TU ELECTRIC

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August 31, 1989

William J. Cahill, Jr.
Executive Vice President

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

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NOS. 50-445 AND 50-446
ADVANCE FSAR SUBMITTAL
ASYMMETRIC PRESSURIZATION LOADS FOR THE
STEAM GENERATORS

Gentlemen:

This letter provides an advance copy of a change to be included in a future FSAR amendment. This change incorporates corrected information on asymmetric pressure loads for the Steam Generators.

In order to facilitate NRC staff review of this change, the attachment is organized as follows:

1. Draft revised FSAR tables, with changed portions indicated by a bar in the margin as they are to appear in a future amendment. Marked up versions of the revised FSAR Figures are provided in lieu of draft revised version.

2. A detailed description/justification for the change.

3. A copy of the related SER section.

4. A page containing the title of a "bullet" which consolidates and categorizes similar individual changes by subject and related SER section.

B001
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5. The marked up version of the revised FSAR tables and figures referenced by the detailed description/justification for the changes identified above. The marked up version facilitates review of the revision by clearly identifying the changes to the current FSAR amendment.

Sincerely,

William J. Cahill, Jr.

William J. Cahill, Jr.

By: Roger D. Walker

R. D. Walker
Manager, Nuclear Licensing

HAM/smp
Attachment

c - Mr. R. D. Martin, Region IV
Resident Inspectors, CPSES (3)

Attachment to TXX-89647
August 31, 1989

Advance FSAR Submittal Concerning Asymmetric Pressurization Loads for the Steam Generators

TABLE 6.2.1-94

(SHEET 1 of 2)

PEAK LOADS ON PRIMARY COMPONENTS DUE TO ASYMMETRIC PRESSURIZATION

COMPONENT Rupture (Cubicle)	LOAD (Maximum/Minimum) F_x	F_y	F_z	M_x	M_z	
STEAM GENERATOR						
Main Steam (4)	36.8	22.6	86.9	17107	10746	DRAFT
	-51.4	-126.4	-20.9	- 9327	-4889	DRAFT
Main Steam (3)	57.6	0.0	125.9	11774	23749	DRAFT
	-118.6	-172.9	-102.5	-12425	-5042	DRAFT
Feedwater (4)	118.9	79.7	20.0	33812	30728	DRAFT
	-64.5	-2.5	-125.0	-2082	-5478	DRAFT
RHR (4)	34.3	42.7	52.8	9736	10427	DRAFT
	-66.1	-7.0	-37.4	-17217	-21855	DRAFT
Aux. Feed (4)	87.2	15.0	132.6	27217	9953	DRAFT
	-37.4	-11.9	-114.9	-22017	-19243	DRAFT
RC Pump						
Main Steam (4)	5.9	12.7	5.3	642	774	
	-5.0	-21.0	-7.6	-984	-823	
Main Steam (3)	8.4	12.5	12.2	999	791	
	-6.4	-13.8	-11.1	-1144	-894	

CPSES/FSAR

TABLE 6.2.1-95

(Sheet 1)

PARAMETERS USED IN STEAM GENERATOR ASYMMETRIC PRESSURE ANALYSIS

VOLUME NUMBER	PROJECTED AREA ($IN.^2$)	NORMAL VECTOR THETA-X	THETA-Y	THETA-Z	ELEVATION (IN.)
7	2719	90.0	0.0	90.0	27.1
	2539	146.0	90.0	56.0	27.1
	1155	146.0	90.0	56.0	53.9
8	4478	90.0	0.0	90.0	27.1
	3765	56.0	90.0	34.0	27.1
	1713	56.0	90.0	34.0	53.9
9	3799	90.0	0.0	90.0	27.1
	3348	47.5	90.0	137.5	27.1
	1523	47.5	90.0	137.5	53.9
12	3399	90.0	0.0	90.0	27.1
	3068	137.5	90.0	132.5	27.1
	1396	137.5	90.0	132.5	53.9
13	6922	146.0	90.0	56.0	107.2
14	10260	56.0	90.0	34.0	107.2
15	9127	47.5	90.0	137.5	107.2
18	8363	137.5	90.0	132.5	107.2
19	10111	146.0	90.0	56.0	219.7
19	5905	146.0	90.0	56.0	325.5
20	14930	56.0	90.0	34.0	219.7
20	8754	56.0	90.0	34.0	325.5
21	13331	47.5	90.0	137.5	219.7

77

TABLE 6.2.1-95

(Sheet 2)

PARAMETERS USED IN STEAM GENERATOR ASYMMETRIC PRESSURE ANALYSIS

VOLUME NUMBER	PROJECTED AREA ($IN.^2$)	NORMAL VECTOR THETA-X	THETA-Y	THETA-Z	ELEVATION (IN.)
24	7134	137.5	90.0	132.5	325.5
25	6065	146.0	90.0	56.0	404.6
	6717	146.0	90.0	56.0	484.9
	1884	90.0	0.0	90.0	484.9
26	8992	56.0	90.0	34.0	404.6
	9959	56.0	90.0	34.0	484.9
	3103	90.0	0.0	90.0	484.9
27	7997	47.5	90.0	137.5	404.6
	8856	47.5	90.0	137.5	584.9
	2632	90.0	0.0	90.0	484.9
30	7320	137.5	90.0	132.5	404.6
	8115	137.5	90.0	132.5	484.9
	2355	90.0	0.0	90.0	484.9
31	22741	146.0	90.0	56.0	637.2
	2559	146.0	90.0	56.0	766.0
	1681	90.0	180.0	90.0	766.0
32	33715	56.0	90.0	34.0	637.2
	3794	56.0	90.0	34.0	766.0
	2768	90.0	180.0	90.0	766.0
33	29983	47.5	90.0	137.5	637.2
	3374	47.5	90.0	137.5	766.0

77

CPSES/FSAR

TABLE 6.2.1-95

(Sheet 3)

PARAMETERS USED IN STEAM GENERATOR ASYMMETRIC PRESSURE ANALYSIS

VOLUME NUMBER	PROJECTED AREA ($IN.^2$)	NORMAL VECTOR THETA-X	THETA-Y	THETA-Z	ELEVATION (IN.)
	2348	90.0	180.0	90.0	766.0
36	27475	137.5	90.0	132.5	637.2
	3092	137.5	90.0	132.5	766.0
	2101	90.0	180.0	90.0	766.0
37	997	146.0	90.0	56.0	787.8
	2922	90.0	180.0	90.0	787.8
38	1479	56.0	90.0	34.0	787.3
	4813	90.0	180.0	90.0	787.3
39	1315	47.5	90.0	137.5	787.3
	4082	90.0	180.0	90.0	787.3
42	1205	137.5	90.0	132.5	787.3
	3653	90.0	180.0	90.0	787.3

77

NOTE: The angles Theta-x, Theta-y, and Theta-z in degrees, define the direction of the normal to the projected area in the direction of the applied pressure force. Volume numbers in this table relate to cubicles 1, 2, & 4; for corresponding volumes in cubicle 3, refer to Figure 6.2.1-63.

