLUMN ANCHORAGE (PAGE A.9)

THE FIGURE SHOWS THE SUPPRESSION CHAMBER UPLIFT RESTRAINT SYSTEM USED IN THE INTERIM PUA. THE RESTRAINT SYSTEM CONSISTS OF TWO PAIR OF TIE PLATES AT EACH COLUMN LOCATION CONNECTED TO BASE PLATES WITH SIX EPOXY GROUTED ANCHOR BOLTS. SINCE OVERSTRESSES WERE REPORTED IN THE INTERIM PUA FOR THE UPLIFT RESTRAINT SYSTEM AND SINCE THE PRELIMINARY ASSESSMENT OF C.O. LOADS SHOW THAT REACTIONS DUE TO C.O. LOADS EXCEED THE UPLIFT RESTRAINT SYSTEM ALLOWABLE CAPACITY, THE DECISION WAS MADE TO REPLACE THE UPLIFT RESTRAINT SYSTEM WITH A FULL MITERED JOINT SADDLE AND MODIFIED COLUMN HOLD-DOWN BASE PLATES.

O PRELIMINARY MITERED JOINT SADDLE DESIGN (PAGE A.10)

THE FIGURE SHOWS THE SUPPRESSION CHAMBER MITERED

JOINT SADDLE AND MODIFIED COLUMN HOLD-DOWN BASE PLATES. THE FIGURE IS NOT UP TO DATE IN THAT TWELVE AND NOT EIGHT ANCHOR BOLTS ARE BEING INSTALLED AT EACH SADDLE BASE PLATE LOCATION, AND SIX AND NOT FOUR ANCHOR BOLTS ARE BEING INSTALLED AT EACH COLUMN HOLD-DOWN BASE PLATE. THE MITERED JOINT SADDLE IS CONTINUOUS WITH THE COLUMN CONNECTION WEB PLATE AND PROVIDES A MEANS OF MORE EVENLY DISTRIBUTING LOADS, AND REDUCING STRESS CONCENTRATIONS, I.E., LOCAL STRESSES IN THE SHELL NEAR THE COLUMN CONNECTION ARE EXPECTED TO BE LESS.

O DOWNCOMER TO VENT HEADER INTERSECTION STIFFENING (PAGE A.11)

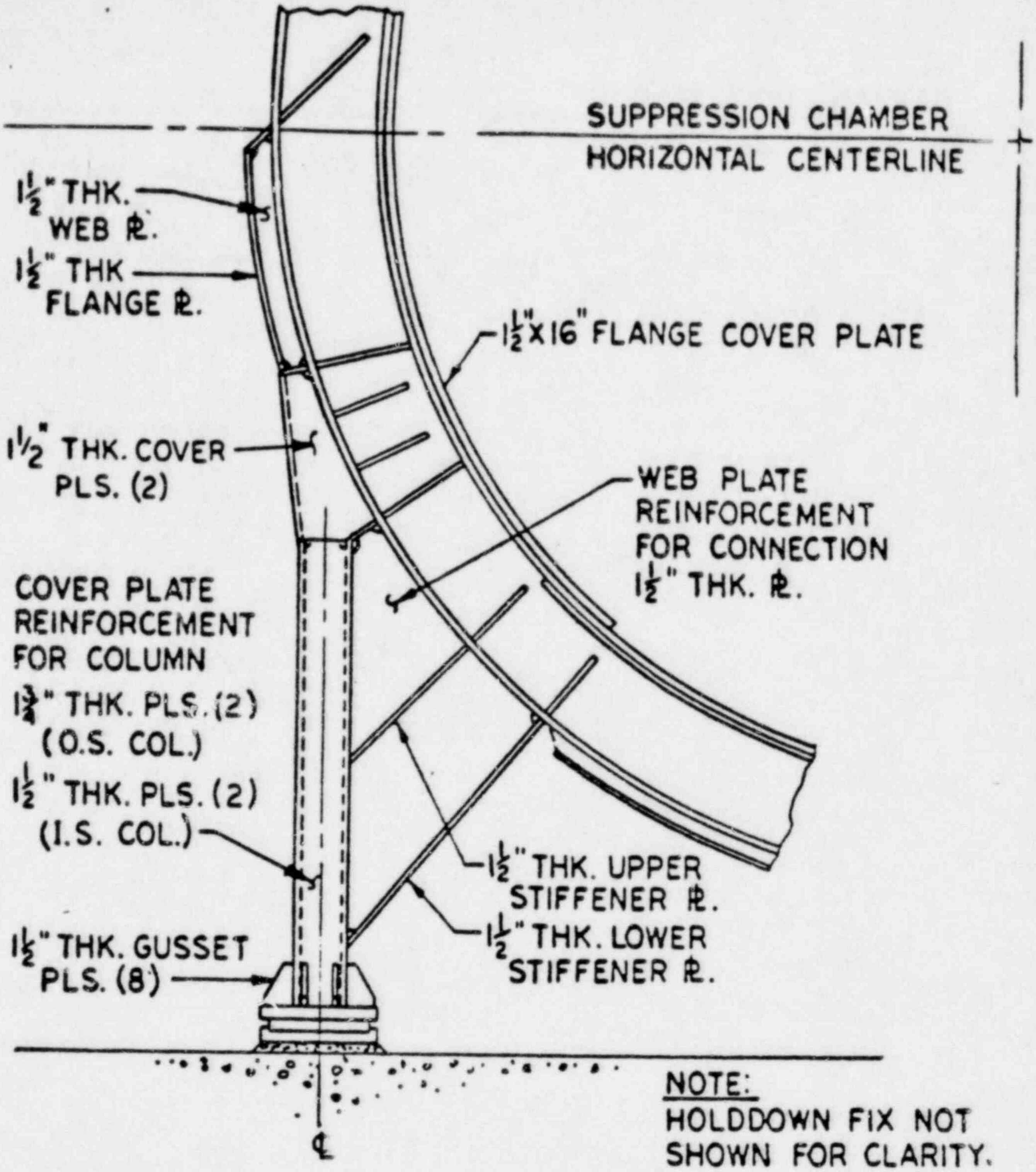
THE FIGURE SHOWS THE MODIFICATIONS WHICH HAVE BEEN MADE TO THE FERMI DOWNCOMER TO VENT HEADER INTERSECTION SINCE THE CONTAINMENT WAS ORIGINALLY DESIGNED AND CONSTRUCTED. THE PRINCIPLE MODIFICATIONS INCLUDE THE ADDITION OF A CROTCH PLATE BETWEEN EACH PAIR OF DOWNCOMERS, TWO OUTER STIFFENING PLATES AT EACH INTERSECTION, AND A RING STIFFENER PLATE ON EACH DOWNCOMER WHICH CONNECTS THE CROTCH PLATE TO THE OUTER STIFFENER PLATE. A COMPLETE DISCUSSION OF THESE VENT SYSTEM MODIFICATIONS IS CONTAINED IN SECTION 3.0 OF THE INTERIM PUA REPORT. THE INTERSECTION STIFFENING SYSTEM PROVIDES AN EFFICIENT MECHANISM FOR REDUCING LOCAL STRESSES IN THE INTERSECTION BY TRANSFERRING LOADS IN IN-PLANE SHEAR TO AREAS AWAY FROM DISCONTINUITIES.

O DOWNCOMER TRUSS (PAGE A.12)

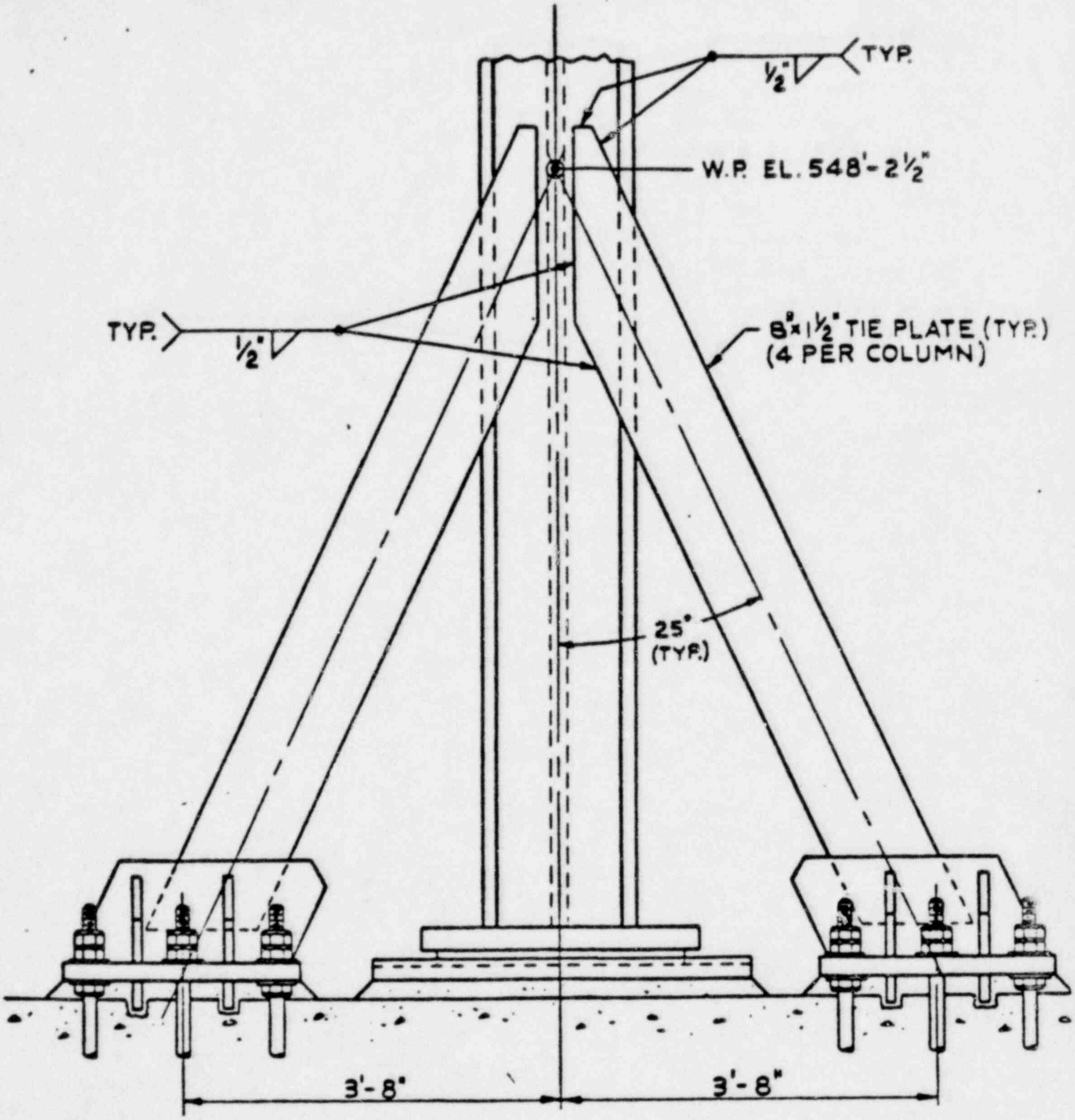
THE FIGURE SHOWS THE DOWNCOMER TRUSS SYSTEM WHICH HAS BEEN ADDED TO THE FERMI VENT SYSTEM. THE PRINCIPLE ELEMENTS OF THE TRUSS SYSTEM INCLUDE BARS WHICH JOIN THE DOWNCOMER STIFFENING RINGS

