GPU Nuclear

GPU Nuclear Corporation
Post Office Box 480
Route 441 South
Middletown, Pennsylvania 17057
717 944-7621
TELEX 84-2386
Writer's Direct Dial Number:

September 9, 1983
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Office of Nuclear Reactor Regulation
Attn: J. F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Sir:

Three Mile Island Nuclear Station, Unit (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
Relief and Safety Valve Testing (NUREG 0737, II.D.1)

In response to your letter of July 5, 1983 and as discussed between members of your Staff and mine on July 26, 1983, enclosed please find our response to your questions. Additionally, RELAP V analysis for the 400°F subcooled water condition were transmitted to EG&G Idaho on August 5, 1983.

Sincerely,

G Toole for
H. D. Hukill
Vice President - TMI-1

cc: R. Conte
J. Van Vliet

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RESPONSE TO NRC LETTER
DATED JULY 5, 1983

RELIEF AND SAFETY VALVE TESTING

Item 1. Selection of "feed and bleed" as the transient that would produce the maximum loads on the discharge piping could not be verified since no discussion of the methods or details of analyses are included in the submittal. The submittal cites the Electric Power Research Institute (EPRI) report, "Valve Inlet Fluid Conditions for Pressurizer Safety and Relief Valves for B&W 177-FA and 205-FA Plants", as justification for the selection. The cited report does not describe a transient titled "feed and bleed". The conditions identified in the submittal, subcooled water at 400°F and 2500 psig, appear to be those resulting from extended high pressure injection events. A discussion should be provided describing the methods used to select the limiting transient and clarifying the events of the transient.

Response:

The term feed and bleed (also referred to as extended HPI) is discussed in section 4.4 of the "Valve Inlet Fluid Conditions for Pressurizer Safety and Relief Valves for B&W 177 and 205 FA Plants". In this report, 3 specific limiting cases are discussed.

Case 1 - High temperature water SB LOCA less than 0.02 $ft.^2$

In this case the energy discharged through the break is not sufficient to remove core heat. No main or emergency feedwater is assumed available to sustain natural circulation on the primary side. Heat removal is accomplished by high pressure injection into the primary with discharge through the pressurizer safety/relief valves.

Case 2 - Low Temperature Water - Steam Line Break

In this case the overcooling event is intensifed by using minimum core decay heat, large uncontrolled emergency feewater flow, and no operator action to throttle or stop HPI. A minimum of 400°F subcooled water discharge resulting from the analyses was performed in response to IE Bulletin 79-05A&B.

Case 3 - Steam - Startup Rod Withdrawal

The design basis event for TMI-1 with a steam discharge is the startup rod withdrawal accident (See FSAR Section 14.1.2.2). The transient is terminated by the high pressure trip.

The report on valve inlet fluid conditions also set the limit for pressurizer surge line flow rate. As it shall be presented in the response to Item 8 in detail, the TMI-1 plant specific maximum surge line in-flow is much less than the set limit, and the corresponding EPRI test has resulted in a safety valve flow rate much greater than that the TMI unit would generate. Since only one safety valve is assumed open at a time, then the surge line in-flow is conservatively equated to safety valve discharge flow. This leads to the conclusion that both the fluid conditions and the test results are applicable to TMI-1.

Item 2. The submittal does not include a discussion of consideration of single failures after the initiating events. NUREG-0737 required selection of single failures that produce maximum loads on the safety valves. A discussion should be provided describing how the single failure considerations required by NUREG-0737 are met.

Response:

As described in the response to item 1, the bounding cases are a high and low temperature water condition.

The single failure, for the purposes of this analysis, for the high temperature water case is an assumed loss of emergency feedwater which necessitates extended HPI operation (Feed and Bleed).

The single failure, for the purposes of this analysis, for the low temperature water case is no operator action to throttle HPI during the overcooling event (additionally, EFW Flow is also considered uncontrolled).

The single failure, for the purposes of this analysis, for the steam case is no pressurizer spray capability in the pressurizer.

All other license basis events result in lower loads on the safety/relief valves and discharge piping.

Item 3. Overpressure transients will cause the pressurizer sprays to activate adding moisture to the steam volume. When the safety valves lift or the power operated relief valves (PORVs) are opened they would be passing a steam-water mixture. Was this effect considered in the analyses done to select the transients that produced maximum loads on the discharge piping?

Response:

The analyses performed on the safety/relief valves indicate that steam/water exist in the valve and down stream piping resulting from flashing of water or condensation of steam. A specific steam-water analysis was not performed. However, a steam analysis (Attachment 3) and a water analysis (Attachment 1) were performed which indicate maximum loads occur for water discharge.

The purpose of the B&W report is to document the expected range of fluid inlet conditions to which the PORV and SRV's may be subjected. The B&W report does not evaluate two phase inlet conditions.

Discharge piping design input assumptions such as: a) lower than expected inlet water temperature, b) higher than rated valve flow rate (see response to item no. 7), and c) fast opening time (see response to item no. 16), are deemed sufficient to insure conservatism in the analysis.

Item 4: The evaluation by Babcock and Wilcox (B&W) that showed up to 20% blowdown can be tolerated without any adverse effect on safety could not be verified since details of the analyses were not provided. The evaluation was based on hot leg voiding but no discussion was included to demonstrate that it is the limiting criteria. The increased blowdown would also cause a higher rise in the pressurizer level during transients that result in the safety valves lifting. No discussion is provided to demonstrate the level will not reach the discharge piping connection resulting in a transition of flow through the safety valves from steam to water-steam mixture. Details of the analyses supporting the conclusion that there will be no adverse effect on safety and details of the analyses demonstrating that the water level will not reach the discharge piping should be provided.

Response:

Attached, please find a copy of the "Pressurizer Safety Valve Maximum Allowable Blowdown" (Attachment 2), which discusses the details of the analysis.

Hot leg voiding has been identified as the primary safety concern relative to the maximum allowable PSV blowdown. The potential for hot leg voiding exists because of the lower system pressure that will be caused by larger PSV blowdown values. These lower pressures combined with transients that produce high system temperatures could result in saturation conditions and voiding that could impede natural circulation cooling.

This increase in pressurizer safety valve blowdown is not a direct safety concern. All nuclear plants are designed to accomodate Loss of Coolant Accidents including that which would result if a pressurizer safety valve sticks in the open position - i.e., an unlimited (100%) blowdown.

An additional desirable criteria would be that the pressurizer not fill for the larger PSV blowdown values. The pressurizer has a greater potential for filling because the larger blowdown values will allow large insurges during the blowdown cycle. The same EPRI tests that identified the blowdown concern also showed the safety valves were generally able to relieve two-phase fluid and water; thus, filling the pressurizer is a concern of secondary importance.

Item 5. The B&W Report on "Valve Inlet Fluid Conditions for Pressurizer Safety and Relief Valves" does not include the consequences of a reactor coolant pump shaft seizure, which is the accident which, in some plants, results in the fastest increase in and the highest peak reactor coolant system pressure. Why wasn't this considered in determining the worst case transient?

Response:

Section 14.1.2.6.3 of the TMI-1 FSAR addresses the locked rotor transient which results in a flux-flow trip. The B&W design mitigates the consequences of the accident which yields high pressures in the Westinghouse design. Attachment 2, Table 2 indicates high pressure and temperature events for B&W reactors. The "Valve Inlet Fluid Conditions for Pressurizer Safety Valves and Relief Valves for B&W 177 and 205 FA Plan B" did not include this transient since it potentially does not challenge the PORV or safety valves (15 psig above nominal).

Item 6. The submittal states that the ring settings to be used for the safety valves are those that showed the most stable valve configuration during the Electric Power Research Institute (EPRI) testing. The specific ring settings, however, are not identified. The back pressures for steam flow are given in the submittal but the back pressures for flows with subcooled water at the valve inlet are not provided. The submittal does not discuss the test valve performance to verify that the valve did perform satisfactorily. The specific ring settings to be used should be provided . A comparison should be provided that demonstrates, with the specfied ring settings and appropriate back pressures, the valves will have stable operation for the Final Safey Analysis (FSAR) transients, will pass rated steam flow and will pass adequate flow to protect the primary system from over pressure for transients with subcooled water at the valve inlet.

Response:

By GPUN letter dated October 28, 1982 (82-260), GPUN informed NRC that the safety valves had been adjusted to the EPRI ring settings.

The TMI-1 plant specific ring settings are as follows:

Lower Ring	+11 notches
Middle Ring	-40 notches
Upper Ring	-48 notches

The EPRI test parameters were established to envelope the B&W, CE and Westinghouse transient conditions by using the most severe transients. Backpressures were established by EPRI using the maximum allowable backpressures per valve manufacturer requirements. A valve that operates satisfactorily at the most severe test conditions will meet plant conditions which are less severe. The TMI-1 conditions are bounded by the EPRI test conditions.

The valve ring settings are based on satisfactory performance on steam transients because the valve was designed for steam. Therefore, the ring settings for steam have to be the ring settings for water. See answer to question 8 for discussion of valve performance with subcooled water.

Item 7. The submittal describes the safey valves as Dresser Valves Model 31739A with a rated relief capacity of 317,973 lb/hr. However, the same model valve used in the EPRI test program is identified in the EPRI test report with a rated relief capacity of 297,845 lb/hr. The apparent difference in rated flow should be explained.

Response:

See second note on bottom of Table 1 of revision 1 of Gilbert report (Attachment 1) for a discussion of flow rates. Dresser Valve Model 31739A has only one orifice size which is 2.545 in.^{2}. Therefore, the only variable in the capacity equation (W=51.5KAP) is the inlet pressure. The higher the inlet pressure, the higher the flow.

W = capacity in lb/hr
K = constant = .8775 = .9 x .975
A = orifice area = 2.545
P = pressure = 2500 psig + accumulation + 14.7 psig
W = 51.5 x .8775 x 2.545 x (2500 + .03 x 2500 + 14.7) = 297,846lb/hr.
W = 51.5 x .8775 x 2.545 x (2500 + .1 x 2500 + 14.7) = 317,973lb/hr.

The higher flow rate was used for conservatism in the analysis of the discharge piping.

Item 8. The EPRI test series for the Dresser Valve Model 31739A included a test at 400°F subcooled liquid in which the valve only partially opened. The system pressure continued to accumulate and the test was terminated. The test considerations nearly duplicated the conditions for the subcooled transient selected in the submittal. Verifications should be provided to demonstrate that the valve will provide sufficient flow to relieve the pressure for the selected transient.

Response:

Under the EPRI proposed bounding conditions, namely, extended operation of three large HPI pumps (620 gpm @ 2500 psig) and maximum (1.2 times ANS) decay heat, assuming the valve inlet temperature to be 579°F, initially, the valve inlet temperature and surge line flow are calculated to be:

Time	Temperature (°F)	Flow (lbm/hr)
0	579.0	227,000
1 hr.	530.0	240,000
2 hrs.	470.1	255,000
3 hrs.	433.5	264,000

Under the realistic conditions of TMI-1, i.e., 2 HPI pumps (480 gpm @ 2500 psig) and 1.0 ANS decay heat, the fluid conditions are:

Time	Temperature (°F)	Flow (lbm/hr)
0	579.0	174.000
1 hr.	547.5	182,000
2 hrs.	496.9	192,000
3 hrs.	463.5	200,000

The EPRI water tests at 550°F and 400°F (tests 1112 and 1114) resulted in maximum flow rates of 450,000 lbm/hr and 500,000 lbm/hr, respectively. Although in the latter case, the system pressure continued to accumulate and the test was aborted at 2750 psia, the valve open flow rate exceeds that calculated for both realistic and bounding cases for TMI-1, and thus should be considered acceptable.

Review of the B&W Valve Inlet Fluid Conditions reveals that in the determination of the surge flow, B&W has incorporated conservatism by taking the sum of two terms: one for HPI injection and one for thermal expansion. Actually, as cold HPI water is mixed with hot RCS water, a contraction is resulted that reduces the net expansion owing to core decay heat.

Item 9. The submittal lists the TMI-1 power operated relief valve (PORV) as a model 31533VX-30 with a 1-3/32 in. bore. The PORV tested by EPRI was a Dresser Model 31533VX-30-2 with a bore diameter of 2-5/16 in. The effect on performance resulting from the difference in models and bore diameter should be addressed.

Response:

The EPRI Valve Selection/Justification Report discusses the differences between the various Dresser Valve models and the differences in bore diameters. The TMI-1 valves have been modified to have the -2 internals and therefore, there is no difference in operation between the TMI-1 valve and the EPRI valve. Both valves have the same size internals. The only difference between the valves is in bore diameter and this affects capacity only and that only in a minor way. The valve functions as a result of pressure ratios based on seat diameter and both valves have the same seat size (1-5/16").

Item 10. The Dresser PORV tested by EPRI failed to close and had a delayed closure for the test conditions of low temperature water followed by 550°F water. Verification should be provided to demonstrate that this performance of the valve will not have an adverse effect on the safety of the plant.

Response:

These tests were for a cold loop seal discharge followed by hot pressurizer water. This test is for plants which have a loop seal before the PORV. TMI-1 does not have a loop seal before its PORV. Therefore, this test is not applicable to TMI-1.

Item 11. NUREG 0737 requires qualification of the block valve. Specific data demonstrating qualification of the block valve is not given in the submittal. A reference is made to a report by R. C. Youndahl indicating satisfactory performance for a similar valve. The TMI-1 block valve is identified as a Velan 2-1/2 inch gate valve F9-454B-I3MS with Limitorque operator SMS-00-10. The valve tested in the EPRI program was a Velan Valve, B10-30548-13MS. The EPRI tests demonstrated closure only with steam. Additional information should be provided to verify that the test valve adequately represents the TMI-1 valve and the testing with steam only provides adequate assurance that the valve will open and close satisfactory for the required plant conditions.

Response:

TMI-1 Block Valve F9-454B-13MS
EPRI Test Block Valve B10-3054B-13MS

F = flanged end	B = Butt weld ends	)No affect on representation
9 = 2-1/2"	10 = 3"	)due to similarity of valve
4 = 2500 lb rating	3 = 1500lb rating	)internals & operation
5 & 05 = conventional port gate valve, OS&Y		)
4B - vertical stem, bolted bonnet		)
13 - 316 stainless steel body		)Same for both valves
MS = 316 stellited disc & seat, 630 stem		)

The TMI-1 valve and the EPRI test valve are the same Type Velan valve (style, internal design, operation) except for size, pressure rating and valve ends which have no effect on valve operation.

The valve motor operator sizing equations use pressure to determine required operator torque outputs. The fluid and/or flow rate are not used in the sizing equations. Therefore, an operator sized to close a valve against a 250 psi pressure differential will operate on either steam or water flow.

Two Velan valves were tested during the EPRI test, both with the same model number. One was an older version of the valve and is similar to the TMI valves. The other is a newer version and is also similar to the TMI valves with regard to internals and operation. The older valve has an SB-00-15 operator and the new valve has an SMB-000-10 operator. Both valves operated satisfactorily during the testing. The older valve started with a torque switch setting of 1.7 (155ft-lbs). Supplemental tests were run down to a torque switch setting of 1.0 (82 ft-lbs). The new valve started with a torque switch setting of 1.5 (110ft-lbs). The supplemental tests were run down to a torque switch setting of 1.0 (82ft-lbs). During the tests the inlet pressures during flow were approximately 2300 psig - 2400 psig with flows of approximately 235,000 lb/hr. (The older valve's operator was originally procured for a 12" gate valve per Limitorque). There was minor seat leakage at the lowest torque switch setting, but did not affect valve operation.

The TMI-1 valve originally had a torque switch setting of 1.5 - 2.0 (60ft-lbs to 75ft-lbs). The setting was revised in 1981 to 2.75 (98ft-lbs). This revision was due to a review of the torque switch setting based on the EPRI test data and using a 2750-psi delta P. The required output torque was calculated in the same manner as the output torque calculated for the EPRI test valves. The reason why the EPRI test valves have a higher torque is because the EPRI valves are 3 in. valves. The area term of the differential pressure component is the reason for the increased required torque in the EPRI valves. Based on the Limitorque method of calculating, the TMI-1 torque switch setting is consistent with the EPRI test data.

The Limitorque method of calculating required output torque uses the differential pressure to determine the required total stem thrust. The type of fluid causing the differential pressure is not of a concern. Only the differential pressure is important.

The EPRI valves were tested in the horizontal position and the TMI-1 valve is installed in the vertical position. The difference in orientation does not affect the test results or the application of the test results to TMI-1. The valves are designed for both orientations. Also the Limitorque sizing calculation does not require the orientation. The valve disc is guided in the valve body so that internal valve forces do not affect valve operation or required stem thrust. Therefore, operator sizing is the same for both vertical and horizontal orientation.

The TMI-2 block valve is a Velan Model F9-354B-13MS, the TMI-1 valve is a Velan Model F9-454B-13MS. The only difference is that the TMI-2 valve is rated at 1500 lbs and the TMI-1 valve is rated at 2500 lbs. Both valves have the same size motor operator, SMB-00-10. Although the TMI-2 torque switch setting cannot be verified, it is assumed that it is the same as the original TMI-1 torque switch setting. This assumption is based on the fact that the TMI-1 valve was originally procured for TMI-2 and the TMI-2 valve was purchased as a direct replacement for the original valve. The valve installed in TMI-2 did operate satisfactorily during the March 29, 1979 incident. The torque switch setting is assumed to be approximately 1.5 - 2.0 (output torque of 60ft-lbs to 75ft-lbs).

Item 12. Describe what steps are being taken to remedy the recent corrosion observed on the TMI-1 PORV which has been attributed to excessively corrosive reactor coolant water. Are the valves being modified in any way to help eliminate this problem? It is our understanding that the loop seal in the safety valve inlet piping has been eliminated. Will this aggravate the corrosion of the safety valves since the valves will now be in direct contact with the pressurizer steam?

Response:

Recent corrosion problems associated with the PORV reported on March 7, 1983 (LER 83-003) and the remedy was subsequently discussed in Rev. 1 to that LER dated June 6, 1983. By eliminating the residual sulfur in the RCS through cleaning (H_2O_2) and hydrolazing, deletion of the sodium thiosulfate tank, refurbishment of the valve, frequent chemical monitoring, and valve inspection further corrosion is expected to be minimized. The safety and relief valves are not being modified as a result of this problem. The advantage of the loop seal was to reduce H_2 cutting of the valve seats. Experience at similar plants has shown this effect to be very minor.

Item 13. The submittal describes the intended modifications to mount the safety valves and the PORV on the pressurizer nozzles. This modification would significantly affect the loads on the pressurizer nozzle. The submittal does not discuss the effect of the modification and the effect of the valve discharge loads on the ASME Section III, Class 1 analysis of the pressurizer nozzles. Verification that the Section III, Class 1 stress limits are met should be provided.

Response:

The original design of the B&W NSSS provided for safety valves to be mounted directly on the pressurizer nozzle. During the construction phase, Met Ed decided to move the valves to the end of the loop seal and provided a justification for that new design. GPUN, as a result of the EPRI test results, has returned the system to its original configuration.

Item 14. The submittal states that the safety valves and PORV connections to the pressurizer are assumed as anchors. It does not mention the large displacement of the connection due to the thermal expansion of the pressurizer when heated to operating conditions. Verification should be provided that the displacement were considered in the stress analyses of the piping and pressurizer nozzles.

Response:

Pressurizer nozzle thermal growths were accounted for by using anchor movement inputs in thermal analysis (for example, vertical thermal displacement = 1.375"). Thermal movement calculations are included in Attachment 1, pp. 32-34.

Item 15. The submittal states that the valve nozzle loads at the outlet flanges imposed by the discharge piping exceeds the allowable listed in the vendor catalog for the safety valves and exceeds those shown in the previous design for the PORV. It states that the loads for both types of valves have been re-evaluated by Dresser, the vendor, and found to be acceptable. However, the acceptance criteria and details of the analyses are not given. Sufficient additional information should be provided so that the acceptability of the nozzle loads can be verified or appropriate references cited.

Response:

By letter dated November 11, 1982, GPUN was notified by Dresser Industries as to the acceptablility of the loads at the outlet flanges: the loads were combined as follows:

Normal Operation	Deadweight # + Thermal Case #
Normal Operation (safe shutdown earthquake-valve closed)	Deadweight # + 2 x OBE Seismic + Thermal Case 3
Upset Operation (valve open)	Deadweight + Thermal + Blowdown
Upset Operation (safe shutdown earthquake-valve open)	Deadweight + Thermal + Blowdown + 2 x OBE Seismic

Nozzle load information is provided on page 55 of the revised Attachment 1.

Item 16. The submittal identifies the initial conditions and valve opening times for the safety valves and PORV analyses. However, the method of handling the valve resistances is not described and the corresponding flows are not reported. Since the ASME code requires derating the safety valves to 90% of predicted flow, actual flows of 100% of rates are likely. Additional information should be provided describing considerations of safety valve derating and describing methods used to predict the flows for the safety valves and the PORV.

Response:

The valve flow areas used in the RELAP-V models were chosen so as to produce a steady state steam flow of 370,968 lbm/hr @ 2500 psig for each SRV and 116,667 lbm/hr @ 2300 psig for the PORV. These values correspond to rated flow corrected for 10% ASME derating and a 5% error. These values conservatively maximize the discharge piping analysis.

The SRV opening times used were obtained from Tables 3.1.1.b and 3.1.1.c of the EPRI Safety Valve Test Data Report corresponding to the short inlet configuration. The shortest opening times reported are 0.012 sec. and 0.043 sec for steam and water conditions, respectively. Therefore, the SRV opening characteristic used in the RELAP5 analysis was linear opening at 0.012 and 0.040 sec, respectively for the steam and water cases.

Item 17. Two valve opening sequences were considered in the submittal, the two safety valves opening simultaneously and discharging without PORV flow and the PORV discharging by itself. These sequences however, may not bound the forces for all possible valve opening sequences. The experience of EG&G Idaho indicates that maximum forces would be expected when the sequence of opening is such that the initial pressure waves from the safety valves opening reach the common junction, located 1-1/2 ft above the drain tank, simultaneously. The safety valve lines and the PORV line were apparently modeled independently; however, if the PORV is discharging with flow past the junction when the safety valves open, piping loads may be significantly affected. Additional justification should be provided to demonstrate that the sequences considered in the submittal are adequate.

Response:

The sequences used for the SRV's and PORV are conservative for discharge piping transient analysis and provide bounding loads.

(a) SRV Sequencing:

Both SRV-A and SRV-B are conservatively assumed to actuate simultaneously. The design basis loading on the SRV discharge piping is based on the 400°F subcooled water discharge case. Despite having a larger force magnitude, the initial wave spike is not the controlling load. The fluid momentum results in a later and broader peak on the discharge piping which piping analysis has determined to be the controlling case. These force time history profiles may be seen by reviewing Attachment 1 of our submittal.

The length of piping between the SRV's and the common junction is approximately 125 ft. The length of SRV-A discharge piping is approximately 6 ft. longer than that of SRV-B. Further information concerning the fluid condition within the SRV discharge lines and their common junction can be obtained by reviewing the RELAP5 computer run for 400°F subcooled water discharge included herein. Items such as nodal pressure within the discharge lines may be seen by studying the provided nodal pressure for components 7 and 17 for each RELAP5 major edit output. RELAP5 minor edit output also provides information concerning individual pipe segment forces and flow rates from the valves, to the common junction, and from the common junction in 1 millisecond intervals.

(b) PORV - SRV Sequencing:

The PORV discharge piping analysis was done separately. The resulting steady state backpressure at the common junction is 73 psia. Therefore, using a backpressure of 70 psia (RCDT rupture disc pressure rating) adequately models the SRV annalysis backpressure.

Conclusion: Based on the above, the conservative flow rates, and opening times used in the analysis, the SRV/PORV discharge piping hydraulic loading functions used are conservative.

Item 18. The adequacy of the thermal-hydraulic analyses could not be verified since sufficient detail is not provided in the submittal. To provide for a more complete evaluation, additional discussion should be provided for the rationale used in the selecting key parameters such as node spacing, time steps, valve flow area and choked flow junctions. Computer printouts of input and output for key problems should also be provided. Suggested key problems are the RELAP5 printouts for the 400°F subcooled water case for both the safety valves and the PORV.

Response:

Calculations and computer output are available for inspection at GPUN or the contractors facilities. A copy of RELAP V analysis for 400° subcooled water was transmitted to EG&G Idaho, August 5, 1983. In addition, the following general criteria were used in developing the RELAP V models:

(a) Nodal Spacing

Near the valve outlet the node size is initially restricted by the geometry of the pipe segment and are typically 0.5 ft. As downstream segments become longer, node length was sometimes increased but the volume change was always less than 50% for adjacent nodes.

Our contractors' experience (See Appendix A of our previous submittal) and sensitivity studies described in EPRI/CE Reference 1 of our previous submittal indicate this criteria is sufficient in modelling relief valve discharge transients.

(b) Time Step Size

The maximum time steps were evaluated using the Courant limit.

$$t = \frac{X}{V+C}$$

where: t = maximum time step

X = minimum nodal length

V = maximum phasic velocity

C - speed of sound

In addition, the minimum time step used was 1×10^{-10} seconds.

The maximum time step used was 1.0×10^{-4} sec.

(c) Valve Flow Rates

Valve flow rates are addressed in response to 16 above.

(d) Choking

RELAP V junctions were allowed to choke at all area changes.

Item 19. Solving the acceleration term of the momentum balance equation was used to develop a forcing function for the structural code. The experience of EG&G Idaho with this technique is that spurious data spikes will occur during water discharge transients if every RELAP 5 computational time step is used. However, if a finite time step is used the technique may not include the peak load. A discussion of the solution techniques should be provided which demonstrates the accuracy and applicability of results for water discharge transients.

Response:

The forcing functions for the structural code were calculated by solving the acceleration term of the momentum balance equation by using every RELAP V computational time step. Although this technique sometimes results in spurious force data spikes, this is not the case for most of the forces calculated. See Appendix B (Attachment 1) for force time histories for every RELAP V computation time step. No smoothing out was performed on the curves.

Item 20. Insufficient information is available to assess the structural analyses. A more complete assessment requires description to be key parameters used in the analyses such as damping, lumped mass spacing details of support models, and the integration time step.

The submittal infers that only the net unbalanced forces for the RELAP elements were used as input to the structural analysis. A discussion should be provided that describes how the axial extension from the balancing forces on each end of the elements was treated. Computer printouts of input and output for key problems should be provided. Suggested key problems are the TPIPE printouts for the 400°F subcooled water case for the safety valves lifting simultaneously and for the PORV lifting along.

Response:

The following parameters were used in the analyses.

(a) Damping Ratio = 0
How is zero damping applied?
In the direct integration method of TPIPE, the damping matrix C used is computed by

$$C = \alpha M + \beta K$$

Where M is the mass matrix, K is the stiffness matrix. The α and β are arbitrary proportional factors. The damping ratio is specified by specifying α and β in the TPIPE time history analysis inputs. Zero damping is applied by specifying $\alpha = \beta = 0$ in TPIPE inputs.

This method is derived from Eq. (13 - 24) in Dynamics of Structures, by R. W. Clough & J. Penzien, McGraw-Hill, 1975.

No damping factor was used in the dynamic analysis.

(b) Lump Mass Spacing

Lumped masses were calculated for each nodal point by TPIPE Computer Code internally. Analysis node spacings can be found from the isometric drawings to the report.

(c) Modeling

The support eccentricity has been modelled. The details are available for inspection at GPU or Contractors' facilities.

(d) Integration Time Step

Analysis time step T = 0.001 second was used in the TPIPE time history analysis for the blowdown load cases.

The forcing functions were checked between RELAP 5 result and TPIPE input to make sure that the analysis time step was acceptable and that the peak forces were accounted for.

(e) Axial Extension

The axial extension effect on piping stresses from the balancing forces on each end of the pipe elements were considered in the static pressure analysis by using peak pressure. This should cover the effects of transient pressure and momentum forces combined. Furthermore, the axial balanced forces have no effect on the support design.

(f) SRV lifting simultaneously

(See response to item 21.)

(g) Print-out of RELAP V for 400° subcooled water condition were transmitted to EG&G Idaho, August 5, 1983.

Item 21. The submittal indicates that the three piping branches were assumed to be structurally independent and that the connectons to the pressurizer and drain tank were treated as anchors. The interaction of the three branches at the junction 1-1/2 ft. above the drain tank and the flexibility of the connections would appear to have a significant effect on the response and stress level of the piping. Additional justifications for these assumptions should be provided.

Response:

The three (3) piping branches were assumed to be structurally independent for the following reasons:

(a) The interaction of the three (3) branch lines and the common header is isolated from the pressurizer connections by three (3) intermediate anchors, one on each branch.

(b) The common junction is located in a relative stiff section of the piping adjacent to the pressurizer drain tank anchor.

(c) The piping dynamic stress in the region of the common junction are very low (i.e., OBE stress 2000 psi and blowdown 1000 psi) leaving sufficient margins for the possible differences that may result from a more refined structural analysis model.

ATTACHMENT 1

APPENDIX B

RELAP5 MODELS AND DISCHARGE LINE PIPING FORCES

<u>Safety Valve Discharge Transients, RELAP 5 Models and Results</u>

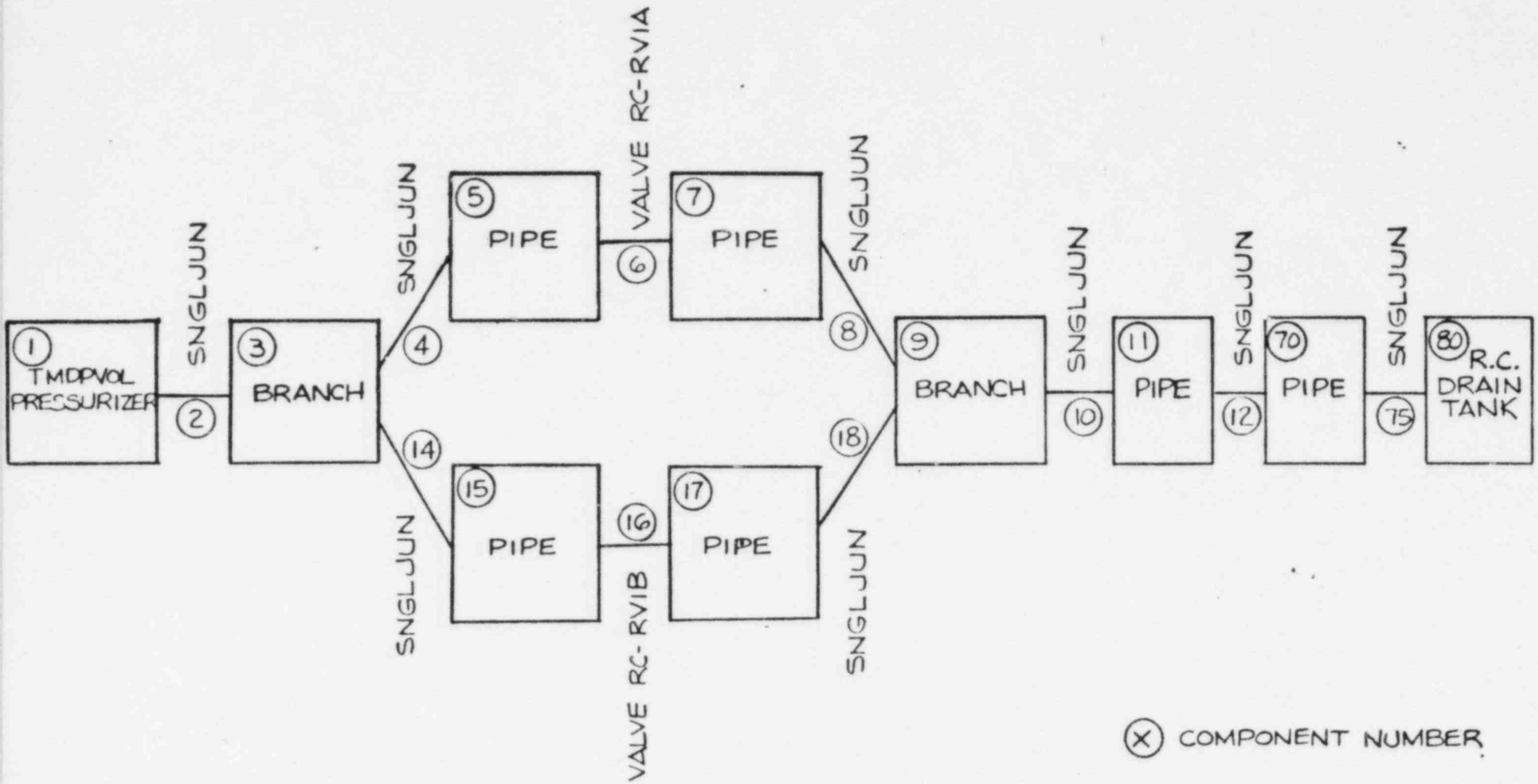
The safety valve discharge lines were modeled using a 233 volume and 233 junction RELAP5 model. Since the valve setpoints are both 2500 psig, the hydraulic forces on the discharge lines were evaluated assuming both safety valves open simultaneously. The generalized RELAP5 model is given in Figure B-1.1.

The hydraulic forcing functions are defined in Figure B-1.2 with the positive force direction defined opposite to the direction of flow. Figures B-1.3 through B-1.13 present the unbalanced forces along each straight segment of pipe for the 400°F subcooled water discharge transient.

<u>Power Operated Relief Valve Discharge Transients, RELAP5 Model and Results</u>

The PORV discharge line RELAP5 model contains 147 volumes and 146 junctions. The generalized RELAP5 model is given in Figure B-2.1.

The hydraulic forcing functions are defined in Figure B-2.2 with the positive force direction defined opposite to the direction of flow. Figures B-2.3 through B-2.10 present the unbalanced forces along each straight segment of pipe for the 400°F subcooled water discharge transient.