FSAR Page (as amended)	Group	Description
Table 6.2.1-94, 95	2	Tables reflect a reconciliation of nodalization inconsistency between the steam generator and subcompartment elevations. Correction: Tables are corrected to reconcile inaccurate appplication of pressures on the steam generator at a higher elevation segment. FSAR Change Request Number: 89-627.1 Related SER Section: 6.2.1; SSER17 4.1.2.3 SER/SSER Impact: No
Figure 6.2.1-60, 63	2	Figures reflect a reconciliation of nodalization inconsistency between the steam generator and subcompartment elevations. Correction: See Justification For Tables 6.2.1-94 and 95. FSAR Change Request Number: 89-627.2 Related SER Section: 6.2.1; SSER17 4.1.2.3 SER/SSER Impact: No

SWEC has developed separation criteria for all commodities as described in CPSES Specification CPSES-S-1021, "Commodity Clearance" (Reference 45k). In addition, Procedure CPE-SWEC-FVM-CS-068, Revision 0 (Reference 451), requires an engineering walkdown to verify commodity clearances.

On the basis of its review of the above specification and procedure, the staff concludes that this concern has been adequately resolved.

4.1.2.3 Review of Static Analysis of Steam Generator Upper Lateral Restraint Beam

The Citizens Association for Sound Energy has alleged that TU Electric's original design and analysis, as well as subsequent analyses undertaken in response to an Atomic Safety and Licensing Board's (ASLB) order, failed to demonstrate the adequacy of the lateral restraint beams and the associated reinforced concrete walls in the steam generator compartments. The objective of the staff's review was to verify the adequacy of the procedures used in qualifying the steam generator upper lateral (SGUL) restraint. The review addressed both structural and thermal-hydraulic aspects. The staff reviewed the approach SWEC used in performing the analysis, the assumptions used in developing the models, the applicable loads and load combinations, and the method used in qualifying the design of the SGUL restraint, the connections, and the reinforced concrete wall to which the SGUL restraint is attached (References 46 through 49).

In addition, the staff reviewed the procedures Westinghouse used to calculate the reaction loads caused by the steam generator (References 50 and 51) and the thermal-hydraulic evaluation (References 51 through 54).

At the time of this review, the final design pipe break loads were not available. Therefore, this review specifically addressed the procedures used to verify the upper lateral restraint. The adequacy of the design will be verified when the final loads become available.

The analysis related to the SGUL restraint involves a number of groups: Ebasco provides data on pipe rupture loads to Westinghouse; SWEC (nuclear technology and mechanical systems) provides data on asymmetric pressure to Westinghouse and on wall pressure and thermal loads to SWEC (structural); and Westinghouse provides data on SGUL restraint reaction loads to SWEC (structural). It requires extensive interaction to maintain consistency in the methodology and assumptions.

The staff reviewed, as background material, TAP Audit Report ATP-88-89 dated April 26, 1988 (Reference 55), and TAP/SWEC inspection followup correspondence (Reference 56), which indicates all inspection technical issues have been resolved. This inspection covered the design of the SGUL restraint and the above interacting groups.

Description of Structure

The steam generators are located in four individual compartments inside the containment structure. The support system for each steam generator consists of an upper lateral/horizontal (SGUL) support, a lower lateral/horizontal (SGLL) support, and a vertical support. The walls of steam generator compartments provide support for the lateral restraints. The SGUL support beam is located on one side of the steam generator at el. 858 feet 6 inches. This beam, along with a bumper strut on the opposite side of the steam generator, provides lateral restraint to the steam generator for motions and loadings normal (perpendicular) to the hot leg. The SGUL support beam is a box girder of A588 steel having a yield strength of 50 kips per square inch (ksi). The beam is bolted to embedment plates located on the walls of the compartment. The embedment plates are anchored to concrete walls using 16 steel reinforcement bars.

Thermal-Hydraulic Aspects

(1) Pipe Breaks

SWEC's initial presentation to the staff on its overview of SGUL support validation (Reference 57) indicated that nine pipe breaks were evaluated. In April 1988, the structural evaluation of the SGUL beam assumed the worst break to be the auxiliary feedwater line on the basis of engineering judgment. SWEC and Westinghouse are performing analyses to confirm this assumption. These analyses evaluate the effects of main steamline, feedwater line, auxiliary feedwater line, and 6-inch residual heat removal (RHR) line breaks on the SGUL beam.

General Design Criterion (GDC) 4 of Appendix A to 10 CFR Part 50 states that dynamic effects associated with postulated pipe ruptures may be excluded when analyses demonstrate that the probability of pipe rupture is extremely low. Ebasco has revised the pipe rupture loads consistent with the leak-before-break criteria, including the extension of the requirements of GDC 4 to branch lines 10 inches and larger. Data on the revised loads have been transmitted to Westinghouse and SWEC (References 58 and 59). Confirmation is required in regard to the extension of the requirements of GDC 4 pertaining to the elimination of the dynamic effects associated with the pressurizer surge line, the 10-inch accumulator line, and the 12-inch RHR line breaks.

In addition, breaks have been eliminated because of the elimination of originally postulated arbitrary intermediate breaks and because of the location of the breaks.

(2) Mass/Energy Releases

Since the new mass/energy release data were not available for review, the staff reviewed the methodology used in determining the data. The blowdown in the calculation (Reference 52) was distributed in four control volumes proportional to the ratio of the angles occupied by the control volumes surrounding the break. SWEC stated that this was based on the assumption that the ruptured steamline will be displaced only in the vertical direction. Subsequently, Ebasco showed that the pipe will also be displaced in the horizontal direction. An analysis in progress takes into consideration the pipe displacement transient and eventually deposits all the reverse flow into one node. The mass and energy from the auxiliary feedwater line break are deposited in only one node.

The staff finds that the modified Zaloudek correlation used for subcooled liquid is appropriate and that the treatment of reverse flow is conservative.

(3) Nodalization

Two nodalization schemes were used - one for steam generators 1, 2, and 4 and another for steam generator 3. SWEC stated that the two nodalization schemes for the steam generator cubicles were based on the physical geometries of the cubicles. The two models developed to represent the four steam generator cubicles were a 44-node model for cubicles 1, 2, and 4 and a 40-node model for cubicle 3. Boundaries between nodes were selected at actual physical discontinuities where geometric changes were expected to create pressure differentials. This modeling technique is consistent with the guidelines in NUREG/CR-1199 and NUREG-0609 (References 60 and 61). The steam generator cubicle models were developed with sufficient detail to account for all physical obstructions; therefore, as indicated in NUREG-0609, nodalization sensitivity studies are not required. The staff, therefore, finds that the number of nodes appears sufficient and acceptable.