DISCUSSION OF FIGURES ON PAGES WHICH FOLLOW (CONT.)

OF ADJACENT DOWNCOMER PAIRS, AND PIPE MEMBERS WHICH CONNECT THE DOWNCOMER STIFFENING RINGS TO PAD PLATES ON THE VENT HEADER. THE DOWNCOMER TRUSS SYSTEM PROVIDES AN EFFICIENT MECHANISM FOR TRANSFERRING LOADS WHICH ACT NORMAL TO THE PLANE OF A DOWNCOMER PAIR. THE TRUSS SYSTEM ALSO PROVIDES ADDITIONAL OVERALL STIFFENING OF THE DOWNCOMER TO VENT HEADER INTERSECTION.



COLUMN TO SHELL CONNECTION



SUPPRESSION CHAMBER COLUMN ANCHORAGE

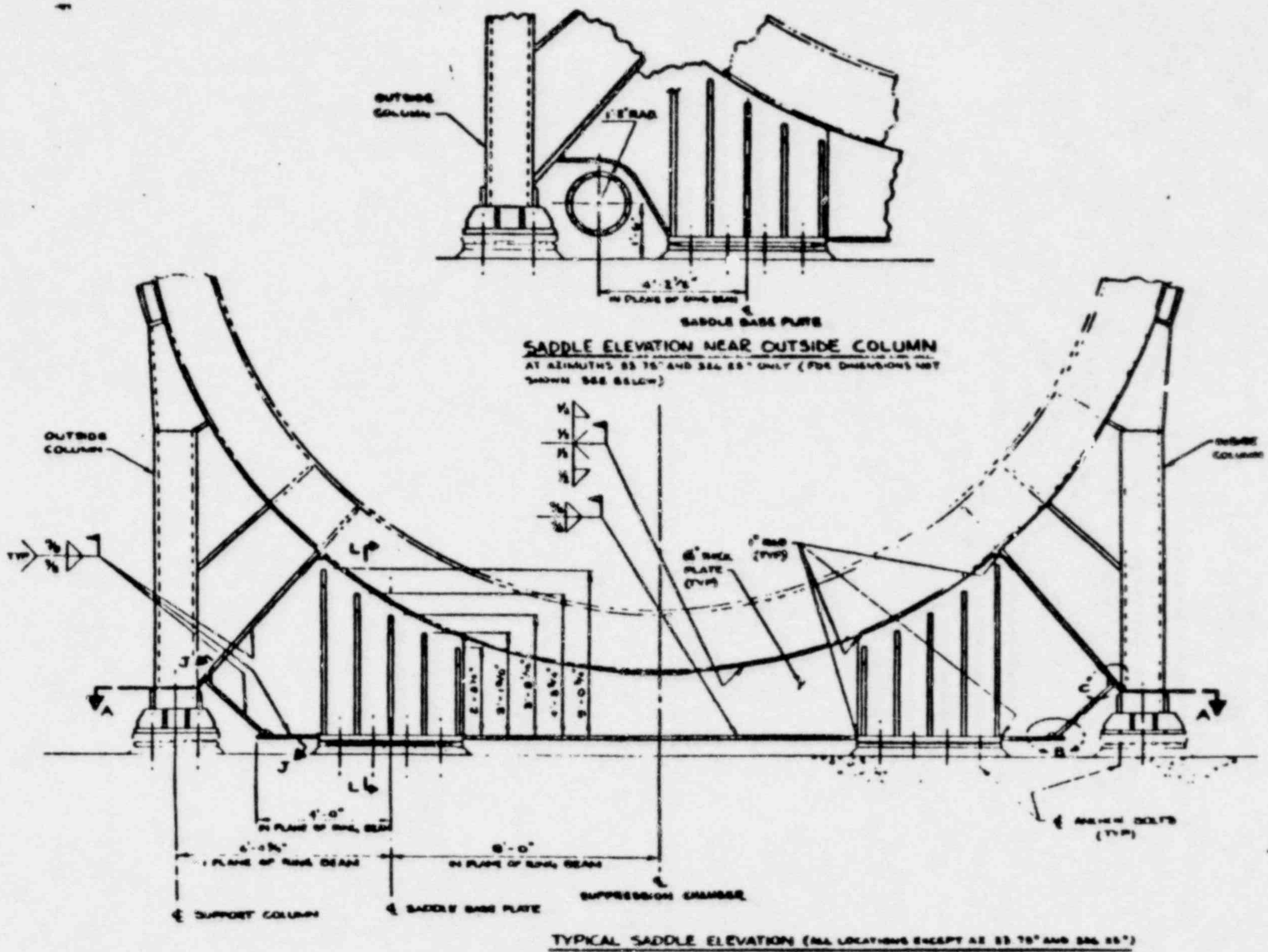


FIGURE 1
PRELIMINARY MITERED JOINT SADDLE DESIGN

POOR ORIGINAL

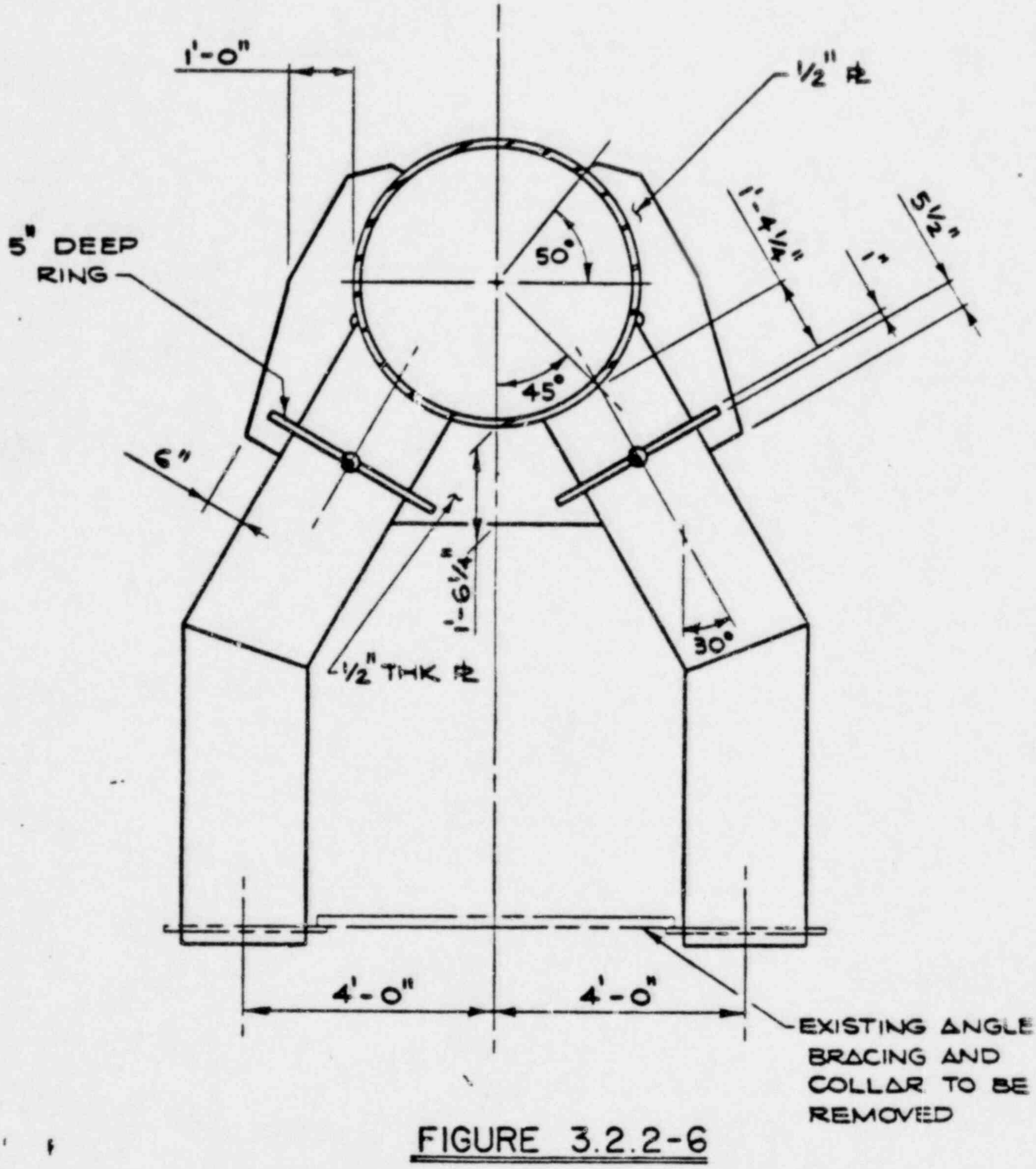
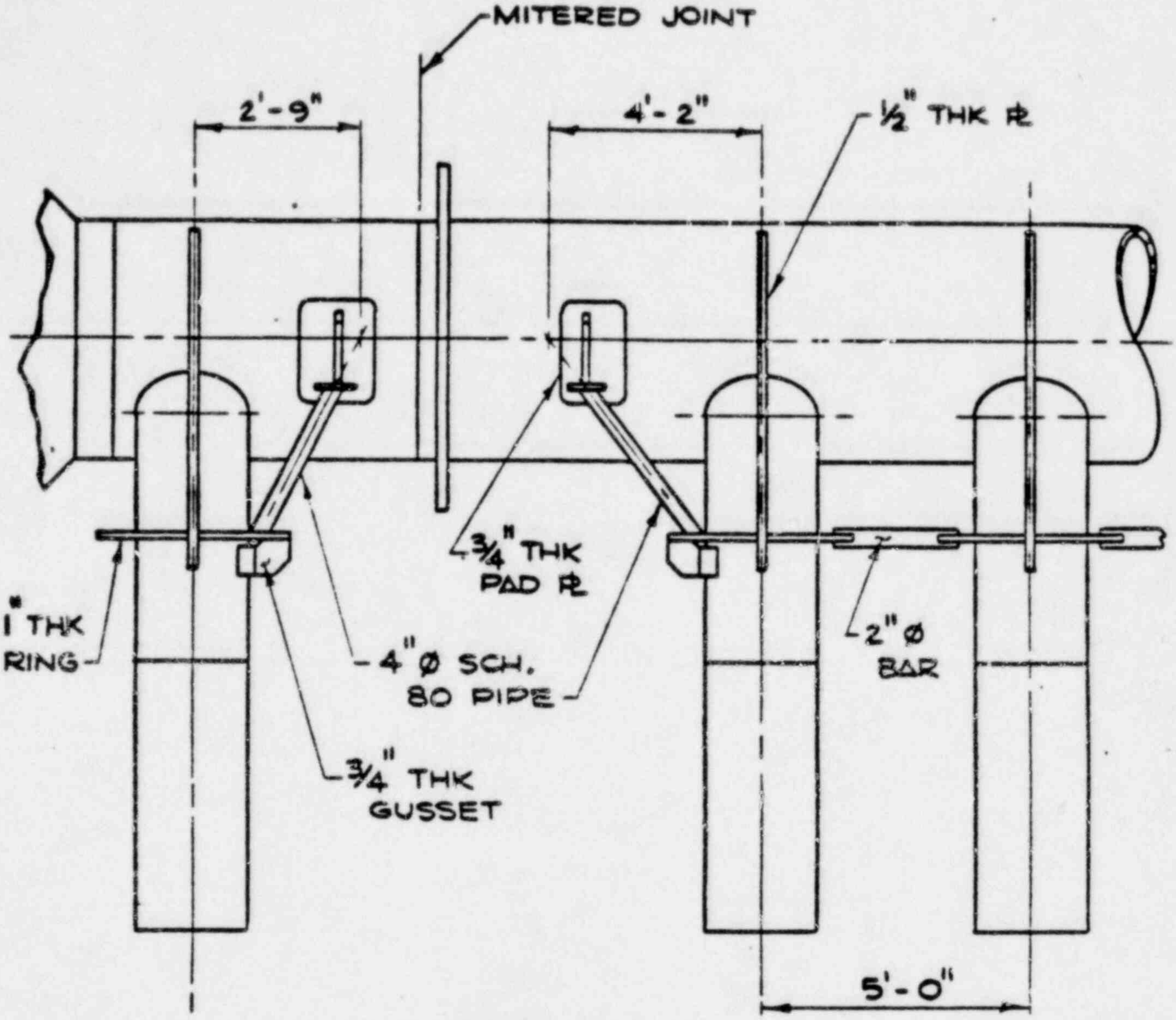


FIGURE 3.2.2-6

DOWNCOMER TO VENT HEADER INTERSECTION STIFFENING



NOTES:

1. VIEW DEVELOPED NORMAL TO AXES OF V.H. AND DOWNCOMER.
2. V.H. SUPPORT COLUMN DETAILS NOT SHOWN FOR CLARITY.

FIGURI 3.2.2-5

DOWNCOMER TRUSS

SUPPRESSION CHAMBER C.O. LOAD ASSESSMENT RESULTS

O STEADY STATE RESPONSE OF FERMI SUPPRESSION CHAMBER IMPROVED WITH MITERED JOINT SADDLE

- PRELIMINARY ANALYSIS SHOWS THAT THE RESPONSE OF THE FERMI SUPPRESSION CHAMBER WITH MITERED JOINT SADDLE IS IMPROVED WHEN SUBJECTED TO A NORMALIZED C.O. PRESSURE LOADING (NORMALIZED HYDROSTATIC PRESSURE DISTRIBUTION) APPLIED HARMONICALLY (STEADY STATE) OVER THE FREQUENCY RANGE SPECIFIED FOR C.O. LOADS.

  - DOMINANT STRUCTURE FREQUENCY INCREASED BY ~60%

  THE STEADY STATE ANALYSIS RESULTS SHOW THAT THE FREQUENCY AT WHICH PEAK AMPLITUDES OCCUR IS 60% GREATER WITH A MITERED JOINT SADDLE. THIS RESULTS IN REDUCED DYNAMIC AMPLIFICATION EFFECTS SINCE THE DOMINANT SUPPRESSION CHAMBER FREQUENCY IS MUCH GREATER THAN THE C.O. LOAD HARMONICS WITH THE LARGEST AMPLITUDES.