THREE MILE ISLAND UNIT #1
RELAP MODEL FOR SRV LINES

FIGURE
B-1.1

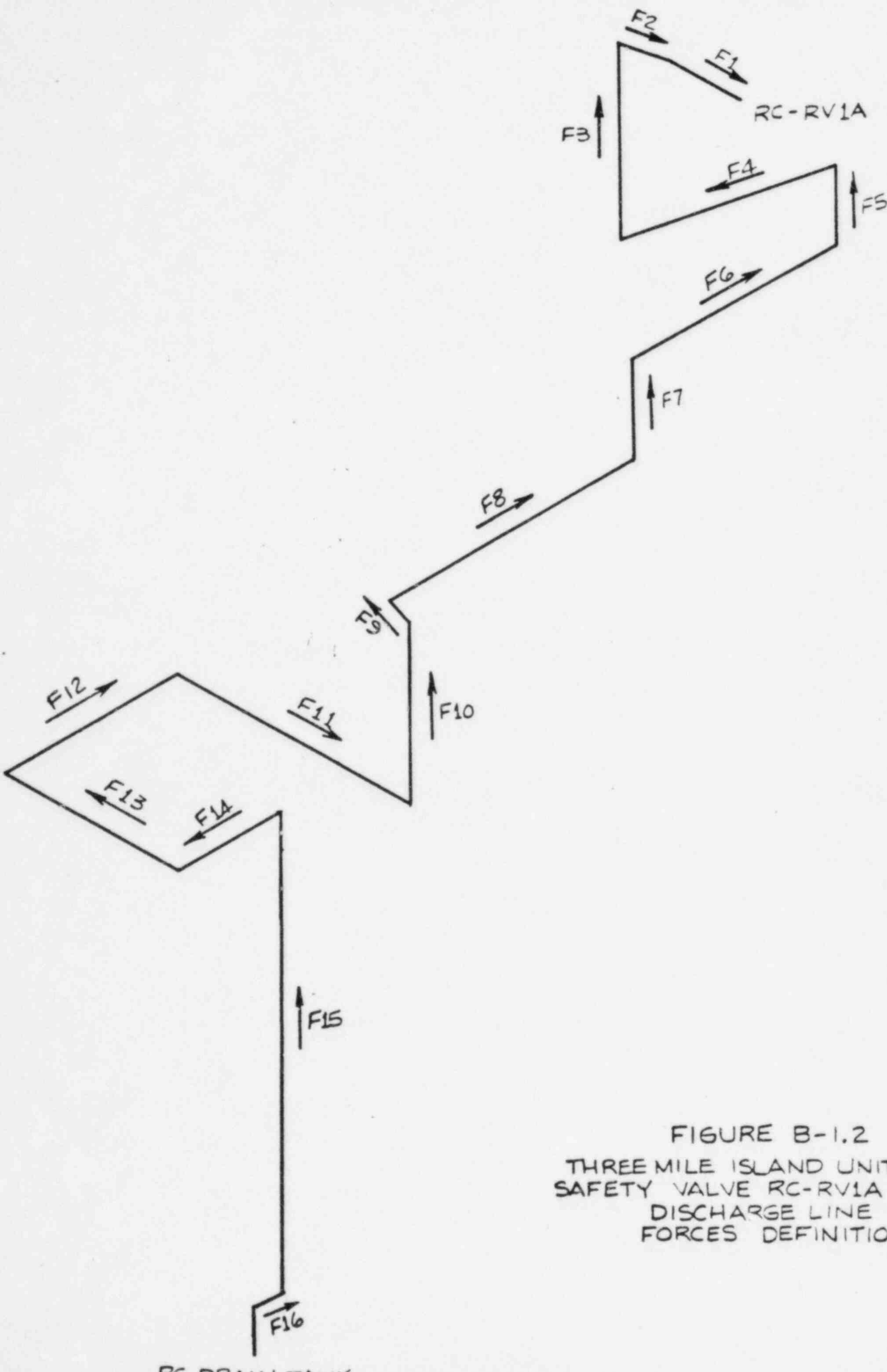


FIGURE B-1.2
THREE MILE ISLAND UNIT # 1
SAFETY VALVE RC-RV1A (ME-91.92)
DISCHARGE LINE
FORCES DEFINITION

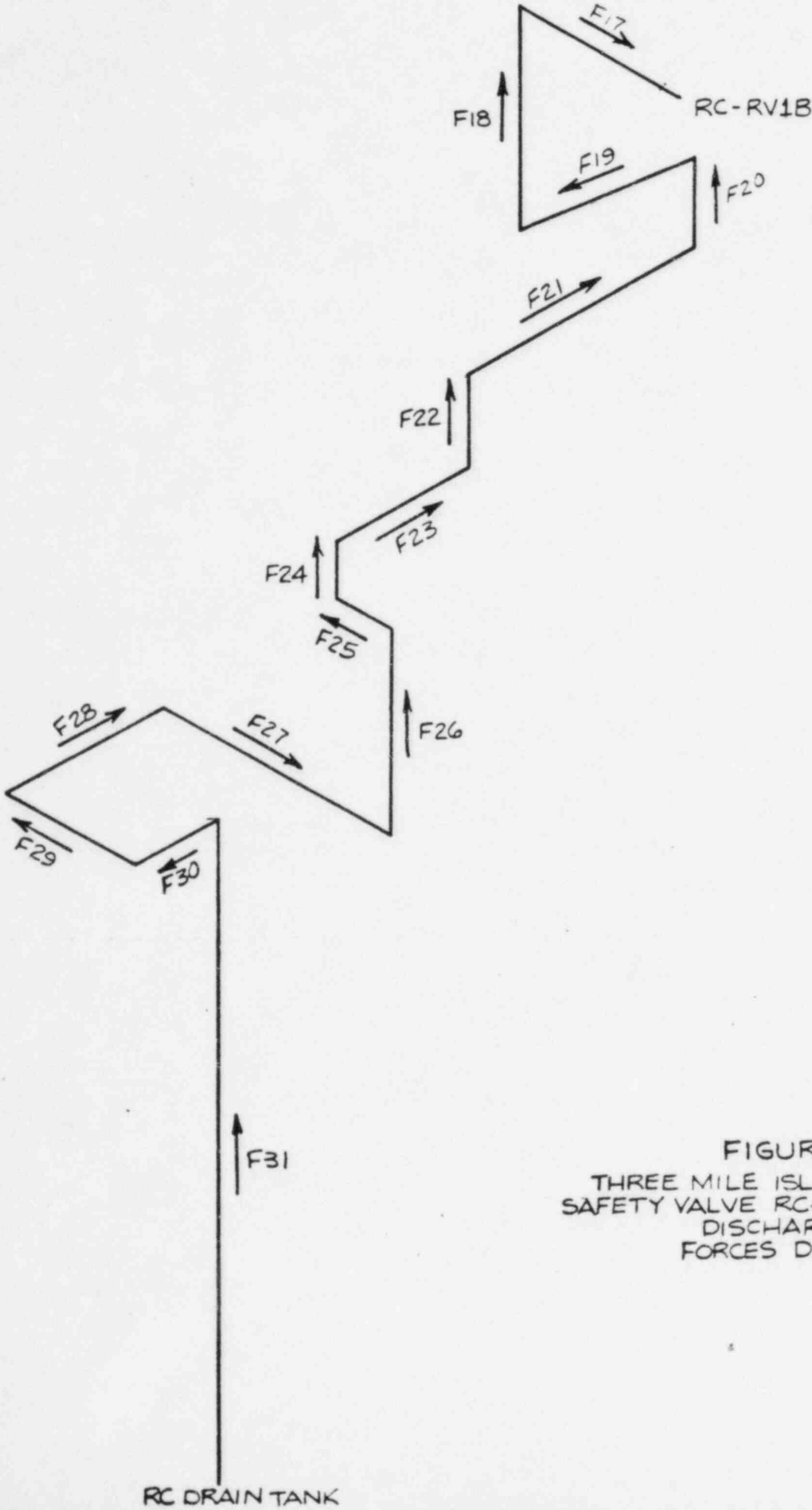
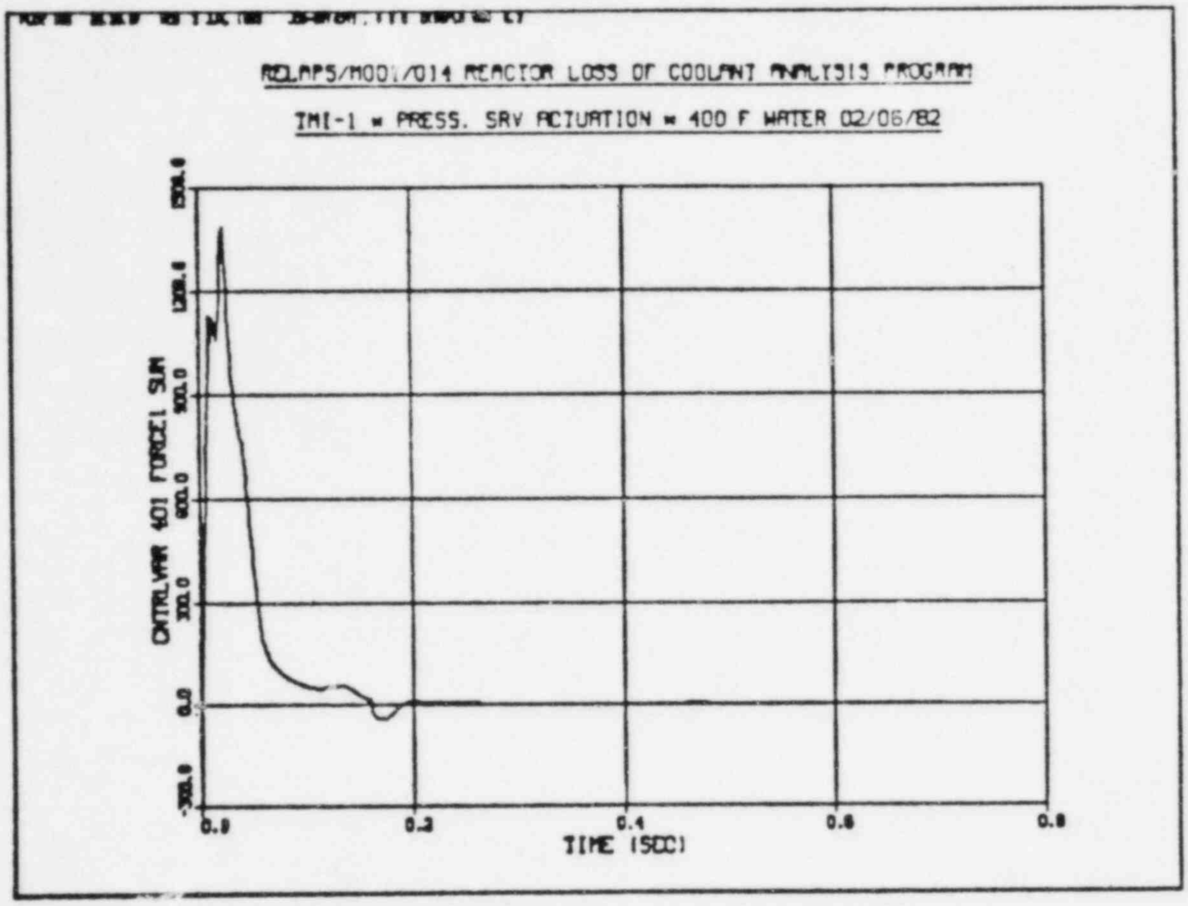


FIGURE B-1.2A
THREE MILE ISLAND UNIT #1
SAFETY VALVE RC-RV1B (ME-88.89)
DISCHARGE LINE
FORCES DEFINITION


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 401 FORCE1 SUM
1500.0
1200.0
900.0
600.0
300.0
0.0
-300.0
0.0
0.2
0.4
0.6
0.8
TIME (SEC)

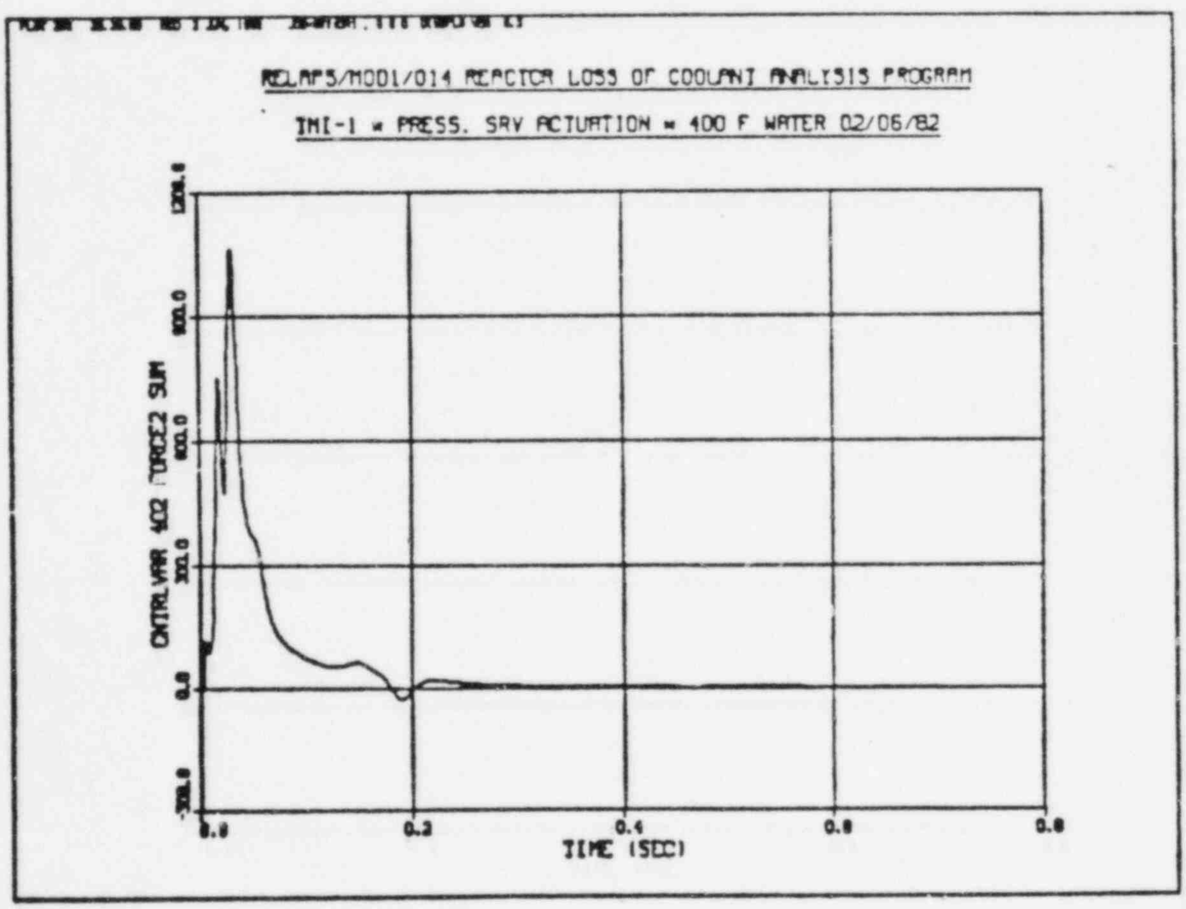
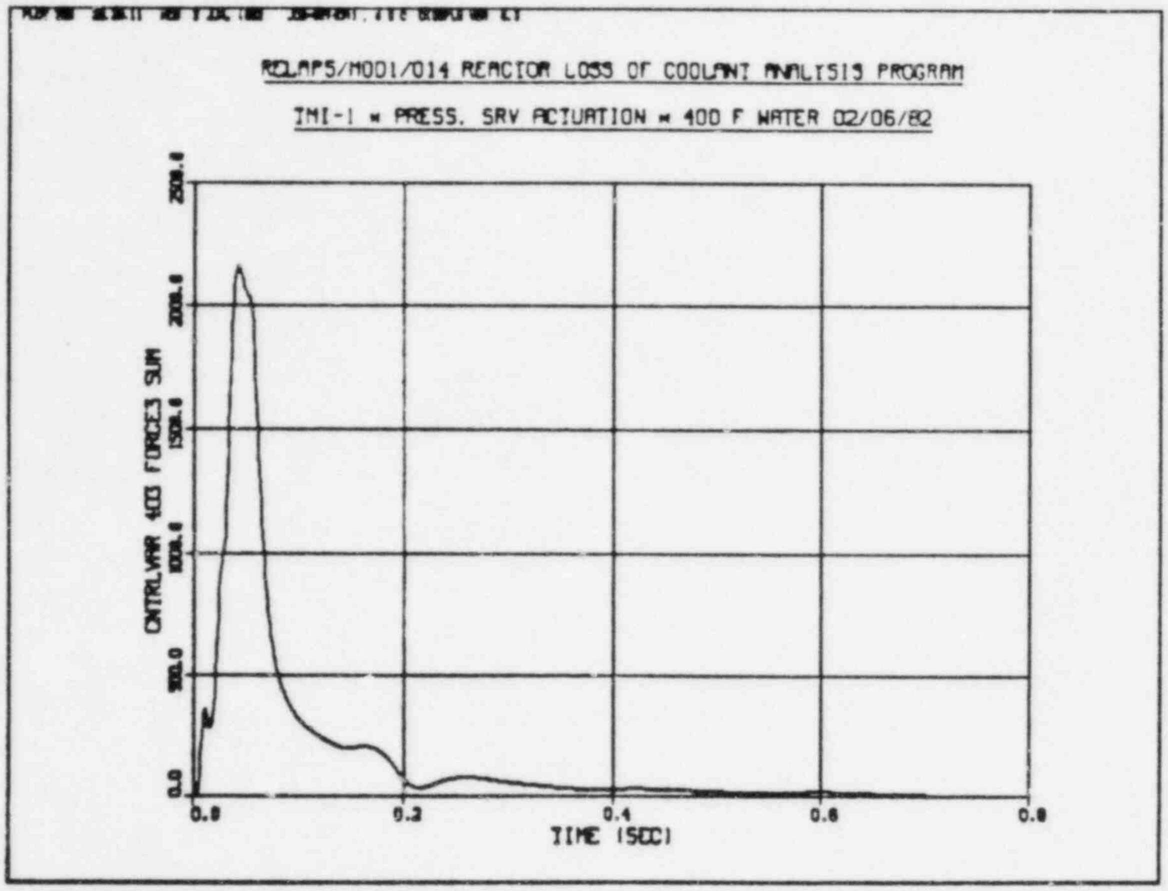

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 402 FORCE2 SUM
1200.0
900.0
600.0
300.0
0.0
-300.0
0.0
0.2
0.4
0.6
0.8
TIME (SEC)

FIG
B-1.3


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 403 FORCE3 SUM
TIME (SEC)

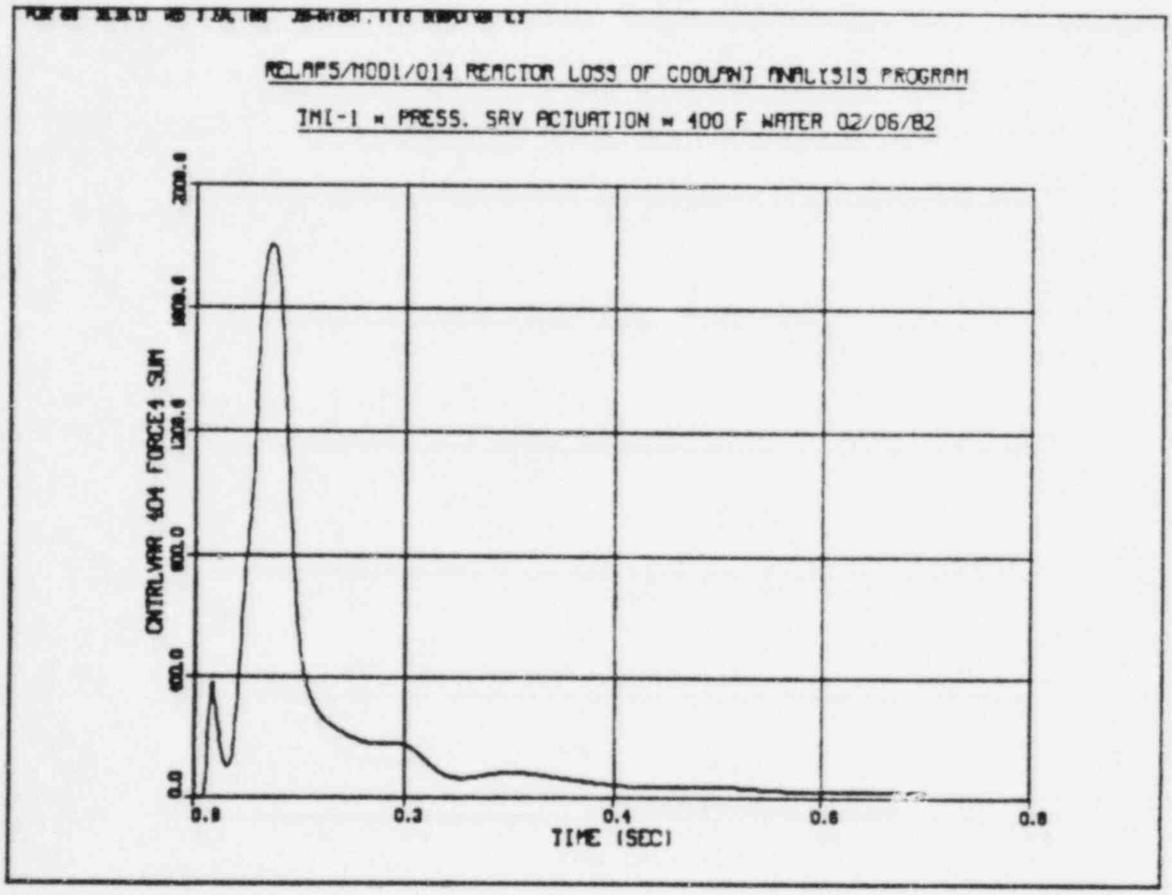
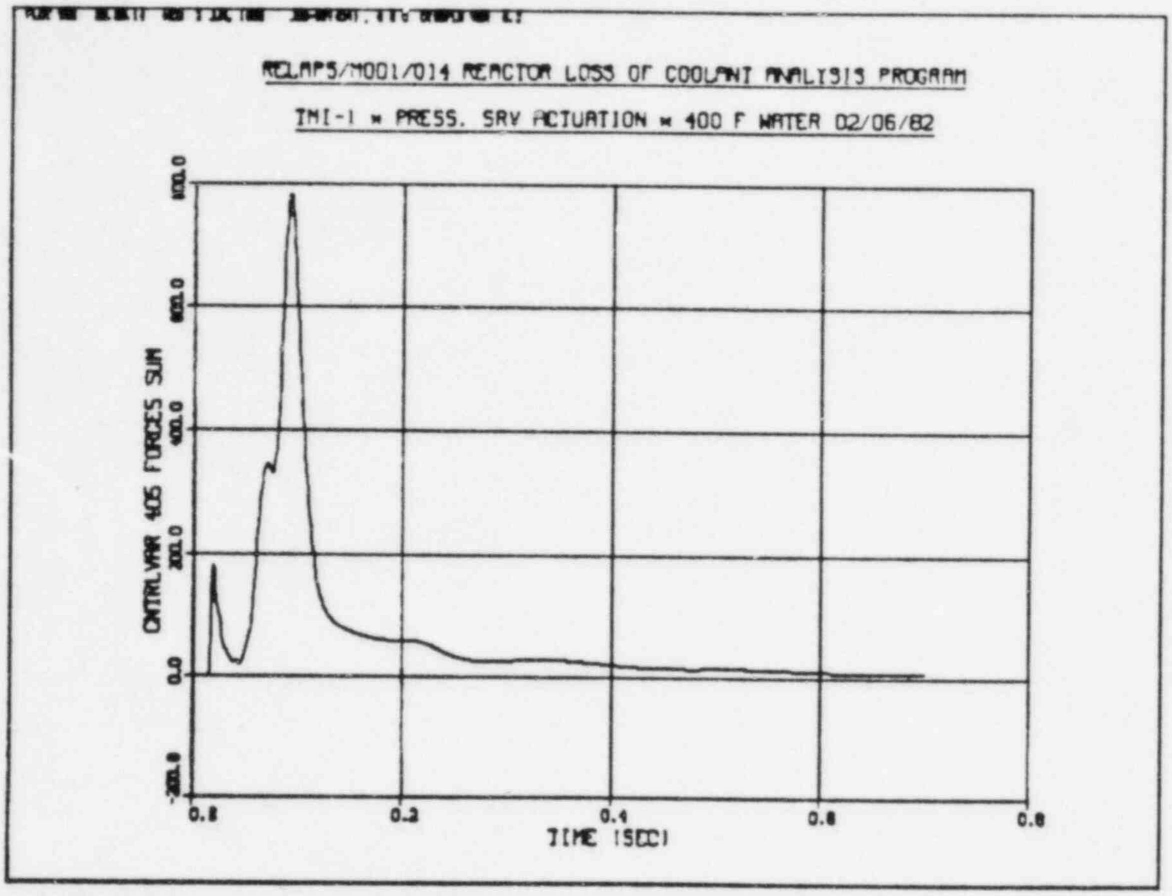

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 404 FORCE4 SUM
TIME (SEC)

FIG.
B-1.4


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 405 FORCES SUM
TIME (SEC)

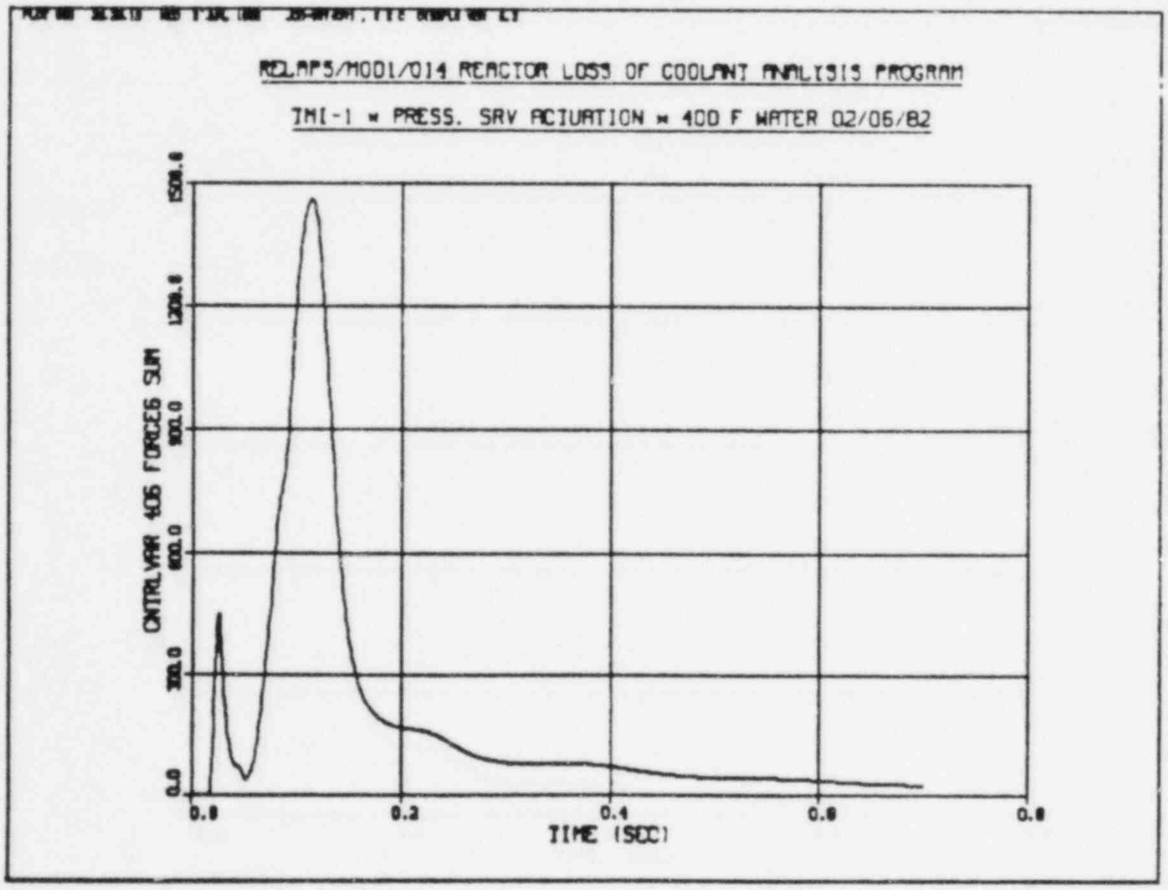
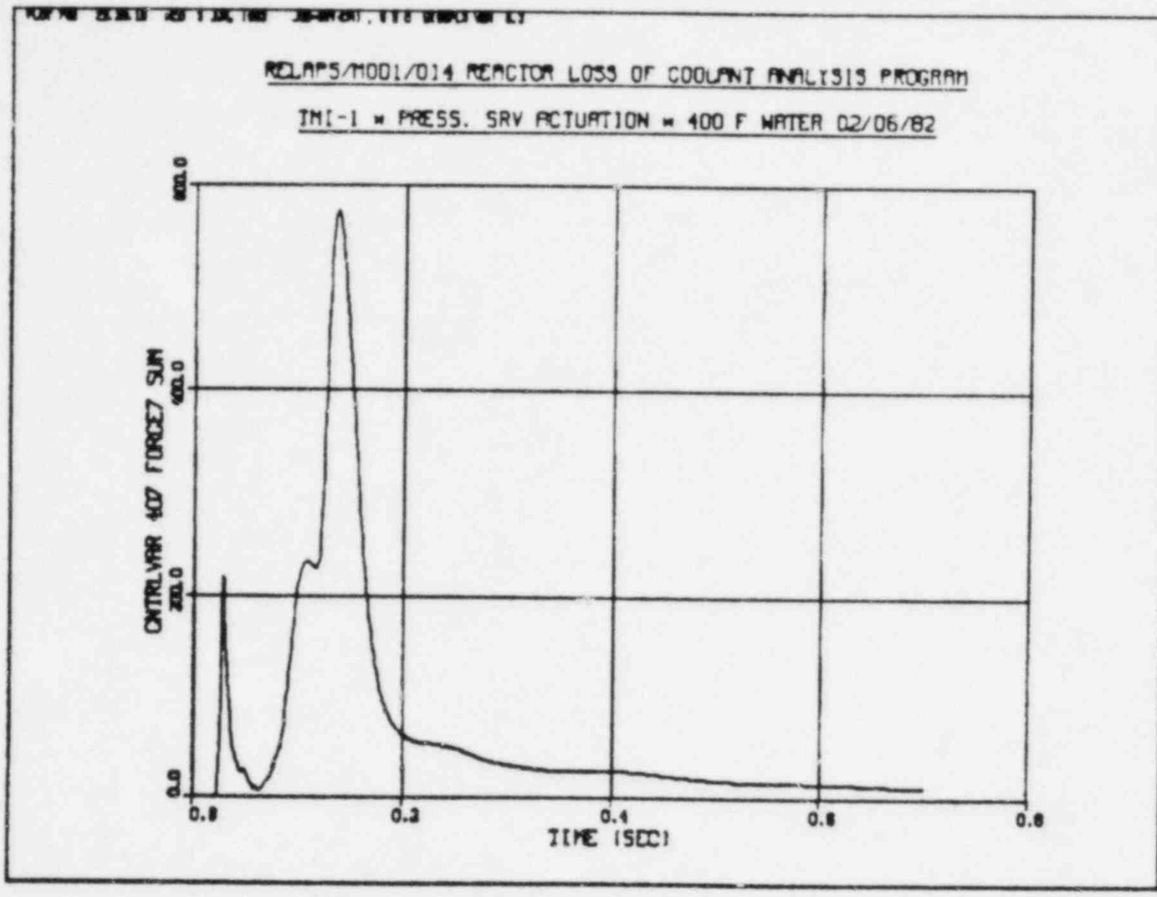

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 406 FORCES SUM
TIME (SEC)

FIG
B-1.5


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 407 FORCE7 SUM
0.0
200.0
400.0
600.0
0.0
0.2
0.4
0.6
0.8
TIME (SEC)

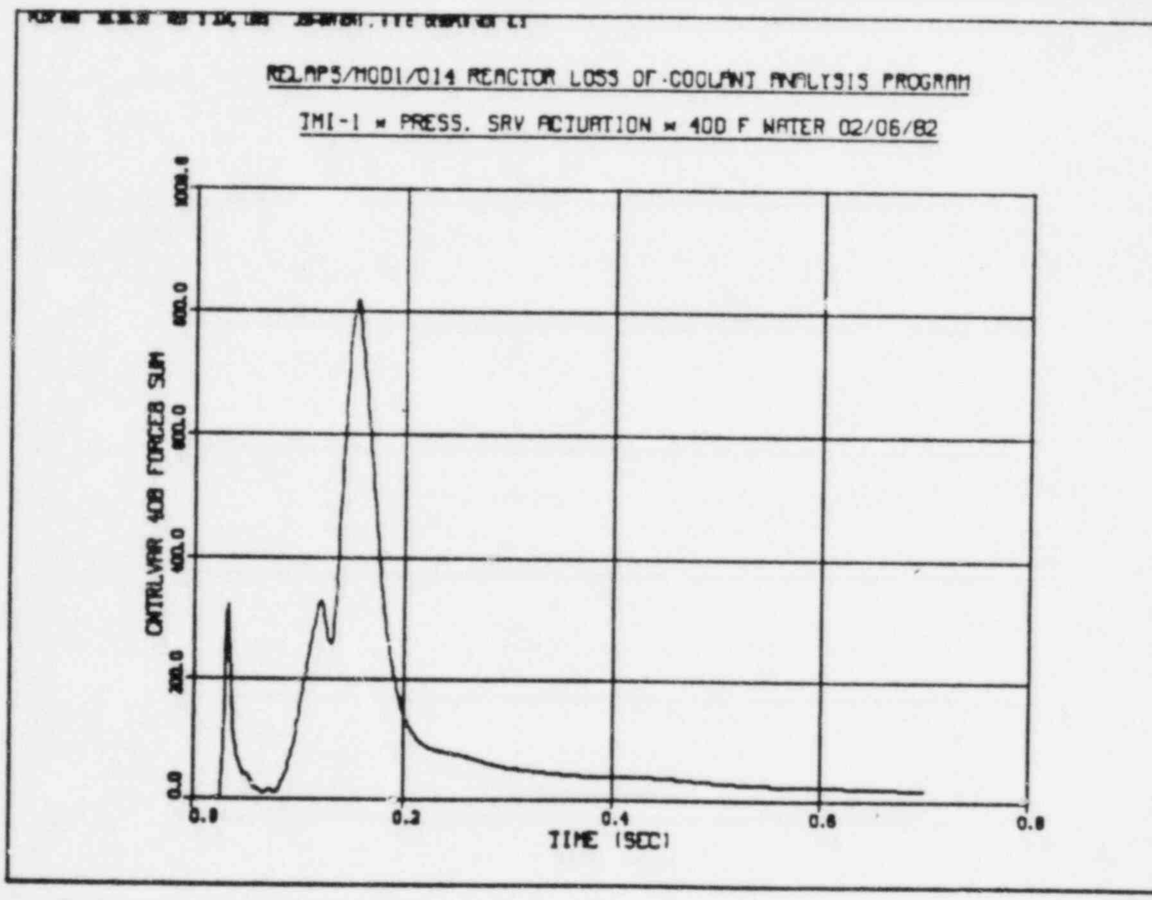
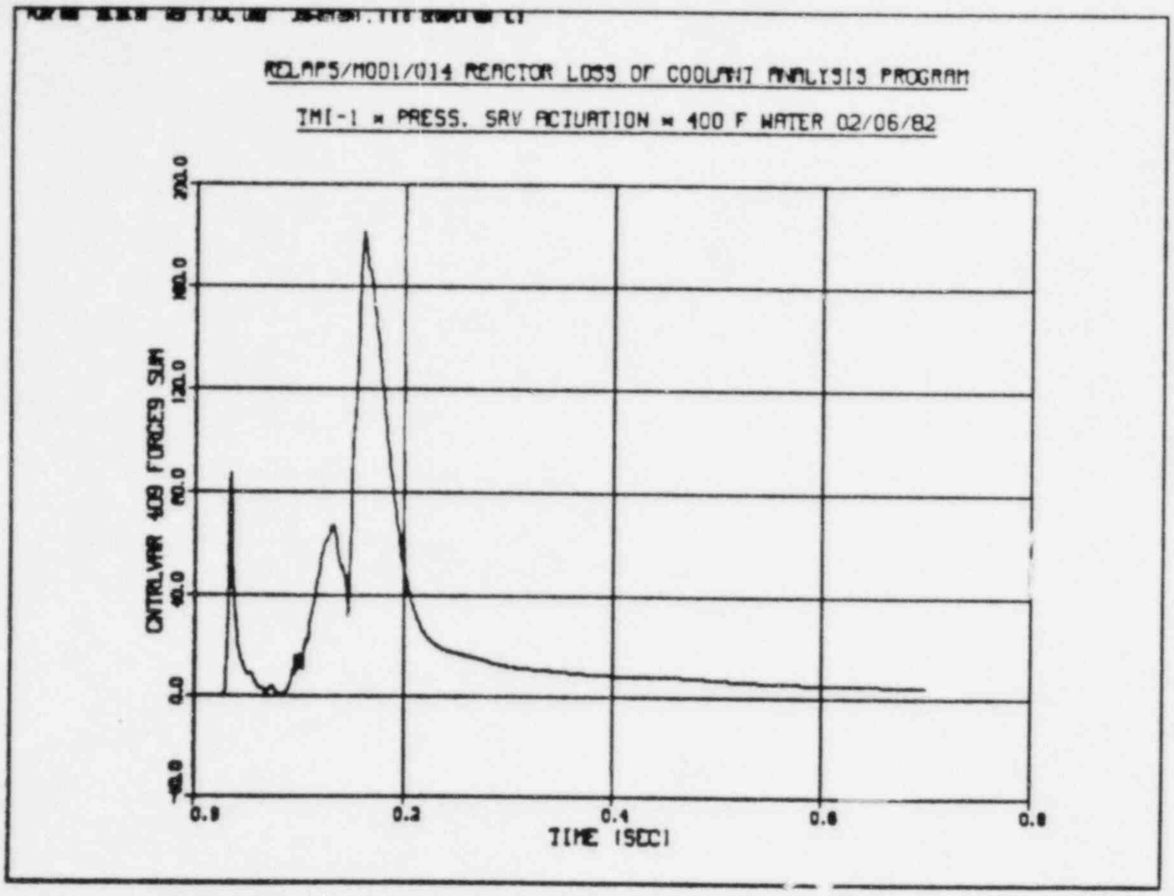

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 408 FORCE8 SUM
0.0
200.0
400.0
600.0
800.0
1000.0
0.0
0.2
0.4
0.6
0.8
TIME (SEC)

FIG
B-1.6


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 409 FORCE9 SUM
200.0
160.0
120.0
80.0
40.0
0.0
-40.0
0.0
0.2
0.4
0.6
0.8
TIME (SEC)

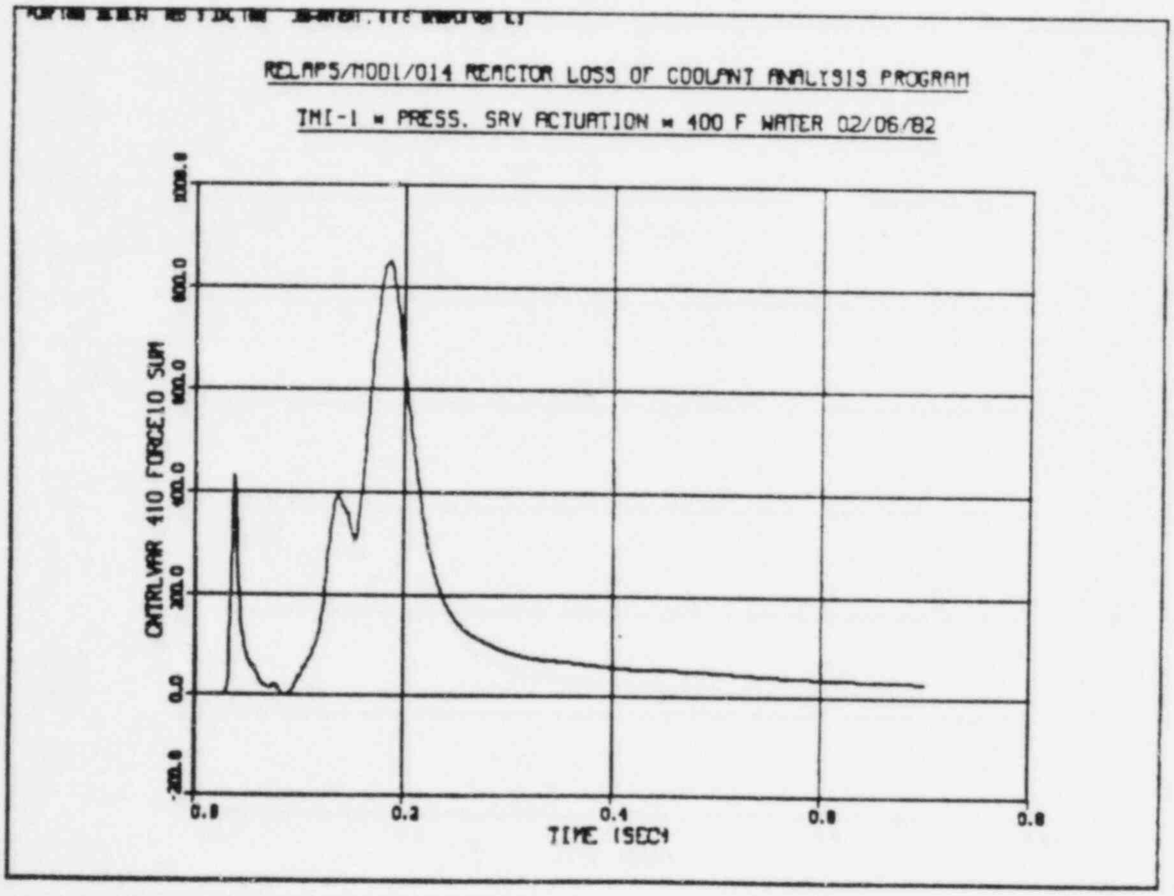
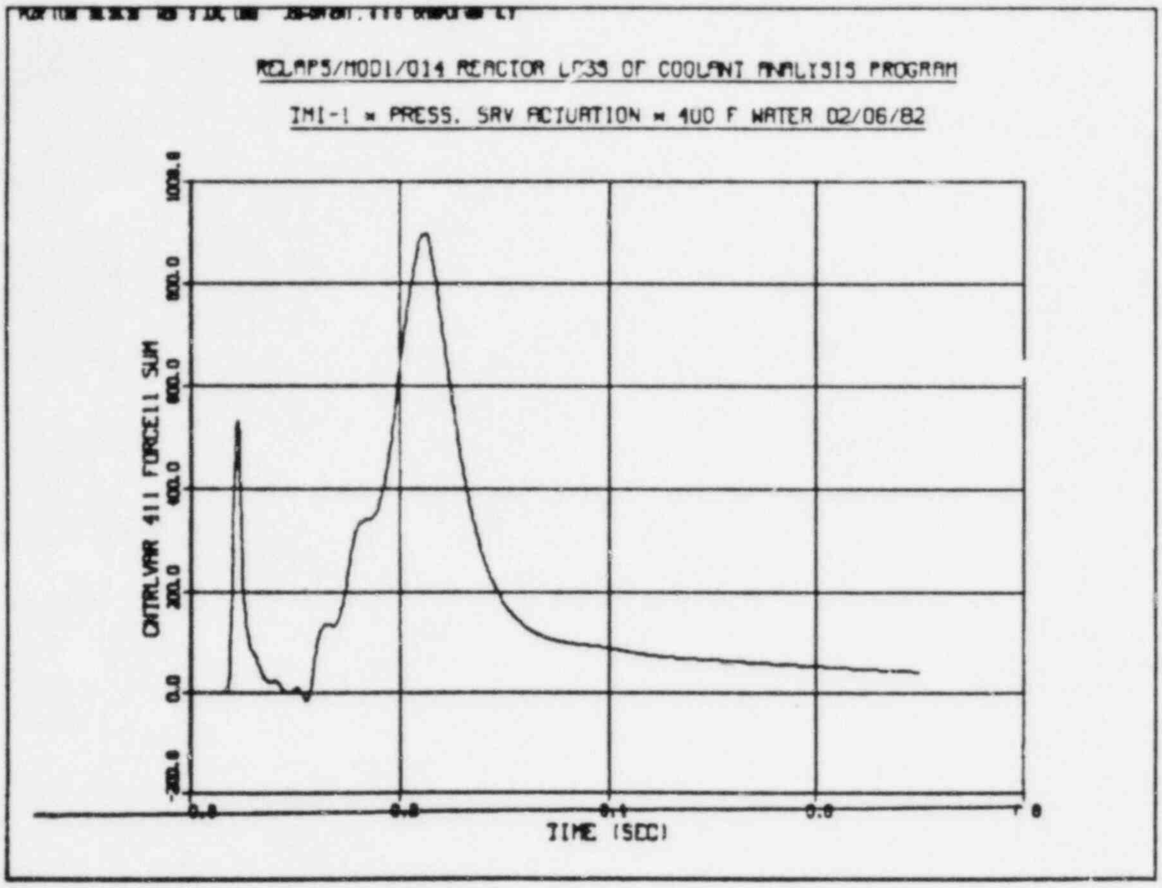
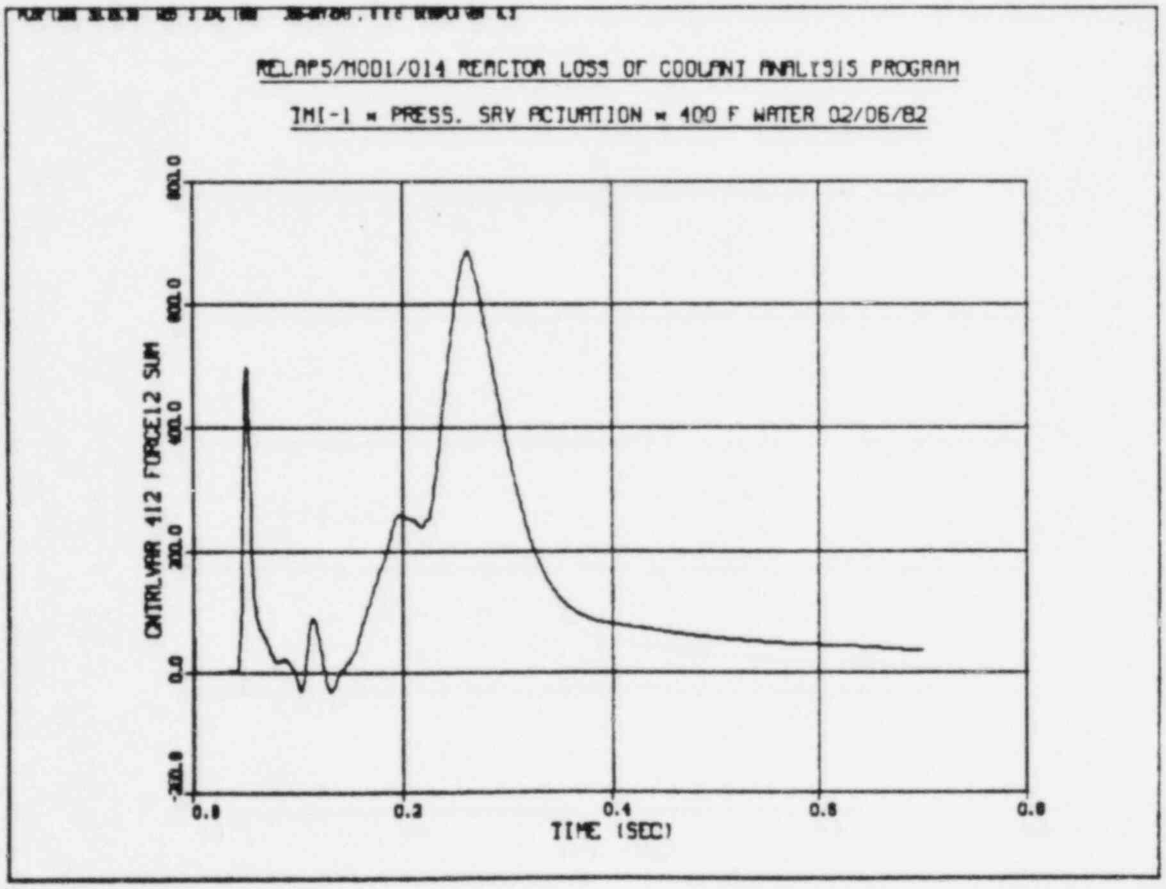
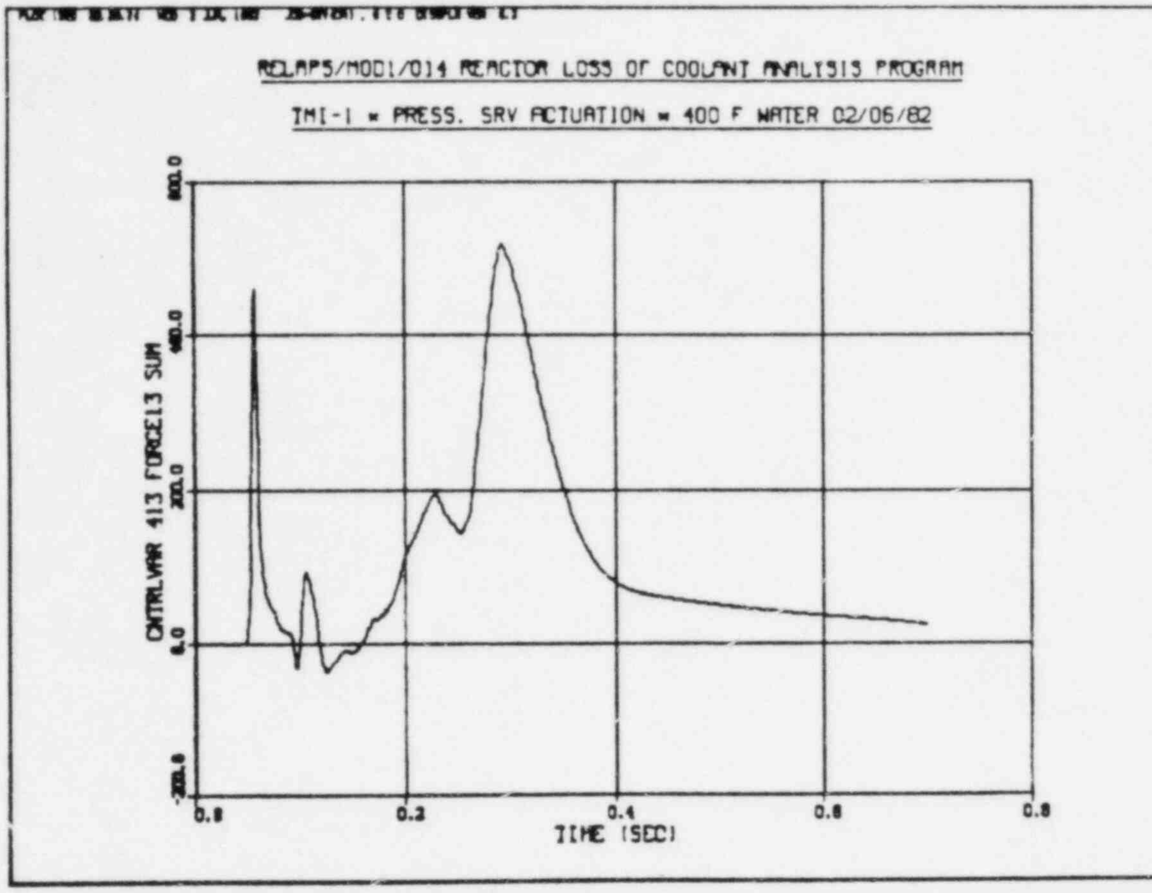