The same nodalization scheme is used for the calculation of the load on the steam generator and the load on the steam generator cubicle wall. The staff noted that the assumptions regarding the calculation of loss factor and inertia terms for one calculation may not be conservative for the other. SWEC stated that sensitivity studies were not performed on the loss coefficient or inertia terms because of the results in NUREG/CR-1199, which show that they have an insignificant effect on the loads, except for moments.

The staff finds that the nodalization schemes used in the analysis are sufficiently detailed and the internodal properties (loss factor and inertia term) have been calculated realistically using acceptable standard methods. As a result, the sensitivity study is not expected to show any significant change in the calculated moments and forces.

(4) Temperature of Structural Steel

The temperature of structural steel was calculated on the basis of the loss-of-coolant-accident (LOCA) temperature profile in the containment (Reference 53). The local temperature inside a steam generator compartment was assumed to be limited by the LOCA profile. The justification was that the maximum structural steel (more than 1/2-inch thick) temperature is limited by the saturation temperature. Since the break size was significantly reduced (by assuming that the auxiliary feedwater line break is controlling), the corresponding maximum pressure is expected to be small, and as a consequence, the saturation temperature corresponding to the partial pressure is also expected to be smaller than the LOCA temperature.

A main steamline break is not expected to be controlling for the loads on the SGUL restraint because of the location of the break with respect to the steam generator compartment. However, since there is a potential that the superheated steam may heat up the temperature of the SGUL restraint beyond the saturation temperature for a LOCA, the staff suggested that SWEC

6.2.1 **Containment Functional Design**

SPLB

16. The FSAR has revised tables 6.2.1-94, 6.2.1-95 and figures 6.2.1-60, 6.2.1-63 to incorporate corrected pressure loads on the Steam Generators.

TABLE 6.2.1-94
(SHEET 1of 2)

PEAK LOADS ON PRIMARY COMPONENTS DUE TO ASYMMETRIC PRESSURIZATION

COMPONENT Rupture (Cubicle)	LOAD (Maximum/Minimum) F_x	F_y	F_z	M_x	M_z
STEAM GENERATOR					
Main Steam (4)	~~26.8~~ 36.8	~~12.9~~ 22.6	~~85.5~~ 86.9	~~17477~~ 17107	~~9780~~ 10746
	~~-48.3~~ -51.4	~~-102.0~~ -126.4	~~-36.3~~ -20.9	~~-10037~~ -9327	~~-3730~~ -4889
Main Steam (3)	~~54.0~~ 57.6	0	~~107.0~~ 125.9	~~9017~~ 11774	~~23741~~ 23749
	-118.~~5~~ 6	~~-168.7~~ -172.9	~~-92.0~~ -102.5	~~-12957~~ -12425	~~-6070~~ -5042
Feedwater (4)	~~133.0~~ 118.9	~~60.2~~ 79.7	~~28.5~~ 20.0	~~33125~~ 33812	~~29410~~ 30728
	~~-56.8~~ -64.5	~~-0.5~~ -2.5	~~-149.7~~ -125.0	~~-5244~~ -2082	~~-6080~~ -5478
RHR (4)	~~53.0~~ 34.3	~~34.1~~ 42.7	~~92.1~~ 52.8	~~11775~~ 9736	~~14690~~ 10427
	~~-115.3~~ -66.1	~~-7.1~~ -7.0	~~-41.0~~ -37.4	~~-24495~~ -17217	~~-31193~~ -21855
Aux. Feed (4)	~~87.7~~ 87.2	~~18.3~~ 15.0	~~133.3~~ 132.6	~~29466~~ 29217	~~9567~~ 9953
	~~-41.1~~ -37.4	~~-10.3~~ -11.9	~~-109.4~~ -114.9	~~-21570~~ -22017	~~-19425~~ -19243
RC Pump					
Main Steam (4)	5.9	12.7	5.3	642	774
	-5.0	-21.0	-7.6	-984	-823
Main Steam (3)	8.4	12.5	12.2	999	791
	-6.4	-13.8	-11.1	-1144	-894

76

CPSES/FSAR

TABLE 6.2.1-95

(Sheet 1)

PARAMETERS USED IN STEAM GENERATOR ASYMMETRIC PRESSURE ANALYSIS

VOLUME NUMBER	PROJECTED AREA (IN.^{2})	NORMAL VECTOR THETA-X	THETA-Y	THETA-Z	ELEVATION (IN.)
~~1~~ 7	2719 2539 1155 ~~4595~~ ~~1155~~	90.0 146.0 146.0 ~~127.6~~ ~~146.0~~	0.0 90.0 90.0 ~~47.3~~ ~~90.0~~	90.0 56.0 56.0 ~~65.7~~ ~~56.0~~	27.1 27.1 53.9 ~~71.9~~ ~~53.9~~
~~2~~ 8	4470 3765 1713 ~~5786~~ ~~1712~~	90.0 56.0 56.0 ~~65.7~~ ~~56.0~~	[illegible] 90.0 90.0 ~~47.3~~ ~~90.0~~	90.0 34.0 34.0 ~~52.5~~ ~~34.0~~	27.1 27.1 53.9 ~~71.9~~ ~~53.9~~
~~3~~ 9	3799 3348 1523 ~~4816~~ ~~1523~~	90.0 47.5 47.5 ~~60.2~~ ~~47.5~~	0.0 90.0 90.0 ~~47.3~~ ~~90.0~~	90.0 137.5 137.5 ~~122.8~~ ~~137.5~~	27.1 27.1 53.9 ~~71.9~~ ~~53.9~~
~~6~~ 12	3399 3068 1396 ~~4545~~ ~~1397~~	90.0 137.5 137.5 ~~122.8~~ ~~137.5~~	0.0 90.0 90.0 ~~47.3~~ ~~90.0~~	90.0 132.5 132.5 ~~119.8~~ ~~132.5~~	27.1 27.1 53.9 ~~71.9~~ ~~53.9~~
~~7~~ 13	6922 ~~6922~~	~~146.0~~ 56.0	90.0	56.0	107.2
~~8~~ 14	10268 ~~10260~~	56.0	90.0	34.0	107.2
~~9~~ 15	9127 ~~9128~~	47.5	90.0	137.5	107.2
~~12~~ 18	8363 ~~8367~~	137.5	90.0	132.5	107.2
~~13~~ 19	10111	146.0	90.0	56.0	219.7
~~14~~ 20	~~6905~~ 14985 30	56.0	90.0	34.0	219.7
~~15~~ 21	~~9754~~ 13329 31	47.5	90.0	137.5	219.7
~~18~~ 24	~~7785~~ 12221 16	137.5	90.0	132.5	219.7
~~19~~	5905	146.0	90.0	56.0	325.5
~~20~~	8751 14	56.0	90.0	34.0	325.5
~~21~~	7785	47.5	90.0	137.5	325.5