  - COLUMN LOAD AMPLIDUES DECREASED ~45%

  THE STEADY STATE ANALYSIS RESULTS SHOW THAT THE COLUMN LOADS DECREASE BY 45% WITH THE ADDITION OF A MITERED JOINT SADDLE SINCE THE SADDLE RESULTS IN REDUCED DYNAMIC AMPLIFICATION EFFECTS AND PROVIDES AN ADDITIONAL LOAD PATH FOR REACTIONS.

O SUMMATION OF C.O. LOAD HARMONICS RESULTS IN TOTAL VERTICAL REACTION OF ± 1550 KIPS

MULTIPLYING THE STEADY STATE RESPONSE BY THE C.O. LOAD AMPLITUDE FOR EACH C.O. LOAD FREQUENCY AND SUMMING THE RESULTS PRODUCES A TOTAL VERTICAL REACTION OF 1550 KIPS IN THE UPWARD AND DOWNWARD

DIRECTIONS. THE TOTAL VERTICAL REACTION LOADS CONSIST OF THE SUM OF THE REACTIONS TRANSFERRED BY THE TWO SADDLE BASE PLATES AND THE TWO COLUMN HOLD-DOWN BASE PLATES AT ANY ONE MITERED JOINT.

DISCUSSION OF FIGURES ON PAGES WHICH FOLLOW

O FERMI II - 1/32 SEGMENT MODEL INTERIM DESIGN SUPPORT SYSTEM (PAGE A.17)

FIGURE SHOWS ANALYTICAL MODEL WHICH WAS USED IN THE PRELIMINARY ASSESSMENT OF C.O. LOADS FOR THE FERMI SUPPRESSION CHAMBER WITH THE SUPPORT SYSTEM USED IN THE INTERIM PUA. THE MODEL IS SUITABLE FOR DETERMINING THE OVERALL RESPONSE OF THE SUPPRESSION CHAMBER AND IS USED TO COMPUTE SUPPORT REACTIONS.

O FERMI II - 1/32 SEGMENT MODEL MITERED JOINT SADDLE STRUCTURE (PAGE A.18)

FIGURE SHOWS ANALYTICAL MODEL WHICH WAS USED IN THE PRELIMINARY ASSESSMENT OF C.O. LOADS FOR THE FERMI SUPPRESSION CHAMBER WITH MITERED JOINT SADDLES. THE MODEL IS SUITABLE FOR DETERMINING THE OVERALL RESPONSE OF THE SUPPRESSION CHAMBER AND IS USED TO COMPUTE SUPPORT REACTIONS.