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 410 FORCE10 SUM
1000.0
800.0
600.0
400.0
200.0
0.0
-200.0
0.0
0.2
0.4
0.6
0.8
TIME (SEC)

FIG
B-1.7


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 411 FORCE11 SUM
TIME (SEC)


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 412 FORCE12 SUM
0.0
0.2
0.4
0.6
0.8
TIME (SEC)

F-6
5-1.8


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 413 FORCE13 SUM
600.0
400.0
200.0
0.0
-200.0
0.0
0.2
0.4
0.6
0.8
TIME (SEC)

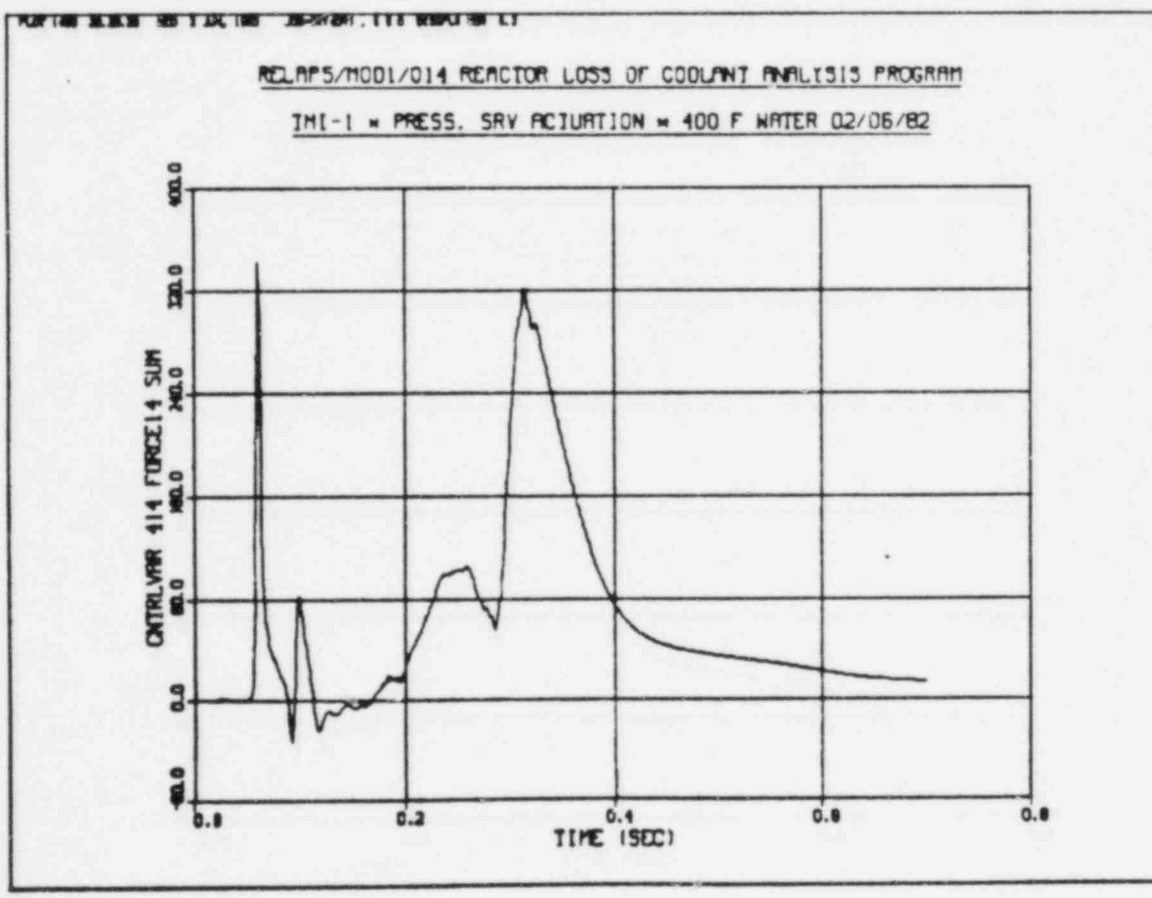
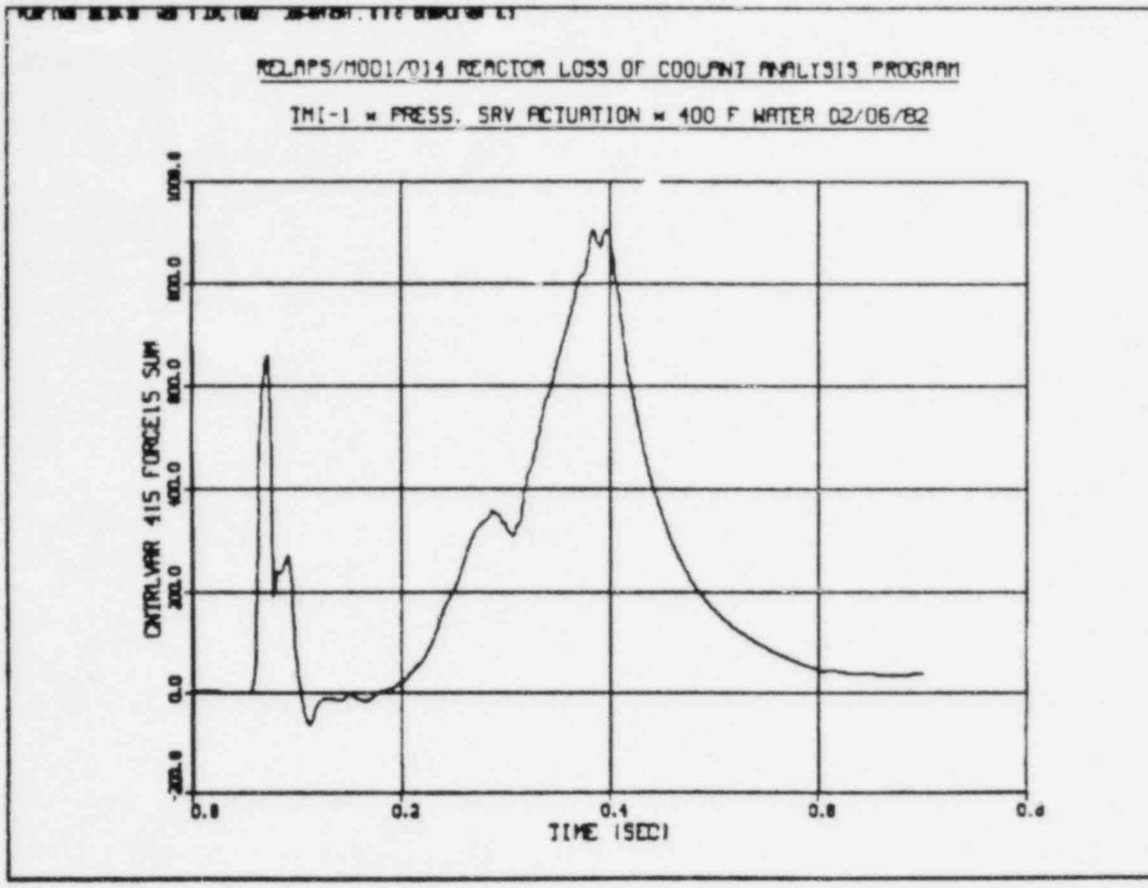

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 414 FORCE14 SUM
400.0
320.0
240.0
160.0
80.0
0.0
-80.0
0.0
0.2
0.4
0.6
0.8
TIME (SEC)

FIG B-1.9


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 415 FORCE15 SUM
1000.0
800.0
600.0
400.0
200.0
0.0
-200.0
0.0
0.2
0.4
0.6
0.8
TIME (SEC)

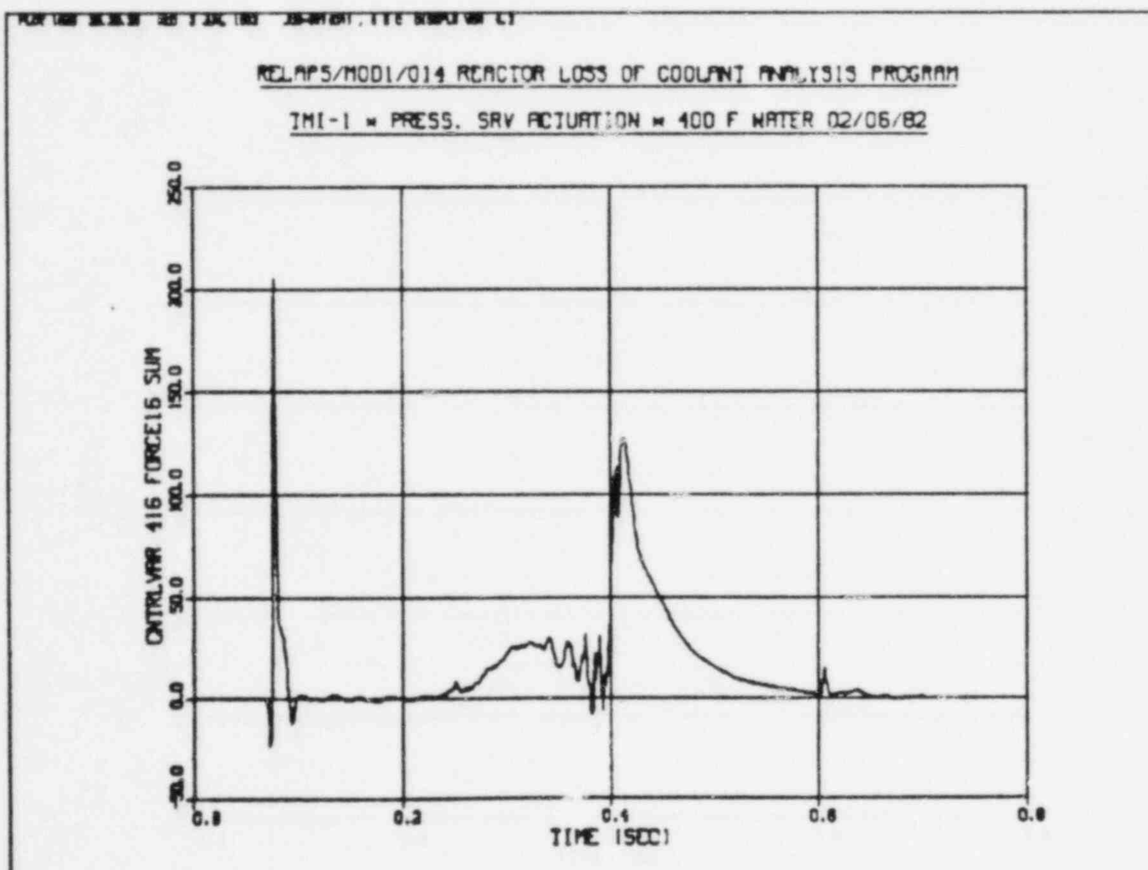
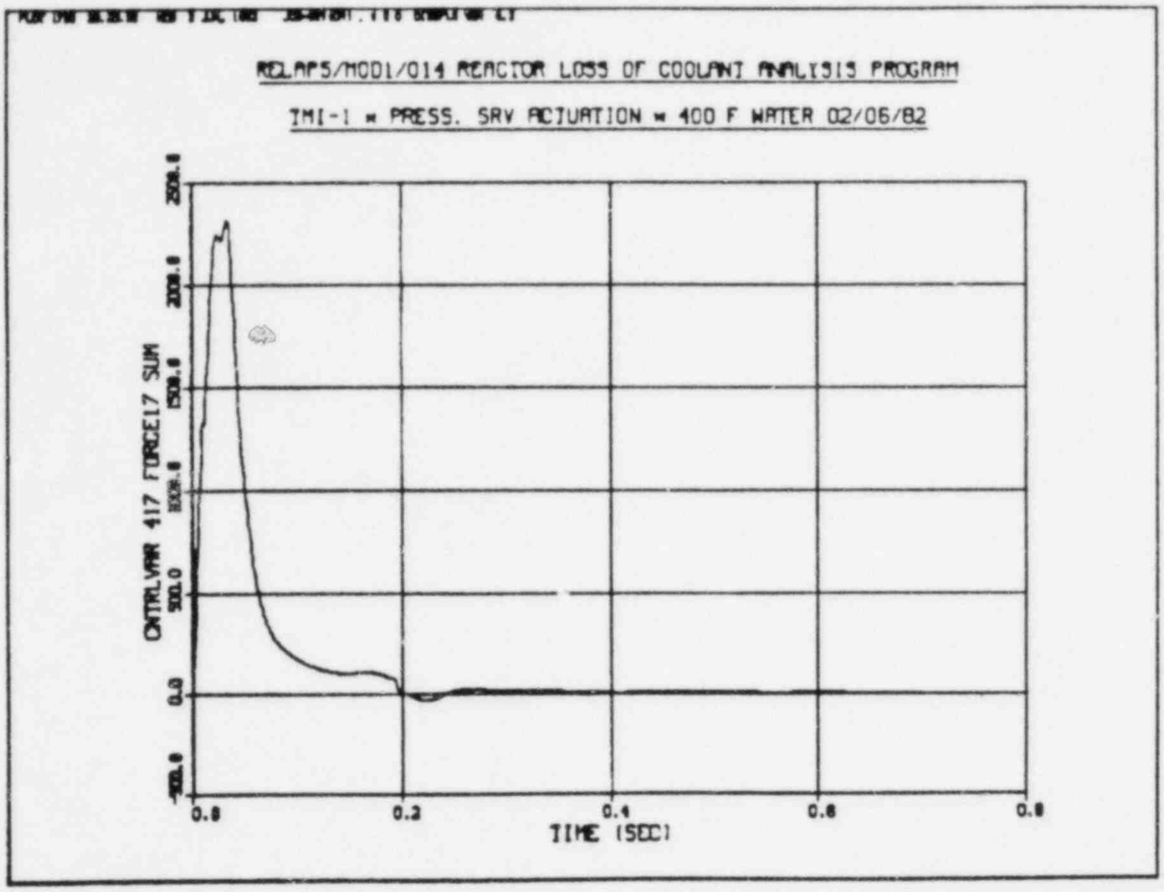

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 416 FORCE16 SUM
250.0
200.0
150.0
100.0
50.0
0.0
-50.0
0.0
0.2
0.4
0.6
0.8
TIME (SEC)

FIG
B-1.10


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 417 FORCE17 SUM
TIME (SEC)

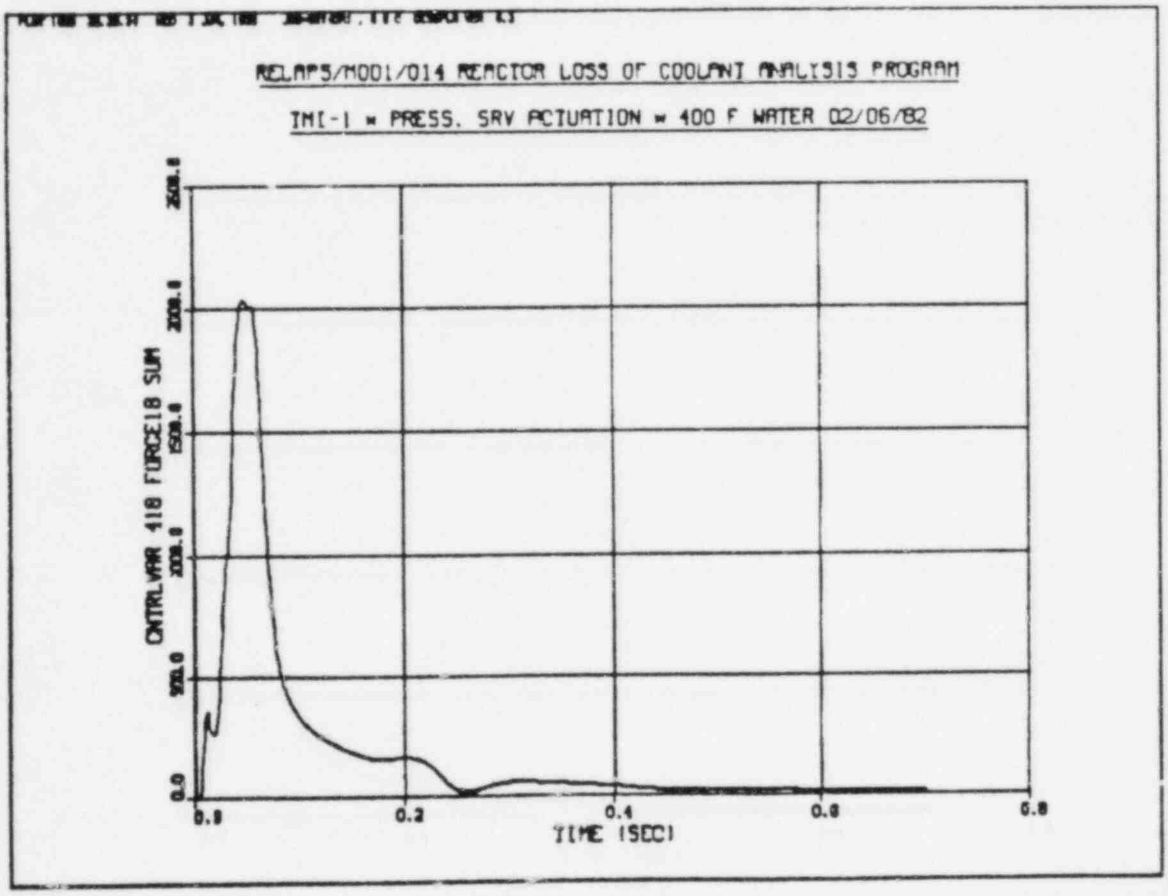
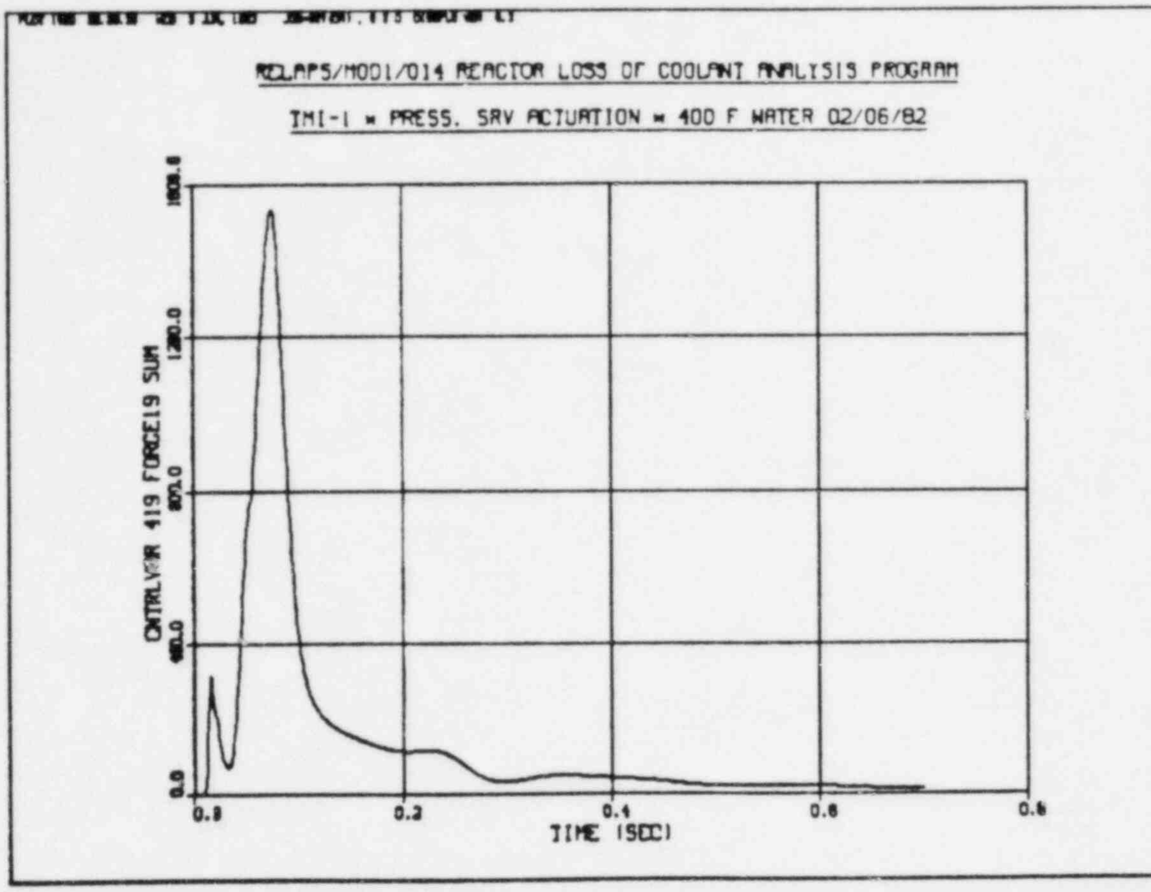

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 418 FORCE18 SUM
TIME (SEC)

FIG
B-1.11


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 419 FORCE19 SUM
0.0
400.0
800.0
1200.0
1600.0
0.0
0.2
0.4
0.6
TIME (SEC)

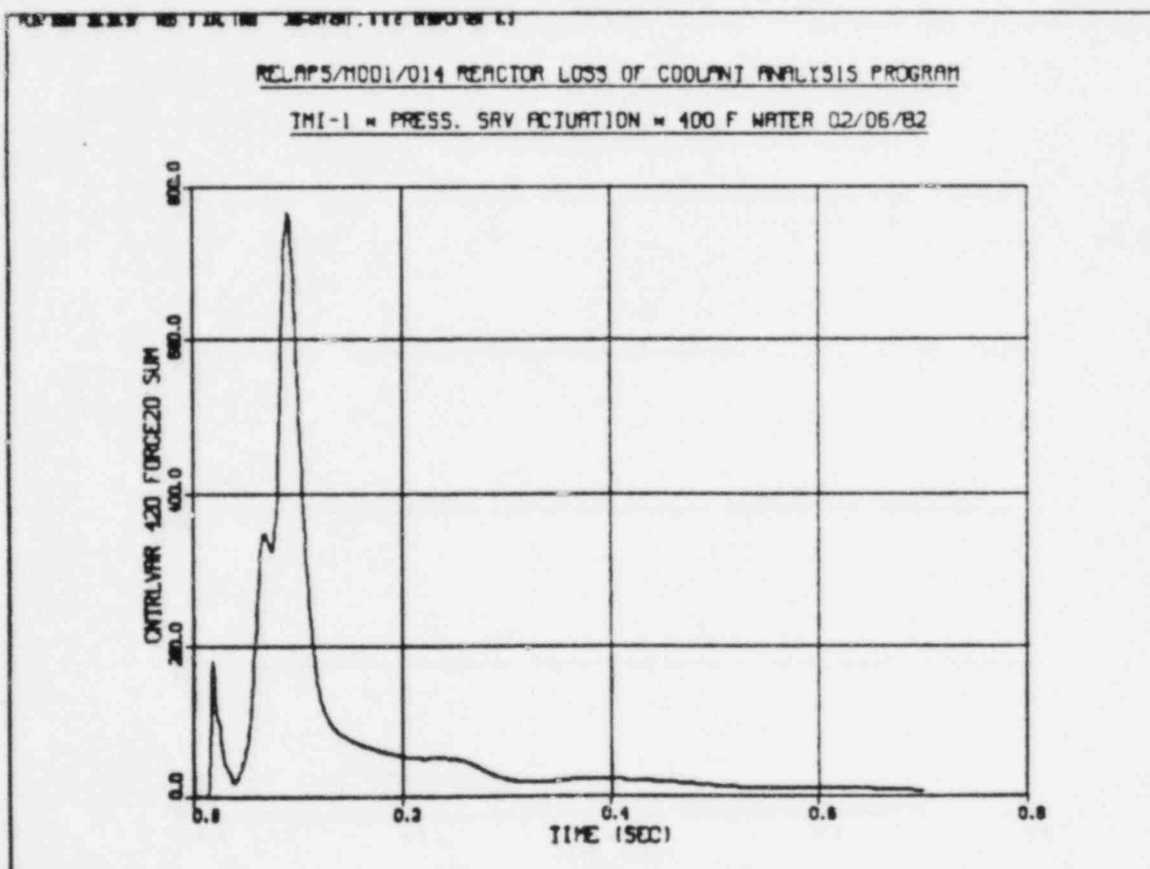
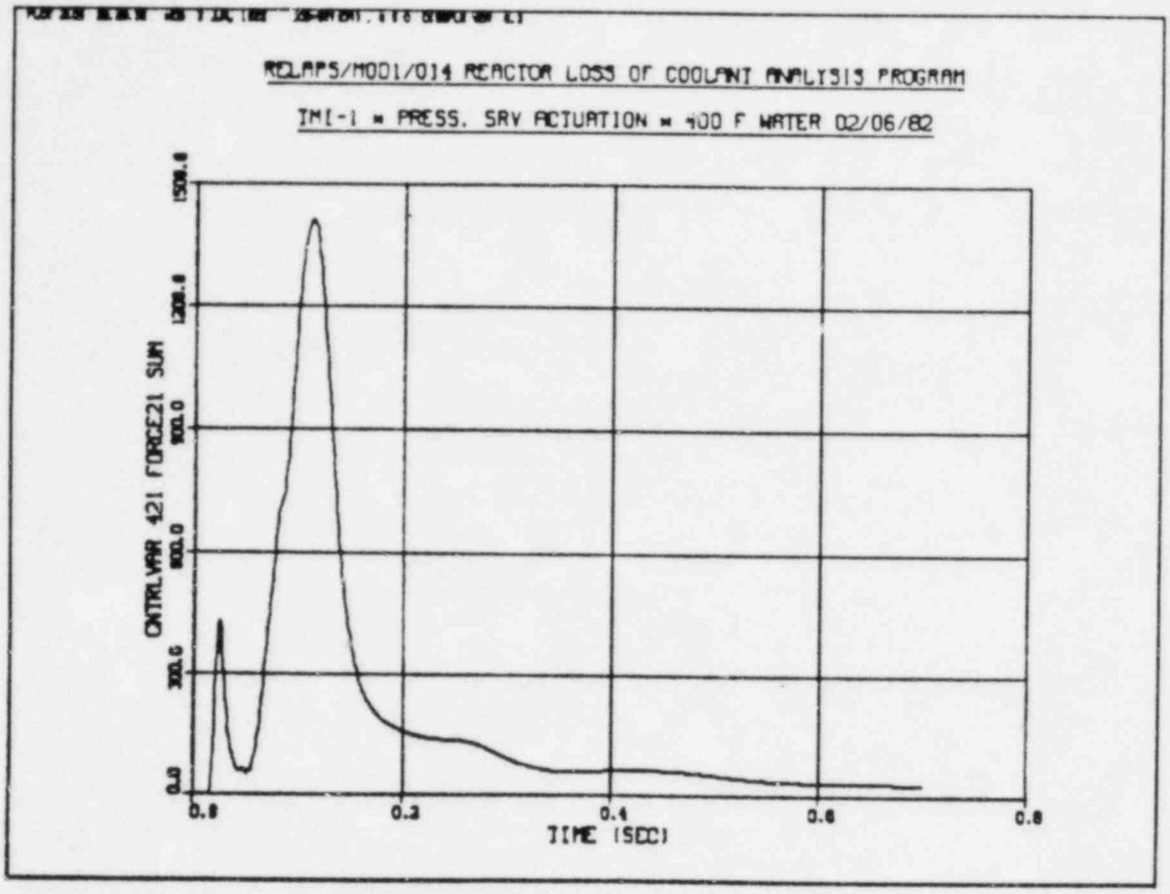

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 420 FORCE20 SUM
0.0
200.0
400.0
600.0
800.0
0.0
0.2
0.4
0.6
0.8
TIME (SEC)

FIG
B-1.12


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 = PRESS. SRV ACTUATION = 400 F WATER 02/06/82
CNTRLVAR 421 FORCE21 SUM
TIME (SEC)
0.0
300.0
600.0
900.0
1200.0
1500.0
0.2
0.4
0.6
0.8

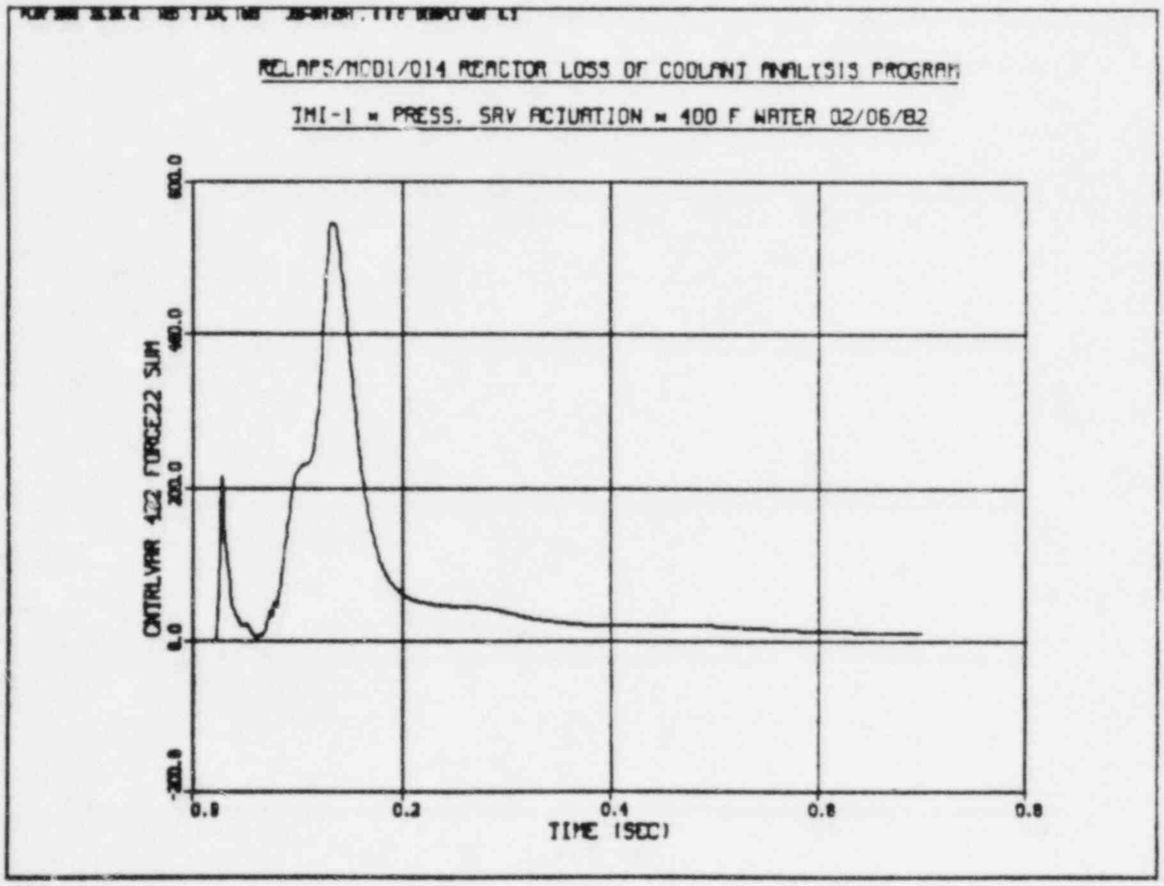
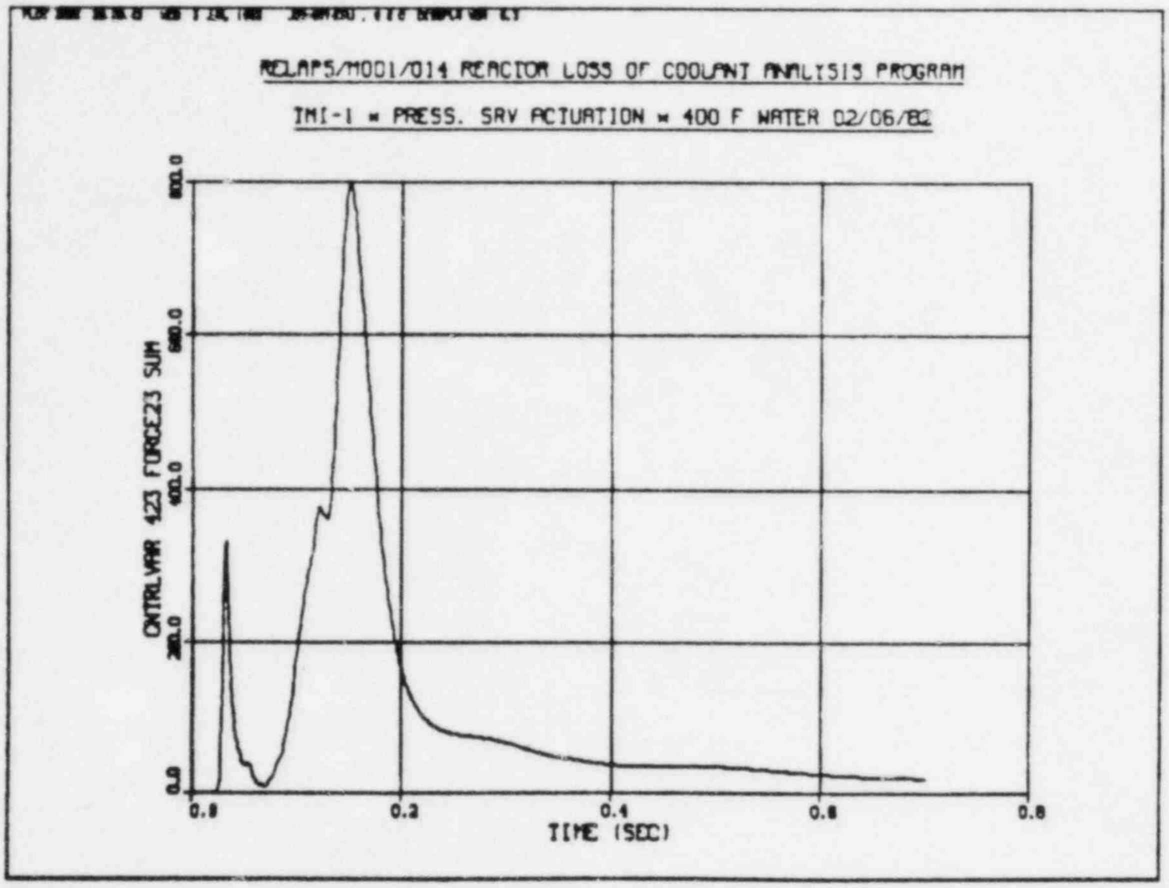