76

CPSES/FSAR

TABLE 6.2.1-95

(Sheet 2)

PARAMETERS USED IN STEAM GENERATOR ASYMMETRIC PRESSURE ANALYSIS

VOLUME NUMBER	PROJECTED AREA (IN.^{2})	NORMAL VECTOR THETA-X	THETA-Y	THETA-Z	ELEVATION (IN.)
24	7137/4	137.5	90.0	132.5	325.5
25	6065	146.0	90.0	56.0	404.6
	6717 / 1884 → ~~6975~~	146.0 / 90.0 → ~~143.3~~	90.0 / 0.0 ~~75.2~~	56.0 / 90.0 ~~57.3~~	484.9 / 484.9 ~~506.5~~
26	8990/2	~~56.0~~ stet	90.0	34.0	404.6
	9959 / 3103 → ~~10421~~	56.0 / 90.0 ~~57.3~~	90.0 / 0.0 ~~75.2~~	34.0 / 90.0 ~~36.7~~	484.9 / 484.9 ~~506.5~~
27	7995/7	47.5	90.0	137.5	404.6
	8856 / 2632 ~~8518~~	47.5 / 90.0 ~~49.2~~	90.0 / 0.0 ~~75.2~~	137.5 / 90.0 ~~135.5~~	484.9 / 484.9 ~~506.5~~
30	7331 20	137.5	90.0	132.5	404.6
	8115 / 2355 ~~8448~~	137.5 / 90.0 ~~135.5~~	90.0 / 0.0 ~~75.2~~	132.5 / 90.0 ~~130.8~~	484.9 / 484.9 ~~506.5~~
31	22742/1	146.0	90.0	56.0	637.2
	2559 / 1681 ~~3058~~	146.0 / 90.0 ~~135.6~~	90.0 / 180.0 ~~120.5~~	56.0 / 90.0 ~~61.2~~	766.0 / 766.0 ~~716.6~~
32	33715	56.0	90.0	34.0	637.2
	37941 / 2768 ~~4674~~	56.0 / 90.0 ~~61.2~~	90.0 / 180.0 ~~120.5~~	34.0 / 90.0 ~~44.4~~	766.0 / 766.0 ~~716.6~~
33	29991 83	47.5	90.0	137.5	637.2
	3374 / 2348 4099	47.5 / 90.0 ~~57.4~~	90.0 / 180.0 ~~120.5~~	137.5 / 90.0 ~~129.5~~	766.0 / 766.0 ~~716.6~~
~~34~~ 36	27475	137.5	90.0	132.5	637.2
	3092 / 2101 ~~3730~~	137.5 / 90.0 ~~129.5~~	90.0 / 180.0 ~~120.5~~	132.5 / 90.0 ~~125.6~~	766.0 / 766.0 716.6
~~35~~ 37	991 / 2922 ~~3087~~	146.1 ~~106.1~~	90.0 / 180.0 ~~160.4~~	56.0 / 90.0 ~~100.8~~	787.8 / 787.8 ~~651.2~~

76

CPSES/FSAR

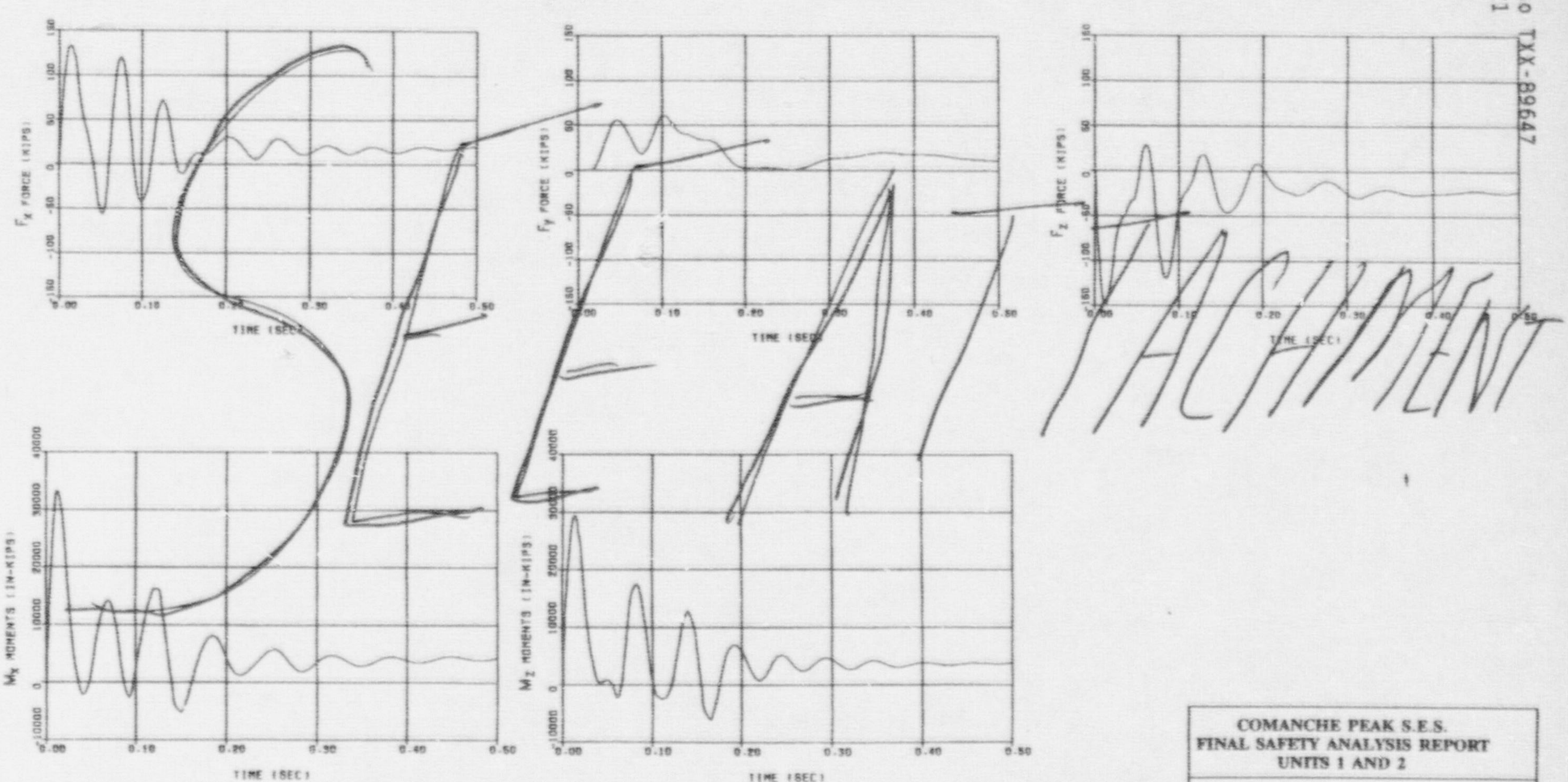
TABLE 6.2.1-95

(Sheet 3)