O ENRICO FERMI NUCLEAR GENERATING PLANT STEADY STATE STRUCTURAL RESPONSE (PAGE A.19)

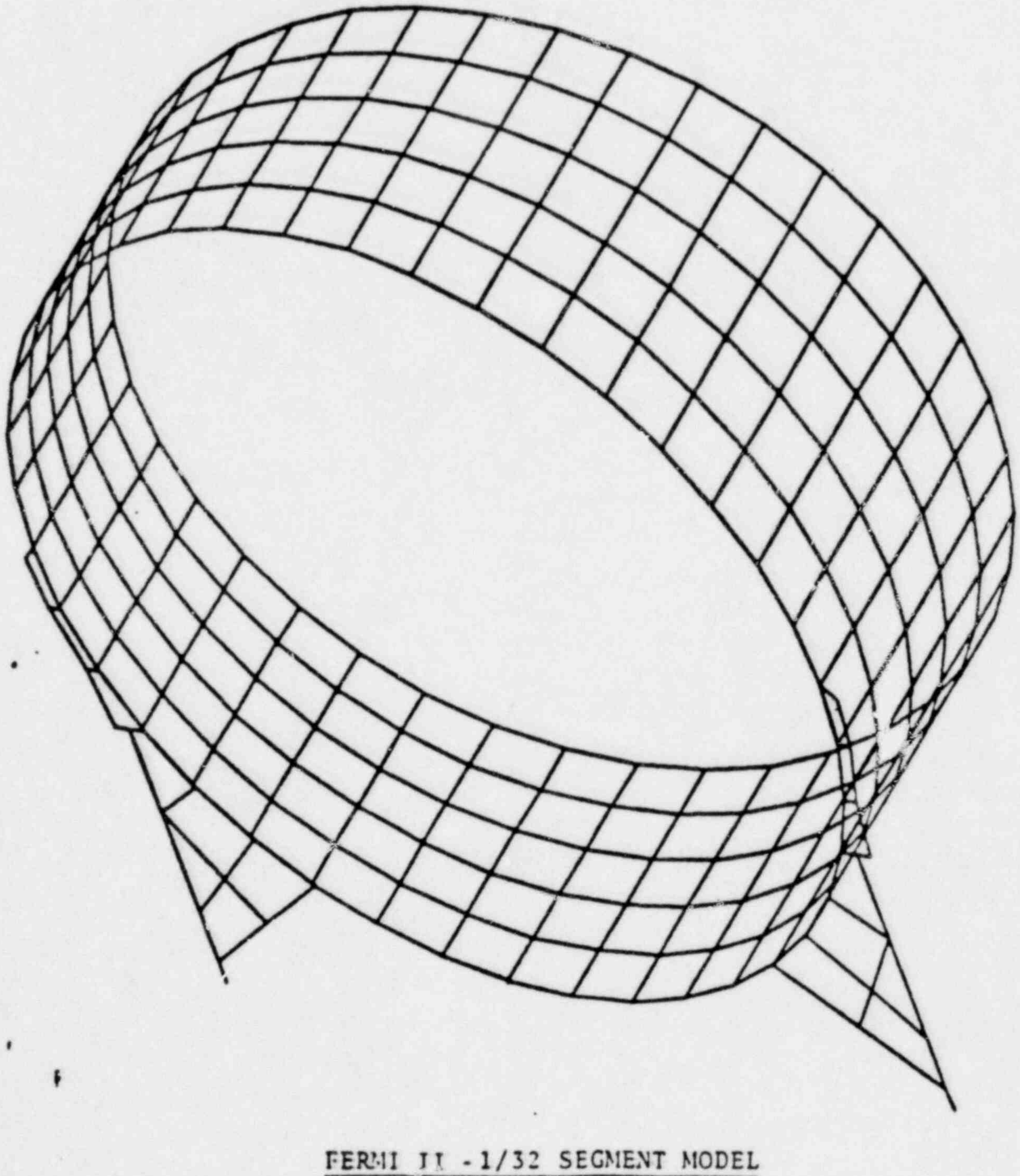
THE FIGURE SHOWS THE STEADY STATE RESPONSE OF THE SUPPRESSION CHAMBER OUTSIDE COLUMN DUE TO A NORMALIZED C.O. LOADING FOR THE SUPPRESSION CHAMBER WITH THE INTERIM PUA SUPPORT SYSTEM AND THE SADDLE SUPPORT SYSTEMS. THE PLOTS SHOW VERTICAL DISPLACEMENTS AT THE TOP OF THE COLUMN AND CAN BE INTERPRETED AS COLUMN AXIAL FORCE IF MULTIPLIED BY AE/L. THE PLOTS SHOW THAT THE DOMINANT SUPPRESSION CHAMBER FREQUENCY IS INCREASED FROM ABOUT 12HZ TO ABOUT 19HZ WITH THE ADDITION OF A MITERED JOINT SADDLE.

DISCUSSION OF FIGURES ON PAGES WHICH FOLLOW (CONT.)

THE PLOTS ALSO SHOW THAT THE AMPLITUDES (COLUMN LOADS) ARE REDUCED BY 45% IN THE RANGE OF THE C.O. LOAD FREQUENCIES WITH THE HIGHEST AMPLITUDES (5-10HZ).

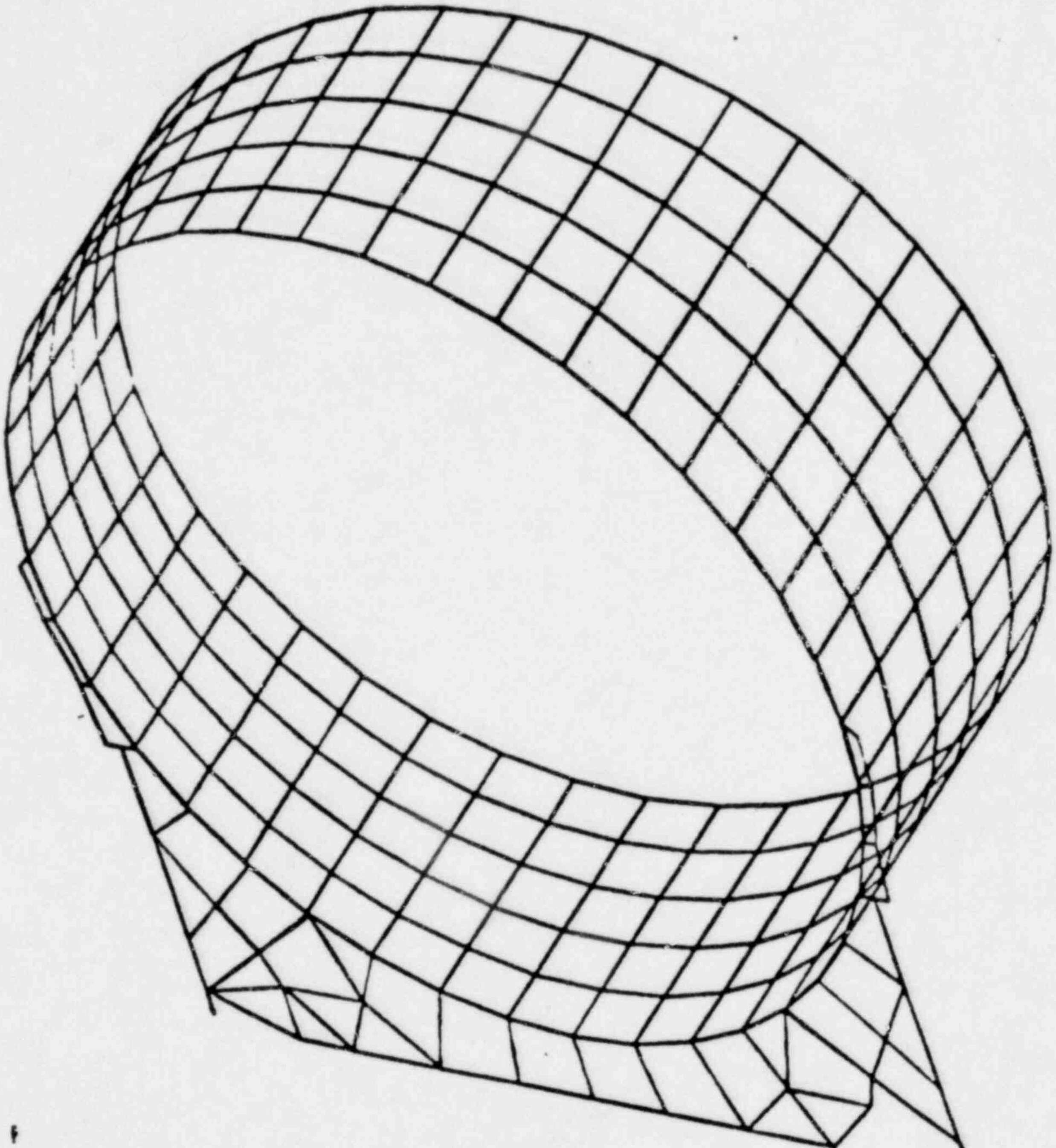
O CONDENSATION OSCILLATION AMPLITUDE - FREQUENCY SPECTRUM (PAGE A.20)

THE FIGURE SHOWS THE AMPLITUDES FOR EACH FREQUENCY OF THE C.O. LOADING. THE STEADY STATE RESPONSES OF THE SUPPRESSION CHAMBER SHOWN FOR THE OUTSIDE COLUMN IN THE PREVIOUS FIGURE, CAN BE MULTIPLIED BY THE CORRESPONDING C.O. LOAD AMPLITUDE AT EACH FREQUENCY AND THE RESULTS SUMMED TO OBTAIN THE TOTAL RESPONSE DUE TO C.O. LOADS.