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 = PRESS. SRV ACTUATION = 400 F WATER 02/06/82
CNTRLVAR 422 FORCE22 SUM
TIME (SEC)
-200.0
0.0
200.0
400.0
600.0
0.2
0.4
0.6
0.8

FIG
B-1.13


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 423 FORCE23 SUM
TIME (SEC)

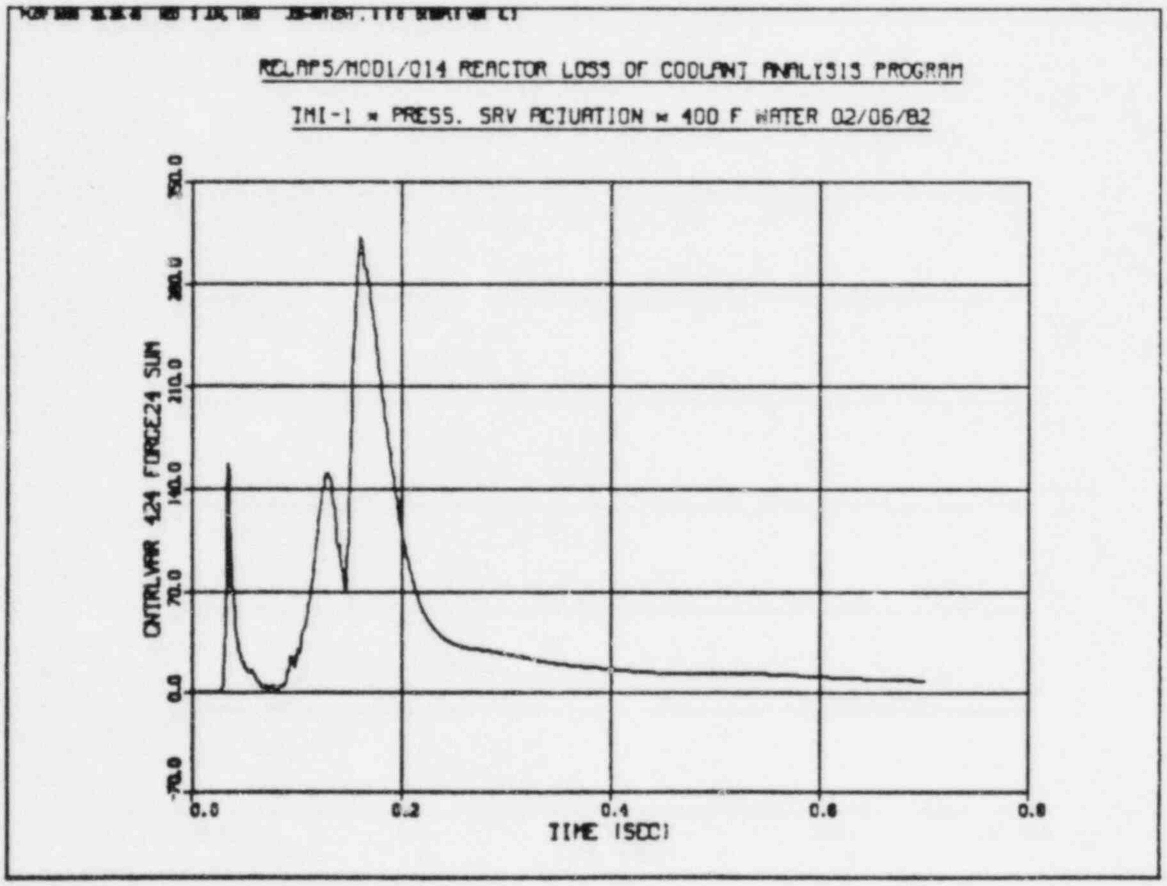
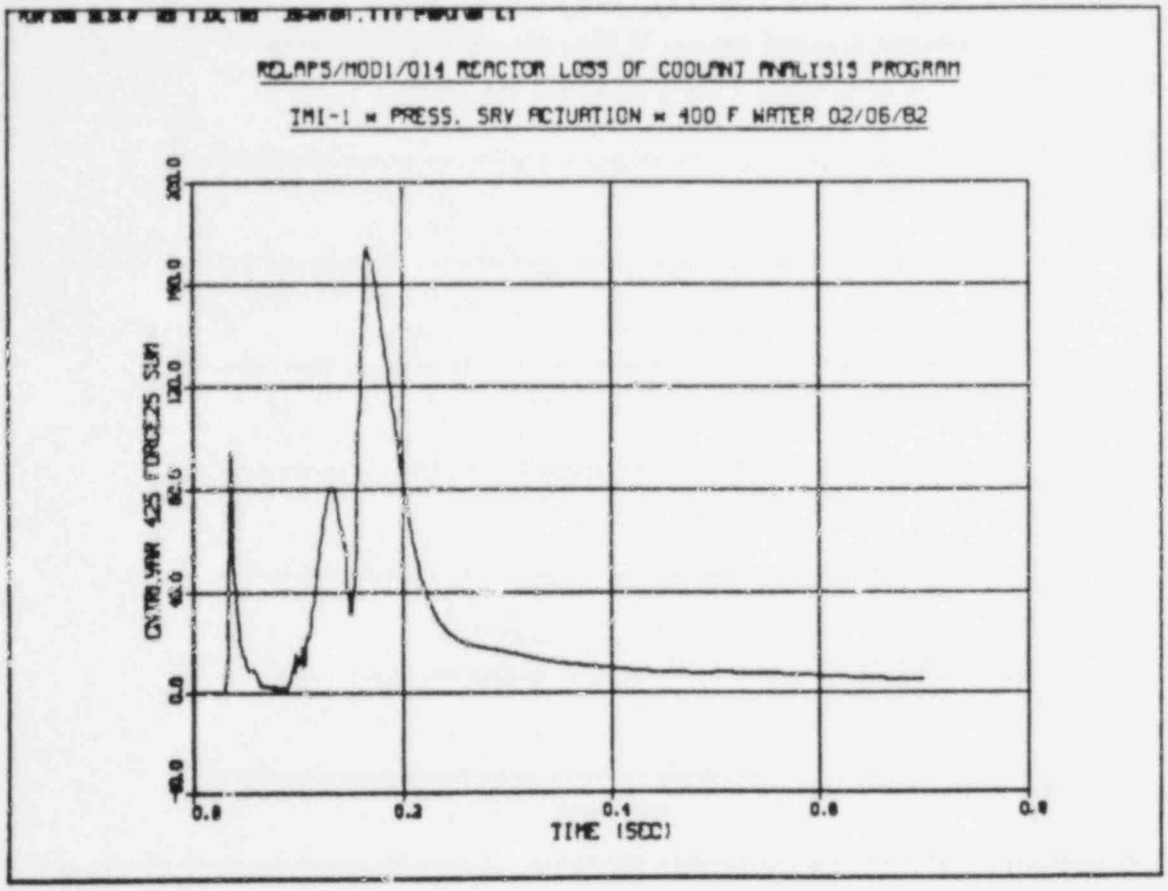

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 424 FORCE24 SUM
TIME (SEC)

FIG
B-1.14


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 425 FORCE25 SUM
TIME (SEC)

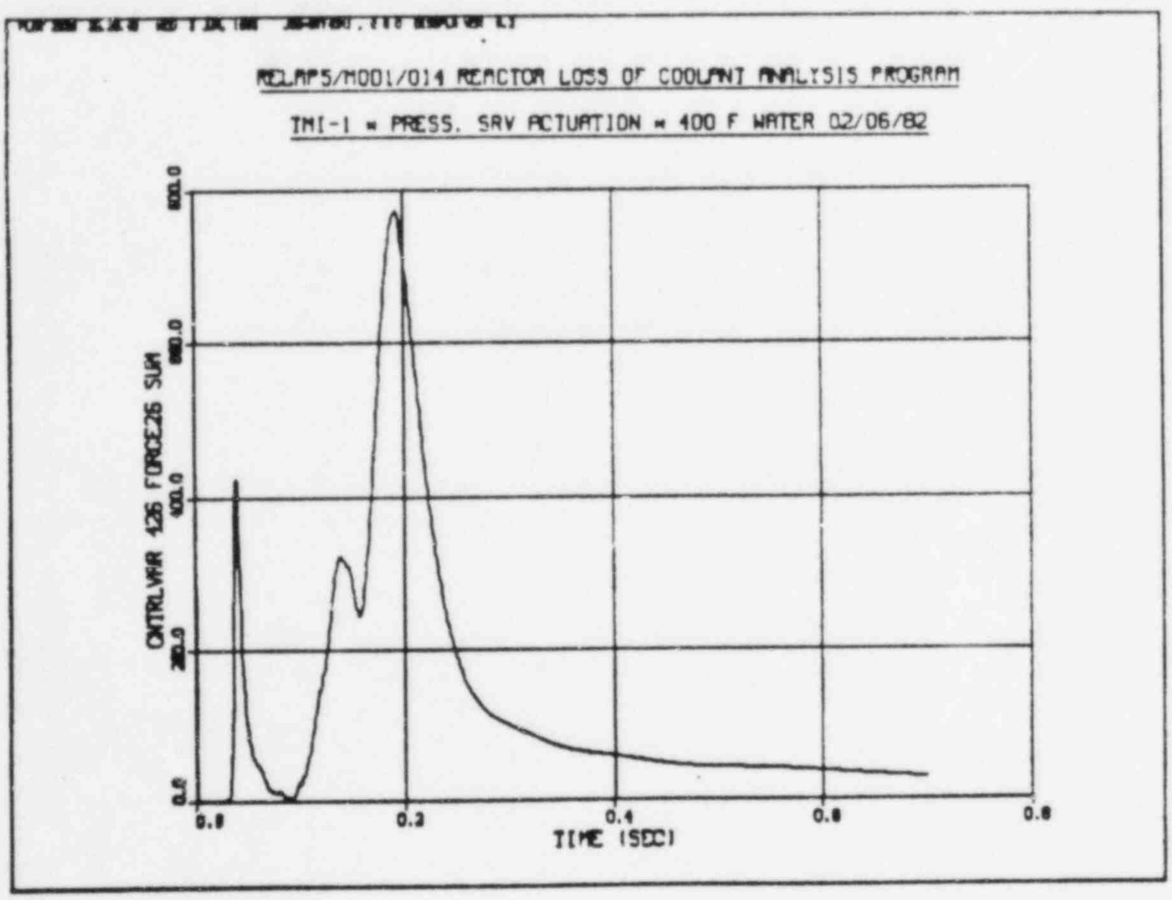
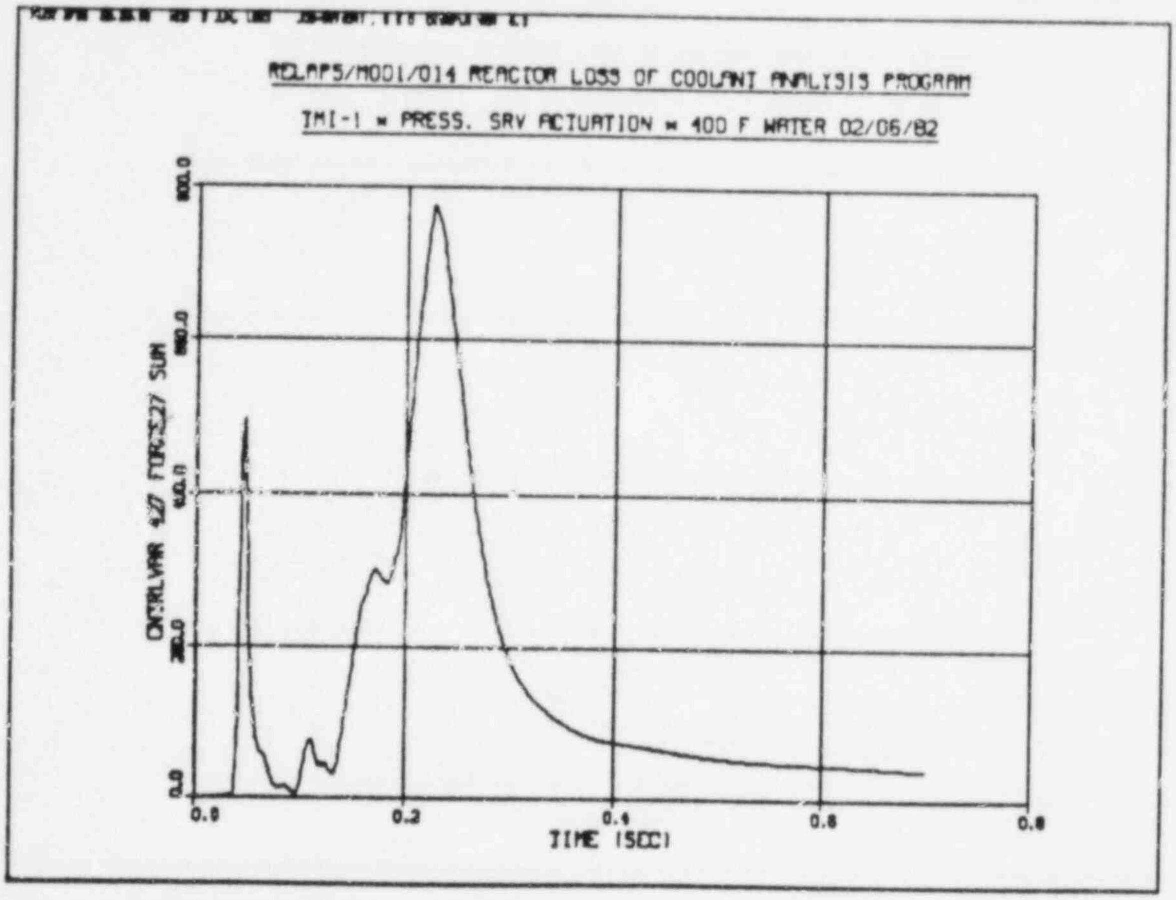

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 426 FORCE26 SUM
TIME (SEC)

FIG.
B-1.15


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 427 FORCE27 SUM
TIME (SEC)
0.0
0.2
0.4
0.6
0.8

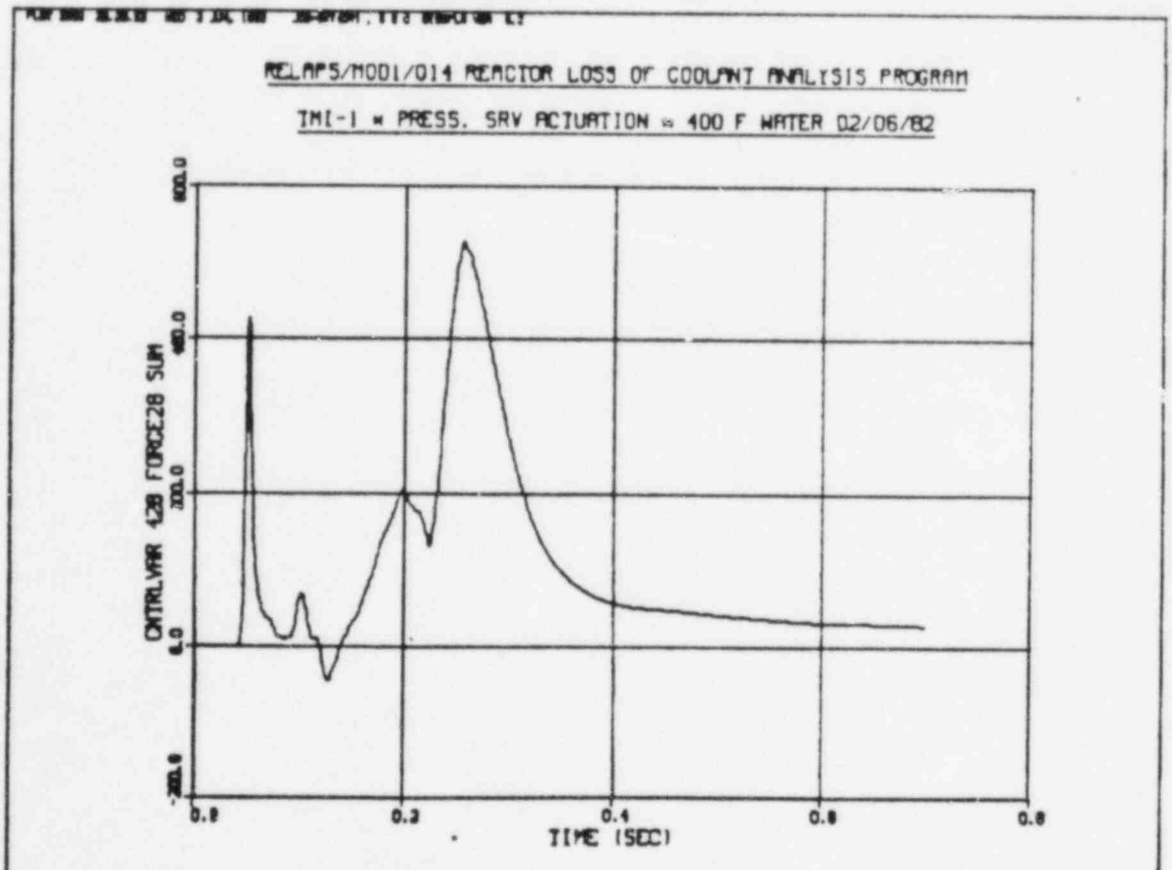
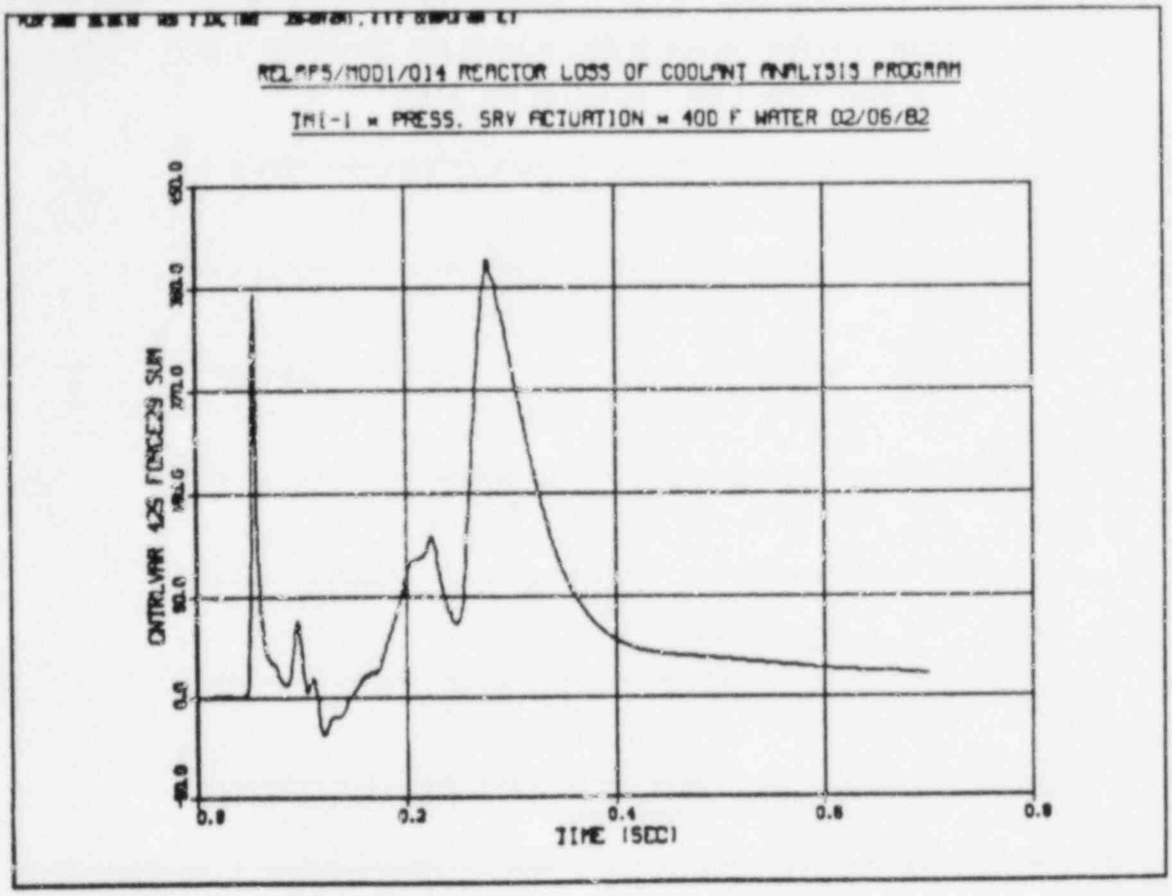

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 428 FORCE28 SUM
600.0
400.0
200.0
0.0
-200.0
TIME (SEC)
0.0
0.2
0.4
0.6
0.8

FIG
B-1.16


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 425 FORCE29 SUM
TIME (SEC)

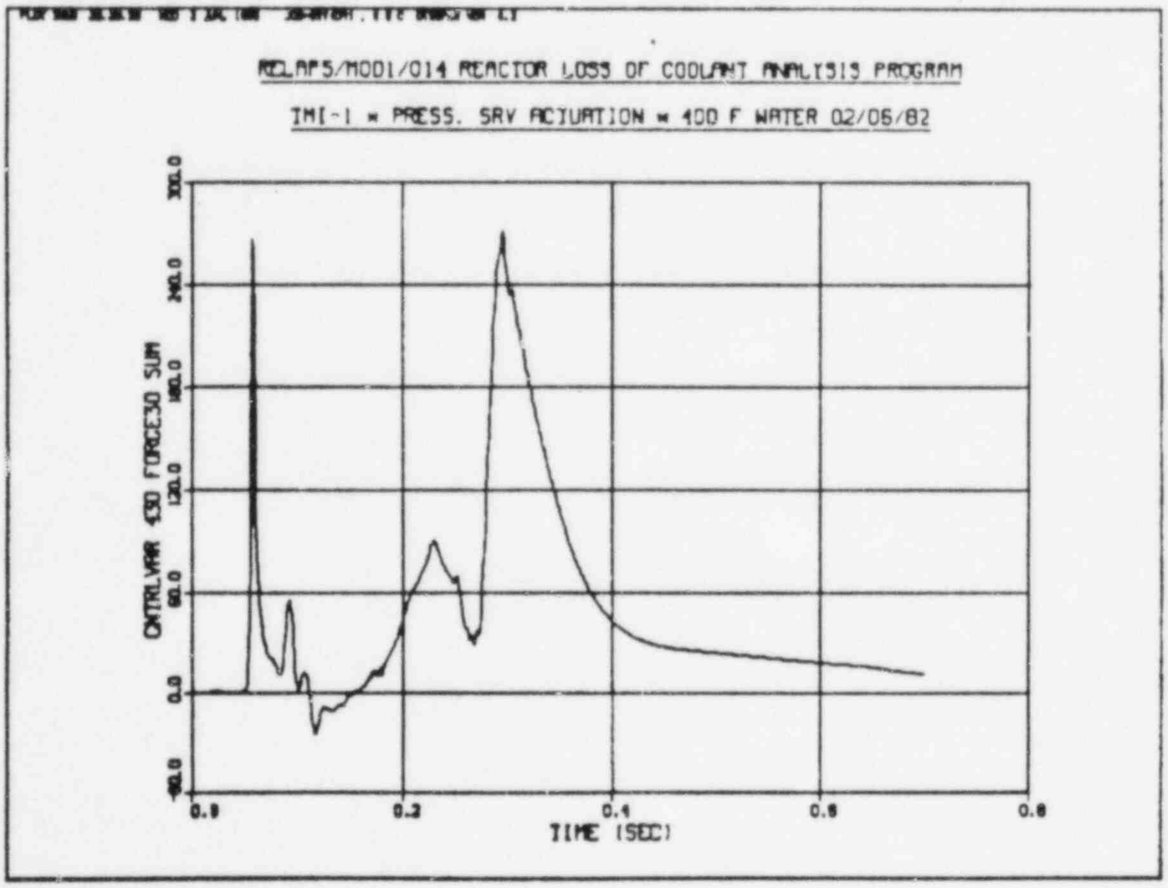

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 * PRESS. SRV ACTUATION * 400 F WATER 02/06/82
CNTRLVAR 430 FORCE30 SUM
TIME (SEC)

FIG
B-1.17

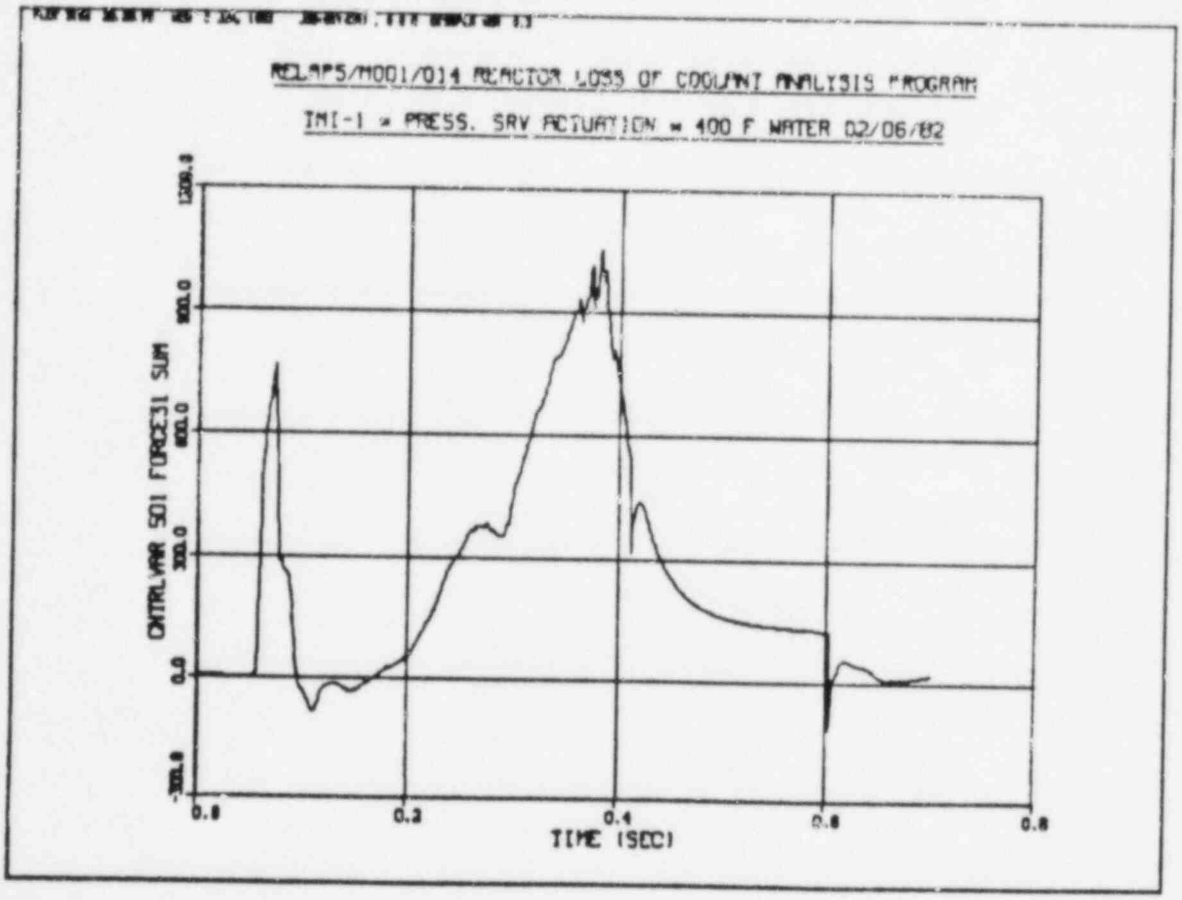
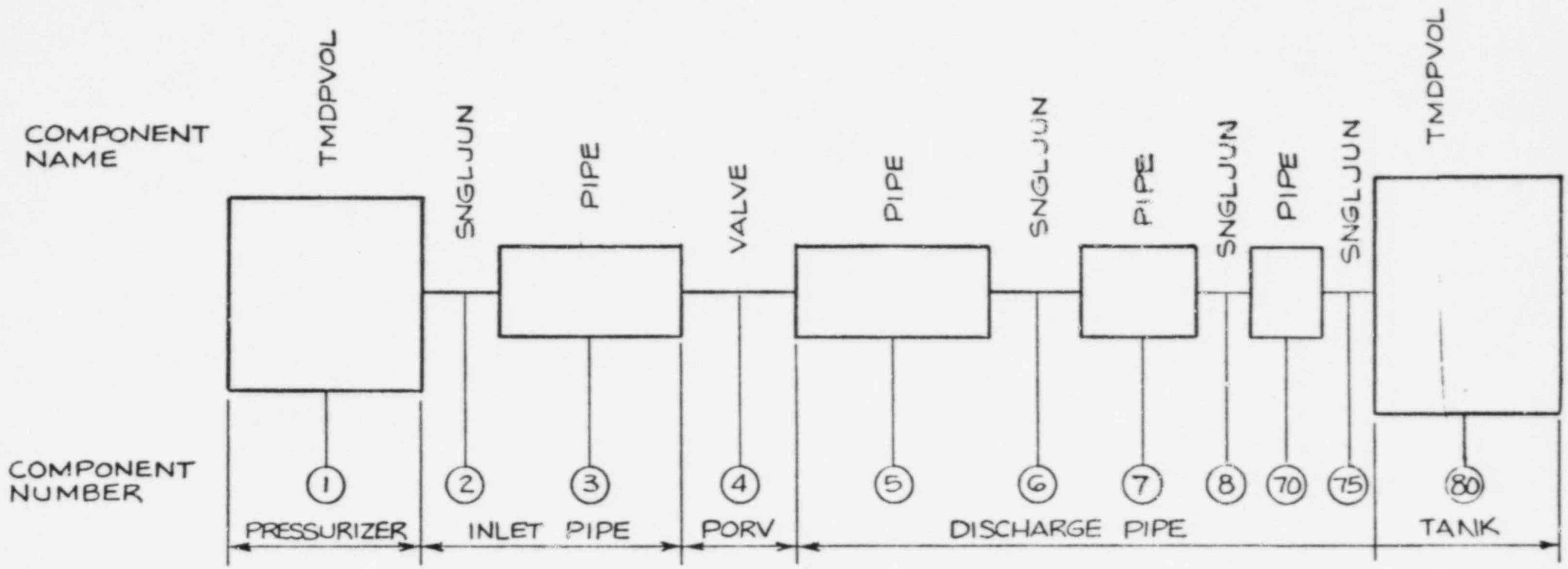

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI-1 = PRESS. SRV ACTUATION = 400 F WATER 02/06/82
CNTRLVAR 501 FORCE31 SUM
1200.0
900.0
600.0
300.0
0.0
-300.0
0.0
0.2
0.4
0.6
0.8
TIME (SEC)

FIG
B-1.18



THREE MILE ISLAND - UNIT #1
RELAP MODEL FOR PORV LINE

FIGURE
B-2.1

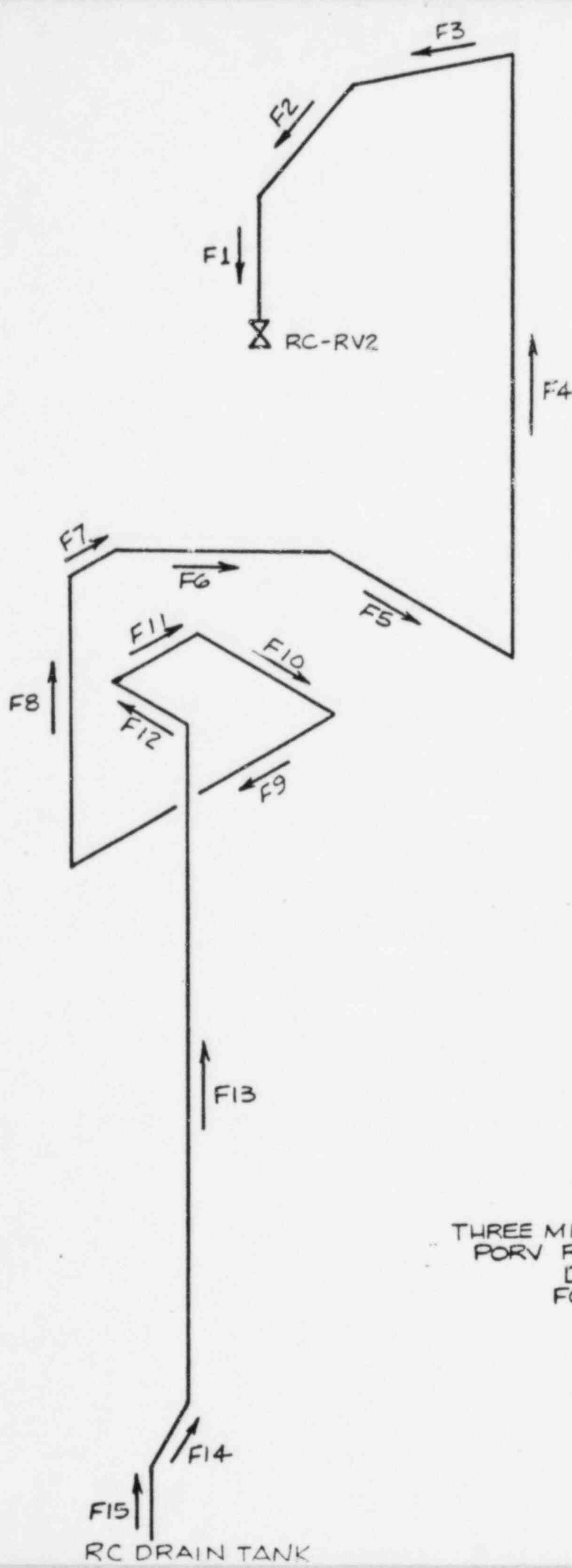
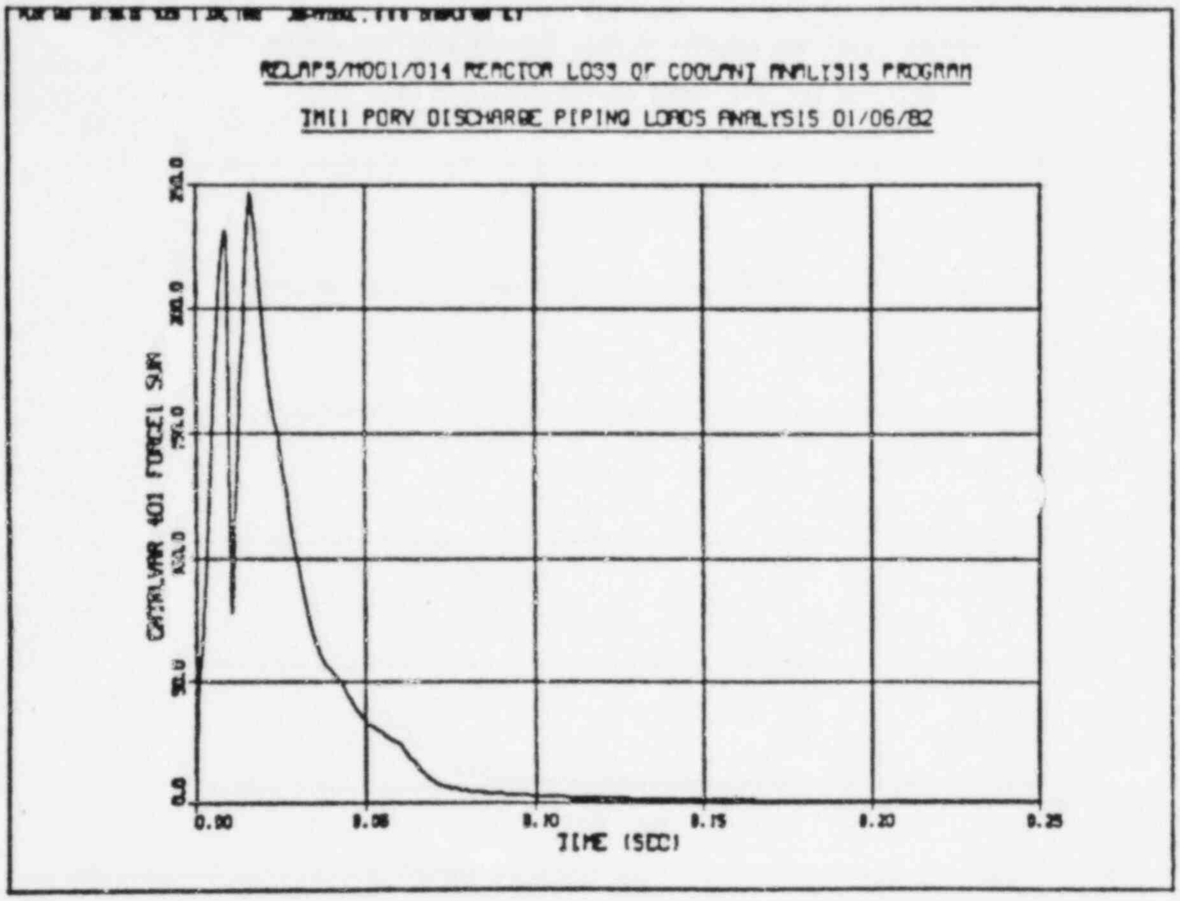


FIGURE B-2.2
THREE MILE ISLAND UNIT # 1
PORV RC-RV2 (ME-162.93)
DISCHARGE LINE
FORCES DEFINITION


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI1 PORV DISCHARGE PIPING LOADS ANALYSIS 01/06/82
CNTRLVAR 401 FORCE1 SUM
0.0
50.0
100.0
150.0
200.0
250.0
0.00
0.05
0.10
0.15
0.20
0.25
TIME (SEC)