PARAMETERS USED IN STEAM GENERATOR ASYMMETRIC PRESSURE ANALYSIS

VOLUME NUMBER	PROJECTED AREA $(IN.^2)$	NORMAL VECTOR THETA-X	THETA-Y	THETA-Z	ELEVATION (IN.)
~~36~~ 38	1479 / 4813 ~~5030~~	56.6 / 90.0 ~~79.2~~	90.0 / 180.0 ~~160.4~~	34.0 / 90.0 ~~73.9~~	787.3 / 787.3 ~~651.2~~
~~37~~ 39	1315 / 4082 ~~4287~~	47.5 / 90.0 ~~76.9~~	90.0 / 180.0 ~~160.4~~	137.5 / 90.0 ~~104.3~~	787.3 / 787.3 ~~651.2~~
~~38~~ 42	1205 / 3653 ~~3845~~	137.5 / 90.0 ~~104.3~~	90.0 / 180.0 ~~160.4~~	132.5 / 90.0 ~~103.1~~	787.3 / 787.3 ~~651.2~~

NOTE: The angles Theta-x, Theta-y, and Theta-z in degrees, define the direction of the normal to the projected area in the direction of the applied pressure force. Volume numbers in this table relate to cubicles 1, 2 & 4; for corresponding volumes in cubicle 3, refer to Fig. 6.2.1-63. 76