FERMI II - 1/32 SEGMENT MODEL

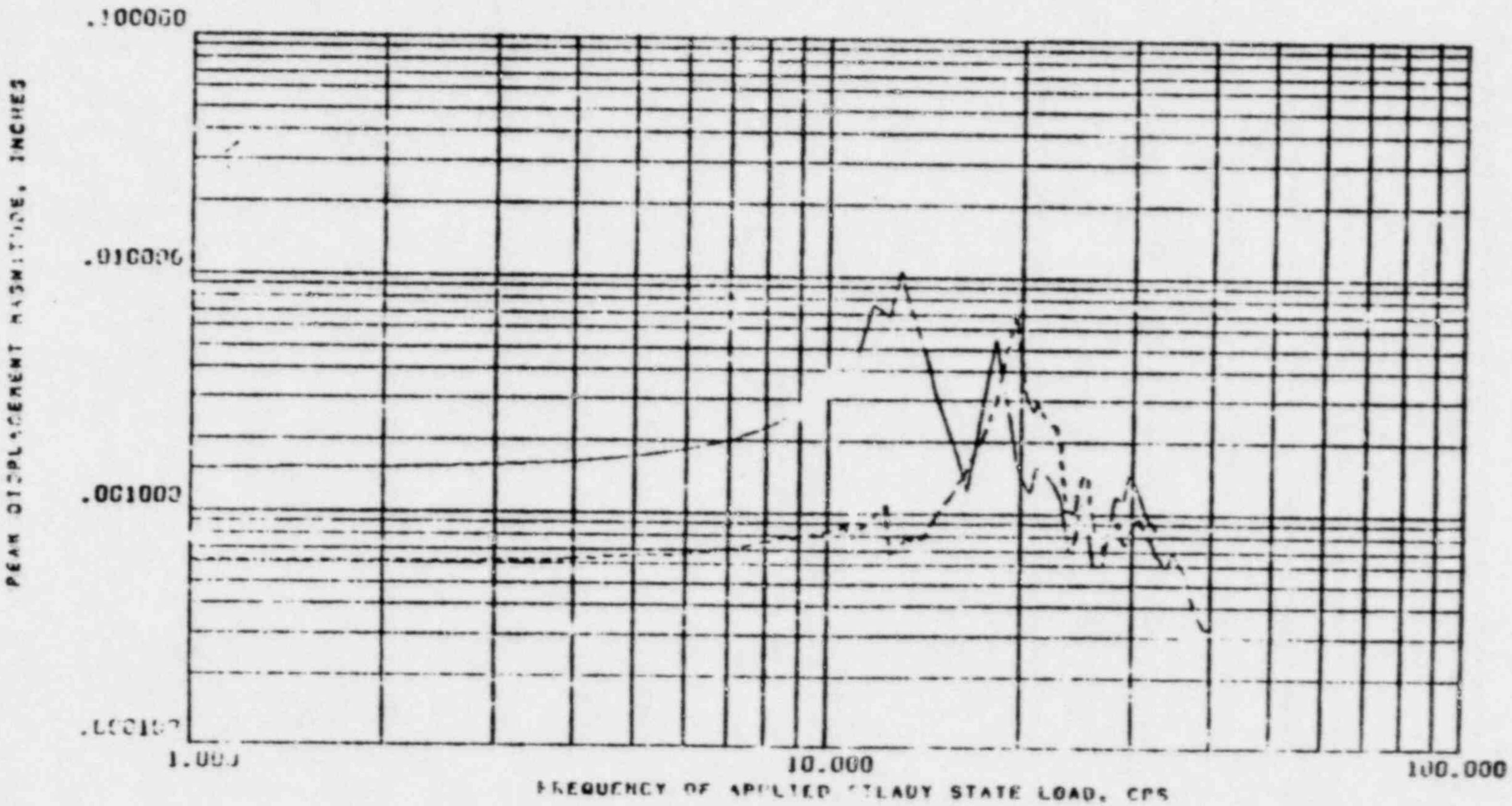
INTERIM DESIGN SUPPORT SYSTEM



FERMI II - 1/32 SEGMENT MODEL

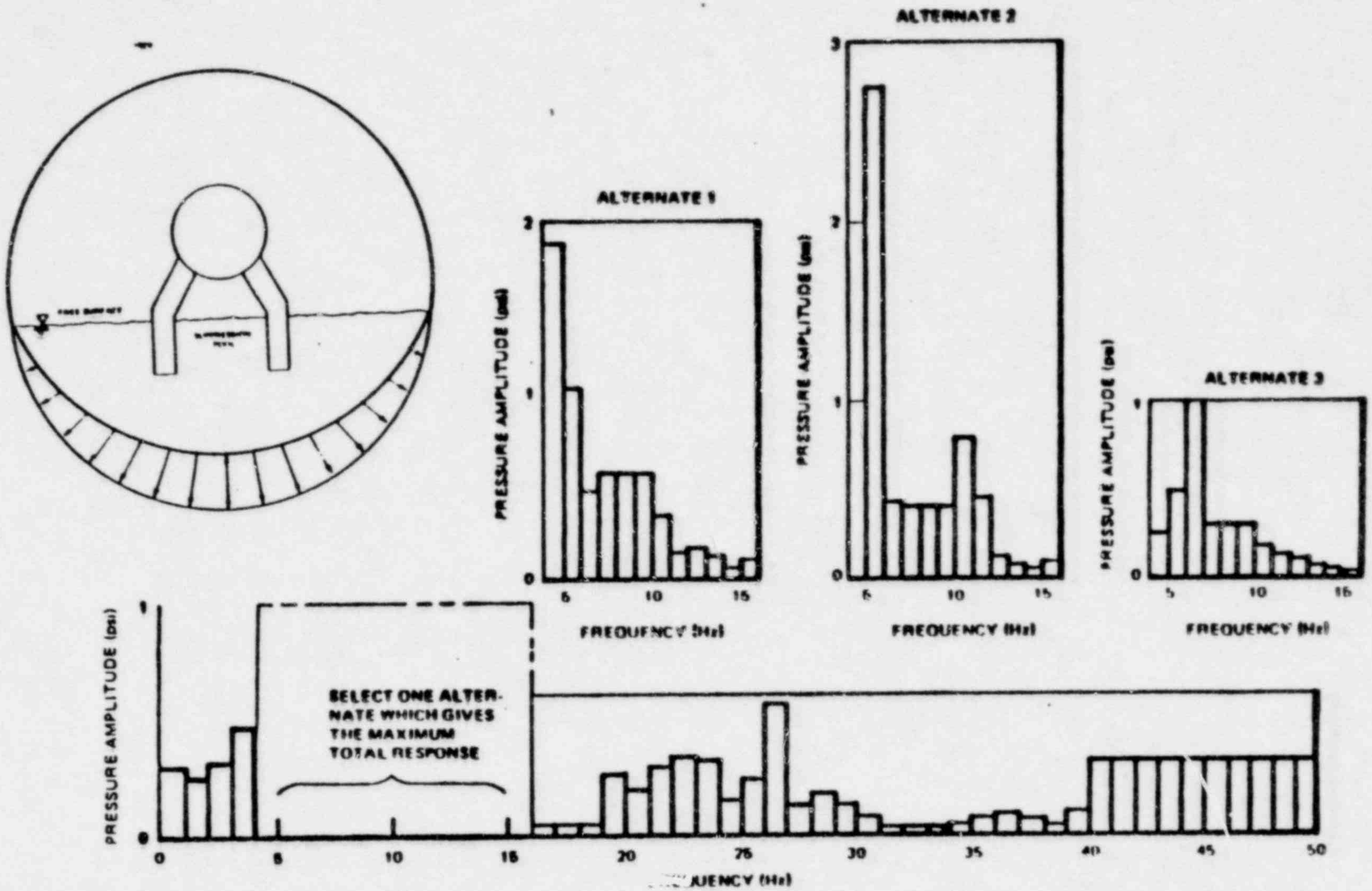
MITERED JOINT SADDLE STRUCTURE

ENRICO FERMI NUCLEAR GENERATING PLANT
STEADY STATE STRUCTURAL RESPONSE
FOR 1 PSI CONDENSATION OSCILLATION LOADING
TOP OF OUTSIDE COLUMN (NODE 290) VERTICAL DISPLACEMENT



FIGURE

———— PEAK DYNAMIC DISPLACEMENT, AS BUILT-SLIDER
- - - - - - PEAK DYNAMIC DISPLACEMENT, SADDLE-SLIDER



Condensation oscillation amplitude - frequency spectrum.

SUPPRESSION CHAMBER SUPPORT SYSTEM CAPACITIES FOR C.O. LOADS

0 INTERIM PUA SUPPORT SYSTEM CAPACITIES

- UPWARD LOAD 800 KIPS

THE ALLOWABLE CAPACITY OF THE UPLIFT RESTRAINT SYSTEM SHOWN ON PAGE A.8 IS 800 KIPS PER MITERED JOINT IN THE UPWARD DIRECTION.

- DOWNWARD LOAD 1400 KIPS

THE ALLOWABLE CAPACITY OF THE COLUMN SUPPORT SYSTEM SHOWN ON PAGE A.9 IS 1400 KIPS PER MITERED JOINT IN THE DOWNWARD DIRECTION.

0 SUPPORT SYSTEM CAPACITIES WITH SADDLE

- UPWARD LOAD 2000 KIPS

THE ALLOWABLE CAPACITY OF THE SADDLE AND MODIFIED COLUMN HOLD-DOWN BASEPLATE SUPPORT SYSTEM SHOWN ON PAGE A.10 IS 2000 KIPS PER MITERED JOINT IN THE UPWARD DIRECTION.

- DOWNWARD LOAD 3000 KIPS

THE ALLOWABLE CAPACITY OF THE SADDLE AND COLUMN SUPPORT SYSTEM SHOWN ON PAGE A.10 IS 3000 KIPS PER MITERED JOINT IN THE DOWNWARD DIRECTION.

0 REACTIONS CAUSED BY C.O. LOADS ARE LESS THAN SADDLE SUPPORT SYSTEM CAPACITIES.

THE REACTIONS LOADS WHICH RESULT FROM C.O. LOADS ($\pm$ 1550 KIPS) OBTAINED FROM THE PRELIMINARY ASSESS-

SUPPRESSION CHAMBER SUPPORT SYSTEM CAPACITIES FOR C.O. LOADS (CONT.)

MENT ARE LESS THAN THE ALLOWABLE CAPACITIES OF THE SADDLE AND COLUMN SUPPORT SYSTEM.

DOWNCOMER C.O. LOADS ASSESSMENT RESULTS

- O MAGNITUDE OF DOWNCOMER LATERAL LOADS USED IN INTERIM PUA ENVELOP LTP LOADS

  - LTP PRESSURE MAGNITUDE ~12.1 PSI

    THE MAGNITUDE OF THE C.O. DOWNCOMER LATERAL LOADS OBTAINED BY SUMMING THE BALANCED AND UNBALANCED PRESSURE MAGNITUDES SPECIFIED FOR EACH HARMONIC BY THE LTP LOAD DEFINITION (MARCH 1981) IS ~12.1 PSI.