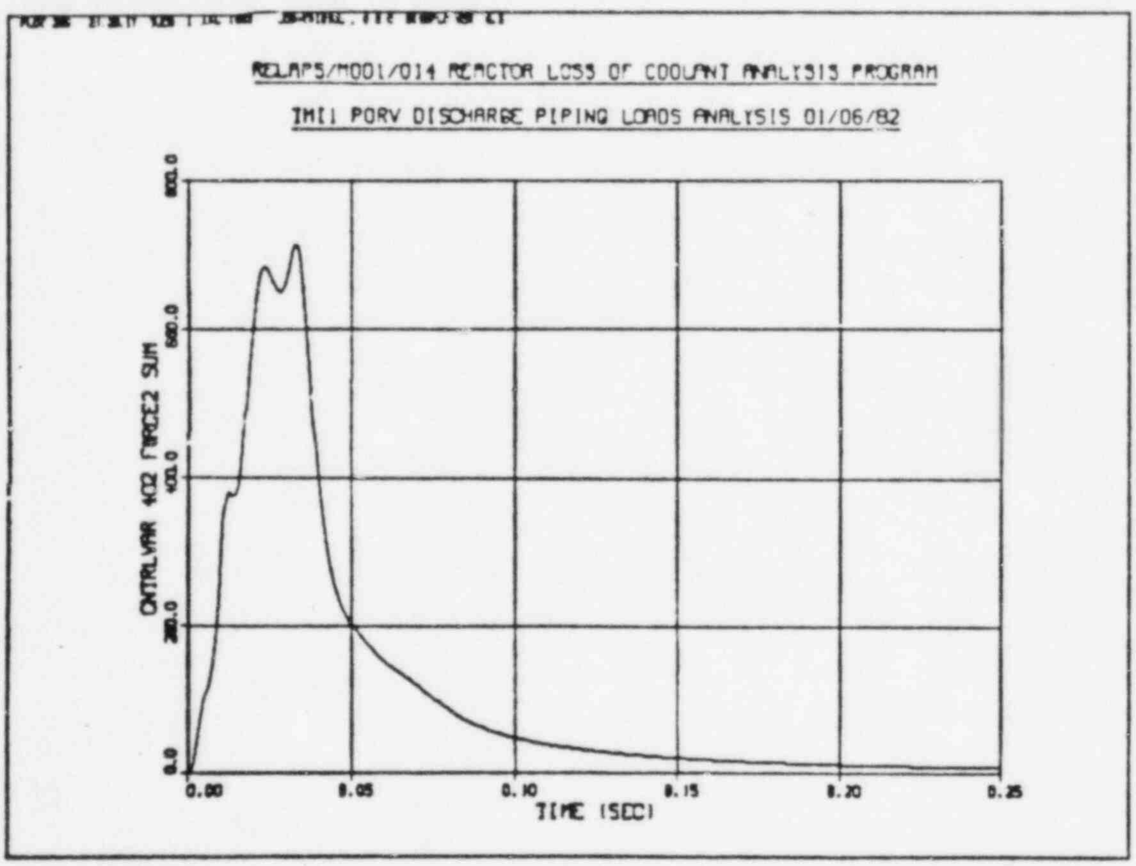
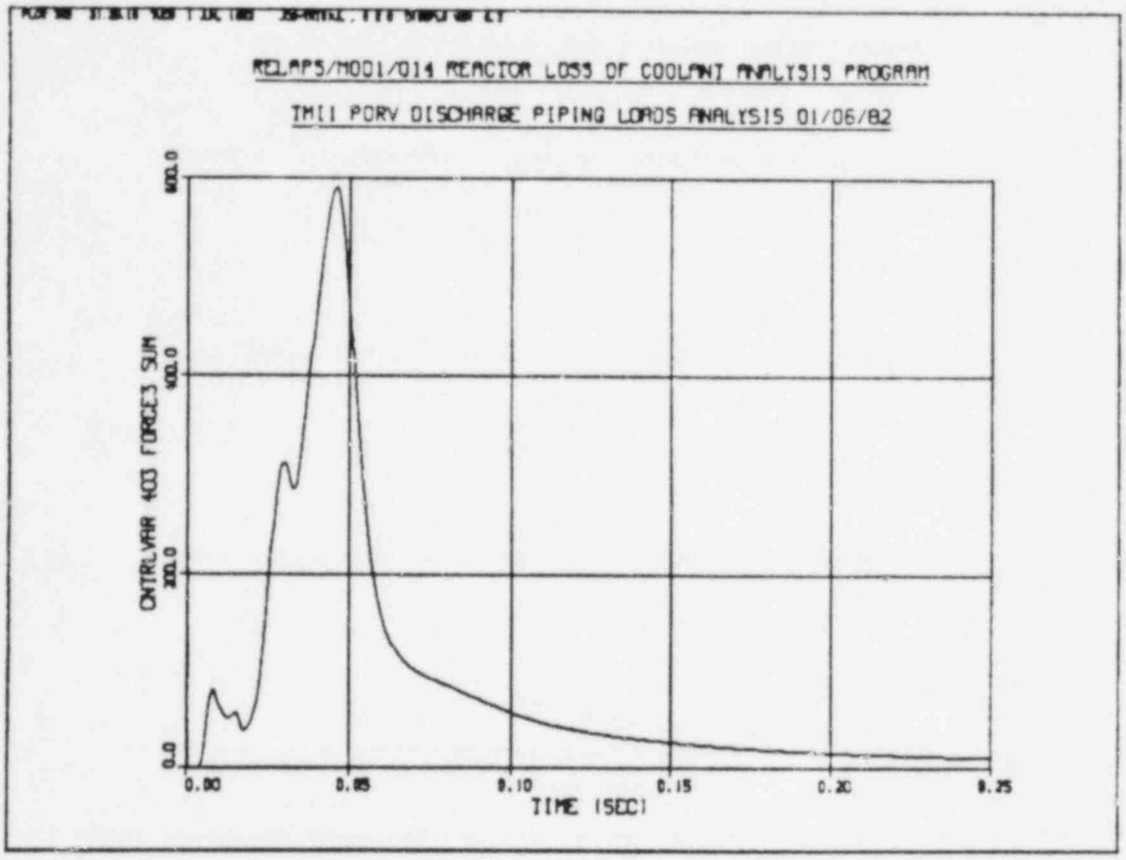

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI1 PORV DISCHARGE PIPING LOADS ANALYSIS 01/06/82
CNTRLVAR 402 FORCE2 SUM
0.0
200.0
400.0
600.0
800.0
0.00
0.05
0.10
0.15
0.20
0.25
TIME (SEC)

FIG
B-2.3


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI1 PORV DISCHARGE PIPING LOADS ANALYSIS 01/06/82
CNTRLVAR 403 FORCE3 SUM
TIME (SEC)
0.00
0.05
0.10
0.15
0.20
0.25

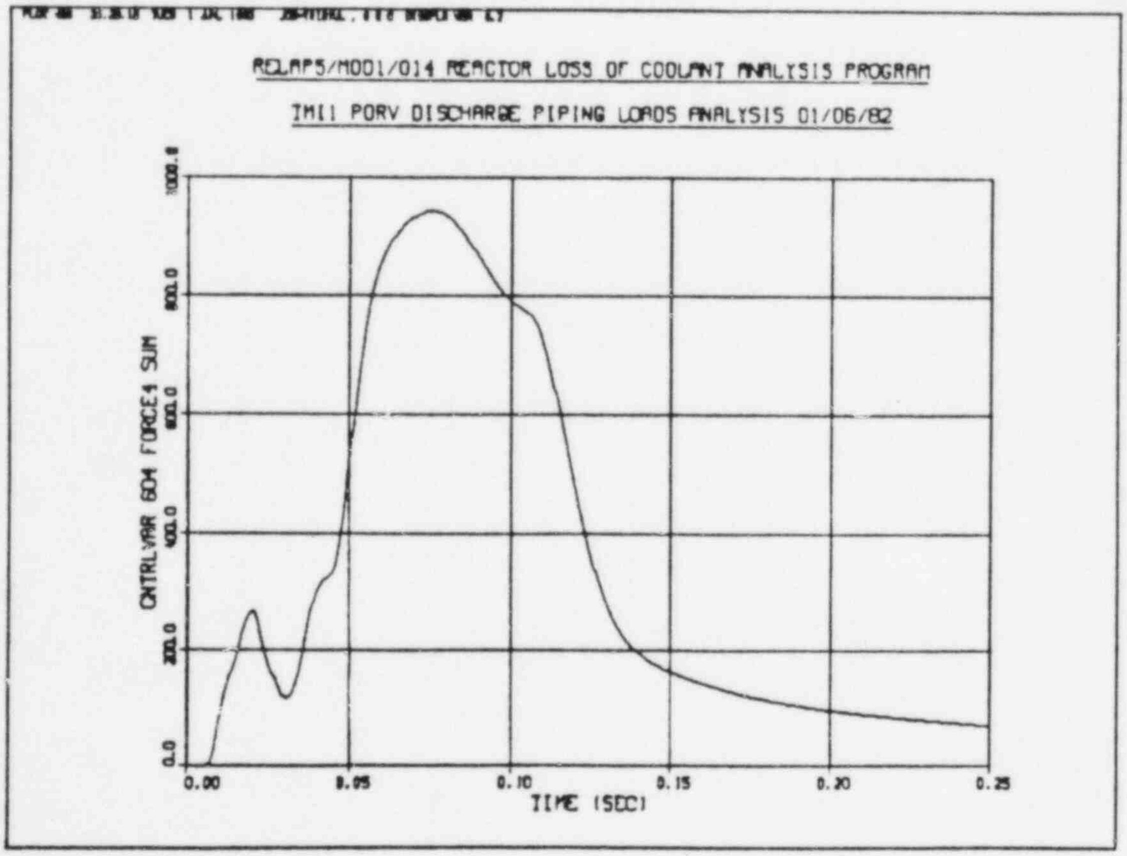
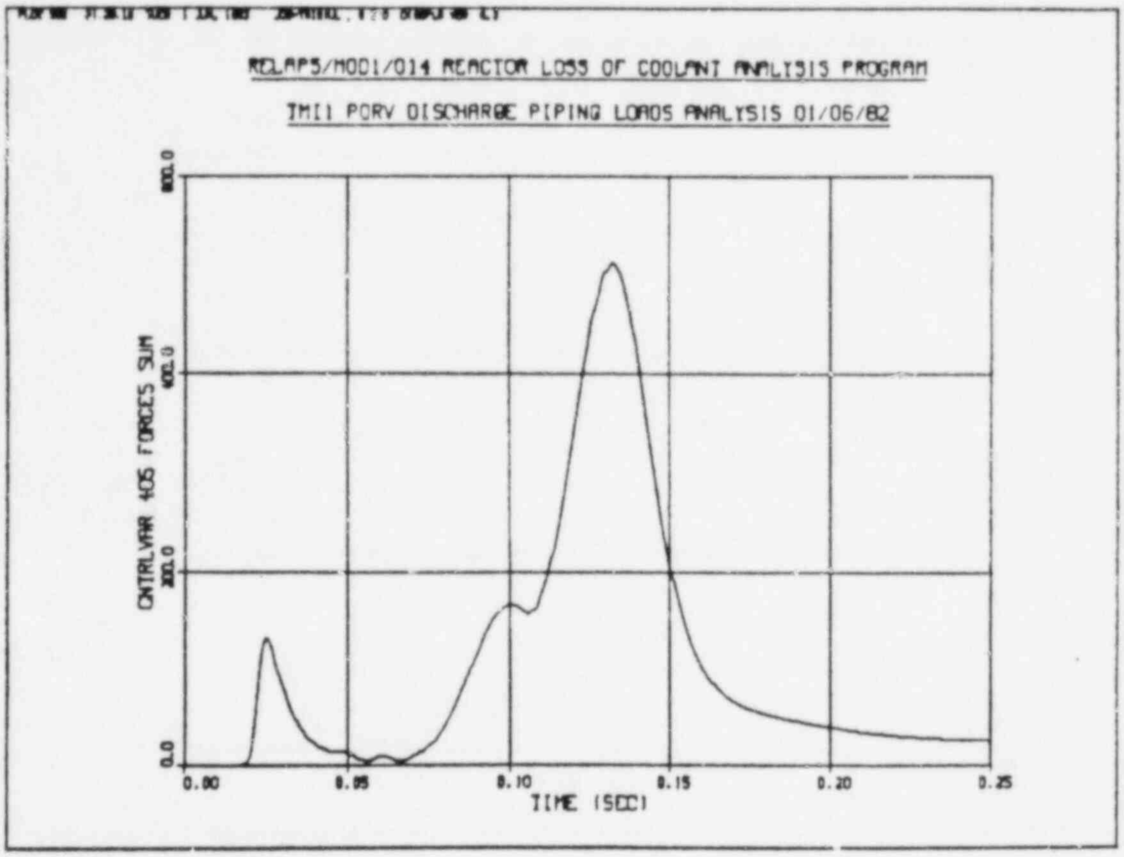

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI1 PORV DISCHARGE PIPING LOADS ANALYSIS 01/06/82
CNTRLVAR 604 FORCE4 SUM
1000.0
800.0
600.0
400.0
200.0
0.0
TIME (SEC)
0.00
0.05
0.10
0.15
0.20
0.25

FIG.
B-2.4


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI1 PORV DISCHARGE PIPING LOADS ANALYSIS 01/06/82
CNTRLVAR 405 FORCES SUM
0.00
0.05
0.10
0.15
0.20
0.25
TIME (SEC)

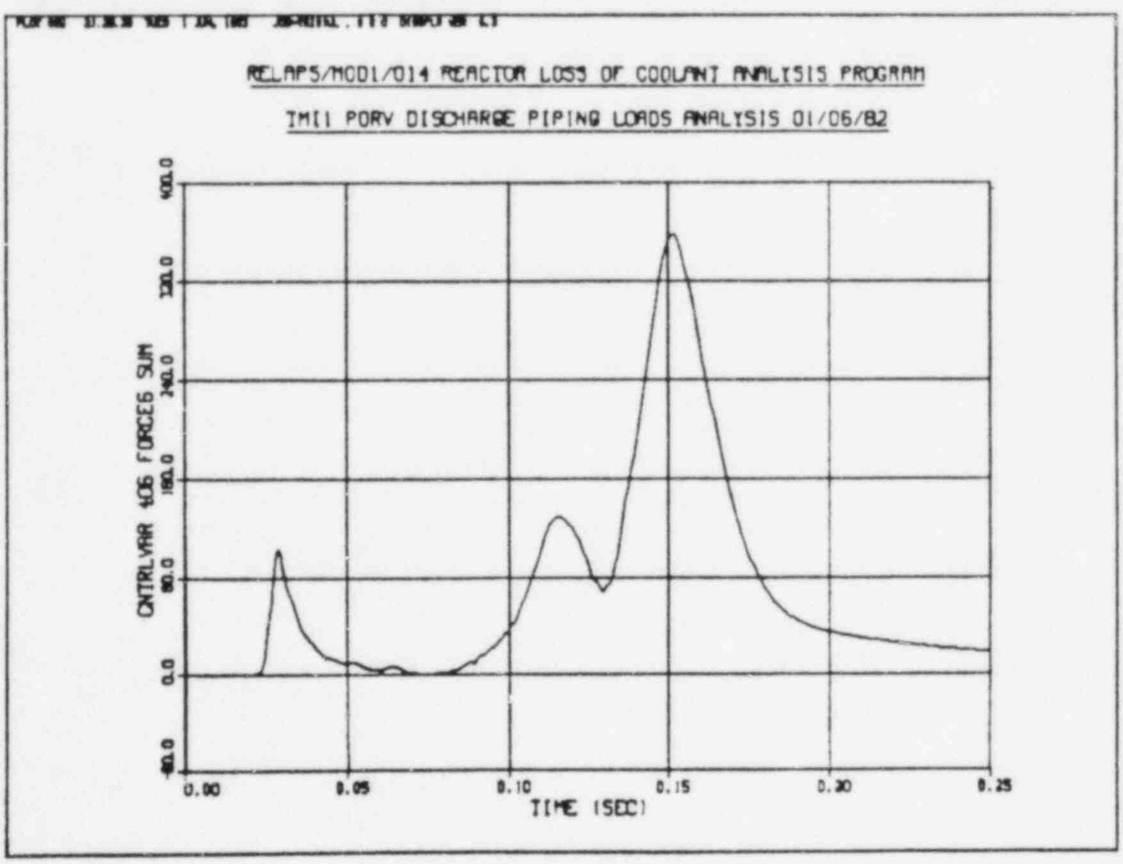
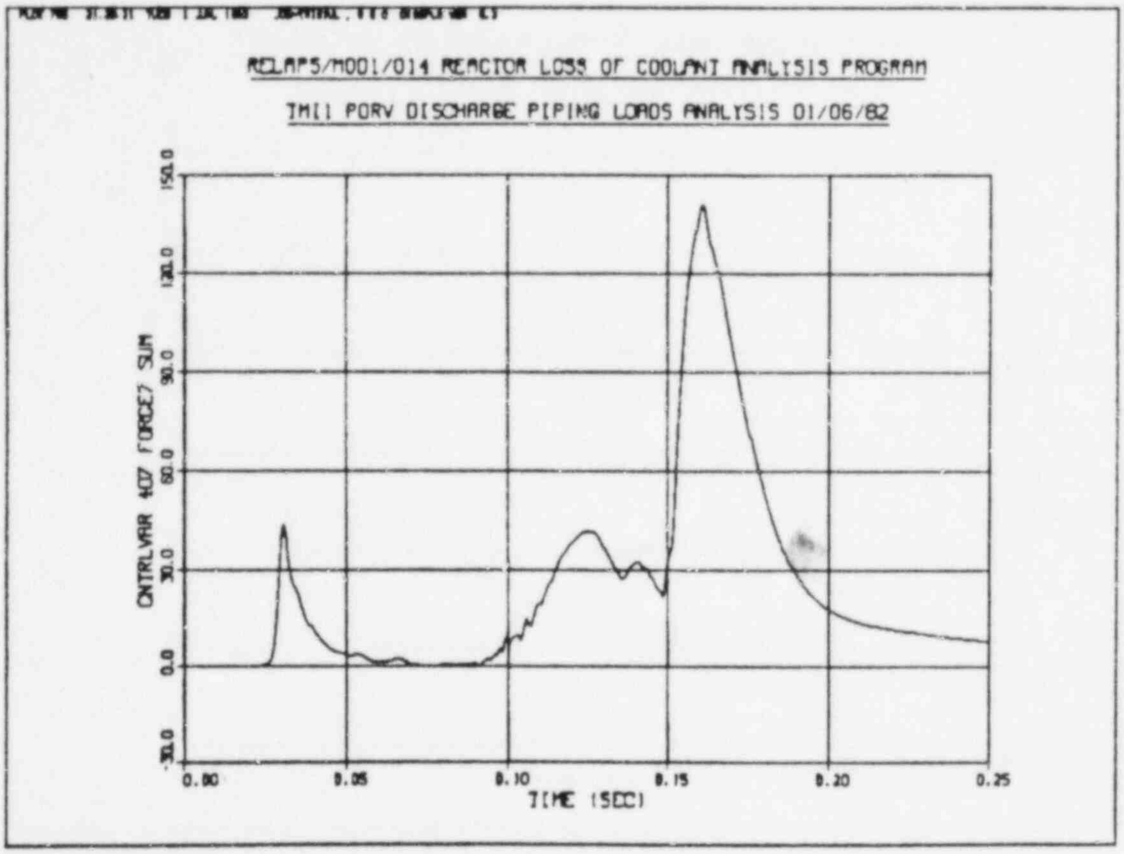

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI1 PORV DISCHARGE PIPING LOADS ANALYSIS 01/06/82
CNTRLVAR 406 FORCES SUM
0.00
0.05
0.10
0.15
0.20
0.25
TIME (SEC)

FIG.
B-2.5


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI1 PORV DISCHARGE PIPING LOADS ANALYSIS 01/06/82
CNTRLVAR 407 FORCE7 SUM
150.0
120.0
90.0
60.0
30.0
0.0
-30.0
0.00
0.05
0.10
0.15
0.20
0.25
TIME (SEC)

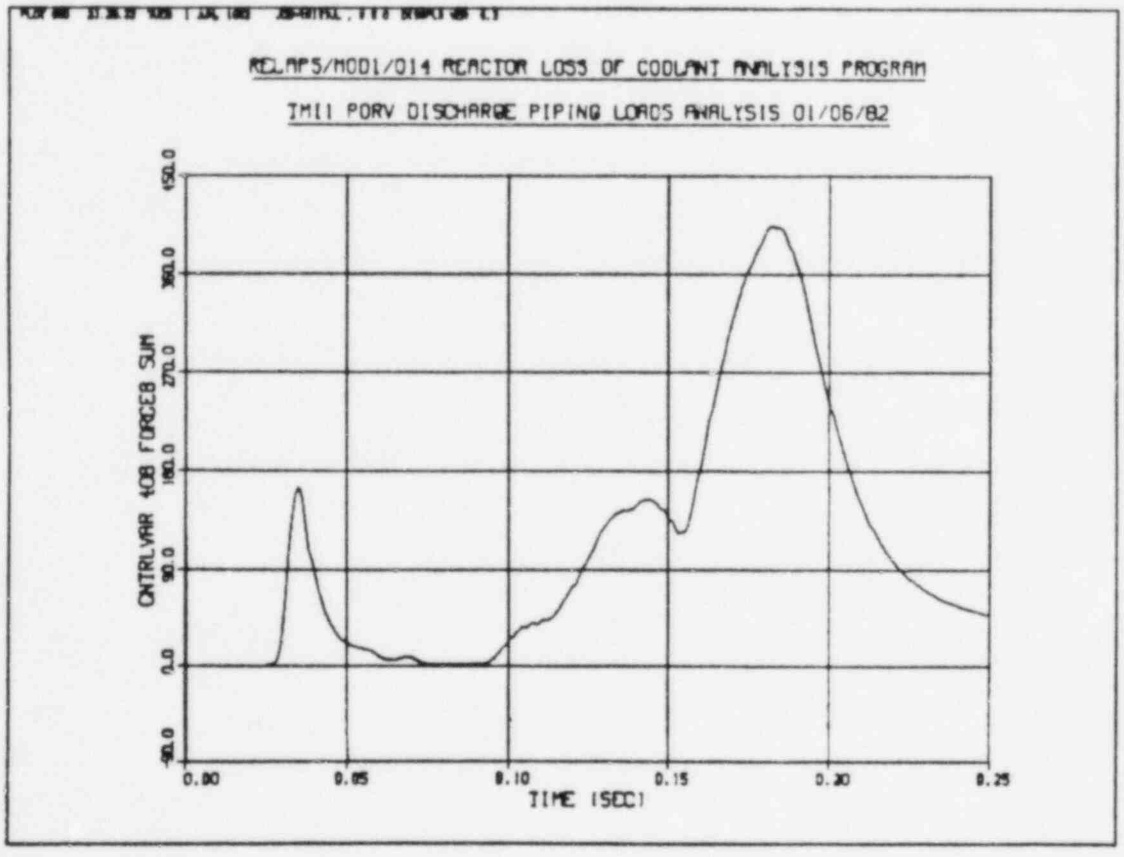
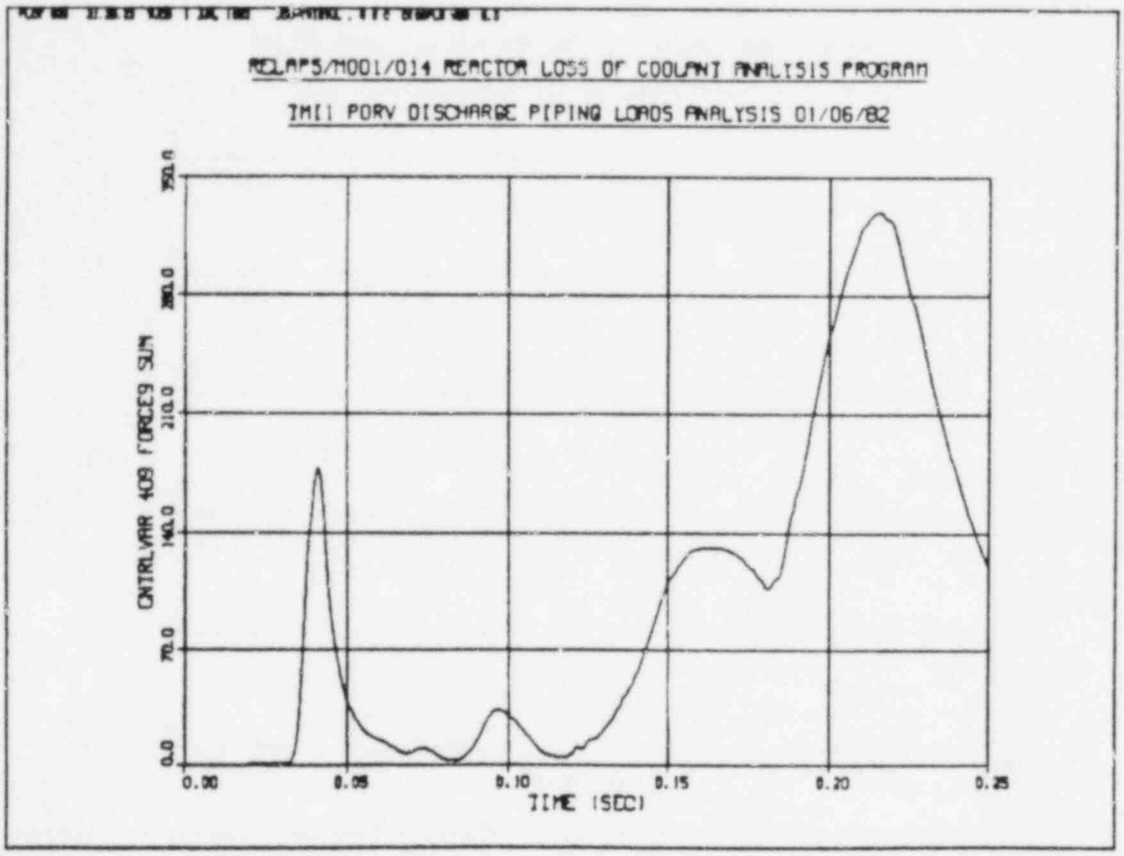

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI1 PORV DISCHARGE PIPING LOADS ANALYSIS 01/06/82
CNTRLVAR 408 FORCE8 SUM
450.0
360.0
270.0
180.0
90.0
0.0
-90.0
0.00
0.05
0.10
0.15
0.20
0.25
TIME (SEC)

FIG.
B-2.6


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI1 PORV DISCHARGE PIPING LOADS ANALYSIS 01/06/82
CNTRLVAR 409 FORCE9 SUM
TIME (SEC)
0.0
70.0
140.0
210.0
280.0
350.0
0.00
0.05
0.10
0.15
0.20
0.25

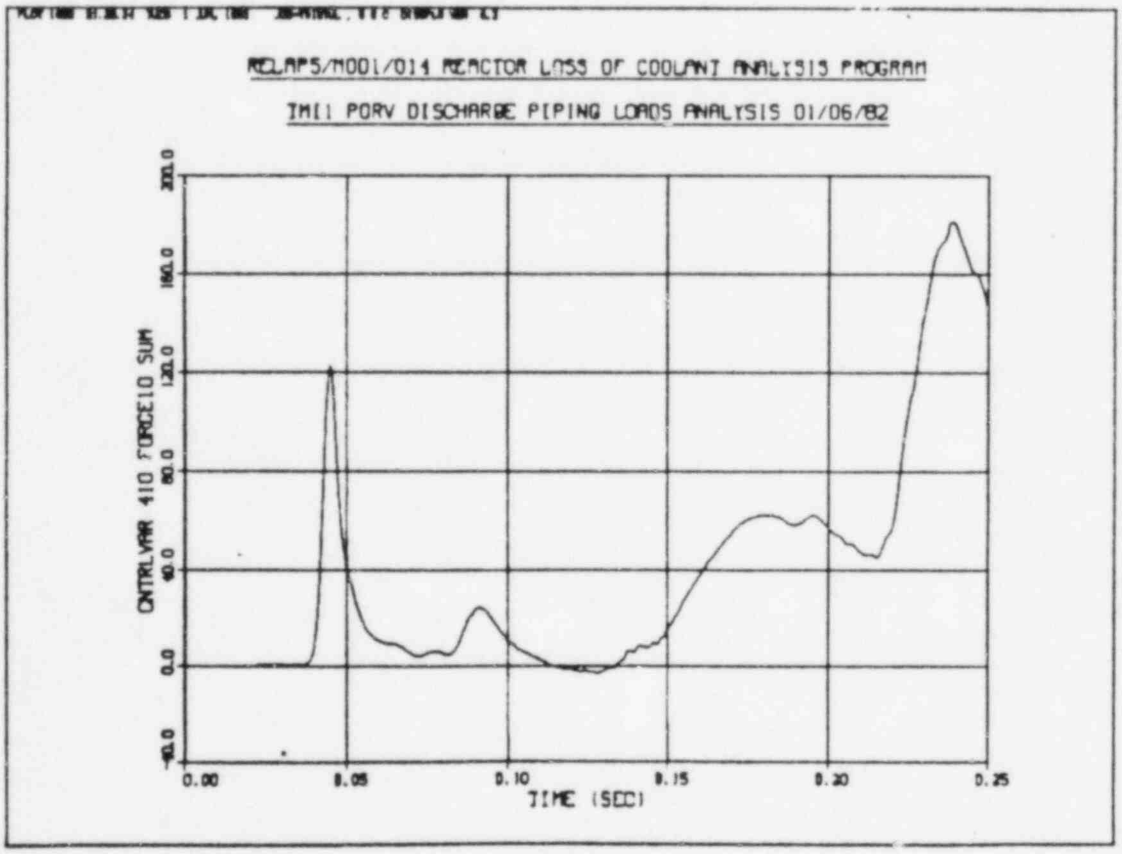
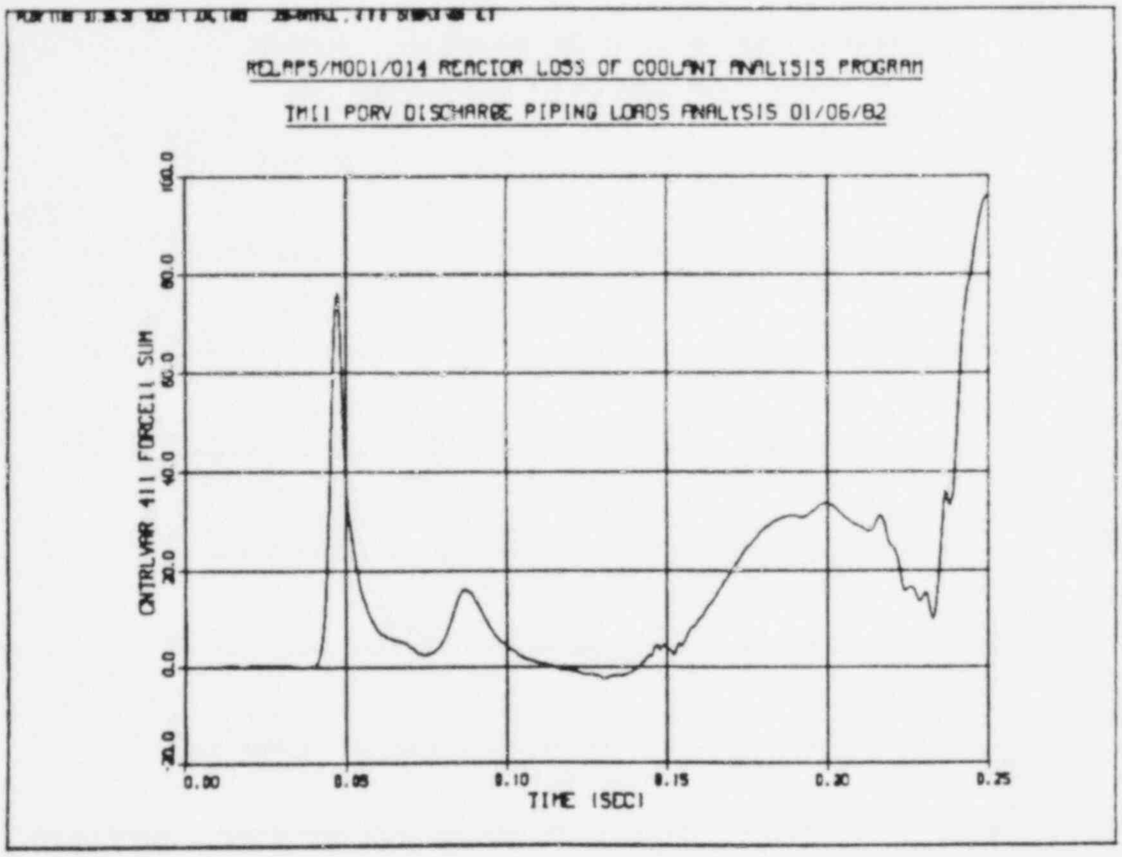

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI1 PORV DISCHARGE PIPING LOADS ANALYSIS 01/06/82
CNTRLVAR 410 FORCE10 SUM
TIME (SEC)
-40.0
0.0
40.0
80.0
120.0
160.0
200.0
0.00
0.05
0.10
0.15
0.20
0.25

FIG.
B-2.7


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI1 PORV DISCHARGE PIPING LOADS ANALYSIS 01/06/82
CNTRLVAR 411 FORCE11 SUM
TIME (SEC)
100.0
80.0
60.0
40.0
20.0
0.0
-20.0
0.00
0.05
0.10
0.15
0.20
0.25

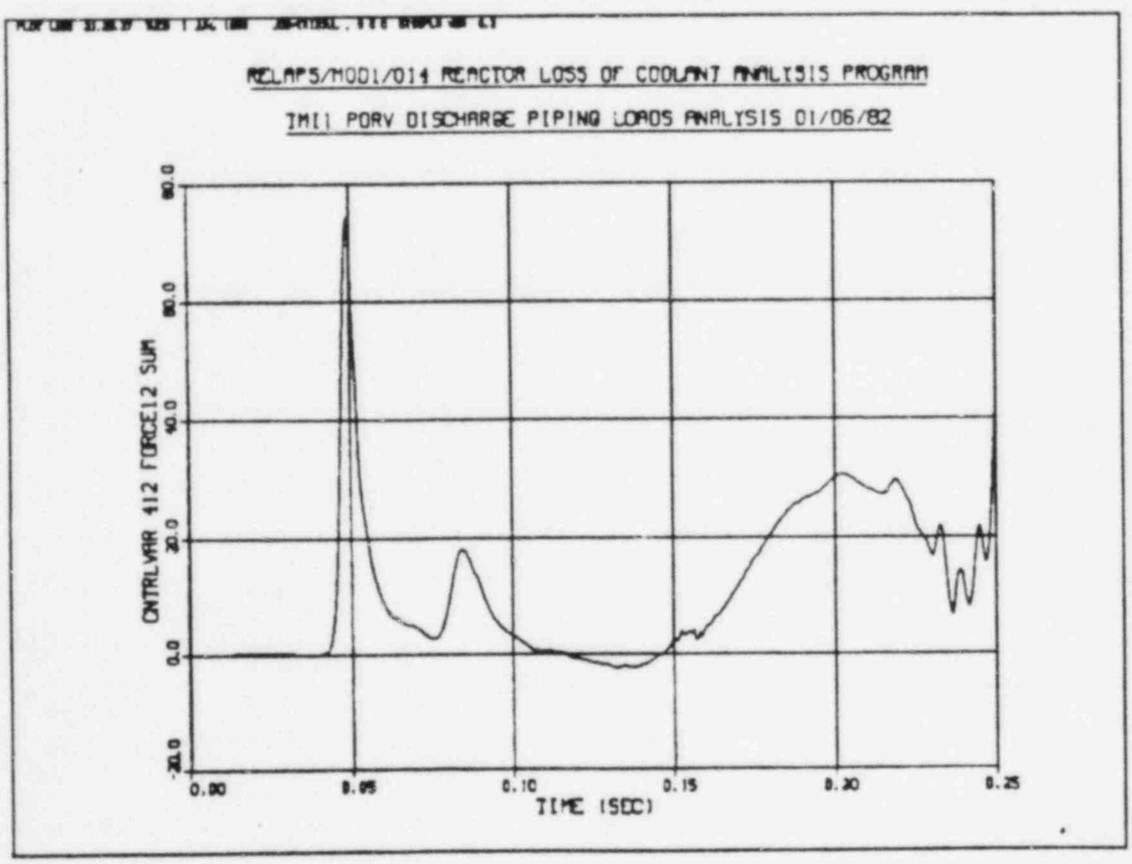
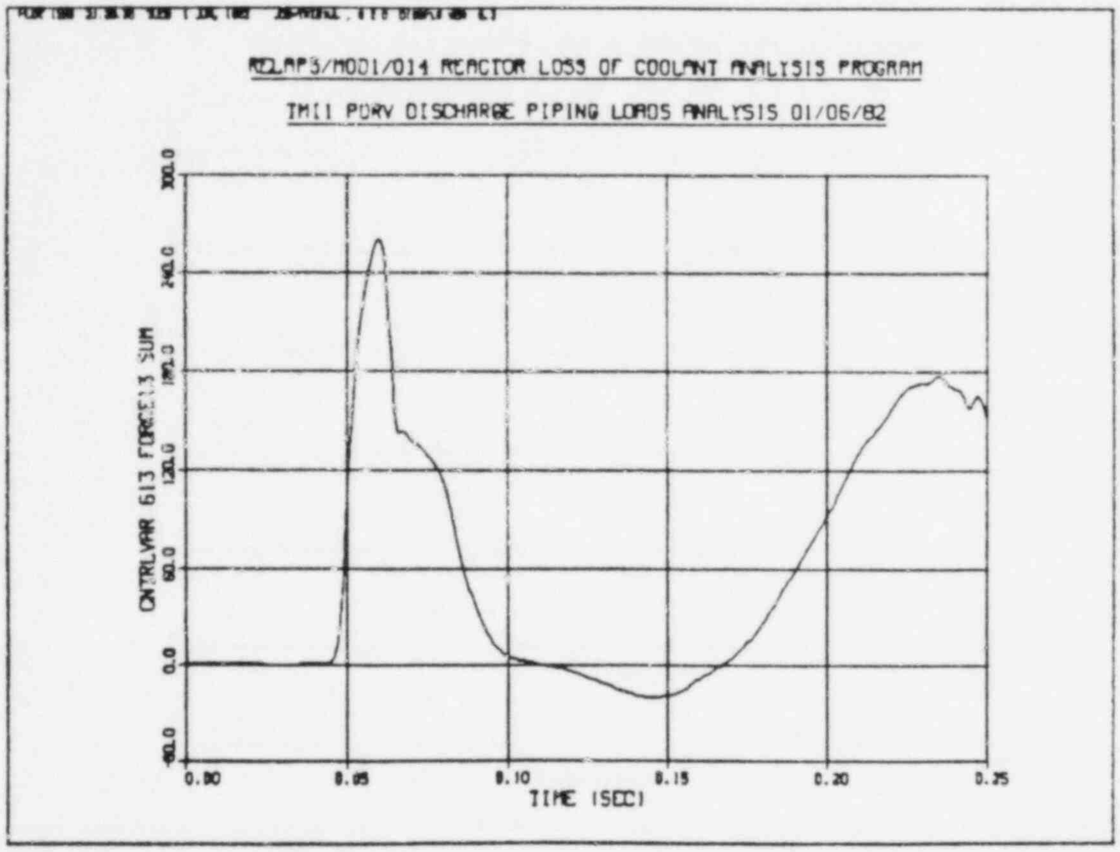

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI1 PORV DISCHARGE PIPING LOADS ANALYSIS 01/06/82
CNTRLVAR 412 FORCE12 SUM
TIME (SEC)
80.0
60.0
40.0
20.0
0.0
-20.0
0.00
0.05
0.10
0.15
0.20
0.25

FIG.
B-2.8


RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI1 PORV DISCHARGE PIPING LOADS ANALYSIS 01/06/82
CNTRLVAR 613 FORCE13 SUM
300.0
240.0
180.0
120.0
60.0
0.0
-60.0
0.00
0.05
0.10
0.15
0.20
0.25
TIME (SEC)