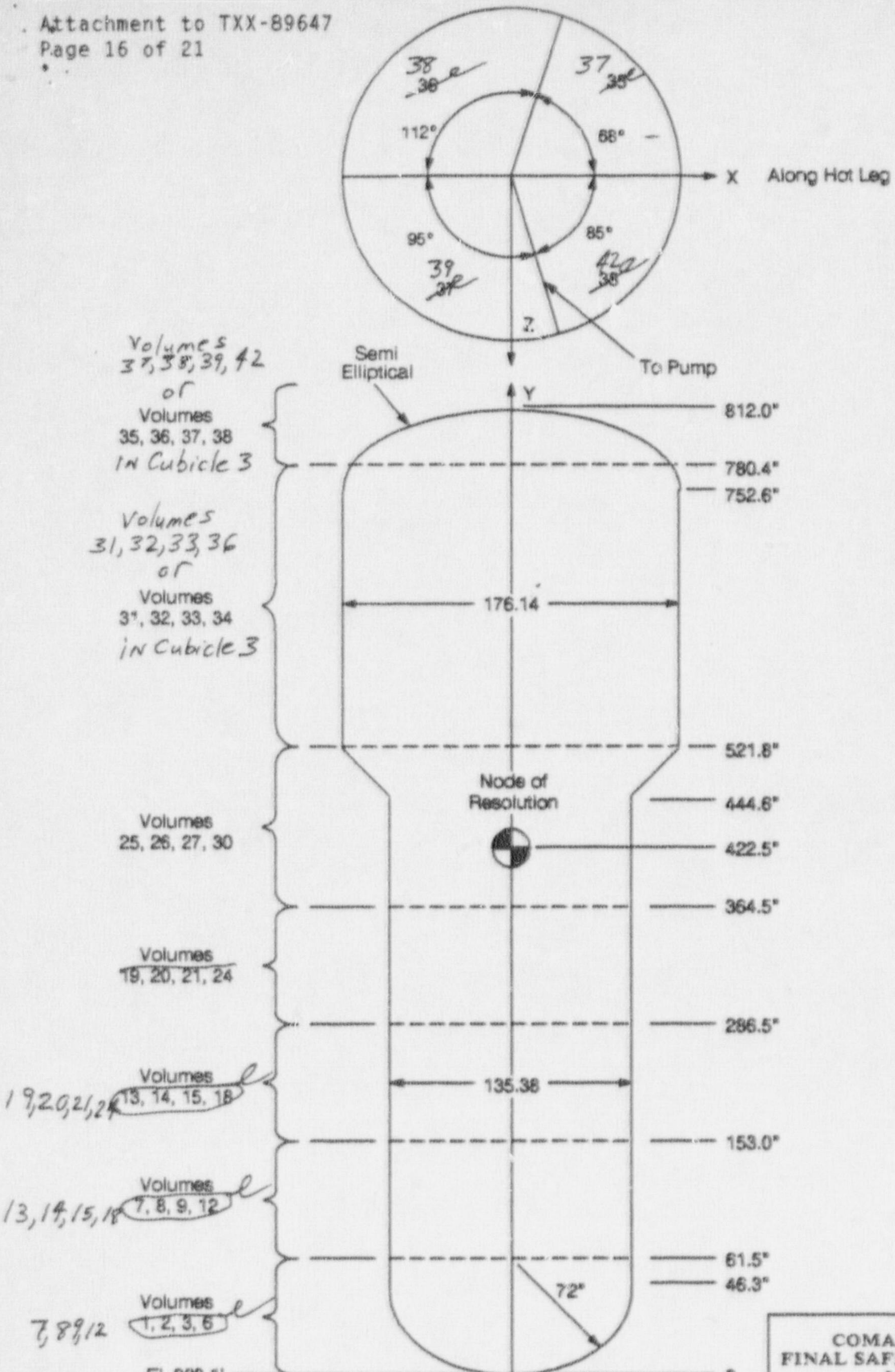


COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

ASYMMETRIC PRESSURE LOADS ON THE STEAM GENERATOR DUE TO A FEED-WATER LINE RUPTURE

FIGURE 6.2.1-60

AMENDMENT 76
MAY 1, 1989



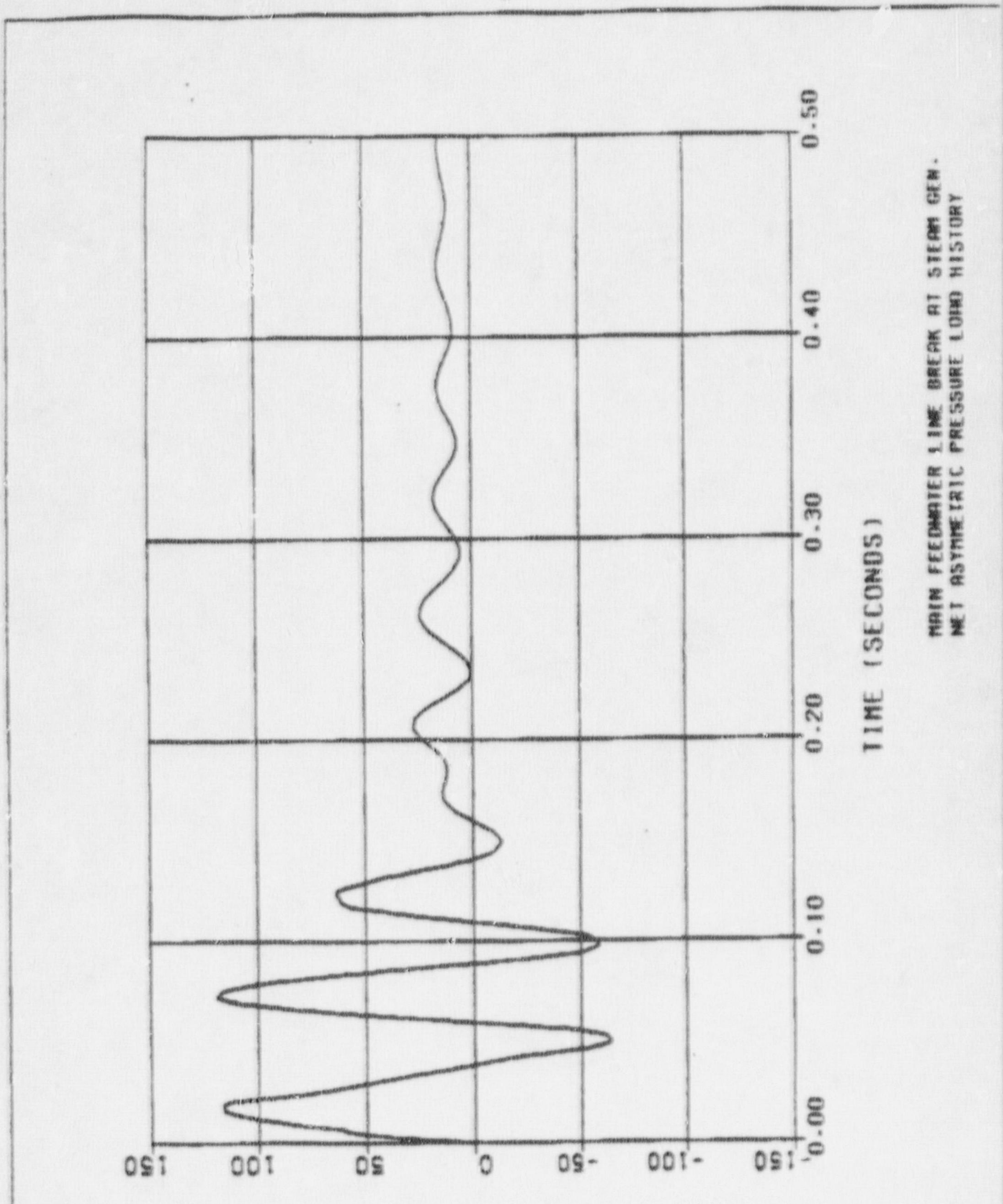
COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 AND 2