  - EQUIVALENT INTERIM PUA PRESSURE MAGNITUDE ~26.5 PSI

    THE C.O. DOWNCOMER LATERAL LOAD USED IN THE INTERIM PUA IS A 6 KIP HORIZONTAL FORCE ACTING AT THE BOTTOM OF A DOWNCOMER. THE EQUIVALENT DOWNCOMER INTERNAL PRESSURE REQUIRED TO CAUSE A 6 KIP HORIZONTAL FORCE IS ~26.5 PSI.

- O LTP DOWNCOMER LATERAL LOAD DISTRIBUTIONS SIMILAR TO THOSE USED IN INTERIM PUA

  THE LTP C.O. DOWNCOMER LATERAL LOAD DEFINITION SPECIFIES THREE DOWNCOMER LATERAL LOAD CASES WITH DIFFERENT DISTRIBUTIONS WHICH MUST BE EXAMINED. A GREATER NUMBER OF DOWNCOMER LATERAL LOAD CASES, SOME OF WHICH ARE SIMILAR TO THOSE SPECIFIED BY THE LTP, HAVE BEEN EXAMINED IN THE INTERIM PUA.

- O PRELIMINARY ASSESSMENT SHOWS DOMINANT DOWNCOMER FREQUENCY GREATER THAN DOMINANT LOAD FREQUENCY

DOWNCOMER C.O. LOADS ASSESSMENT RESULTS (CONT.)

PRELIMINARY ASSESSMENT OF DOWNCOMER FREQUENCIES OBTAINED USING A BEAM MODEL OF THE VENT SYSTEM INDICATES THAT THE DOWNCOMER SWINGING MODE FREQUENCY IS ABOUT 10 HZ WHICH IS GREATER THAN THE C.O. DOWNCOMER LATERAL LOAD FREQUENCIES WITH THE HIGHEST AMPLITUDES.

O VENT SYSTEM STRESSES RESULTING FROM C/O DOWNCOMER LATERAL LOADS COMPUTED IN INTERIM PUA ARE EXPECTED TO ENVELOP THE STRESSES COMPUTED USING LTP LOADS

STRESSES IN THE DOWNCOMER TO VENT HEADER INTERSECTION COMPUTED IN THE INTERIM PUA FOR C.O. DOWNCOMER LATERAL LOADS ARE EXPECTED TO ENVELOP THOSE WHICH WILL BE COMPUTED USING LTP DOWNCOMER LATERAL LOADS.

CONDENSATION OSCILLATION LOAD ASSESSMENT CONCLUSIONS

O ADDITION OF MITERED JOINT SADDLE IS EXPECTED TO PROVIDE LONG TERM SOLUTION FOR LTP SUPPRESSION CHAMBER LOADS

WITH THE ADDITION OF THE SADDLE THE SUPPRESSION CHAMBER IS EXPECTED TO BE ADEQUATE FOR ALL LTP LOADS AND LOAD COMBINATIONS.

- RAISES DOMINANT STRUCTURE FREQUENCY BEYOND MAXIMUM LOAD FREQUENCIES THEREFORE LOWERS RESPONSE

THE MITERED JOINT SADDLE STIFFENS THE SUPPRESSION CHAMBER CAUSING THE DOMINANT STRUCTURE FREQUENCY TO INCREASE AND AS A RESULT LOWERS THE DYNAMIC AMPLIFICATION.

- MORE EVENTLY DISTRIBUTES LOADS THEREFORE REDUCTIONS IN LOCAL STRESSES ANTICIPATED

THE SADDLE PROVIDES A CONTINUOUS LOAD TRANSFER MECHANISM WHICH ACTS TO REDUCE THE LOCAL STRESSES NEAR DISCONTINUITIES.

- MORE THAN DOUBLES SUPPORT SYSTEM CAPACITY

THE SUPPRESSION CHAMBER SADDLE SUPPORT SYSTEM CAPACITY IS MORE THAN DOUBLE THE CAPACITY OF THE SUPPRESSION CHAMBER SUPPORT SYSTEM USED IN THE INTERIM PUA AS SHOWN ON PAGE A.21.

O DOWNCOMER STIFFENING SYSTEM EXPECTED TO BE ADEQUATE FOR LTP DOWNCOMER C.O. LOADS

PRELIMINARY ASSESSMENTS HAVE SHOWN THAT THE DOWNCOMER STIFFENING SYSTEM SHOWN ON PAGES A.11 AND A.12 PROVIDE AN EFFICIENT MEANS OF REDUCING LOCAL

STRESSES AND RAISING THE DOWNCOMER FREQUENCIES. THE STIFFENING SYSTEM IS EXPECTED TO BE ADEQUATE FOR ALL LTP LOADS AND LOAD COMBINATIONS.

APPENDIX B

FERMI ASSESSMENT OF POOL SWELL IMPACT LOADS ON THE VENT SYSTEM

(EXPANDED PRESENTATION OUTLINE USED FOR MEETING HELD WITH NRC ON MAY 20, 1981

POOL SWELL IMPACT ON THE VENT SYSTEM - OVERVIEW

- O SOME AREAS OF VENT SYSTEM OVERSTRESSED FOR INTERIM ANALYSIS POOL SWELL LOADS

  THE PRIMARY MEMBRANE STRESSES COMPUTED FOR THE VENT HEADER IN THE INTERIM PUA EXCEEDED ALLOWABLES BY ~14%.

- O GENERIC EFFORTS PREDICT HIGH LOCAL VENT HEADER STRESSES DUE TO POOLSWELL IMPACT

  SINCE THE INTERIM ANALYSIS WAS COMPLETED A DETAILED ANALYSIS HAS BEEN PERFORMED IN THE MARK I PROGRAM FOR THE LOCAL EFFECTS OF POOL SWELL IMPACT ON THE VENT HEADER. THE ANALYSIS RESULTS PREDICT HIGH LOCAL STRESSES IN THE VENT HEADER.

- O DECISION WAS MADE TO ADD VENT HEADER DEFLECTOR

  IN ORDER TO RESOLVE THE VENT SYSTEM OVERSTRESSES COMPUTED IN THE INTERIM PUA AND TO ADDRESS THE HIGH LOCAL STRESSES PREDICTED IN THE VENT HEADER THE DECISION WAS MADE TO ADD A VENT HEADER DEFLECTOR.

  - QUARTER SCALE TESTS SHOW DEFLECTOR EFFECTIVELY MITIGATES HIGH LOCAL STRESSES

  THE PLANT UNIQUE QUARTER SCALE TESTS PERFORMED FOR FERMI INDICATE THAT THE VENT HEADER DEFLECTOR ELIMINATES POOL SWELL IMPACT LOADS WHICH ACT DIRECTLY ON THE VENT HEADER AND AS A RESULT MITIGATES HIGH LOCAL STRESSES.

- O ASSESSMENT OF POOL SWELL LOADS SHOWED INTERIM LOADS ENVELOP LTP LOADS

POOL SWELL IMPACT OF THE VENT SYSTEM - OVERVIEW (CONT.)

A PRELIMINARY ASSESSMENT OF POOL SWELL IMPACT LOADS HAS BEEN PERFORMED SINCE THE INTERIM PUA WAS COMPLETED. THE RESULTS INDICATE THAT THE INTERIM PUA LOADS ENVELOP THOSE SPECIFIED IN THE LTP (ADDITIONAL ASSESSMENT DETAILS ARE DISCUSSED LATER).

COMPLETE EVALUATION OF POOL SWELL INCLUDED IN PUA

- PUA NOW UNDERWAY

A COMPREHENSIVE EVALUATION OF THE EFFECTS OF POOL SWELL IMPACT WILL BE INCLUDED IN THE FERMI FINAL PUA WHICH IS NOW UNDERWAY.

DISCUSSION OF FIGURE ON PAGE WHICH FOLLOWS

0 VENT HEADER DEFLECTOR MODIFICATION (PAGE B.5)

THE FIGURE SHOWS THE VENT HEADER DEFLECTOR WHICH HAS BEEN ADDED TO THE FERMI VENT SYSTEM SINCE THE INTERIM PUA WAS COMPLETED. THE DEFLECTOR CONSISTS OF A 12 IN. DIAMETER PIPE WITH A 6 IN. TEE WELDED ON EACH SIDE. THE HORIZONTAL PROJECTED WIDTH OF THE DEFLECTOR IS ABOUT 26 IN. THE DEFLECTOR IS SUPPORTED BETWEEN THE DOWNCOMERS BELOW THE VENT HEADER BY THE CROTCH PLATES AS SHOWN ON PAGE A.11.