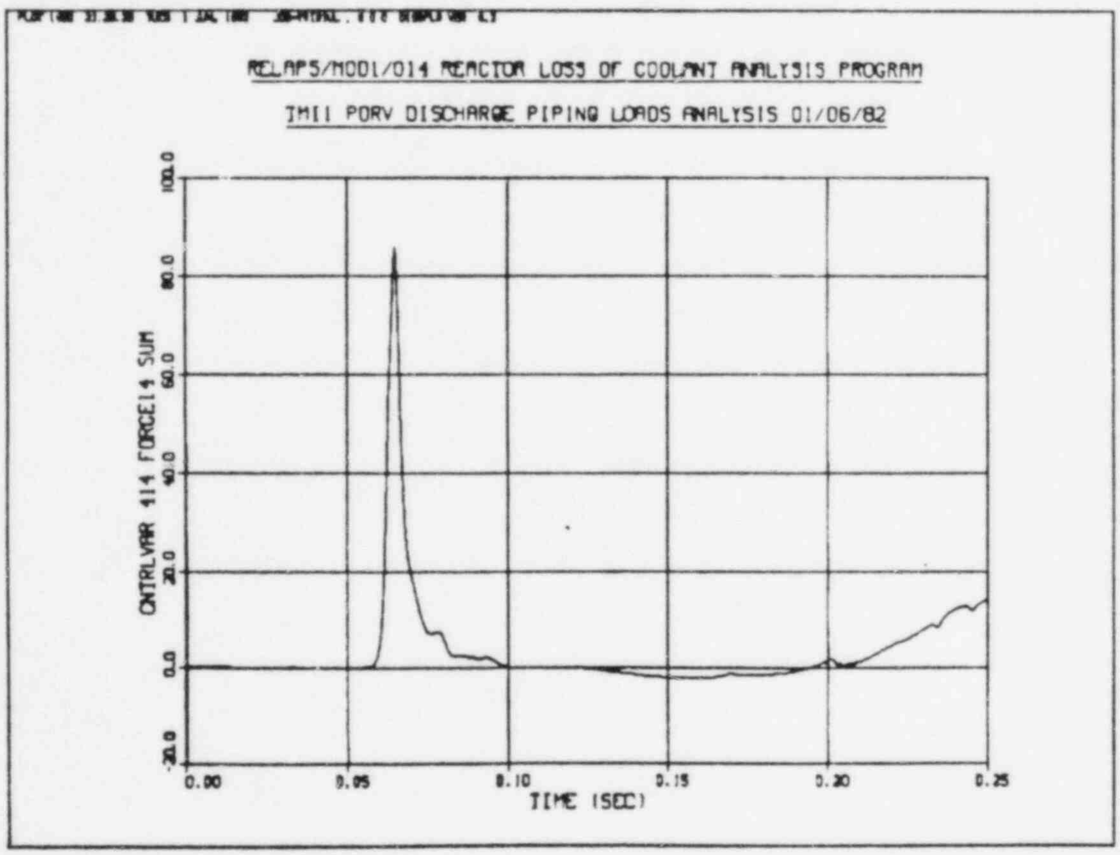

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI1 PORV DISCHARGE PIPING LOADS ANALYSIS 01/06/82
CNTRLVAR 414 FORCE14 SUM
100.0
80.0
60.0
40.0
20.0
0.0
-20.0
0.00
0.05
0.10
0.15
0.20
0.25
TIME (SEC)

FIG
B-2.9

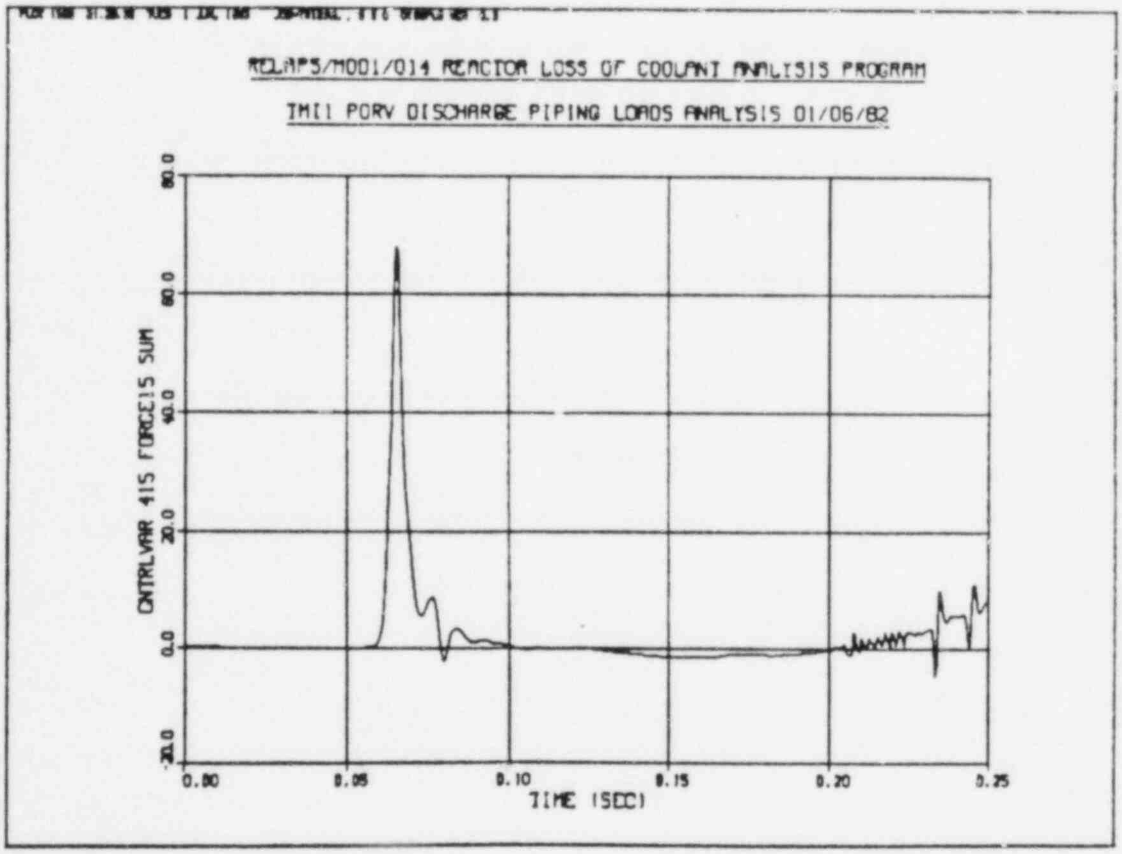

RELAP5/MOD1/014 REACTOR LOSS OF COOLANT ANALYSIS PROGRAM
TMI1 PORV DISCHARGE PIPING LOADS ANALYSIS 01/06/82
CNTRLVAR 415 FORCE15 SUM
80.0
60.0
40.0
20.0
0.0
-20.0
0.00
0.05
0.10
0.15
0.20
0.25
TIME (SEC)

FIG.
B-2.10

Appendix-C TPIPE Piping Analysis Report

METROPOLITAN EDISON COMPANY
THREE MILE ISLAND NUCLEAR STATION
UNIT-1

STRESS ANALYSIS OF PRESSURIZER SAFETY/RELIEF VALVE DISCHARGE PIPING

Originator : L. Chou

Reviewer : S. H. Yang

Supervisor : M. Z. Lee

SPECIALITY ENGINEERING DEPARTMENT
GILBERT/COMMONWEALTH
READING, PA

JULY, 1982

ABSTRACT

The purpose of this report is to present the result of piping structural analysis of pressurizer safety/relief valve discharge line due to fluid transient, seismic, thermal and deadweight effects, also to demonstrate the evaluation of piping system in accordance with the guideline issued by EPRI, April 1982 ("Guide for application of valve test program results to plant specific evaluation", Appendix E.)

TABLE OF CONTENTS

1. SYSTEM DESCRIPTION

Three Mile Island Nuclear Station, Unit-1 utilizes a Babcock & Wilcox pressurized water reactor system with an electric power output of 871 MW.

Its primary loop overpressure protection system consists of two safety relief valves (SRV) and one power operated relief valve (PORV). Both SRVs and PORV are installed directly on the pressurizer, and consequently the valve connections at the pressurizer are assumed as anchors. The two 6", SRV discharge lines and the one 4" PORV discharge piping merge to a 10" common header, 1.5' above the reactor coolant drain tank.

2. ANALYSIS DESCRIPTION

The integrity of the piping system and its effects on the operability of the valves are analyzed for pressure, deadweight, seismic, thermal expansion, and the flow transient loads. The effects of the flow transient loads are analyzed in three steps: (1) perform thermal-fluid analysis to determine the states and the flow conditions of the fluid, (2) generate time dependent, flow induced forces on the pipe for piping dynamic analysis, (3) perform piping structural dynamic analysis. Steps (1) and (2) are performed by AEA - Dept. of Gilbert Associates, Inc. and are reported separately. This report covers step (3) and the analysis for pressure, deadweight, seismic and thermal expansion loadings. Fig. 2.1 shows the major analysis procedure.

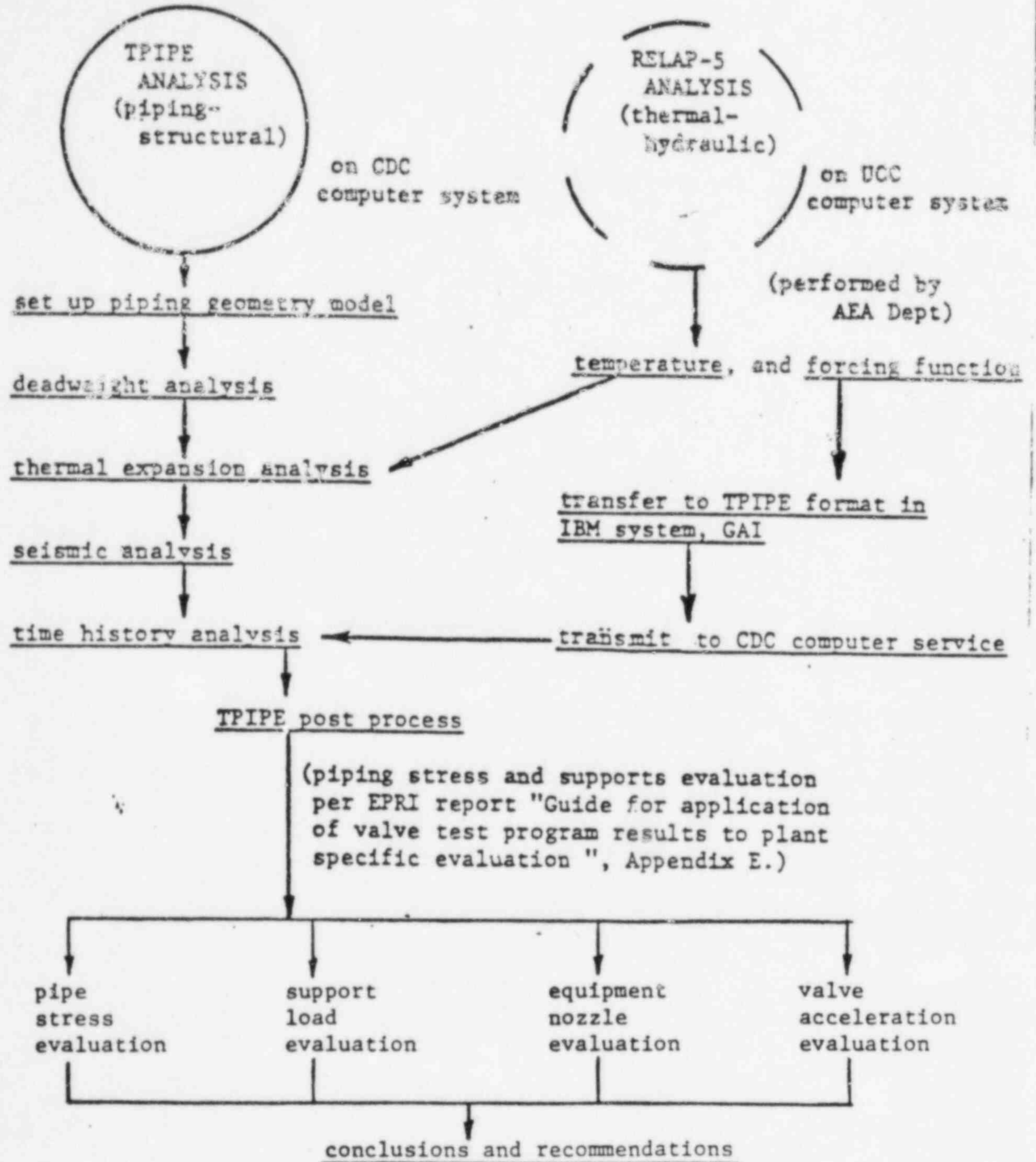


Fig. 2.1 Analysis Functional Flow Diagram

3. Analysis Tool

Gilbert/Commonwealth piping analysis computer code TPIPE version 4.2, July 1982, was used in the piping system analysis. TPIPE is a general piping analysis computer code developed by PMB Systems Engineering, Inc. in San Francisco, and has been used by Tennessee Valley Authority, Gilbert/Commonwealth and other organizations for several nuclear power plant projects.

4. Transient Conditions Analyzed

The SRV discharge piping could be subjected to saturated discharge and subcooled water discharge. Both cases were analyzed separately and the worse of the two loading cases for piping stresses and support loads were screened using TPIPE postprocessor.

The PORV discharge piping was analyzed for a 400F, 2500 psig subcooled water discharge.

5. Loading Combination and Acceptance Criteria

The loading combination and acceptance criteria for the SRV and PORV discharge systems were based on table 5.1, which were given in appendix E of reference 6.

LOAD COMBINATIONS AND ACCEPTANCE CRITERIA FOR PRESSURIZER SAFETY AND RELIEF VALVE PIPING AND SUPPORTS - SEISMICALLY DESIGNED DOWNSTREAM PORTION

(TABLE 5.1)

Combination	Plant/System Operating Condition	Load Combination	Service Stress Limit
1	Normal	N	A
2	Upset	$N + SOT_U$	B
3	Upset	$N + OBE + SOT_U$	C
4	Emergency	$N + SOT_E$	C
5	Faulted	N + MS/FWPB or DBPB + SSE + SOT_F	D
6	Faulted	$N + LOCA + SSE + SOT_F$	D

DEFINITIONS OF LOAD ABBREVIATIONS

N = Sustained Loads During Normal Plant Operation

SOT = System Operating Transient

SOT_U = Relief Valve Discharge Transient(1)

SOT_E = Safety Valve Discharge Transient(1)

SOT_F = Max (SOT_U; SOT_E); or Transition Flow

OBE = Operating Basis Earthquake

SSE = Safe Shutdown Earthquake

MS/FWPB = Main Steam or Feedwater Pipe Break

DBPB = Design Basis Pipe Break

LOCA = Loss of Coolant Accident

This table is applicable to the seismically designed portion of downstream non-Category I piping (and supports) necessary to isolate the Category I portion from the non-seismically designed piping response, and to assure acceptable valve loading on the discharge nozzle.

Use SRSS for combining dynamic load responses.

6. Summary of Results and Conclusions

6.1 The results of S/RV discharging piping are summarized as follows:

a. PORV(ME-162,93) - Maximum stress in this piping branch is within allowable limits. (see table 6.1) Also, all snubber supports loads are within the designed capacities.

b. SRV(ME-88,89) - Maximum stress in this piping branch just reached the allowable limits. (see table 6.2) All snubber supports load are within designed capacities.

c. SRV(ME-91,92) -Maximun stress in this piping branch will be within allowable limits after adding one 3 kip snubber at joint 346 in Z direction. However, all the snubber supports load are still within designed capacities.

d. The SRV nozzle loads at outlet flange imposed by the piping exceed recommended maximum loads shown on vendor . catalog (see Reference 1 or attached).

e. The PORV nozzle allowable limits are not available.

f. The Reactor Coolant Drain Tank (WDL-T-3) nozzle loads are below the allowable limits used for previous analysis.

g. The normal operating condition for the S/RV discharging piping is when the SRV and PORV are closed. The discharging piping temperature will be the same as the plant normal eneiromental temperature. The discharging piping will not contain any sub-cooled water during the system normal operating condition.

Gilbert Associates, Inc. Reading, Pennsylvania CALCULATION	SUBJECT		CISID		PAGE ___ OF ___ PAGES
	REV.	0	1	2	3
	MICROFILMED				
	ORIGINATOR	[illegible signature]			
	DATE	7/20/87			

Table 6.1 -- Stress Summary Of PORV Branch Piping (ME-162,93)

TPIPE TMI PWR S/RV DISCHARGE PIPING (ME-162.93) (W.O.-045064000) LLCHOC
FROM PORV(RC-RV2) TO PRESSURIZER RELIEF TANK

A S M E   C O D E   C L A S S   2   S T R E S S   S U M M A R Y

MEMBER NAME	NODAL NAME	EQN NO.	CODE STRESS	ALLOWABLE STRESS	STRESS RATIO	DESCRIPTION
1500 I	146 I	8	6159.	15500.	.40	MAX STRESS
1500 I	146 I	8	6159.	15500.	.40	MAX STRESS RATIO
1270 I	CENTRI	10	24722.	27000.	.92	MAX STRESS
1270 I	CENTRI	10	24722.	27000.	.92	MAX STRESS RATIO
1270 I	CENTRI	11	27816.	42500.	.65	MAX STRESS
1270 I	CENTRI	11	27816.	42500.	.65	MAX STRESS RATIO
1510 I	148 I	9U	16762.	18600.	.90	MAX STRESS
1510 I	148 I	9U	16762.	18600.	.90	MAX STRESS RATIO
1510 I	148 I	9E	21122.	27900.	.76	MAX STRESS
1510 I	148 I	9E	21122.	27900.	.76	MAX STRESS RATIO
1510 I	148 I	9F	29788.	37200.	.80	MAX STRESS
1510 I	148 I	9F	29788.	37200.	.80	MAX STRESS RATIO
1270 I	CENTRI	PR	28678.	36480.	.79	MAX STRESS
1270 I	CENTRI	PR	28678.	36480.	.79	MAX STRESS RATIO
1510 I	148 I	AV	41608.	600000.	.07	MAX STRESS
1510 I	148 I	AV	41608.	600000.	.07	MAX STRESS RATIO

TOTAL NUMBER OF PIPE MEMBERS WITH NODAL POINTS GREATER THAN A THRESHOLD STRESS RATIO OF 1.000

EQUATION 8..... 0
EQUATION 10..... 0
EQUATION 11..... 0
EQUATION 9U..... 0
EQUATION 9E..... 0
EQUATION 9F..... 0

PIPE RUPTURE.... 0
ACTIVE VALVE.... 0

Gilbert Associates, Inc. Reading, Pennsylvania CALCULATION	SUBJECT		CISID		PAGE ___ OF ___ PAGES
	REV. 0	1	2	3	
	MICROFILMED				
	ORIGINATOR LLChou				
	DATE 7/20/87				

Table 6.2 -- Stress Summary Of SKV Branch Piping (ME-88,89)

TPIPE TMI PWR S/RV DISCHARGE PIPING (ME- 88,89) (W.O.-045064000) LLCHOU
FROM SRV(ME-147) TO PRESSURIZER RELIEF TANK
A S M E CODE CLASS 2 STRESS SUMMARY

MEMBER NAME	NODAL NAME	EQN NO.	CODE STRESS	ALLOWABLE STRESS	STRESS RATIO	DESCRIPTION
2250 I	223 I	8	6061.	15500.	.39	MAX STRESS
2250 I	223 I	8	6061.	15500.	.39	MAX STRESS RATIO
2210 I	219 I	10	16087.	27000.	.60	MAX STRESS
2210 I	219 I	10	16087.	27000.	.60	MAX STRESS RATIO
2250 I	CENTRI	11	21509.	42500.	.51	MAX STRESS
2250 I	CENTRI	11	21509.	42500.	.51	MAX STRESS RATIO
2410 I	240 I	9U	10874.	18600.	.58	MAX STRESS
2410 I	240 I	9U	10874.	18600.	.58	MAX STRESS RATIO
2470 I	245 I	9E	20370.	27900.	.73	MAX STRESS
2470 I	245 I	9E	20370.	27900.	.73	MAX STRESS RATIO
2470 I	245 I	9F	37275.	37200.	1.00	MAX STRESS
2470 I	245 I	9F	37275.	37200.	1.00	MAX STRESS RATIO
2250 I	CENTRI	PR	24390.	36480.	.67	MAX STRESS
2250 I	CENTRI	PR	24390.	36480.	.67	MAX STRESS RATIO
2470 I	245 I	AU	38877.	600000.	.06	MAX STRESS
2470 I	245 I	AU	38877.	600000.	.06	MAX STRESS RATIO

TOTAL NUMBER OF PIPE MEMBERS WITH NODAL POINTS GREATER THAN A THRESHOLD STRESS RATIO OF 1.000

EQUATION 8..... 0
EQUATION 10..... 0
EQUATION 11..... 0
EQUATION 9U..... 0
EQUATION 9E..... 0
EQUATION 9F..... 1

PIPE RUPTURE.... 0
ACTIVE VALVE.... 0

Gilbert Associates, Inc. Reading, Pennsylvania CALCULATION	SUBJECT		CISID		PAGE ___ OF ___ PAGES
	REV.	0	1	2	3
	MICROFILMED				
	ORIGINATOR	[signature]			
	DATE	7/26/82			

MARK NO.	PIPE NODE NO.	SUPPORT LOAD (NEW/EXIST) LB				PERCENT CHANGE			
		NORMAL	UPSET	EMERGENCY	FAULTED	NORMAL	UPSET	EMERGENCY	FAULTED
PR46	103	NA	213/10350	244/10350	320/10350	NA	OK	OK	OK
PR50	S113	↓	316/10350	339/10350	401/10350	↓	OK	OK	OK
PR49	117	↓	499/10350	506/10350	526/10350	↓	OK	OK	OK
PR48	S133	↓	1118/10350	1136/10350	1191/10350	↓	OK	OK	OK
PR47	S138	↓	445/10350	537/10350	747/10350	↓	OK	OK	OK

TABLE 6.4 SNUBBER LOAD COMPARISON OF PORV (ME-162,93)

Gilbert Associates, Inc. Reading, Pennsylvania CALCULATION	SUBJECT				CISID	PAGE ___ OF ___ PAGES
	REV.	0	1	2	3	
	MICROFILMED					
	ORIGINATOR	[illegible]				
	DATE	7/26/82				

MARK NO.	TPIPE NODE NO.	SUPPORT LOAD (NEW/EXIST) LB				PERCENT CHANGE			
		NORMAL	UPSET	EMERGENCY	FAULTED	NORMAL	UPSET	EMERGENCY	FAULTED
PR44	—	NA	—	—	—	NA	OK	OK	OK
PR43	S206	↓	1525/25500	1525/25500	1570/25500	↓	OK	OK	OK
PR41	211	↓	2640/17600	2640/17600	2651/17600	↓	OK	OK	OK
PR39	215	↓	3805/17600	3805/17600	3964/17600	↓	OK	OK	OK
PR37	S234	↓	1658/25500	1658/25500	1801/25500	↓	OK	OK	OK
PR26	237	↓	2039/10350	2039/10350	2682/10350	↓	OK	OK	OK
PR24	238	↓	1424/17600	1424/17600	1443/17600	↓	OK	OK	OK
PR35	242	↓	446/25500	446/25500	482/25500	↓	OK	OK	OK

TABLE 6.5 SNUBBER LOAD COMPARISON OF SRV (ME-88,89)

Gilbert Associates, Inc. Reading, Pennsylvania CALCULATION	SUBJECT				CISID	PAGE ___ OF ___ PAGES
	REV.	0	1	2	3	
	MICROFILMED					
	ORIGINATOR	[illegible signature]				
	DATE	8/6/82				

MARK NO.	TPIPE NODE NO.	SUPPORT LOAD (NEW/EXIST) LB				PERCENT CHANGE			
		NORMAL	UPSET	EMERGENCY	FAULTED	NORMAL	UPSET	EMERGENCY	FAULTED
PR45	S303	NA	2308/17600	2308/17600	2442/17600	NA	OK	OK	OK
PR42	308	↓	2286/17600	2286/17600	2356/17600	↓	OK	OK	OK
PR40	317	↓	3359/17600	3359/17600	3390/17600	↓	OK	OK	OK
PR38	319	↓	2627/17600	2627/17600	3978/17600	↓	OK	OK	OK
PR36	337	↓	3292/25500	3292/25500	6847/25500	↓	OK	OK	OK
PR25	340	↓	1331/10350	4447/10350	9626/10350	↓	OK	OK	OK
PR23	S341	↓	2422/17600	2422/17600	3348/17600	↓	OK	OK	OK
PR34	S345	↓	3316/27300	3316/27300	3976/27300	↓	OK	OK	OK
PRXX	346	NA	469/NA	469/NA	841/NA	—	—	—	—

Note: SNUBBER PRXX IS PROPOSED

TABLE 6.6 SNUBBER LOAD COMPARISON OF SRV (ME-91, 92)

Gilbert Associates, Inc. Reading, Pennsylvania ANALYSIS/CALCULATION	SUBJECT		CISID		PAGE OF PAGES
	REV. 0	1	2	3	
	MICROFILMED				
	ORIGINATOR [illegible]				
	DATE 7/27/82				

MARK NO.	TPIPE NODE NO.	EXIST DESIGN LOAD (LB)	NEW LOAD (LB)	PERCENT CHANGE
PR22	107	-247	-227	OK
PR17	112	-87	-103	INCREASE 18%
PR14	116	-112	-137	INCREASE 22%
PR11	124	-197	-275	INCREASE 39%
PR5	137	-382	-471	INCREASE 23%

Note: ANALYSIS RESULT FROM JOB RUN I.D. AYXBCAU

TABLE 6.7 SPRING HANGER LOAD COMPARISON OF PORV (ME-162,93)

MARK NO.	TPIPE NODE NO.	EXIST DESIGN LOAD (LB)	NEW LOAD (LB)	PERCENT CHANGE
PR19	207	-169	-210	INCREASE 24%
PR16	210	-176	-199	INCREASE 13%
PR13	214	-245	-243	OK
PR10	222	-276	-544	INCREASE 97%
PR4	233	-451	-403	OK
PR1	241	-365	-425	INCREASE 16%

Note: ANALYSIS RESULT FROM JOB RUN I.D. AYXBCBD

TABLE 6.8 SPRING HANGER LOAD COMPARISON OF SRV (ME-88,89)

Gilbert Associates, Inc. Reading, Pennsylvania ANALYSIS/CALCULATION	SUBJECT		CISID		PAGE OF PAGES
	REV. 0	1	2	3	
	MICROFILMED				
	ORIGINATOR [illegible signature]				
	DATE 7/27/82				

MARK NO.	TPIPE NODE NO.	EXIST DESIGN LOAD (LB)	NEW LOAD (LB)	PERCENT CHANGE
PR20	307	-510	-696	INCREASE 36%
PR18	311	-218	-250	INCREASE 15%
PR15	314	-255	-335	INCREASE 17.5%
PR12	318	-380	-352	OK
PR3	336	-445	-417	OK
PR2	344	-371	-454	INCREASE 22%

Note: ANALYSIS RESULT FROM JOB RUN I.D. AYXBCAV

TABLE 6.9 SPRING HANGER LOAD COMPARISON OF SRV (ME-91, 92)

Gilbert Associates, Inc. Reading, Pennsylvania	SUBJECT		CISID		PAGE ___ OF ___ PAGES
ANALYSIS/CALCULATION	REV. 0	1	2	3	
	MICROFILMED				
	ORIGINATOR [signature]				
	DATE 7/27/82				

MARK NO.	TPIPE NODE NO.	EXIST DESIGN LOAD (LB)	NEW LOAD (LB)	REMARK
PR30 GUIDE	102	X +144 / -329; Z +470 / -522	X +210 / -358; Z +256 / -337	R
PR31 GUIDE	104	X +2275 / -1029; Z +494 / -776	X +1915 / -694; Z +171 / -572	OK
PR22 STRUT	107	+920 / -2239	+696 / -2235	OK
PR28 GUIDE	120	X +440 / -343; Z +1212 / -1793	X +714 / -125; Z +639 / -1031	R
PR27 GUIDE	121	X +203 / -2005; Z +4767 / -1276	X +209 / -2397; Z +3854 / -377	R
PR6A GUIDE	132	X +225 / -177; Z +570 / -921	X +412 / -242; Z +908 / -298	R
PR6 GUIDE	134	X +230 / -398; Z +1901 / -265	X +433 / -400; Z +607 / -2330	R

R : RE-EVALUATE NEEDED

TABLE 6.10 RIGID SUPPORT LOAD COMPARISON OF PORV (ME-162,93)

MARK NO.	TPIPE NODE NO.	EXIST DESIGN LOAD (LB)	NEW LOAD (LB)	REMARK
PR29 GUIDE	200	X +362 / -982, Z 791 / -367	X +29 / -510, Z +292 / -154	OK
PR31 GUIDE	201	X +6074 / -2768, Z 100 / -457	X +4552 / -1439, Z 475 / -623	R
PR21 STRUT	204	+2446 / -6192	+1647 / -5941	OK
PR28 GUIDE	218	X +440 / -343, Z +1212 / -1793	X +2382 / -1538, Z 7135 / -6685	R
PR27 GUIDE	219	X +203 / -2005, Z +4767 / -276	X +1246 / -5084, Z 8476 / -2091	R
PR4A STRUT	5230	±17000	+3732 / -1789	OK
PR33 GUIDE	245	F_x = +276 / -85, M_x = +29709 / -28927, F_y = +16478 / -16580, M_y = +5005 / -2511, M_z = +36414 / -4158	F_x = +583 / -194, M_x = +248765 / -231305, F_y = +2374 / -1740	R

R : RE-EVALUATE NEEDED

TABLE 6.11 RIGID SUPPORT LOAD COMPARISON OF SRV (ME-88, 89)

Gilbert Associates, Inc.
Reading, Pennsylvania

ANALYSIS/CALCULATION

SUBJECT	CISID	PAGE ___ OF ___ PAGES
REV. 0 / 1 / 2 / 3		
MICROFILMED		
ORIGINATOR Lycoris		
DATE 7/28/82		

MARK NO.	TPIPE NODE NO.	EXIST DESIGN LOAD (LB)	NEW LOAD (LB)	REMARK
PR29 GUIDE	302	X +270 / -654 Z +1295 / -267	X +1651 / -2038 Z +1989 / -1416	R
PR31 GUIDE	304	X +4362 / -911 Z +36 / -456	X +7688 / -4324 Z +1103 / -1058	R
PR20 STRUT	307	+1214 / -3859	+4452 / -8643	R
PR28 GUIDE	322	X +440 / -343 Z +1212 / -1793	X +2743 / -1041 Z +5404 / -5134	R
PR27 GUIDE	323	X +203 / -2005 Z +4767 / -1276	X +691 / -8368 Z +3876 / -1569	R
PR9 RIGID ROD	326	±5860	+4565 / -5346	OK
PR3A STRUT	S332	+16300 / -16800	+4528 / -1472	OK
PR51 STRUT	333	+265 / -253	+1677 / -2663	R
PR32 GUIDE	348	F_x = +235 / -112 F_Y = +16525 / -16781 M_x = +29686 / -30814 M_Y = +6175 / -1861	F_x = +1864 / -2085 F_Y = +2931 / -2274 M_x = +365604 / -373920 M_Y = +41047 / -51901	R
		M_z = +30877 / -6343	M_z = +64380 / -54744	

* NEW LOAD BASED ON EMERGENCY RESULTS

R : RE-EVALUATE NEEDED

TABLE 6.12 RIGID SUPORT LOAD COMPARISON OF SRV (ME-91, 92)

STATUS: ☒ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0430	FILING CODE
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-4692	PAGE 43 of 44

SUBJECT: Support Load Summary Sheet

ORIGINATOR: D. SALLADE DATE 6/20/80

REV. 0

VERIFIER: J. M. GALWAY DATE 7/28/80

MARK NO. PR-7

TYPE OF SUPPORT ANCHOR

ANALYSIS CODE ME-89, ME-92

ANALYSIS JOINT NO. 108, 1

NOTE: THESE LOADS ARE COMPLETE

LOAD TYPE	BRANCH JOINT NO.	SUPPORT LOAD (LBS.) (IN.-LBS.)					
		Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	1(108) 2(1) 3( )	-25 +1 -6	+42 +0 -88	+365 +7 -0	+194 +0 -75	+5185 +0 -340	-902 +0 -1144
THERMAL	1(108) 2(1) 3( )	+1877 -0 +0 -103	+3032 -0 +336 -0	+0 -3622 +50 -0	+0 -5765 +888 -0	+0 -35854 +0 -5112	+0 -31899 +8304 -0
SEISMIC - OBE	1(108) 2(1) 3( )	±59 ±86	±307 ±21	±235 ±62	±1780 ±646	±3640 ±2879	±5459 ±537
	1( ) 2( ) 3( )						
DESIGN LOAD		+1998 -272	+3650 -374	+719 -3547	+3433 -8972	+11464 -42540	+12254 -39941
HYPOTHETICAL LOAD		+2143 -417	+3978 -702	+1016 -3844	+5859 -10498	+17983 -49059	+18250 -45937

Design loading combinations for seismic category 1, 2, 3, and non-nuclear supports

Seismic Category	Loading Case	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ± (2) OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☒ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0430	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.C. NUMBER 04-4692		PAGE 41 of 44

SUBJECT: Support Load Summary Sheet

ORIGINATOR: D. SALLADE — DATE 6/20/80
VERIFIER: G.P. BULLOCK — DATE 7/23/80
REV. 0

MARK NO. PR-8

TYPE OF SUPPORT ANCHOR

ANALYSIS CODE ME-89,93,91 COMBINED / ME-162 — ANALYSIS JOINT NO. 38 / 1

NOTE: THESE LOADS ARE COMPLETE

LOAD TYPE	BRANCH JOINT NO.	SUPPORT LOAD (LBS.) (IN.-LBS.) Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	1(38) 2(1) 3( )	+0 -69 +0 -38	+0 -152 +0 -279	+105 -0 +0 -0	+3186 -0 +7 -0	+2600 -0 +78 -0	+5250 -0 +0 -11513
THERMAL	1(38) 2(1) 3( )	+16662 -0 +64 -0	+416 -0 +439 -0	+0 -2333 +50 -0	+0 -6708 +881 -0	+0 -54644 +0 -1247	+0 -11336 +23009 -0
SEISMIC - OBE	1(38) 2(1) 3( )	±66 ±65	±30 ±9	±49 ±383	±406 ±1862	±1080 ±23320	±1054 ±224
	1( ) 2( ) 3( )						
DESIGN LOAD		+1743 -231	+461 -468	+588 -2661	+6351 -5792	+27160 -77695	+17956 -18809
HYPOTHETICAL LOAD		+1867 -355	+498 -505	+1021 -3094	+8628 -8069	+51642 -102177	+19166 -20019

Design loading combinations for seismic category 1, 2, 3, and non-nuclear supports

Seismic Category	Loading Case	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ± (2) OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

Gilbert Associates, Inc. Reading, Pennsylvania ANALYSIS/CALCULATION	SUBJECT		CISID		PAGE
	REV. 0	1	2	3	OF
	MICROFILMED				PAGES
	ORIGINATOR [signature]				
	DATE 8/5/82				

Table 6.3 -- Stress Summary of SRV Branch Piping (ME-91,92)

TPIPE TMI PWR S/RV DISCHARGE PIPING (ME- 91,92) (W.O.=045064000) LLCHOU
FROM SRV(ME-148) TO PRESSURIZER RELIEF TANK

LLC TMI/EPRI PWR/PORV PIPING EVALUATION (ME91 ,ME92)

A S M E C O D E C L A S S 2 S T R E S S S U M M A R Y

MEMBER NAME	NODAL NAME	EQN NO.	CODE STRESS	ALLOWABLE STRESS	STRESS RATIO	DESCRIPTION
3150 *	314 *	8	5625.	15500.	.36	MAX STRESS
3150 *	314 *	8	5625.	15500.	.36	MAX STRESS RATIO
3290 *	328 *	10	26258.	27000.	.97	MAX STRESS
3290 *	328 *	10	26258.	27000.	.97	MAX STRESS RATIO
3290 *	328 *	11	30145.	42500.	.71	MAX STRESS
3290 *	328 *	11	30145.	42500.	.71	MAX STRESS RATIO
3190 *	318 *	9U	8718.	18600.	.47	MAX STRESS
3190 *	318 *	9U	8718.	18600.	.47	MAX STRESS RATIO
3070 *	306 *	9E	19900.	27900.	.71	MAX STRESS
3070 *	306 *	9E	19900.	27900.	.71	MAX STRESS RATIO
3070 *	306 *	9F	35129.	37200.	.94	MAX STRESS
3070 *	306 *	9F	35129.	37200.	.94	MAX STRESS RATIO
3290 *	328 *	PR	32868.	36480.	.90	MAX STRESS
3290 *	328 *	PR	32868.	36480.	.90	MAX STRESS RATIO
3310 *	329 *	AV	24597.	600000.	.04	MAX STRESS
3310 *	329 *	AV	24597.	600000.	.04	MAX STRESS RATIO

TOTAL NUMBER OF PIPE MEMBERS WITH NODAL POINTS GREATER THAN A THRESHOLD STRESS RATIO

EQUATION 8..... 0
EQUATION 10..... 0
EQUATION 11..... 0
EQUATION 9U..... 0
EQUATION 9E..... 0
EQUATION 9F..... 0

PIPE RUPTURE.... 0
ACTIVE VALVE.... 0

Gilbert Associates, Inc. Reading, Pennsylvania CALCULATION	SUBJECT		CISID		PAGE OF PAGES
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	ORIGINATOR [signature]				
	DATE 7/30/82				

7.2.1 Material Property and Pipe Cross Section

MATERIAL PROPERTIES

MATERIAL NUMBER	COLD ELASTIC MODULUS (PSI)	POISSONS RATIO	THERMAL EXPANSION COEFFICIENT (IN/IN/FA)	MEMBER TEMPERATURE (FA)	HOT ELASTIC MODULUS (PSI)	COMMEN
1	28300000.0	.300	.000009760	550.00	28300000.0	SA312
2	28300000.0	.300	.000009650	450.00	28300000.0	SA312
3	28300000.0	.300	.000009520	340.00	28300000.0	SA312

PIPE MEMBER CROSS SECTION TYPES

SECTION NUMBER	OUTSIDE DIAMETER (IN)	WALL THICKNESS (IN)	AXIAL AREA (IN**2)	SHEAR AREA (IN**2)	FLEXURAL INERTIA (IN**4)	WEIGHT/ LENGTH (LB/FT)	SECTION DESCR[illegible]ION
1	6.625	.2800	5.58	2.79	28.1	26.57	6"PIP
2	4.500	.2370	3.17	1.59	7.2	15.45	4"PIP
3	10.750	.3650	11.91	5.96	160.7	49.43	10"PIP
4	6.625	.5600	10.67	5.37	49.5	.02	SRV
5	4.500	.4740	6.00	3.03	12.3	.02	PORV
6	18.000	8.5000	253.68	180.28	5152.9	38.00	6"EXT
7	12.000	6.5000	112.31	91.83	1017.8	28.00	4"EXT

CLASS 2 POSTPROCESSOR MATERIALS

MATL ID NUM	MATL CLASS	DESIGN PRESSURE (PSIG)	PEAK PRESSURE (PSIG)	ALLOWABLE STRESSES COLD (PSI)	HOT (PSI)	YIELD STRESS (PSI)
1	2	700.00	700.00	18500.00	15500.00	30000.00
2	2	700.00	700.00	18500.00	15500.00	30000.00
3	2	2500.00	2500.00	18500.00	15500.00	30000.00

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	DEPARTMENT NAME: PIPING	DEPT. NO.: 0432	FILING CODE: ME-
	PROJECT NAME: TMI-1	W.O. NUMBER: 04-4546-000	PAGE:
SUBJECT: 2.8 VALVE ACCELERATIONS		ORIGINATOR: Lif Hou DATE 07/16/82	VERIFIER: DATE

TAG NO.		RC-RV2		RC-V2			
JOINT NO.		V144		V146			
ISO NO.		B-312-565 Rev.4		B-312-565 Rev.4			
SRSS LOAD TOTALS	A_{1T}	1.098		0.400			
	A_{2T}	0.353		0.906			
	A_{3T}	0.922		1.065			
		ACCELERATION	ALLOWABLE	ACCELERATION	ALLOWABLE	ACCELERATION	ALLOWABLE
VERTICAL (A_{2T})		0.353 g	2 g	0.906 g	2 g		
HORIZONTAL *		1.434 g	3 g	1.137 g	3 g		

TAG NO.		RC-RV1A		RC-RV1B			
JOINT NO.		354		250			
ISO NO.		55-312-580 Rev.3		B-312-579-Rev.3			
SRSS LOAD TOTALS	A_{1T}	0.024		0.			
	A_{2T}	0.001		0.			
	A_{3T}	0.201		0.035			
		ACCELERATION	ALLOWABLE	ACCELERATION	ALLOWABLE	ACCELERATION	ALLOWABLE
VERTICAL (A_{2T})		0.001 g	2 g	0. g	2 g		
HORIZONTAL *		0.201 g	3 g	0.035 g	3 g		

* HORIZONTAL ACCELERATION = $\sqrt{(A_{1T})^2 + (A_{3T})^2}$

6.2 As a result of the analysis, some tentative conclusions and recommendations are as follows:

a. After adding one 3 kip snubber at joint no. 346 (ME-91,92), the maximun stress of the S/RV discharging piping will be within the allowable limits.

b. Valve nozzle loads shall be re-evaluated by the vendors.

c. Tank nozzle loads are lower than the allowable limits used for previous design. (see next page)

d. Spring and rigid supports need to be re-evaluated due to load changed by the piping filled with subcooled water. (see Section 6.1 comparison results)

"CONSOLIDATED" AND HANCOCK VALVES FOR NUCLEAR SERVICE

The most respected names in industrial control and measurement . . . ASHCROFT, HANCOCK and CONSOLIDATED.