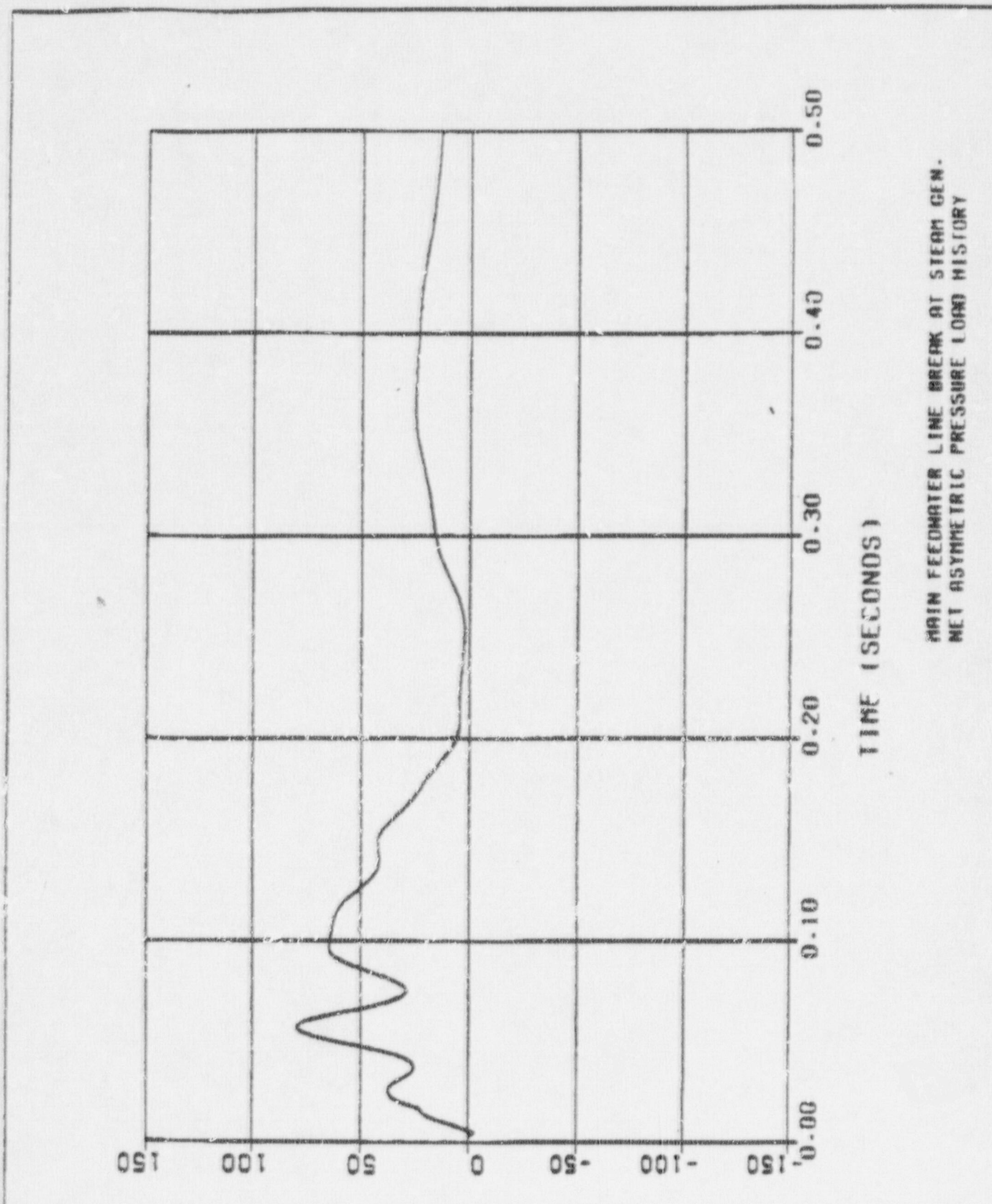
ASYMMETRIC PRESSURE LOAD
MODEL FOR STEAM GENERATOR

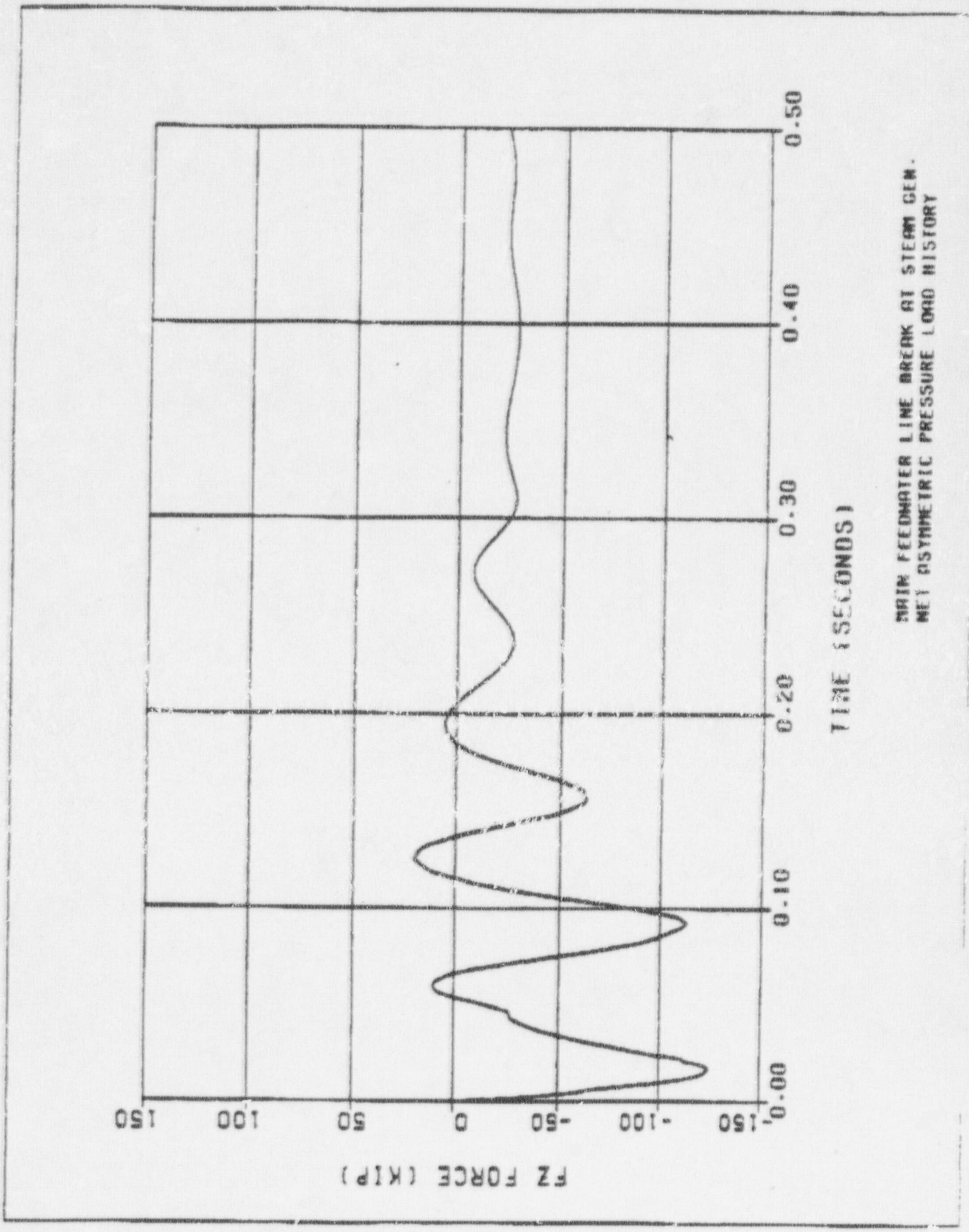
FIGURE 6.2.1-63

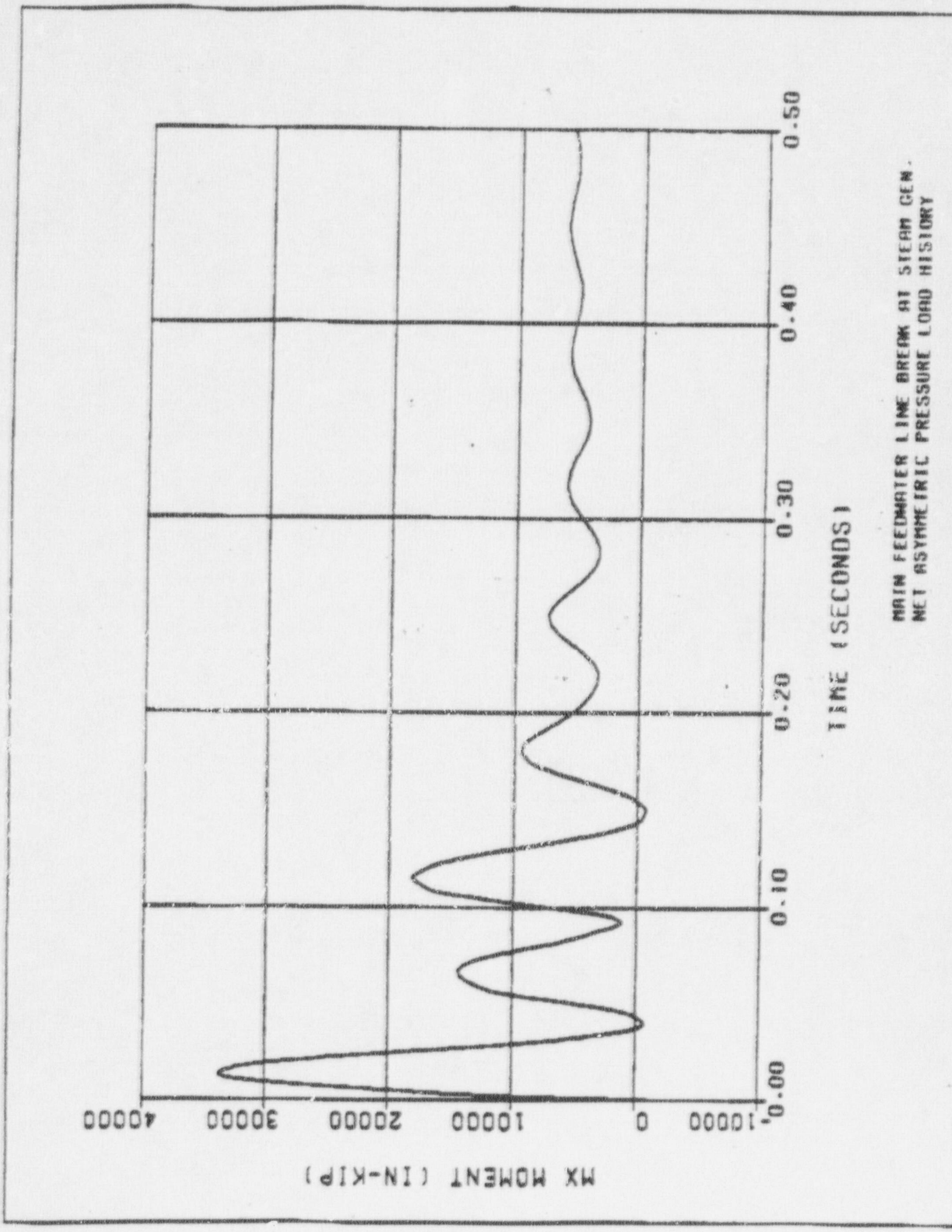
AMENDMENT 76
MAY 1, 1989

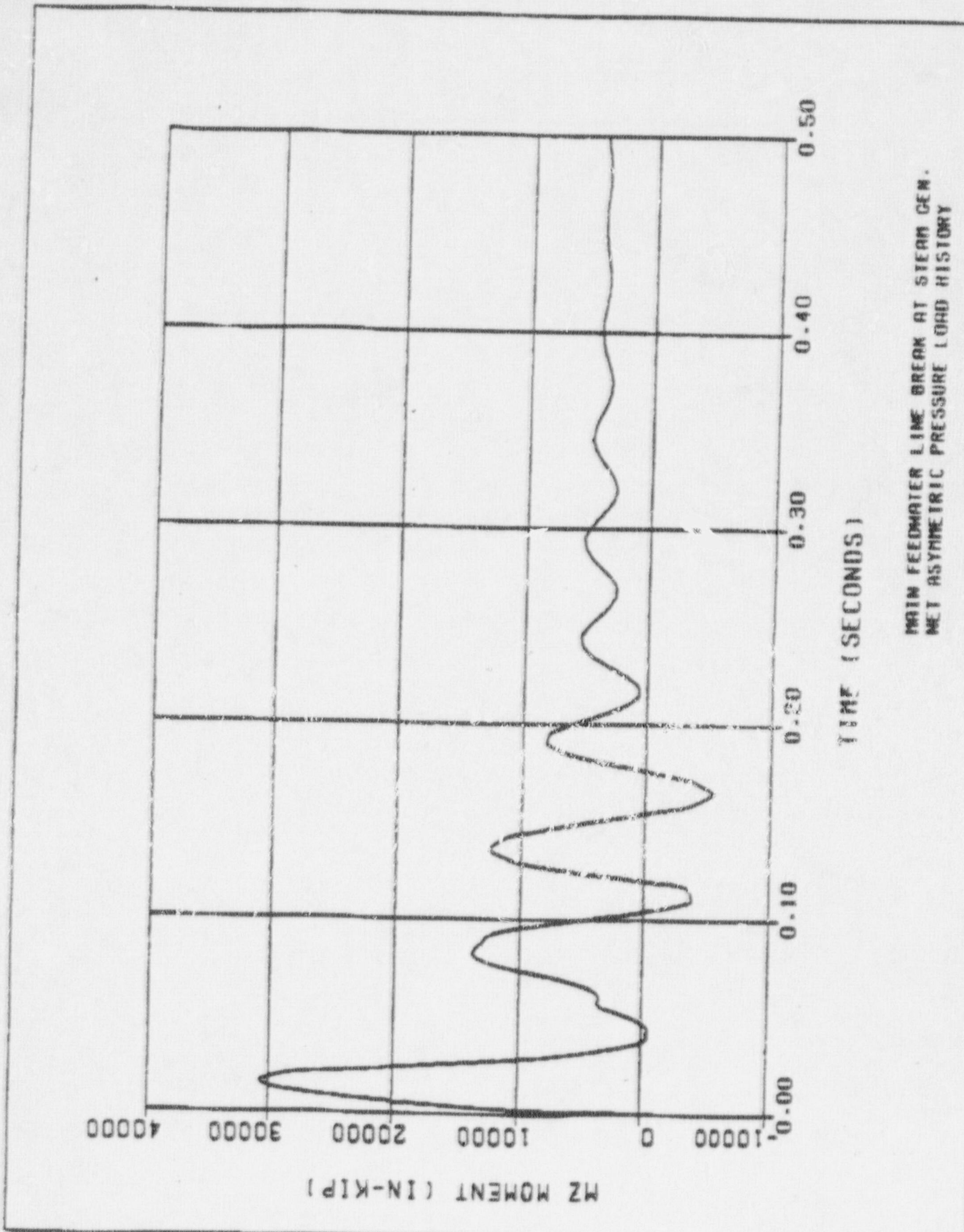
0847d_eps


MAIN FEEDWATER LINE BREAK AT STEAM GEN.
NET ASYMMETRIC PRESSURE LOAD HISTORY
TIME (SECONDS)
0.00
0.10
0.20
0.30
0.40
0.50
FX FORCE (KIP)
150
100
50
0
-50
-100
-150


MAIN FEEDWATER LINE BREAK AT STEAM GEN.
NET ASYMMETRIC PRESSURE LOAD HISTORY
TIME (SECONDS)
FY FORCE (KIP)
0.00
0.10
0.20
0.30
0.40
0.50
150
100
50
0
-50
-100
-150


FZ FORCE (KIP)
150
100
50
0
-50
-100
-150
0.00
0.10
0.20
0.30
0.40
0.50
TIME (SECONDS)
MAIN FEEDWATER LINE BREAK AT STEAM GEN.
NET ASYMMETRIC PRESSURE LOAD HISTORY


MX MOMENT (IN-KIP)
-10000
0
10000
20000
30000
40000
TIME (SECONDS)
0.00
0.10
0.20
0.30
0.40
0.50
MAIN FEEDWATER LINE BREAK AT STEAM GEN.
NET ASYMMETRIC PRESSURE LOAD HISTORY


MZ MOMENT (IN-KIP)
40000
30000
20000
10000
0
-10000
0.00
0.10
0.20
0.30
0.40
0.50
TIME (SECONDS)
MAIN FEEDWATER LINE BREAK AT STEAM GEN.
NET ASYMMETRIC PRESSURE LOAD HISTORY