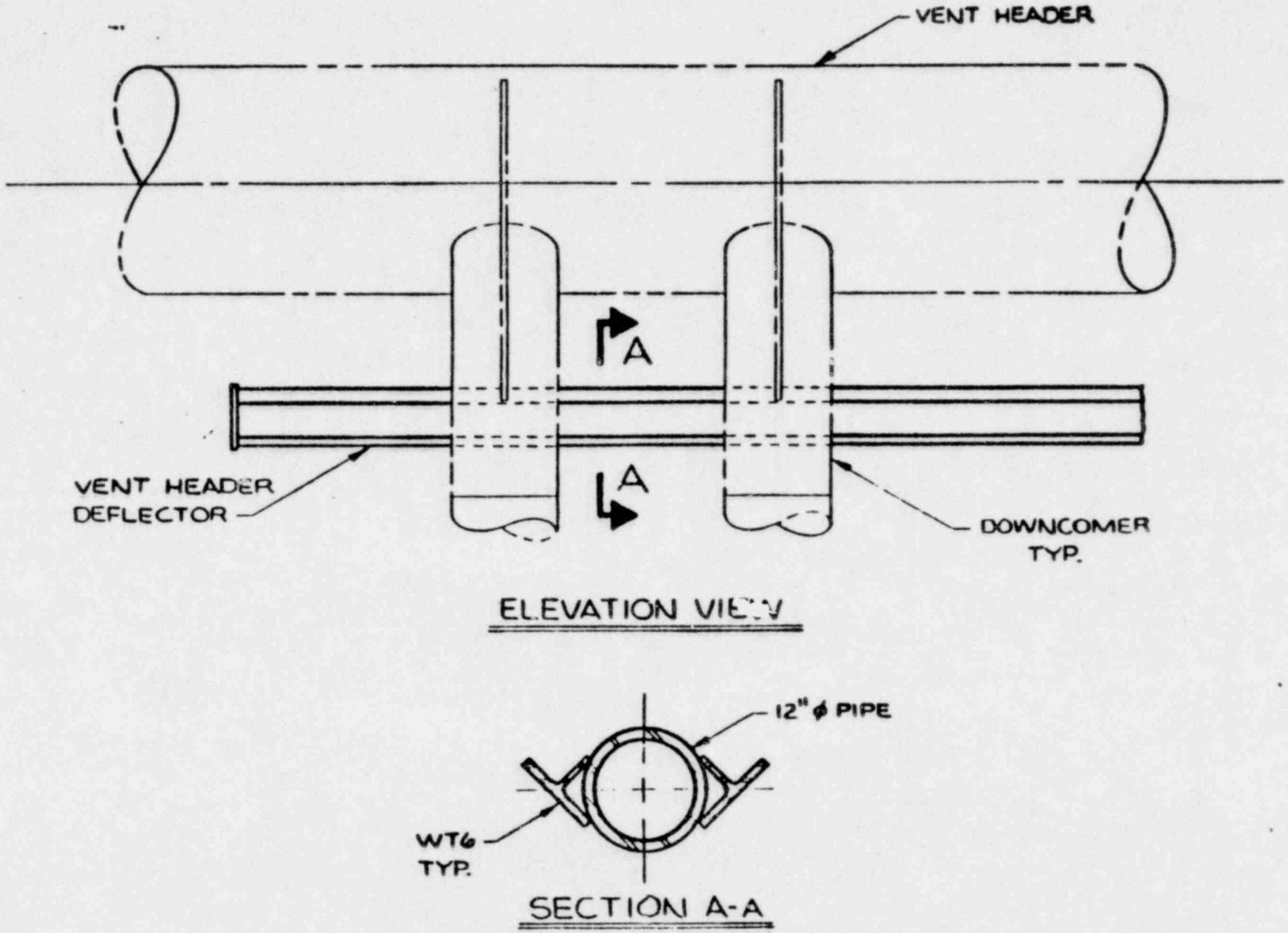


FIGURE 2

VENT HEADER DEFLECTOR MODIFICATION

VENT SYSTEM ASSESSMENT WITH VENT HEADER DEFLECTOR

O POOL SWELL IMPACT ACCOUNTS FOR MORE THAN HALF OF TOTAL COMPUTED STRESS IN THE INTERIM PUA

AS SHOWN IN THE TABLE ON PAGE B.8 POOL SWELL IMPACT ACCOUNTS FOR MORE THAN HALF OF THE TOTAL STRESS IN THE VENT HEADER COMPUTED IN THE INTERIM PUA.

O INTERIM ANALYSIS POOL SWELL LOADS

- MAXIMUM PRESSURE OF 15.1 PSI

THE MAXIMUM POOL SWELL IMPACT PRESSURE USED IN THE INTERIM PUA IS 15.1 PSI.

- TOTAL APPLIED LOAD OF 200 KIPS

THE TOTAL INTEGRATED APPLIED LOAD ACTING ON THE VENT HEADER AT THE TIME OF MAXIMUM IMPACT IS ABOUT 200 KIPS.

- FLAT POOL ASSUMED

THE POOL SWELL IMPACT LOADS WERE CONSERVATIVELY ASSUMED TO OCCUR SIMULTANEOUSLY ALONG THE LENGTH OF THE VENT HEADER IN THE NON-VENT BAY.

O LTP POOL SWELL LOADS (TAKEN FROM PULD)

- MAXIMUM PRESSURE OF 12.0 PSI

THE MAXIMUM POOL SWELL IMPACT PRESSURE COMPUTED USING FERMI QUARTER SCALE TEST RESULTS IS ABOUT 12.0 PSI.

- TOTAL APPLIED LOAD OF 75 KIPS

THE TOTAL INTEGRATED APPLIED LOAD ACTING ON THE VENT HEADER DEFLECTOR AT THE TIME OF MAXIMUM IMPACT IS ABOUT 75 KIPS.

- POOL PROFILE LESS CRITICAL

THE FERMI QUARTER SCALE TEST RESULTS INDICATE THAT THE ENTIRE VENT HEADER DEFLECTOR IS NOT IMPACTED SIMULTANEOUSLY.

O VENT SYSTEM STRESSES RESULTING FROM POOL SWELL IMPACT LOADS COMPUTED IN INTERIM PUA ARE EXPECTED TO ENVELOP THE STRESSES COMPUTED USING LTP LOADS

STRESSES IN THE VENT SYSTEM DUE TO POOL SWELL IMPACT COMPUTED IN THE INTERIM PUA ARE EXPECTED TO ENVELOP THOSE WHICH WILL BE COMPUTED USING LTP POOL SWELL IMPACT LOADS. AS A RESULT THE STRESSES COMPUTED IN THE INTERIM PUA WHICH EXCEED ALLOWABLES ARE EXPECTED TO BE LESS THAN ALLOWABLES.

LOADS CONTRIBUTION DETERMINED IN THE INTERIM - PUA

Stress/Area	Total Stress (KSI)	D.L.	Seismic (%)	Pool Swell	SRV (%)	V.S. Disc. Thrust (%)	Int. Pressu (%)
Membrane/ Vent Header Near Vent Line	22.0	1	3	53	29	10	4
Membrane/ Vent Header Near Mitered Joint	22.0	3	2	63	17	13	2

APPENDIX C

FERMI FATIGUE ASSESSMENT

(EXPANDED PRESENTATION OUTLINE USED FOR MEETING HELD WITH NRC ON MAY 20, 1981)

FATIGUE ASSESSMENT

- O COMPREHENSIVE BASIS FOR EVALUATING FATIGUE NOT AVAILABLE AT TIME OF INTERIM PUA

  THE FREQUENCIES, DURATIONS AND NUMBER OF OCCURRENCES OF ALL THE HYDRODYNAMIC LOADS WAS NOT AVAILABLE AT THE TIME THE INTERIM PUA WAS PERFORMED.

- O EMPHASIS OF INTERIM PUA PLACED ON SHORT TERM SAFETY NOT LONG TERM EFFECTS SUCH AS FATIGUE

  SINCE SRV DISCHARGE LOADS ARE THE LARGEST CONTRIBUTING TO FATIGUE EFFECTS AND SINCE A SUBSTANTIAL NUMBER OF SRV ACTUATIONS MUST OCCUR BEFORE FATIGUE LIMITS ARE EXCEEDED, FATIGUE IS A LONG TERM CONCERN AND HAS NO EFFECT ON SHORT TERM SAFETY.

  - CONSISTENT WITH STP APPLIED TO OPERATING MARK I'S

  THE MARK I STP DID NOT REQUIRE OPERATING PLANTS TO PERFORM A FATIGUE EVALUATION.

- O NO EVIDENCE OF FATIGUE PROBLEMS ENCOUNTERED AT FSTF

  IN THE MANY SERIES OF TESTS CONDUCTED USING FSTF NO EVIDENCE OF FATIGUE WAS ENCOUNTERED.

- O NO EVIDENCE OF FATIGUE PROBLEMS ENCOUNTERED IN OPERATING MARK I'S

  IN THE MANY SERIES OF SRV TESTS CONDUCTED AT MONTICELLO THERE HAS BEEN NO EVIDENCE OF FATIGUE.

FATIGUE ASSESSMENT (CONT.)

O FATIGUE EFFECTS FULLY ADDRESSED IN PUA

- NOW UNDER WAY

A COMPREHENSIVE EVALUATION OF FATIGUE EFFECTS WILL BE INCLUDED IN THE FERMI FINAL PUA WHICH IS NOW UNDERWAY.

INTERIM PUA FATIGUE ASSESSMENT

- FOR CHUGGING THE PREDICTED LOAD DURATION AND FREQUENCY IDENTIFIED 6000 STRESS CYCLES

  A PRELIMINARY ASSESSMENT OF FATIGUE HAS BEEN PERFORMED FOR THE SUPPRESSION CHAMBER USING INTERIM PUA STRESS RESULTS AND THE LOAD FREQUENCIES AND DURATIONS DEFINED IN THE LTP. THE ASSESSMENT ASSUMES 6000 PEAK STRESS CYCLES FOR CHUGGING. THE PEAK STRESSES AND NUMBER OF STRESS CYCLES FOR IBA C.O. ARE ASSUMED TO BE THE SAME AS CHUGGING.

- COULD ACCOMODATE 2000 SRV ACTIVATIONS BEFORE ATTAINING A USAGE FACTOR OF 1.0

  WHEN THE FATIGUE EFFECTS OF CHUGGING AND C.O. ARE COMBINED WITH THE FATIGUE EFFECTS OF SRV DISCHARGE LOADS THE ASSESSMENT RESULTS SHOW THAT MORE THAN 2000 ACTUATIONS OF ANY ONE SRV CAN OCCUR BEFORE THE FATIGUE USAGE FACTOR OF 1.0 IS EXCEEDED. FIVE CYCLES OF PEAK STRESS ARE ASSUMED FOR SRV.