DRESSER

DRESSER INDUSTRIAL VALVE & INSTRUMENT DIVISION

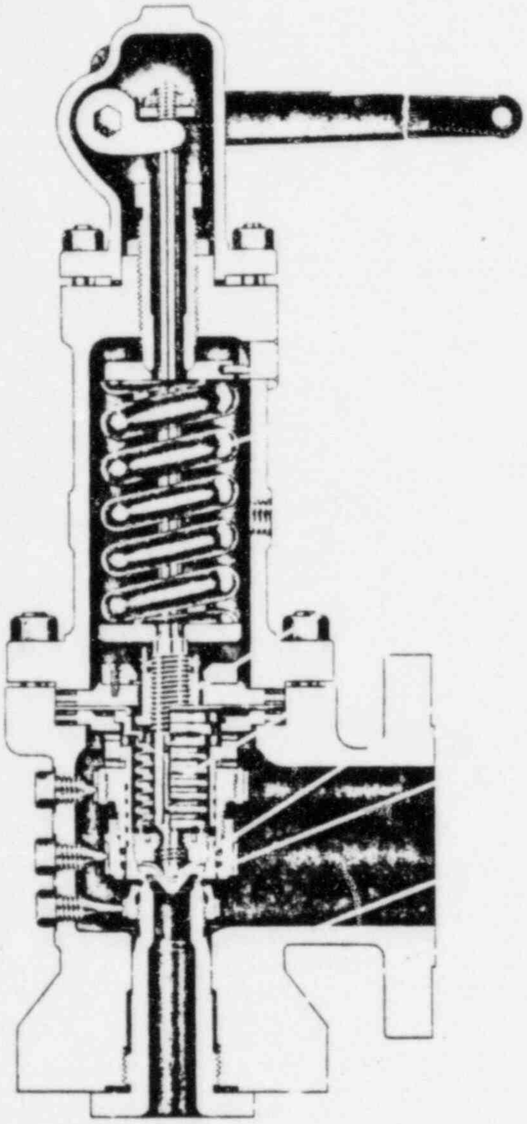
DRESSER INDUSTRIES, INC

ALEXANDRIA, LOUISIANA 71301

safety valve — series 31700

Pressurized water reactor service

Primary vessel service; closed loop systems



paւking around stainless steel shaft prevents leakage to atmosphere.

unique in closed bonnet valves, this feature prevents damage to spindle bearing points.

specially designed to eliminate eccentric loading and to provide full relieving capacity at minimum accumulation.

assures pressure balance in the event of damage to bellows. Also acts as a lift stop.

Inconel 600 suitable for back pressures up to 750 psi.

the machined spherical tip, and a small flat at the extreme end provides a better bearing point than a ball which might break as a result of stress concentration. Bearing surfaces are stellited to eliminate galling.

eliminates distortion due to thermal stresses. Temperature differentials quickly equalized and permanent tightness assured.

prevents misalignment due to unusual tightening of flange studs.

permits higher external loading than conventional valves; see Force Diagram on page 15.

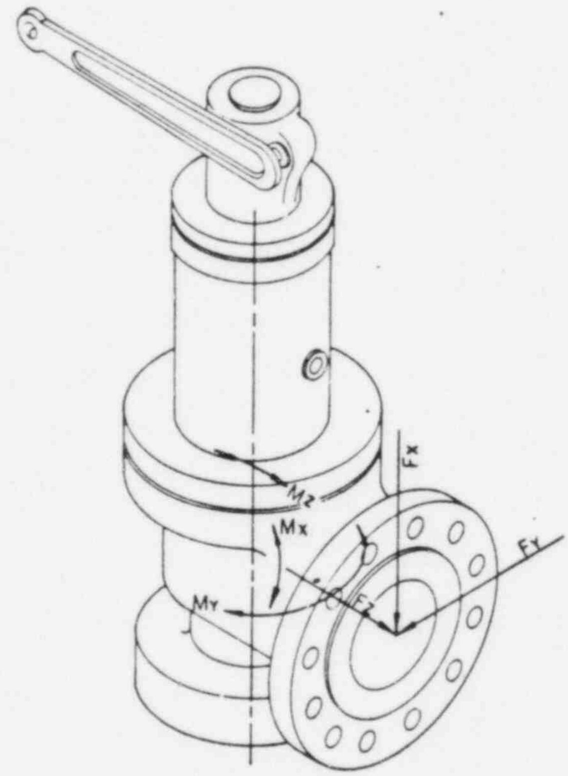
alloy steel forgings. Precision machined inlet surfaces provide optimum entrance conditions for steam flow, greater resistance to steam erosion and corrosion.

*U.S. patent #2,643,671; other patents pending.

High capacity, flat seated, reaction type safety valve with enclosed bonnet, balanced bellows, and auxiliary balanced piston, this CONSOLIDATED Maxiflow safety valve is designed to assure a maximum degree of tightness and operate under variable back pressure conditions on a pressurized water reactor.

Thermodisc® Seat

The disc seat in the CONSOLIDATED pressurizer safety valve is the Thermodisc design. The experimental work conducted by a research institute some years ago for CONSOLIDATED valves, demonstrated conclusively that extreme tightness on steam service required some means of compensating for temperature variations around the periphery of the seat bushing. This was accomplished by the Thermodisc® seat construction, a patented feature of CONSOLIDATED valves.



The guiding of the stainless steel through bushing in the flanged inlet valve is located in the upper part of the base as close to the seating area as possible. Locating the guiding area at this point permits better alignment of the seat and disc, assuring a greater degree of tightness. This eliminates the possibility of misalignment of the nozzle caused by uneven torque on the bolting when the flange of a safety valve with a through bushing is installed on a unit.

Safety valve is popped on steam. A standard test is conducted on steam, with condensate leakage maximum of 2 cc/hr. per hour after valve has "popped" and the pressure reduced to 95% of set pressure.

Experience has proven that the spring load must be transmitted to the valve disc with the load imposed as close to the seating surface as possible. The CONSOLIDATED valve design has this feature, assuring proper alignment and load distribution at the seating surface. This prevents the disc from sliding across the seat on opening and closing. In addition, the accurately centered position of the disc relative to the seat is maintained by a close tolerance guide between the disc and the disc holder.

The CONSOLIDATED pressurizer safety valve has a machine spherical tip on the spindle and a very small machined flat at the extreme end. It has been proven that this provides a better bearing than a perfect ball since stress concentration at one point on the ball will normally cause breakage of the ball.

Standard body material is ASTM A-351, Grade CF8M stainless steel to eliminate corrosion due to borated coolant water.

Material is Inconel 600, with suitable back pressure to 750 psi. Seal plate beneath spindle is welded to the disc nut which is in turn welded to the bellows. This design feature prevents any gas or steam from escaping past the disc and spindle.

The auxiliary piston in the CONSOLIDATED pressurizer safety valve compensates for bellows failure, allowing the valve to function properly and protecting equipment until the bellows can be replaced.

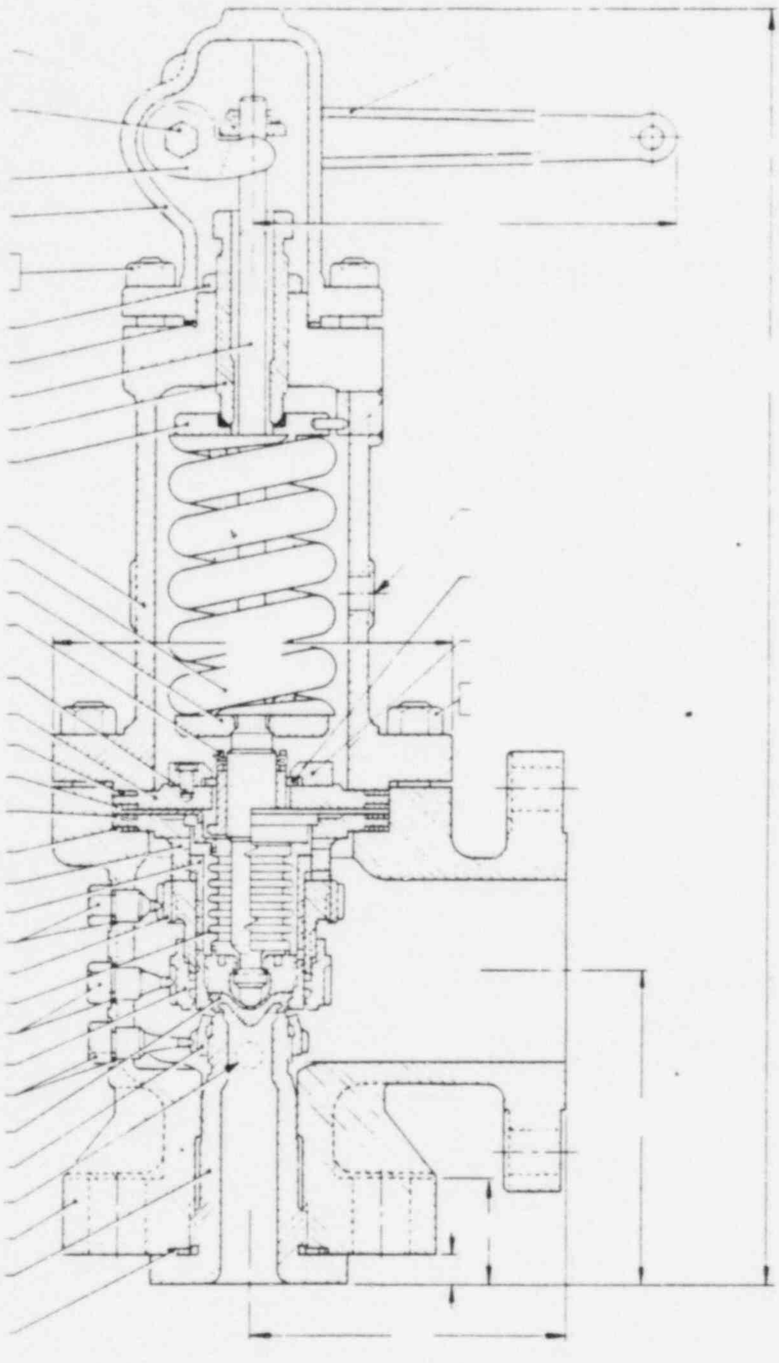
RECOMMENDED MAXIMUM EXTERNAL LOADS

VALVE TYPE	F_x Lbs.	F_y Lbs.	F_z Lbs.	MAXIMUM LOADS M_x (In.-Lbs.)	M_y & M_z (In.-Lbs.)
31719-A	250	125	125	1750	875
31729-A	270	135	135	2294	1147
31739-A	670	335	335	6700	3320
31759-A	700	350	350	7000	3500
31749-A	700	350	350	7000	3500
31709K-A	600	300	300	6000	2900

DISTRIBUTION OF SIMULTANEOUS EXTERNAL LOADS*

If F_x is:	one horizontal load may be:	and the other may be:
100	0	0
90	50	50
75	75	75
50	90	50
0	100	0

*Values shown are % of maxima



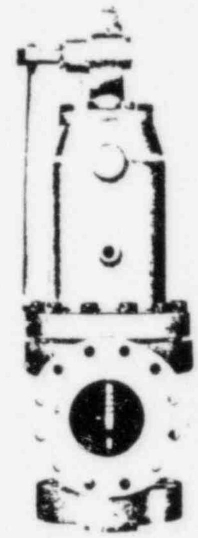
DIMENSIONS

ALL TEMPERATURE CLASSES

SIZE AND TYPE	A	B (300#)	B (600#)	C	D	E	F	G	Dismantling Height	Approx. Weight Lbs.
1½" 31719	7⅛	7⅛	8⅜	29⅜	11/16	2 7/16	9	13	39	200
2" 31729	7 9/16	8½	9¼	36½	11/16	2 11/16	10¾	18⅜	49	240
2½" 31709K	9	9 13/16	10¾	41⅝	11/16	3 1/16	10¾	20⅝	66¼	500
2½" 31739	9	9 13/16	10¾	41⅝	11/16	3 1/16	10¾	20⅝	66¼	500
3" 31759	8⅞	10	11½	45½	11/16	3 7/16	14	18⅜	70	800
3" 31749	8⅞	10	11½	45½	11/16	3 7/16	14	18⅜	70	800

MATERIALS

1	Base	ASTM A351 Grade CF8M Stainless Steel
2	Nozzle	ASTM A182 Grade F347 Stainless Steel
3	Nozzle Gasket	AISI 304 and Asbestos
4	Lower Adj. Ring	19% Chrome Stainless Steel to Eng. Inst. MA-12
5	Lower Adj. Ring Pin	13% Chrome Stainless Steel to Eng. Inst. MA-7
6	Disc	ASTM A461 Grade 688 Nickel Base Alloy
7	Guide	Monel Alloy 505
8	Bellows Assembly	
8A	Bellows	ASME SB168 Inconel 600
8B	Bellows Flange	ASME SA240 Type 316L Stainless Steel
8C	Disc Nut	ASME SA182 Grade F316L Stainless Steel
8D	Flange Adaptor	ASME SA182 Grade F316L Stainless Steel
9	Guide Gaskets	AISI 304 and Asbestos
10	Disc Holder	Monel Alloy 505
11	Upper Adj. Ring	19% Chrome Stainless Steel to Eng. Inst. MA-12
12	Upper Adj. Ring Pin	13% Chrome Stainless Steel to Eng. Inst. MA-7
13	Top Adj. Ring	19% Chrome Stainless Steel to Eng. Inst. MA-12
14	Top Adj. Ring Pin	13% Chrome Stainless Steel to Eng. Inst. MA-7
15	Spindle	ASTM A182 Grade F316 Stainless Steel
16	Lift Stop	Monel Alloy 505
17	Support Plate	AISI 410 Stainless Steel
18	Support Plate Gaskets	AISI 304 and Asbestos
19	Floating Washer	Monel Alloy 400
20	Washer Retainer	AISI 410 Stainless Steel
21	Retainer Cap Screw	AISI 316 Stainless Steel
22	Top Spring Washer Assembly	
22A	Spring Washer	ASTM A105 Grade II Carbon Steel
22B	Pin	Chrome Vanadium Steel
23	Bottom Spring Washer	ASTM A105 Grade II Carbon Steel
24	Spring	EHW Tungsten Steel to Eng. Inst. MA-16
25	Bonnet Assembly	
25A	Bonnet	ASTM A216 Grade WCB Carbon Steel
25B	Bonnet Plug	ASTM A105 Grade II Carbon Steel
26	Bonnet Stud	ASTM A193 Grade B7 Alloy Steel
27	Stud Nut	ASTM A194 Grade 2H Alloy Steel
28	Compression Screw	ASTM B98 Alloy 661
29	Compression Screw Nut	ASTM B199 Alloy 118 Leaded Nickel Silver
30	Release Nut	AISI C1018 Carbon Steel
31	Cap	ASTM A216 Grade WCB Carbon Steel
32	Cap Gasket	AISI 316 with Asbestos Filler
33	Cap Stud	ASTM A193 Grade B7 Alloy Steel
34	Cap Stud Nut	ASTM A194 Grade 2H Alloy Steel
35	Lever Shaft	13% Chrome Stainless Steel to Eng. Inst. MA-7
36	Lifting Fork	ASTM A47 Grade 35018 Malleable Iron
37	Lever	ASTM A47 Grade 35018 Malleable Iron
38	Shaft Collar (Not Shown)	13% Chrome Stainless Steel to Eng. Inst. MA-7
39	Retaining Ring (Not Shown)	17-7 PH Stainless Steel
40	Packing (Not Shown)	Asbestos
41	Packing Nut (Not Shown)	13% Chrome Stainless Steel to Eng. Inst. MA-7
42	Lever Nut (Not Shown)	ASTM A194 Grade I Steel
43	Ring Pin Gaskets	AISI 316 with Asbestos Filler



CONNECTION

Orifice Size	Orifice Dis. Area Sq. Inches	Orifice Designation	Inlet* ANSI Flange	Outlet** ANSI Flange
1½	.994	1	1½" 2500#	4" 300# R. F.
2	1.431	2	2" 2500#	4" 300# R. F.
2½	1.840	K	2½" 2500#	6" 300# R. F.
2½	2.545	3	2½" 2500#	6" 300# R. F.
3	3.341	5	3" 2500#	6" 300# R. F.
3	3.976	4	3" 2500#	6" 300# R. F.

*Flange Thickness may exceed ANSI — See Dimension Table
**Also Available with 600# Outlet.

VALVE SIZES

Pres-Temp.		Valve Size	1½"	2"	2½"	2½"	3"	3"	Pres.	Connection** ANSI Flange
		Orifice Size	.994 1	1.431 2	1.840 K	2.545 3	3.341 5	3.976 4		
Pres.	Temp. Degrees F.	Temp. Desig.								
2500	650°	A	31719A	31729A	31709KA	31739A	31759A	31749A	2500	Inlet 2500# R. F. Outlet 300# R. F.

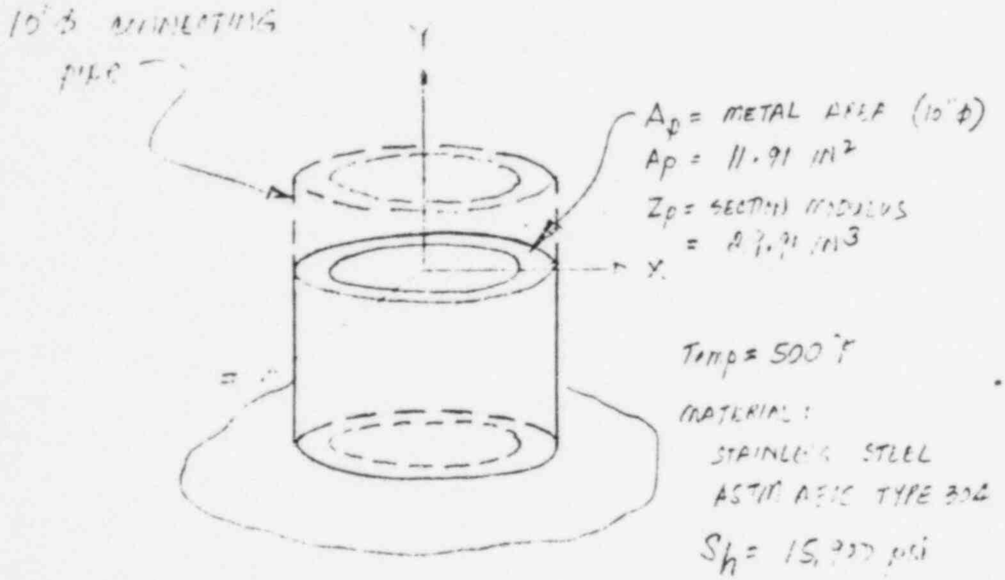
**Flange thickness may exceed ANSI (see dimension table); also available with 600# outlet.

Capacities shown on pages 18 and 19 — Outlet reaction shown on Pages 8 and 9.

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	DEPARTMENT NAME: PIPING ENGINEERING	DEPT. NO.: 0420	FILING CODE: [illegible]
	PROJECT NAME: TMI UNIT 1	W.O. NUMBER: [illegible]	PAGE

SUBJECT: REACTOR COOLANT DRAIN TANK (WDL-T3) ALLOWABLE LOADS

ORIGINATOR: [illegible]
DATE: 7/16/80
VERIFIER: [illegible]
DATE: [illegible]



VESSELS: (NON-ROTATING EQUIPMENT)

$$F_{y_{AXIAL}} = 0.035\, A_p \cdot S_h = 0.035\,(11.91)(15{,}900)$$

$$F_{y_{AXIAL}} = 6628 \text{ lbs.} \times 1.2\,(OBE) = \underline{7954 \text{ lbs.}}$$

$$\sqrt{F_{x_{SHEAR}}^2 + F_{z_{SHEAR}}^2} = 0.035\, A_p \cdot S_h = 6628 \text{ lbs.} \times 1.2\,(OBE) = \underline{7954 \text{ lbs.}}$$

$$M_{y_{TORSIONAL}} = 0.3\, Z_p \cdot S_h = 0.3\,(29.91)(15{,}900)$$

$$M_{y_{TORSIONAL}} = 142{,}671 \text{ in-lbs} \times 1.2\,(OBE) = \underline{171{,}205 \text{ in-lbs.}}$$

$$\sqrt{M_{x_{BENDING}}^2 + M_{z_{BENDING}}^2} = 0.3\, Z_p \cdot S_h = 142{,}671 \text{ in-lbs} \times 1.2\,(OBE) = \underline{171{,}205 \text{ in-lbs.}}$$

FILING CODE

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	DEPARTMENT NAME	DEPT. NO.	FILING CODE
	PROJECT NAME TMI-1	W.O. NUMBER	PAGE

SUBJECT [illegible]

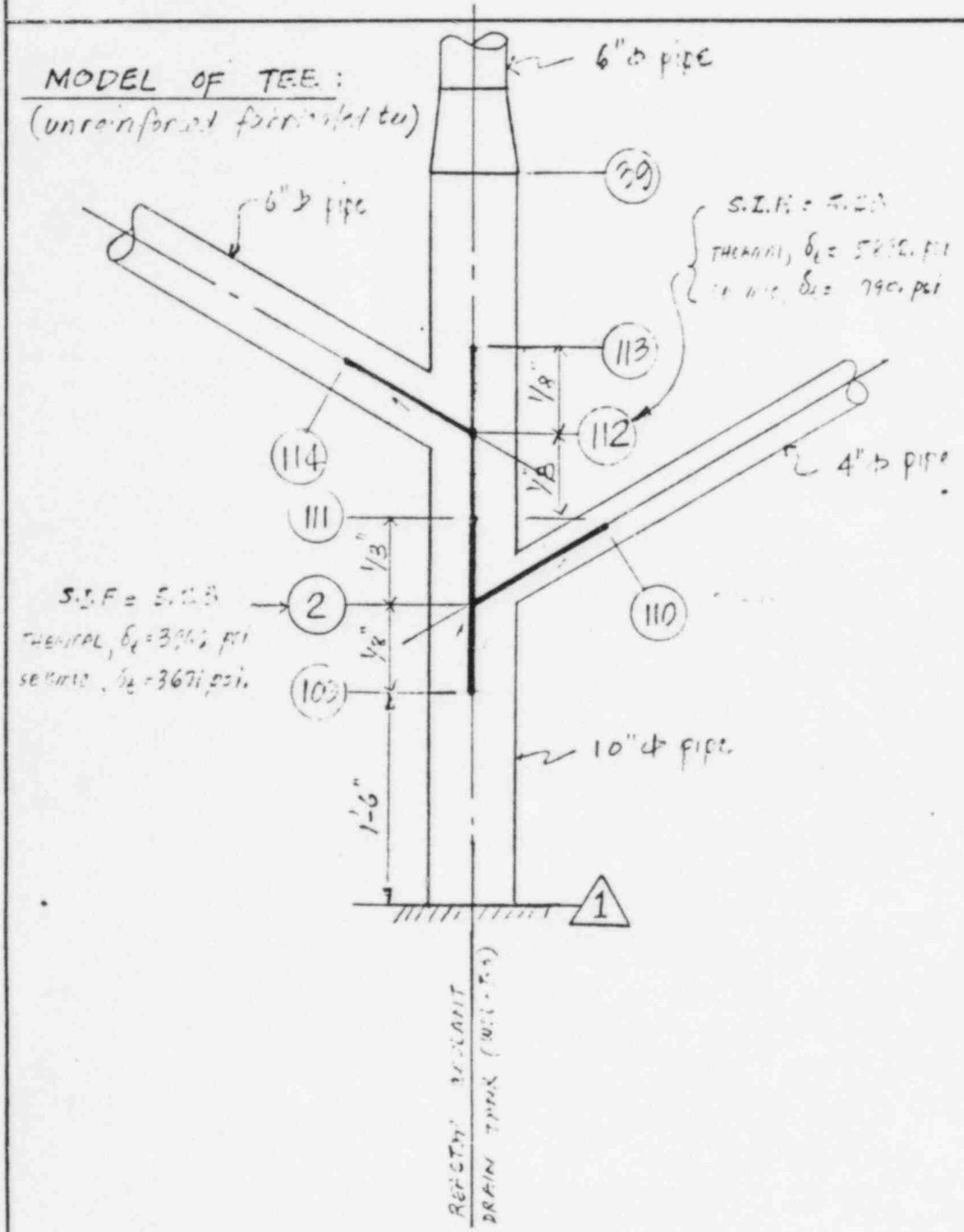
ORIGINATOR [illegible]

DATE [illegible]

VERIFIER

DATE

MODEL OF TEE:
(unreinforced fabricated tee)



∴ stresses is ok.

FILING CODE

memorandum Gilbert/Commonwealth

to: DISTRIBUTION

from: P. L. Bunker

subject: TMI-1 PORV/SRV
Meeting with GPU Nuclear
May 17, 1982, Reading

May 18, 1982

Minutes of Meeting

Purpose

A meeting was held on Monday, May 17, 1982 at GAI in Reading between GPU and GAI. The purpose was to discuss GAI's ability to provide preliminary results to GPU on an accelerated basis. PORV and SRV valve characteristics were also discussed.

Present

GAI	GPU
D. E. Aunkst	J. D. Abramovici
R. R. Brems	U. S. Bhachu
P. L. Bunker	
J. M. Cajigas	
M. Z. Lee	

Documents Exchanged

GAI memo Bunker to Brems, "TMI-1 Recommended Valve Inlet Conditions for S/RV Discharge Piping Analysis" May 17, 1982.

Discussion

1. Schedule Acceleration

GAI indicated that a preliminary evaluation of the support loads could be available to GPU 4 working days after the preliminary RELAP5 Force data is available. This will enable GPU to begin procurement of any required snubbers.

2. Progress Reporting

GAI will call J. Abramovici or U. S. Bhachu each Thursday to report progress. Followup will be by telephone conversation memorandum.

3. PORV/SRV Inlet Conditions

The GAI interpretation of the B&W "Plant Conditions Justification Report was given to GPU. GPU will review and call J. Cajigas by May 19, 1982. At that time agreement should be reached between GPU and GAI as to the valve inlet conditions.

4. PORV/SRV Valve Characteristics

The following items were discussed and tentatively agreed upon unless better information is obtained from Dresser.

(A) Valve Flow Rates to be used in RELAP5 analysis:
Use the rated steam flow and apply a 90% factor for derating and a 5% error factor.

PORV

$$m = \frac{100{,}000}{.90} \text{ lbm/hr} \times 1.05 = 116667 \frac{\text{lbm}}{\text{hr}} \text{ @ 2300 psig}$$

Safety Valves

$$m = \frac{317973}{.90} \text{ lbm/hr} \times 1.05 = 370968 \frac{\text{lbm}}{\text{hr}} \text{ @ 2500 psig}$$

(B) Valve opening times:

Safety valves;
(a) Use .040 seconds for subcooled water discharge
(b) Use .012 seconds for steam discharge
PORV;
(a) Use .060 seconds for subcooled water discharge

(C) PORV Cv vs. Stroke
(a) GPU does not have a Cv vs. stroke curve.
(b) GAI will contact Jim Correa (GPU) and discuss the problems. Jim or GAI will contact Dresser.

(D) Safety Valve Ring Settings
GPU does not have this information. They expect ring settings to be changed after valves are relocated.

P. L. Bunker

P. L. BUNKER
NUCLEAR ANALYSIS

PLB:jah
cc: Attendees
R. E. Anderson
G. M. Kowal
R. Murthy
M. M. Waselus

ATTACHMENT A

SEISMIC CRITERIA DOCUMENTS

October 9, 1969

October 9, 1969

TO: Mr. B. R. Wheelock, Jr.

FROM: K. E. Nodland

SUBJECT: Three Mile Island Nuclear Station
Piping - Seismic Analysis
GAI-1192

In accordance with our previous discussion and in reply to your memo dated September 30, 1969; the following information should answer your request.

The seismic pipe analysis for Class I piping is performed with "QUAKE-PIPE STRESS", which is based on maximum response due to 0.06g horizontal ground motion, using 0.5% damping, for a system's undampened natural frequency. In addition the effect of vertical ground motion is specified by the FSAR to be 2/3 of the horizontal ground motion. Refer to Fig. 3.1.1, Amendment #6 of the FSAR. The factor of 2/3 for the vertical seismic stresses must be applied to the results from "QUAKE-PIPE STRESS" before combining these results with the horizontal seismic stresses and other load combinations.

For maximum hypothetical earthquake equal to 0.12g horizontal ground motion, the previous results due to 0.06g horizontal ground motion shall be doubled; and similar for vertical ground motion.

Amplification factors for equipments at different elevation located in various buildings have been furnished by D. A. Godfrey in his memo to C. H. Ritting dated January 13, 1969. Those amplification factors shall be applied to the final results as obtained from "QUAKE-PIPE STRESS".

REACTOR BUILDING Elevation:	Reactor Building, Interior Structures, Amplification Factors	Reactor Building Shell Amplification Factors
281'-0"	1.00	1.00
303'-0"	2.00	1.00
326'-0"	2.85	1.60
346'-0"	3.72	2.04
365'-0"	4.45	2.65
436'-0"	—	4.12

For piping located at different elevations, use the most conservative amplification factor.

GAI-35 8/54

[illegible] between the above elevations. [illegible]

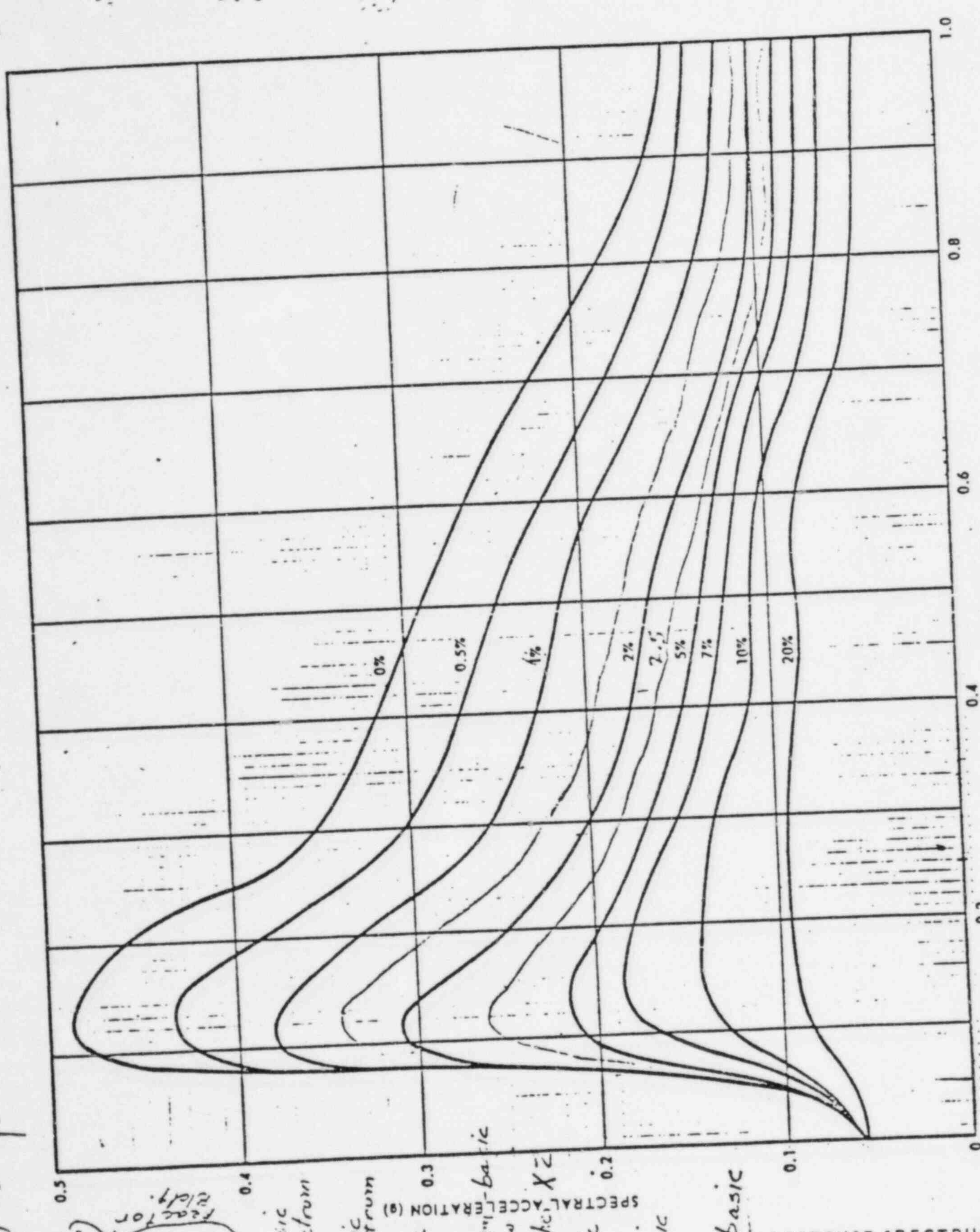
The first mode horizontal frequency is 3.82 cps for the reactor building.

K. E. Nodland

K. E. Nodland

KEN:flg

cc: C. H. Eitting
W. R. Shade
W. E. Mock
J. E. Bohen, Jr.
J. Grzelakowski
D. K. Cronsberger
W. J. Leininger
K. Akselsen



RESPONSE SPECTRUM

FIGURE 3.1-1

AMEND. 6 (1-8-68)

FOR .06 g.

of the response (i.e., stress, shear, moment, or deflection) of each contributing mode due to vertical motion to the corresponding absolute values of the response of each contributing mode due to horizontal motion.

Damping Factors

The following damping factors have been applied to the maximum earthquake in the seismic design of components and structures:

Component or Structure	Percent of Critical Damping
1. Reactor Building	2.0
2. Concrete Support Structures Inside the Reactor Building	2.0
3. Assemblies and Structures	
(a) Bolted or Riveted	2.5
(b) Welded	1.0
4. Vital Piping Systems	0.5
5. Other Concrete Structures above ground	5.0

Scaled plots of stress resultants, stress couples, shear, and deflections for seismic load are shown in Figures 5-20, 5-21, 5-22, 5-23, and 5-24.

ALLOWABLE STRESS
OBE - increase by 33%
DBE - up to yield

MEMORANDUM

GILBERT ASSOCIATES, INC.

June 17, 1970

TO: Mr. C. H. Bitting

FROM: D. D. Krause

SUBJECT: Three Mile Island Nuclear Station
Unit No. 1
Seismic Design

Refer to K. E. Hodland's memo of January 9, 1970. As mentioned there, normal engineering practice often requires the development and utilization of new information as it becomes available.

Accompanying this memo is a guide entitled "Seismic Design for Equipment Specifications. The typical seismic design requirements described therein remain the same for any equipment mounted on the included structures.

These floor response spectrum curves have been generated from output of a program based on the report Seismic Analysis of Equipment Mounted on a Massive Structure by J. M. Biggs and J. M. Roesset of MIT. Input to the new program is from the QUAKE program. The curves are based on the .06g design earthquake with 5% structural damping and 0.5% equipment damping. Curves for other buildings will be available in the near future.

D.D.K

D. D. Krause

DDK:flg
Attachment

cc: W. R. Shade
K. T. Kerese
H. F. Lorenz
C. Chen
W. Meck
J. Cohen, Jr.
E. R. Wheelock, Jr.
A. M. Larson
W. Shields
H. Seiler
D. K. Cronsberger
W. J. Leininger
K. Akselsen
L Foster

Note: FRANK BELL HAS FOLDER WITH COMPUTER OUTPUT AND CURVES FOR
REAC
AUX, FUEL, CONT.
INTERM,
INTAKE

1-17-71

TABLE OF CONTENTS

TYPICAL SEISMIC REQUIREMENTS FOR EQUIPMENT SPECIFICATIONS

The assembled switch, components and wiring shall be designed so that the function of the circuits or components will be performed in accordance with the specification when subjected to the horizontal acceleration plus two-thirds (2/3) of the vertical acceleration acting simultaneously.

In addition, equipment, accessories, controls, components, and wiring shall not dislodge nor suffer relative movement resulting in any loss of function for the seismic condition:

> 2X (horizontal accel.) plus 2X (2/3 vertical accel.) acting simultaneously.

Horizontal Acceleration:

Calculate the natural period of the equipment for the horizontal direction chosen such that the corresponding acceleration from the response spectrum is maximum.

If the natural period is unknown, use the maximum possible acceleration of the spectrum.

Vertical Acceleration:

Calculate the natural period of the equipment in the vertical direction. From the appropriate response spectrum, find the corresponding acceleration. Similarly, if the natural period is unknown, use the maximum possible acceleration for the particular response spectrum.

Choosing the Appropriate Floor Response Spectrum:

Use the floor response spectrum for the floor closest to the location of the equipment.

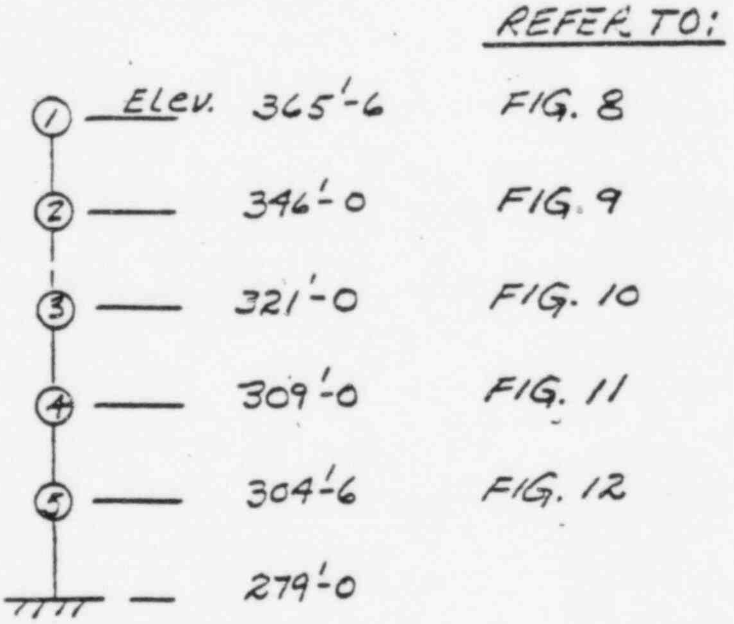
For example, given a piece of equipment that must be specified for seismic requirements and is located in the Auxiliary Building at El. 310'.