- BASED ON OPERATING HISTORY OF OTHER PLANTS 2000 ALLOWABLE SRV ACTUATIONS EXPECTED TO EXCEED ANTICIPATED SRV ACTUATIONS OVER 40 YEAR LIFE

  THE NUMBER OF SRV ACTUATIONS EXPECTED TO OCCUR DURING THE 40 YEAR PLANT LIFE OF FERMI IS EXPECTED TO BE LESS THAN 2000 BASED ON OPERATING PLANT HISTORIES.

ATTACHMENT 3
EF2-53471

J. Halaptz Verbal Question 6/1/81

A statement is needed on the amount of time required for the SGTS to reduce the secondary containment to - ½" water guage after a postulated LOCA.

ANSWER:

The analysis for the reactor building pressure transient supplied in the FSAR in section E.5.042-43 shows that the secondary containment pressure reaches a - ½" water guage pressure in less than 5½ minutes after a postulated LOCA.

ATTACHMENT 4
EF2-53471

Verbal Question 6/3/81

Question:

The analysis for secondary containment pressurizaton subsequent to a postulated LOCA would seem to indicate that the building pressure for t=0 is 0 psig. NRC is questioning why a value of -1/4 inch water gauge was not used assuming the reactor building ventilation system normally limits the building pressure to this value.

I advised NRC that reactor building ventilation system is not a safety grade system and the calculation was conservatively done for P=0 at t=0. I request the D. F. Lehnert confirm to me that P=0 and t=0 is still appropriate and valid.

Answer:

The analysis for the secondary containment pressure transient in the FSAR in Section E.5.042-43 shows the building pressure to be .038 inches water gauge after 10 seconds into the transient. However since this information was supplied on semi-log graph paper, the 0 point can not be shown. The analysis was started at P=-.249 inches water gauge at t=0 and the P=0 occurred at ~~[illegible]~~ t=8 seconds and proceeded as shown on the indicated graph.

ATTACHMENT 5
EF2-53471

H.II.K.3.13.4 Modifications

Currently there is no automatic reset on the RCIC system after it trips on high reactor vessel water level (L8). This requires manual reset by the operator. The RCIC System will be modificed to incorporate an automatic reset following a high reactor vessel water level (L8) trip. This change will utilize an additional relay which will automatically close the steam supply valve (F 045) on high vessel water trip rather than ~~to~~ the existing turbine trip valve (F 059). The turbine trip valve (F 059) would stay open throughout the high level trip and reset operation.

M. K. Deora

GED/16/4.0

ATTACHMENT 6
EF2-53471

June 3, 1981

Ray Berg:

This response should be given to NRC for the ~~March~~ May 11, 1981 set of six questions on Enrico Fermi Unit 2 High Density Spent Fuel Storage System.

1. The maximum k_{eff} of the aluminum storage racks with a fuel bundle against the outside of a fully loaded work rack with either centered or eccentrically located fuel bundles is calculated 0.910 $\pm$ 0.004 (1 σ) including all biases and uncertainties.

MLB
M. L. Batch

MLB/dk

cc: D. F. Lehnert

ATTACHMENT 7
EF2-53471

RESPONSE TO CPB-2 FUEL CLADDING ~~REPUTRE~~ RUPTURE LOCA

In response to NRC Staff's request to perform supplemental ECCS analysis using the materials model of NUREG-0630, General Electric has transmitted a report entitled, "Fuel Swell and Rupture Model Experimental Data Review and Sensivity Studies," dated May 12, 1981. This transmittal is in response to regulatory positions 4(a) and 4(b) of the referenced (1) NRC Topical Report evaluation. The transmittal contains a discussion of the burst stress and circumferential strain data applicable to the BWR and presents results from sensitivity studies performed comparing the NUREG-0630 models with the current General Electric models.

Detroit Edison is referencing this General Electric material (2) to fully respond to your concern.

REFEPENCE:

1. Letter from R. L. Tedesco (NRC) to G. G. Sherwood (General Electric). "Acceptance for Referencing of Topical Report NEDE-20566P, NEDO-20566-1, Revision 1 and NEDE-20566-4," February 4, 1981.

2. Letter from L. H. Buchholz to U. S. Nuclear Regulatory Commission,"General Electric Fuel Clad Swelling and Rupture Model," MFN-097-81, May 16, 1981.

MKDeora
M. K. Deora
/dk
6-4-81

ATTACHMENT 8
EF2-53471

Parameter	Value
High-neutron flux (APRM) scram setpoint	
% of initial power	120.0 (b)
% NBR	125.0 (b)
High vessel dome pressure scram setpoint, psig	1101 (b)
High vessel dome pressure recirculation pump trip set point, psig	1135 // Ammd.

a. This input is calculated by ODYN analysis.
b. Maximum safety limit.

ATWS recirculation pump has been simulated in the overpressure // Ammd analysis performed with ODYN.

4.3 Transients

4.3.1 The overpressure protection system must accommodate the most severe pressurization transient. Both the closure of all main steam isolation valves, and a turbine trip with bypass failure produce severe transients. The evaluation of transient behavior with final plant configuration has shown that the isolation valve closure is slightly more severe when credit is taken only for indirect derived scrams, therefore, it is used as the overpressure protection basis event.

4.4 Scram

a. Direct reactor scram - Failed
b. Scram reactivity curve - See Figure 2
c. Control rod drive scram motion - See Figure 2

4.5 Safety/Relief Valve (SRV) Characteristics

Type	Target Rock
Number	15
SRV capacity, % NBR steam flow	91.95 at 1121 psig
First safety relief setpoint, psig	1121 (a)
Number of safety relief group simulated	3
Increment in SRV setpoint between groups, psi	10
Delay time (including pressure sensor and logic delay plus valve delay), seconds	0.4 (a)
Response time constant (opening), seconds	0.15 (a)
Valve response characteristics	See Figure 1

a. Maximum safety limit.

4.6 Safety Valve Sizing

4.6.1 The safety valve capacity required for overpressure protection is determined from the minimum capacity which will provide an adequate margin between the peak vessel pressure and the vessel code limit (1375 psig) in response to the MSIV closure-flux SCRAM event. The number of safety valves which provide a total capacity equal to or greater than the minimum required

POST-LOCA LEAKAGE

ATTACHMENT 9
EF2-53471

RESPONSE TO NON-TMI OPEN ITEM NO. 7

For postulated long-term leakage from the first isolation valve outside the suppression pool following a LOCA, the leakage will drain into ~~that~~ the Reactor Building Floor Drain Sump (No. D065) in the torus area. This sump is equipped with two 50-gpm pumps to transfer water to the radwaste system. Redundant capability for water processing is provided in the radwaste system, and an operability requirement for the system is included in plant Tech. Specs. Water processed in the radwaste system is returned to the condensate storage tank from where it can be injected into the vessel and suppression pool by the Core Spray System. A closed loop is therefore provided to maintain suppression pool inventory.

At the request of NRC, Detroit Edison has evaluated the basis for 5 gpm leak rate as specified in response to Q 212.124. In Detroit Edison's opinion, 5 gpm leak rate is conservative and bounding, however, to provide additional conservatism, a leak rate of 20 gpm is postulated from the first isolation valve outside the suppression pool. This leak rate is equivalent to flow through a 1/4" hole.

For a postulated conservative leak rate of 20 gpm, at least 205 hours would be required to lower the suppression pool water level to the minimum suppression pool level required by the ECCS pump with the highest design condition NPSHR (core spray). 205 hours is more than enough time for operator action. The operator would be alerted to the leakage by control room alarms activated by the sump level sensors, leak detection tapes in the torus room area and the suppression pool level.

The potential for flooding of the emergency core cooling system equipment as a result of the leakage is prevented by providing water tight walls up to an elevation equivalent to that associated with the resultant equilibrium water level from a hypothetical suppression pool rupture.

The long-term cooling capability of the low pressure emergency core cooling systems (CS and LPCI) is, therefore, not threatened either by potential flooding of the equipment or drainage of the suppression pool as a result of postulate leakage from the first isolation valve.

M. K. Deora
/dk
5-13-81

ATTACHMENT 10
EF2-53471

Detroit Edison

ENRICO FERMI UNIT 2 PROJECT
Architectural/Civil Engineering

June 4, 1981
EF2 - 53,341

To: L. E. Schuerman
Licensing

From: Y. N. Anand YNA
System Engineer

Subject: OBE Return Period

In reference to our telecom with L. L. Kintner and J. Kimball of the NRC on June 1, 1981, we submit that as currently defined, the Operating Basis Earthquake for the Fermi-2 site is based on a peak acceleration of 0.08 g. Weston Geophysical, our consultants, have conducted a seismic hazard analysis which demonstrates that an acceleration of 0.08 g has a return period, as a minimum, of the order of 100 to 300 years.

A copy of the report prepared by Weston Geophysical is enclosed for your reference and submittal to the NRC.

YNA:jr
Enclosure

cc (w/o encl): [redacted]
W.F. Colbert
F.E. Gregor
E. Lusis
W.M. Street
A/C Division File
Document Control

Weston Geophysical
CORPORATION

June 4, 1981

Mr. Y. N. Anand
Detroit Edison
2000 Second Avenue
Detroit, Michigan 48226

Dear Mr. Anand:

Enclosed are four copies of our draft report on the "Recurrence Frequency of the OBE at the EF-2 site," per your request on June 4, 1981.

Sincerely,

WESTON GEOPHYSICAL CORPORATION

George C. Klimkiewicz

George C. Klimkiewicz

GCK:cp

Post Office Box 550 • Westboro, Massachusetts 01581 • (617) 366-9191