Refer to Fig. 1 showing the mass model for the Auxiliary, Fuel Handling and Control Buildings. The closest mass point to El. 310' is mass point 5 at El. 302'-6". Therefore, Fig. 6 showing the floor response of mass point 5 would be included in the specifications along with the typical seismic requirements.

METROPOLITAN EDISON COMPANY	MADE	GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PENNA.			
	CHK'D.				
	SQ. CF.				
	CF. DFM.			9	
	ENG.	WORK ORDER	SIZE	DRAWING	REV.
	REV. CH. APP. DATE				

REACTOR BUILDING

INTERIOR CONCRETE



LUMPED MASS MODEL
FOR DYNAMIC ANALYSIS

FIG. 7

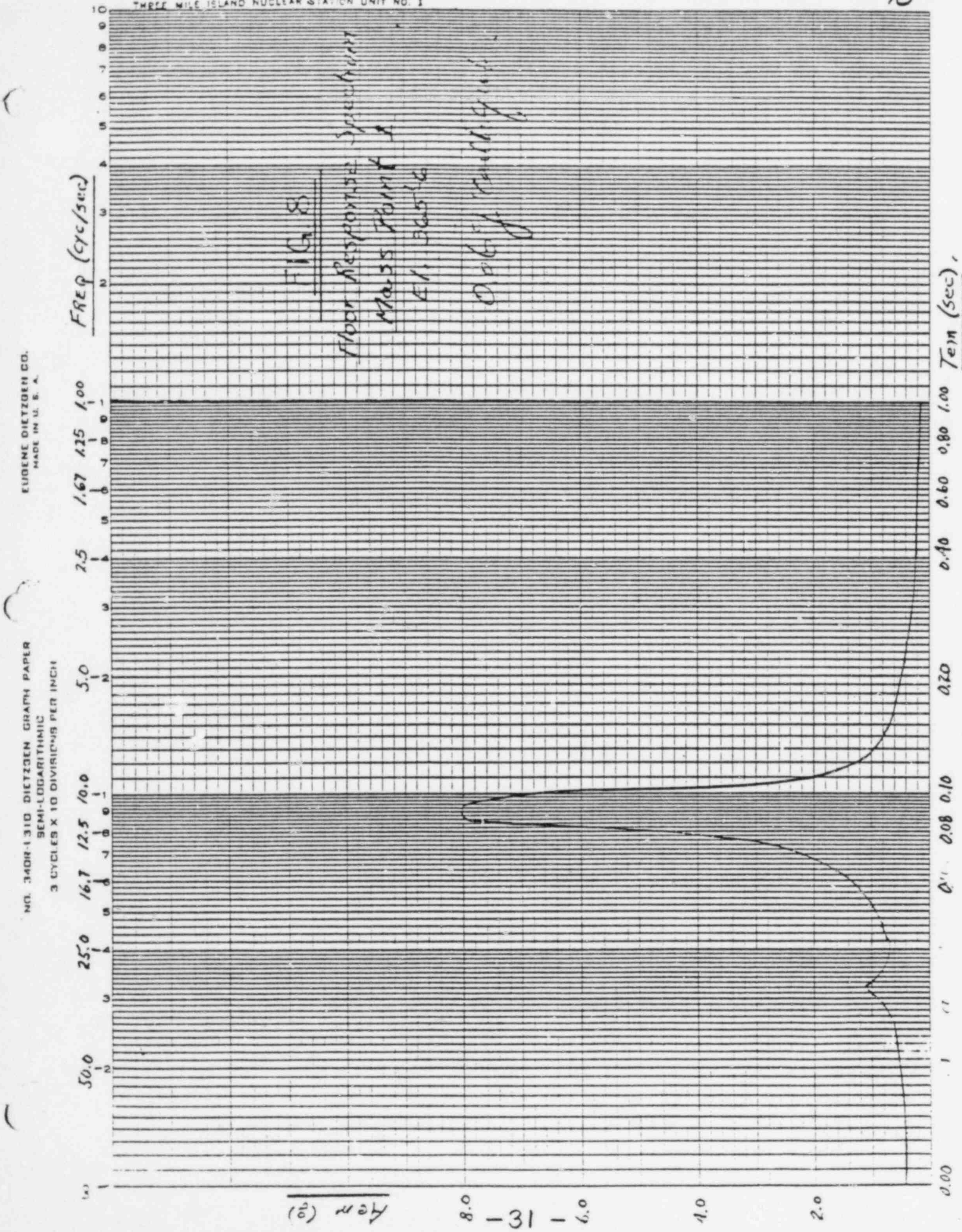


FIG. 8
Floor Response Spectrum
Mass Point 4
El. 365'-6
FREQ (cyc/sec)
1.00
1.25
1.67
2.5
5.0
10.0
12.5
16.7
25.0
50.0
TEM (sec)
0.00
0.08
0.10
0.20
0.40
0.60
0.80
1.00
Acm (g)
8.0
6.0
4.0
2.0
EUGENE DIETZGEN CO.
MADE IN U.S.A.
NO. 340R-L310 DIETZGEN GRAPH PAPER
SEMI-LOGARITHMIC
3 CYCLES X 10 DIVISIONS PER INCH

7. DESIGN INPUT

7.1 Assumption

a. piping filled with water was used in the completed analysis (DW+THERMAL+OBE+BLOWDOWN). Additionally, piping filled with steam was analyzed in deadweight case only.

b. Three piping branches are structurally independent each other.

c. Valves were simulated as the same size pipe but doubled pipe thickness.

d. 450°F was used to piping thermal expansion analysis. (ref. to AEA's RELAP5 analysis)

7.2 Input Data for Time History, OBE, THERMAL

Gilbert Associates, Inc.
Reading, Pennsylvania

CALCULATION

SUBJECT			CISID		PAGE
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MICROFILMED					PAGES
ORIGINATOR	[illegible signature]				
DATE	7/30/82				

TPIPE TMI PWR S/RV DISCHARGE PIPING (ME-162,93) (W.O.-045064000) LLCHOU
FROM PORV(RC-RV2) TO PRESSURIZER RELIEF TANK
S U P P O R T   A N D   L U G   D E S I G N   I N F O R M A T I O N

TPIPE VERSION G/C4.2
RUN DATE- 82/06/17.

NODE NAME		SUPPORT DIR	TYP	CLS	*DESIGN TRAVL* +	-	*MAX PIPE MOVEMENT* X	Y	Z	NORMAL SUST.	***UPSET*** + EXPAN	-	+ OCCAS	-	***EMERGENCY*** + OCCAS (LUG DSGN LOAD)	-	***FAULTED*** + OCCAS (LUG ALLOW STRS)	-	
H100	*	X	AN	2			0.000	0.000	0.000	-1.	91.	0.	31.	-31.	37.	-37.	51.	-51.	LBS
		Y	AN	2			0.000	0.000	0.000	-389.	0.	-378.	262.	-262.	267.	-267.	282.	-282.	LBS
		Z	AN	2			0.000	0.000	0.000	15.	84.	0.	68.	-68.	81.	-81.	110.	-110.	LBS
		XM	AN	2			0.000	0.000	0.000	-261.	57.	0.	302.	-302.	359.	-359.	492.	-492.	FTLB
		YM	AN	2			0.000	0.000	0.000	1.	0.	-1.	64.	-64.	83.	-83.	122.	-122.	FTLB
		ZM	AN	2			0.000	0.000	0.000	3.	0.	-340.	105.	-105.	126.	-126.	175.	-175.	FTLB
102	*	X	RR	2			0.000	.538	0.000	2.	0.	-208.	125.	-125.	150.	-150.	208.	-208.	LBS
																414.		30000.	
102	*	Z	RR	2			0.000	.538	0.000	-15.	0.	-83.	91.	-91.	188.	-188.	341.	-341.	LBS
																440.		30000.	
103	*	SX	DS	2	0.000	-.656	.656	.155	.053				213.	-213.	244.	-244.	320.	-320.	LBS
																213.		15234.	
104	*	X	RR	2			0.000	1.492	0.000	-136.	1331.	0.	168.	-168.	449.	-449.	849.	-849.	LBS
																2044.		30000.	
104	*	Z	RR	2			0.000	1.492	0.000	2.	0.	-281.	172.	-172.	209.	-209.	293.	-293.	LBS
																572.		30000.	
107	*	X	RR	2			0.000	1.669	.093	135.	0.	-1436.	344.	-344.	571.	-571.	974.	-974.	LBS
																2274.		30000.	
107	*	Y	CS	2	1.644	0.000	0.000	1.669	.093	-251.	0.	-0.							LBS
																251.		12334.	
112	*	Y	CS	2	1.508	0.000	.323	1.725	.340	-113.	0.	0.							LBS
																113.		12463.	
S113	*	X	DS	2	0.000	-.035	.035	1.253	.527				316.	-316.	339.	-339.	401.	-401.	LBS
																316.		18595.	
116	*	Y	US	2	.425	0.000	.044	.637	.484	-150.	0.	0.							LBS
																150.		12241.	
117	*	Y	DS	2	0.000	-.550	.066	.550	.103				499.	-499.	506.	-506.	526.	-526.	LBS
																499.		14487.	
120	*	X	RR	2			0.000	.609	0.000	-6.	597.	0.	77.	-77.	87.	-87.	113.	-113.	LBS
																704.		30000.	
120	*	Z	RR	2			0.000	.609	0.000	-2.	0.	-802.	539.	-539.	548.	-548.	575.	-575.	LBS
																1379.		30000.	
121	*	X	RR	2			0.000	.258	0.000	15.	0.	-2211.	115.	-115.	139.	-139.	195.	-195.	LBS
																2195.		18799.	
121	*	Z	RR	2			0.000	.258	0.000	-16.	3656.	0.	275.	-275.	288.	-288.	324.	-324.	LBS
																3635.		18799.	
124	*	Y	US	2	0.000	-.040	.297	.069	.189	-303.	0.	0.							LBS
																303.		12223.	
129	*	X	AN	2			0.000	0.000	0.000	-9.	1734.	0.	591.	-591.	592.	-592.	593.	-593.	LBS
		Y	AN	2			0.000	0.000	0.000	-143.	411.	0.	93.	-93.	100.	-100.	118.	-118.	LBS
		Z	AN	2			0.000	0.000	0.000	17.	0.	-2639.	242.	-242.	381.	-381.	636.	-636.	LBS
		XM	AN	2			0.000	0.000	0.000	13.	0.	-418.	65.	-65.	164.	-164.	307.	-307.	FTLB
		YM	AN	2			0.000	0.000	0.000	53.	0.	-4824.	424.	-424.	1544.	-1544.	3000.	-3000.	FTLB
		ZM	AN	2			0.000	0.000	0.000	-53.	0.	-160.	230.	-230.	269.	-269.	362.	-362.	FTLB
132	*	X	RR	2			0.000	.666	0.000	-15.	185.	0.	114.	-114.	161.	-161.	253.	-253.	LBS
																423.		30000.	
132	*	Z	RR	2			0.000	.666	0.000	7.	641.	0.	109.	-109.	218.	-218.	393.	-393.	LBS
																1042.		30000.	
S133	*	Y	DS	2	1.033	0.000	.046	1.033	.049				1118.	-1118.	1136.	-1136.	1191.	-1191.	LBS
																1118.		18595.	
134	*	X	RR	2			0.000	1.040	0.000	16.	0.	-21.	222.	-222.	296.	-296.	449.	-449.	LBS
																239.		12569.	
134	*	Z	RR	2			0.000	1.040	0.000	4.	0.	-1703.	289.	-289.	445.	-445.	735.	-735.	LBS
																2434.		30000.	
137	*	Y	CS	2	1.300	0.000	.173	1.338	.317	-517.	0.	0.							LBS
																517.		11642.	
S138	*	SX	DS	2	.006	0.000	.006	1.657	.461				445.	-445.	537.	-537.	747.	-747.	LBS
																747.		30000.	
148	*	X	AN	2			0.000	0.000	0.000	-2.	0.	-64.	579.	-579.	849.	-849.	1369.	-1369.	LBS
		Y	AN	2			0.000	0.000	0.000	-924.	0.	-33.	433.	-433.	760.	-760.	1321.	-1321.	LBS
		Z	AN	2			0.000	0.000	0.000	-11.	1133.	0.	926.	-926.	1351.	-1351.	2176.	-2176.	LBS
		XM	AN	2			0.000	0.000	0.000	-67.	3090.	0.	2031.	-2031.	2612.	-2612.	3861.	-3861.	FTLB
		YM	AN	2			0.000	0.000	0.000	11.	677.	-0.	601.	-601.	1081.	-1081.	1895.	-1895.	FTLB
		ZM	AN	2			0.000	0.000	0.000	-894.	152.	0.	1894.	-1894.	2843.	-2843.	4645.	-4645.	FTLB

TPIPE TMI PWR S/RV DISCHARGE PIPING (ME- 88,89) (W.O.-045064000) LLCHOU
FROM SRV(ME-147) TO PRESSURIZER RELIEF TANK

TPIPE VERSION G/C4.2
RUN DATE- 82/06/10.

S U P P O R T   A N D   L U G   D E S I G N   I N F O R M A T I O N

NODE NAME	SUPPORT DIR	TYP	CLS	*DESIGN TRAVL* +	-	*MAX PIPE MOVEMENT* X	Y	Z	NORMAL SUST.	***UPSET*** + EXPAN	-	+ OCCAS	-	***EMERGENCY*** + OCCAS	- (LUG DSGN LOAD)	***FAULTED*** + OCCAS	- (LUG ALLOW STRS)	
H200 *	X	AN	2			0.000	0.000	0.000	-2.	208.	0.	5.	-5.	7.	-7.	15.	-15.	LBS
	Y	AN	2			0.000	0.000	0.000	-1730.	0.	-534.	2937.	-2937.	2937.	-2937.	2987.	-2987.	LBS
	Z	AN	2			0.000	0.000	0.000	-1.	0.	-56.	35.	-35.	44.	-44.	96.	-96.	LBS
	XM	AN	2			0.000	0.000	0.000	-4.	0.	-236.	109.	-109.	186.	-186.	388.	-388.	FTLB
	YM	AN	2			0.000	0.000	0.000	-3.	511.	0.	29.	-29.	76.	-76.	155.	-155.	FTLB
	ZM	AN	2			0.000	0.000	0.000	9.	0.	-872.	16.	-16.	30.	-30.	61.	-61.	FTLB
200 *	X	RR	2			0.000	.457	0.000	5.	0.	-489.	8.	-8.	16.	-16.	34.	-34.	LBS
															518.		30000.	
200 *	Z	RR	2			0.000	.457	0.000	2.	132.	0.	54.	-54.	104.	-104.	216.	-216.	LBS
															350.		30000.	
201 *	X	RR	2			0.000	1.228	0.000	-259.	3488.	0.	398.	-398.	782.	-782.	1613.	-1613.	LBS
															4842.		30000.	
201 *	Z	RR	2			0.000	1.228	0.000	-0.	0.	-199.	455.	-455.	455.	-455.	457.	-457.	LBS
															455.		14345.	
204 *	X	RR	2			0.000	1.360	.053	258.	0.	-3446.	1733.	-1733.	1733.	-1733.	2309.	-2309.	LBS
															5497.		30000.	
204 *	Y	CS	2	1.345	0.000	0.000	1.360	.053	-567.	0.	-0.							LBS
															567.		11595.	
5206 *	Z	DS	2	.153	0.000	.289	1.723	.153				1525.	-1525.	1525.	-1525.	1570.	-1570.	LBS
															1525.		18598.	
207 *	Y	CS	2	1.496	0.000	.289	1.667	.086	-520.	0.	0.							LBS
															520.		11385.	
210 *	Y	VS	2	.988	0.000	.405	1.476	.331	-523.	0.	0.							LBS
															523.		11282.	
211 *	X	DS	2	0.000	-.217	.217	1.004	.538				2640.	-2640.	2640.	-2640.	2651.	-2651.	LBS
															2640.		13157.	
214 *	Y	VS	2	.230	0.000	.157	.734	.514	-612.	0.	0.							LBS
															612.		11315.	
215 *	Y	DS	2	0.000	-.515	.069	.515	.083				3805.	-3805.	3805.	-3805.	3964.	-3964.	LBS
															3805.		11627.	
218 *	X	RR	2			0.000	.538	0.000	-61.	817.	0.	1480.	-1480.	1480.	-1480.	1490.	-1490.	LBS
															1541.		9593.	
218 *	Z	RR	2			0.000	.538	0.000	4.	0.	-2021.	6213.	-6213.	6213.	-6213.	6479.	-6479.	LBS
															6217.		9593.	
219 *	X	RR	2			0.000	.263	0.000	218.	0.	-3699.	1205.	-1205.	1205.	-1205.	1258.	-1258.	LBS
															4739.		30000.	
219 *	Z	RR	2			0.000	.263	0.000	-382.	7146.	0.	1543.	-1543.	1543.	-1543.	1578.	-1578.	LBS
															6764.		22219.	
222 *	Y	VS	2	0.000	-.047	.201	.083	.080	-1467.	0.	0.							LBS
															1467.		10554.	
227 *	X	AN	2			0.000	0.000	0.000	-157.	2669.	0.	2162.	-2162.	2162.	-2162.	2188.	-2188.	LBS
	Y	AN	2			0.000	0.000	0.000	-276.	0.	-879.	1147.	-1147.	1147.	-1147.	1613.	-1613.	LBS
	Z	AN	2			0.000	0.000	0.000	377.	0.	-5032.	1068.	-1068.	1307.	-1307.	2825.	-2825.	LBS
	XM	AN	2			0.000	0.000	0.000	517.	0.	-372.	1412.	-1412.	2479.	-2479.	5155.	-5155.	FTLB
	YM	AN	2			0.000	0.000	0.000	822.	0.	-7682.	3489.	-3489.	5547.	-5547.	11630.	-11630.	FTLB
	ZM	AN	2			0.000	0.000	0.000	-614.	0.	-4665.	2585.	-2585.	2585.	-2585.	5264.	-5264.	FTLB

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TPIPE TMI PUR S/RV DISCHARGE PIPING (ME- 88,89) (W.O.-045064000) LLCHOU
FROM SRV(ME-147) TO PRESSURIZER RELIEF TANK

TPIPE VERSION G/C4.2
RUN DATE- 82/06/18.

S U P P O R T   A N D   L U G   D E S I G N   I N F O R M A T I O N

NODE NAME		SUPPORT DIR	TYP	CLS	*DESIGN TRAVL* +	-	*MAX PIPE MOVEMENT* X	Y	Z	NORMAL SUST.	***UPSET*** + EXPAN	-	+ OCCAS	-	***EMERGENCY*** + OCCAS	- (LUG DSGN LOAD)	***FAULTED*** + OCCAS	- (LUG ALLOW STRS)	
5230	*	SX	RR	2			.000	.244	.384	56.	1667.	0.	1658.	-1658.	1658.	-1658.	1801.	-1801.	LBS
																3524.		30000.	
233	*	Y	VS	2	.194	0.000	.142	.272	.783	-1008.	0.	0.							LBS
																1008.		11073.	
5234	*	X	DS	2	.298	0.000	.298	.629	.681				4318.	-4318.	4318.	-4318.	4350.	-4350.	LBS
																4318.		18598.	
237	*	Z	DS	2	0.000	-.318	.524	1.024	.318				2039.	-2039.	2039.	-2039.	2682.	-2682.	LBS
																2039.		11879.	
238	*	Y	DS	2	1.050	0.000	.506	1.050	.387				1424.	-1424.	1424.	-1424.	1443.	-1443.	LBS
																1424.		12326.	
241	*	Y	CS	2	1.095	0.000	.387	1.108	.620	-1046.	0.	0.							LBS
																1046.		10217.	
242	*	X	DS	2	.180	0.000	.180	1.064	.883				446.	-446.	446.	-446.	482.	-482.	LBS
																446.		11341.	
245	*	X	AN	2			0.000	0.000	0.000	-11.	404.	0.	68.	-68.	115.	-115.	240.	-240.	LBS
		Y	AN	2			0.000	0.000	0.000	-1072.	0.	-333.	2278.	-2278.	2278.	-2278.	2286.	-2286.	LBS
		Z	AN	2			0.000	0.000	0.000	0.	0.	0.	0.	0.	0.	0.	0.	0.	LBS
		XM	AN	2			0.000	0.000	0.000	140.	0.	-185.	3623.	-3623.	17140.	-17140.	34471.	-34471.	FTLB
		YM	AN	2			0.000	0.000	0.000	-9.	768.	0.	1441.	-1441.	1441.	-1441.	2093.	-2093.	FTLB
		ZM	AN	2			0.000	0.000	0.000	-95.	556.	0.	387.	-387.	591.	-591.	1243.	-1243.	FTLB
252	*	X	AN	2			0.000	0.000	0.000	0.	0.	-236.	0.	0.	0.	-0.	0.	-0.	LBS
		Y	AN	2			0.000	0.000	0.000	-937.	103.	0.	372.	-372.	372.	-372.	567.	-567.	LBS
		Z	AN	2			0.000	0.000	0.000	-0.	31.	0.	2563.	-2563.	2563.	-2563.	5485.	-5485.	LBS
		XM	AN	2			0.000	0.000	0.000	-531.	633.	0.	2392.	-2392.	2752.	-2752.	6002.	-6002.	FTLB
		YM	AN	2			0.000	0.000	0.000	0.	1289.	0.	0.	0.	0.	-0.	0.	-0.	FTLB
		ZM	AN	2			0.000	0.000	0.000	0.	85.	0.	0.	0.	0.	-0.	0.	-0.	FTLB

TPIPE TMI PUR S/RV DISCHARGE PIPING (ME- 91,92) (W.O.-045064000) LLCHO
FROM SRU(ME-148) TO PRESSURIZER RELIEF TANK

TPIPE VERSION G/C4.2
RUN DATE- 82/06/17.

S U P P O R T   A N D   L U G   D E S I G N   I N F O R M A T I O N

NODE NAME	SUPPORT DIR	TYP	CLS	*DESIGN TRAVL* +	-	*MAX PIPE MOVEMENT* X	Y	Z	NORMAL SUST.	***UPSET*** + EXPAN	-	+ OCCAS	-	***EMERGENCY*** + OCCAS (LUG DSGN	- LOAD)	***FAULTED*** + OCCAS (LUG ALLOW	- STRS)	
H300 *	X	AN	2			0.000	0.000	0.000	-3.	167.	0.	530.	-530.	530.	-530.	674.	-674.	LBS
	Y	AN	2			0.000	0.000	0.000	-541.	0.	-243.	4019.	-4019.	4019.	-4019.	4282.	-4282.	LBS
	Z	AN	2			0.000	0.000	0.000	-15.	0.	-299.	1155.	-1155.	1155.	-1155.	1218.	-1218.	LBS
	XM	AN	2			0.000	0.000	0.000	379.	0.	-1283.	2684.	-2684.	2684.	-2684.	3268.	-3268.	FTLB
	YM	AN	2			0.000	0.000	0.000	3.	1322.	0.	655.	-655.	655.	-655.	891.	-891.	FTLB
	ZM	AN	2			0.000	0.000	0.000	12.	0.	-412.	1432.	-1432.	1432.	-1432.	1917.	-1917.	FTLB
302 *	X	RR	2			0.000	.402	0.000	6.	0.	-414.	928.	-928.	928.	-928.	1709.	-1709.	LBS
															934.		13138.	
302 *	Z	RR	2			0.000	.402	0.000	8.	405.	0.	781.	-781.	795.	-795.	1772.	-1772.	LBS
															2185.		30000.	
S303 *	Y	DS	2	.513	0.000	.040	.513	.067				2308.	-2308.	2308.	-2308.	2442.	-2442.	LBS
															2308.		18598.	
304 *	X	RR	2			0.000	1.151	0.000	-569.	3884.	0.	711.	-711.	3093.	-3093.	6227.	-6227.	LBS
															9541.		30000.	
304 *	Z	RR	2			0.000	1.151	0.000	8.	0.	-32.	1032.	-1032.	1032.	-1032.	1040.	-1040.	LBS
															1041.		13744.	
367 *	X	RR	2			0.000	1.248	.091	565.	0.	-3857.	1719.	-1719.	3067.	-3067.	6370.	-6370.	LBS
															9662.		30000.	
307 *	Y	CS	2	1.224	0.000	0.000	1.248	.091	-1839.	0.	0.							LBS
															1839.		10752.	
308 *	Z	DS	2	.529	0.000	.226	1.791	.529				2286.	-2286.	2286.	-2286.	2356.	-2356.	LBS
															2286.		13680.	
311 *	Y	CS	2	1.388	0.000	.653	1.891	.373	-672.	0.	0.							LBS
															672.		10804.	
314 *	Y	US	2	.749	0.000	1.010	1.766	.286	-900.	0.	0.							LBS
															900.		9981.	
317 *	X	DS	2	0.000	-.645	.645	.834	.572				3359.	-3359.	3359.	-3359.	3390.	-3390.	LBS
															3359.		11498.	
318 *	Y	US	2	0.000	-.198	.455	.517	.318	-946.	0.	0.							LBS
															946.		9860.	
319 *	Y	DS	2	0.000	-.425	.119	.425	.072				2627.	-2627.	2627.	-2627.	3978.	-3978.	LBS
															2627.		11672.	
322 *	X	RR	2			0.000	.425	0.000	-39.	1765.	0.	786.	-786.	786.	-786.	897.	-897.	LBS
															2623.		30000.	
322 *	Z	RR	2			0.000	.425	0.000	-59.	0.	-900.	5040.	-5040.	5040.	-5040.	5092.	-5092.	LBS
															5099.		10415.	
323 *	X	RR	2			0.000	.149	0.000	39.	0.	-7707.	527.	-527.	527.	-527.	591.	-591.	LBS
															7668.		22015.	
323 *	Z	RR	2			0.000	.149	0.000	45.	2409.	0.	1384.	-1384.	1384.	-1384.	1433.	-1433.	LBS
															3886.		30000.	
326 *	Y	RR	2			.296	0.000	.035	-1009.	0.	-565.	3218.	-3218.	3218.	-3218.	4197.	-4197.	LBS
															4227.		13109.	
329 *	X	AN	2			0.000	0.000	0.000	-5.	5204.	0.	3008.	-3008.	3008.	-3008.	3087.	-3087.	LBS
	Y	AN	2			0.000	0.000	0.000	-588.	0.	-1210.	180.	-180.	367.	-367.	756.	-756.	LBS
	Z	AN	2			0.000	0.000	0.000	21.	0.	-881.	290.	-290.	1138.	-1138.	2294.	-2294.	LBS
	XM	AN	2			0.000	0.000	0.000	52.	267.	0.	536.	-536.	1477.	-1477.	3002.	-3002.	FTLB
	YM	AN	2			0.000	0.000	0.000	69.	0.	-7899.	1353.	-1353.	6194.	-6194.	12461.	-12461.	FTLB
	ZM	AN	2			0.000	0.000	0.000	374.	0.	-9155.	801.	-801.	1364.	-1364.	2842.	-2842.	FTLB

TPIPE TMI PWR S/RV DISCHARGE PIPING (ME- 91,92) (W.O.-045064000) LLCHO
FROM SRV(ME-148) TO PRESSURIZER RELIEF TANK

TPIPE VERSION Q/C4.2
RUN DATE- 82/06/17.

S U P P O R T   A N D   L U G   D E S I G N   I N F O R M A T I O N

NODE NAML	SUPPORT DIR	TYP	CLS	*DESIGN TRAVL* +	-	*MAX PIPE MOVEMENT* X	Y	Z	NORMAL SUST.	***UPSET*** + EXPAN	-	+ OCCAS	-	***EMERGENCY*** + OCCAS (LUG DSGN	- LOAD)	***FAULTED*** + OCCAS (LUG ALLOW	- STRS)	
S332 *	SX	RR	2			.000	.254	.193	88.	2248.	0.	1814.	-1814.	1814.	-1814.	1965.	-1965.	LBS
															4302.		30000.	
333 *	SX	RR	2			0.000	.111	.132	-9.	-0.	-966.	807.	-807.	881.	-881.	1938.	-1938.	LBS
															2913.		30000.	
336 *	Y	US	2	.173	0.000	.100	.237	.125	-1045.	0.	0.							LBS
															1045.		11029.	
337 *	X	DS	2	.318	0.000	.318	.723	.278				3292.	-3292.	3292.	-3292.	6847.	-6847.	LBS
															6847.		19286.	
340 *	SX	DS	2	0.000	-.512	.512	1.114	.245				1331.	-1331.	4767.	-4767.	9626.	-9626.	LBS
															9626.		20119.	
S341 *	Y	DS	2	.954	0.000	.619	.954	.703				2422.	-2422.	2422.	-2422.	3348.	-3348.	LBS
															2422.		18598.	
344 *	Y	CS	2	1.037	0.000	.668	1.214	1.437	-1115.	0.	0.							LBS
															1115.		10975.	
S345 *	SX	DS	2	.182	0.000	.182	1.121	1.395				3316.	-3316.	3316.	-3316.	3976.	-3976.	LBS
															3316.		18598.	
348 *	X	AN	2			0.000	0.000	0.000	-17.	0.	-221.	322.	-322.	1542.	-1542.	3101.	-3101.	LBS
	Y	AN	2			0.000	0.000	0.000	-1125.	0.	-396.	2475.	-2475.	2475.	-2475.	2637.	-2637.	LBS
	Z	AN	2			0.000	0.000	0.000	0.	0.	0.	0.	0.	0.	0.	0.	0.	LBS
	XM	AN	2			0.000	0.000	0.000	120.	0.	-739.	1960.	-1960.	28461.	-28461.	56956.	-56956.	FTLB
	YM	AN	2			0.000	0.000	0.000	-37.	0.	-928.	369.	-369.	3052.	-3052.	6115.	-6115.	FTLB
	ZM	AN	2			0.000	0.000	0.000	-197.	1055.	0.	937.	-937.	3427.	-3427.	6917.	-6917.	FTLB
356 *	X	AN	2			0.000	0.000	0.000	4.	312.	0.	804.	-804.	804.	-804.	1284.	-1284.	LBS
	Y	AN	2			0.000	0.000	0.000	-898.	199.	0.	374.	-374.	506.	-506.	1080.	-1080.	LBS
	Z	AN	2			0.000	0.000	0.000	1.	134.	0.	1270.	-1270.	4553.	-4553.	9195.	-9195.	LBS
	XM	AN	2			0.000	0.000	0.000	-304.	1076.	0.	1737.	-1737.	7269.	-7269.	14642.	-14642.	FTLB
	YM	AN	2			0.000	0.000	0.000	-14.	0.	-1256.	255.	-255.	422.	-422.	882.	-882.	FTLB
	ZM	AN	2			0.000	0.000	0.000	-42.	0.	-357.	1274.	-1274.	1274.	-1274.	2142.	-2142.	FTLB

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DATE 7/21/82

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7.2.2 FLUID TRANSIENT FORCING FUNCTION FOR TIME HISTORY DYNAMIC ANALYSIS

L. Y. L. Chou G III 2400

memorandum

Gilbert/Commonwealth

to: M. Z. LEE

from: R. Murthy

subject: TMI1 SRVS and PORV Discharge Line Forces - Data Transmittal

June 7, 1982

Enclosed are the preliminary force data and plots obtained from the RELAP5/MOD1 analyses of the TMI-1 SRVS and PORV discharge piping systems. The force data are in the following files:

1.0 TMI.PORV.FORCE.PSI70.DATA
(opening of the PORV with 400°F, 2500 psig subcooled water and 70 psia back pressure).

1.1 FORCE plots of Item 1.0 for 0-0.25 sec (Plots for 0.25 - 0.5 sec could not be obtained).

2.0 SRV40.DATA
(opening of SRV with 400°F, 2500 psig subcooled water and 70 psia back pressure).

2.1 FORCE plots of Item 2.0

3.0 STEAM.DATA
opening of SRV with 2500 psig steam pressure and 70 psia back pressure.

3.1 FORCE plots of Item 3.0

M. R. Murthy

R. MURTHY

RM:jah
Enclosure
cc: P. Bunker
R. E. Anderson RE Anderson
M. Waselus
G. Kowal
L. Y. L. Chou
R. R. Brems

GAI 35 12-75

7.2.3. SEISMIC SPECTRUM ANALYSIS INPUT DATA

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```
           1
  0.01         0.48      25 TMI HORI 1 RESPONSE
  0.02         0.55
  0.025        0.6
  0.028        0.77
  0.032        1.1
  0.037        0.74
  0.042        0.7
  0.048        0.9
  0.056        1.18
  0.062        1.5
  0.07         2.2
  0.076        3.0
  0.078        4.0
  0.08         5.0
  0.084        7.0
  0.09         8.0
  0.1          7.0
  0.105        3.0
  0.11         2.0
  0.12         1.3
  0.13         0.97
  0.15         0.7
  0.2          0.5
  0.33         0.28
  1.           0.17
           2
  0.01         0.32      25 TMI VERT RESPONSE
  0.02         0.367
  0.025        0.4
  0.028        0.513
  0.032        0.733
  0.037        0.493
  0.042        0.467
  0.048        0.6
  0.056        0.787
  0.062        1.0
  0.07         1.467
  0.076        2.0
  0.078        2.667
  0.08         3.333
  0.084        4.66
  0.09         5.333
  0.10         4.667
  0.105        2.0
  0.11         1.333
  0.12         0.867
  0.13         0.647
  0.15         0.467
  0.2          0.333
  0.33         0.187
  1.0          0.113
           3
  0.01         0.48      25 TMI HORI 2 RESPONSE
  0.02         0.55
  0.025        0.6
  0.028        0.77
  0.032        1.1
  0.037        0.74
  0.042        0.7
  0.048        0.9
  0.056        1.18
  0.062        1.5
  0.07         2.2
  0.076        3.0
  0.078        4.0
  0.08         5.0
  0.084        7.0
  0.09         8.0
  0.1          7.0
  0.105        3.0
  0.11         2.0
  0.12         1.3
  0.13         0.97
  0.15         0.7
  0.2          0.5
  0.33         0.28
  1.           0.17
  ??
```


TMI-1 SEISMIC SPECTRUM DATA
FROM REACTOR INTER-BUILDING FIG-8

7.2.4 THERMAL MOVEMENT CALCULATION

Gilbert Associates, Inc.
Reading, Pennsylvania
CALCULATION

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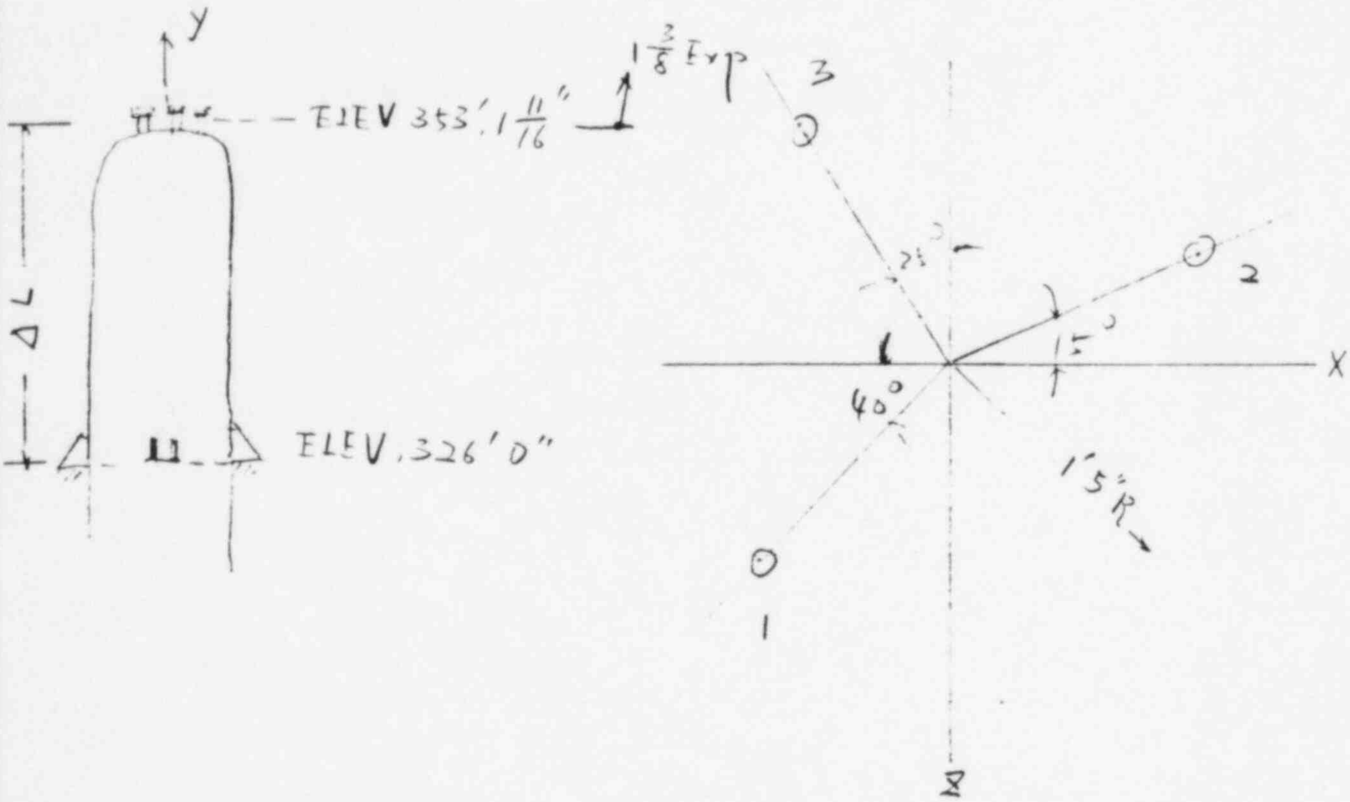
Simple Calculation of Thermal Expansion Movement



Assume: $\alpha = 9.3 * 10^{-6}$ in/in/°F

Given : $\Delta Y = 1\frac{3}{8}$ "

$$\Delta L = 353'\,1\tfrac{11}{16}" - 326' = 325.69"$$

Therefore the temperature change can be found as

$$\Delta T = \frac{\Delta Y}{\alpha \Delta L} = \frac{1.375}{9.3*10^{-6} \times 325.69} = 454\ ^{\circ}F$$

GAI 446 12/81

Assume a linear expansion of the top of the pressurizer, therefore the total movement, in the radial direction, of each valve site can be calculate as

$$\Delta R = \alpha R \Delta T$$

$$= 9.3 \times 10^{-6} \times (1'5'') \times (454)$$

$$= 0.072 \text{ in}_{*}$$

Then (a) the movements of valve site #1 are

$$\begin{cases} \Delta X = -0.072 \cos 40^\circ = 0.055'' \\ \Delta Y = 1.375'' \\ \Delta Z = +0.072 \sin 40^\circ = 0.046'' \end{cases}$$

(b) the movements of valve site #2

$$\begin{cases} \Delta X = 0.072 \cos 15^\circ = 0.070'' \\ \Delta Y = 1.375'' \\ \Delta Z = -0.072 \sin 15^\circ = -0.019'' \end{cases}$$

(c) the movements of valve site #3

$$\begin{cases} \Delta X = -0.072 \sin 25^\circ = -0.030'' \\ \Delta Y = 1.375'' \\ \Delta Z = -0.072 \cos 25^\circ = -0.065'' \end{cases}$$

GAI 446 12/81

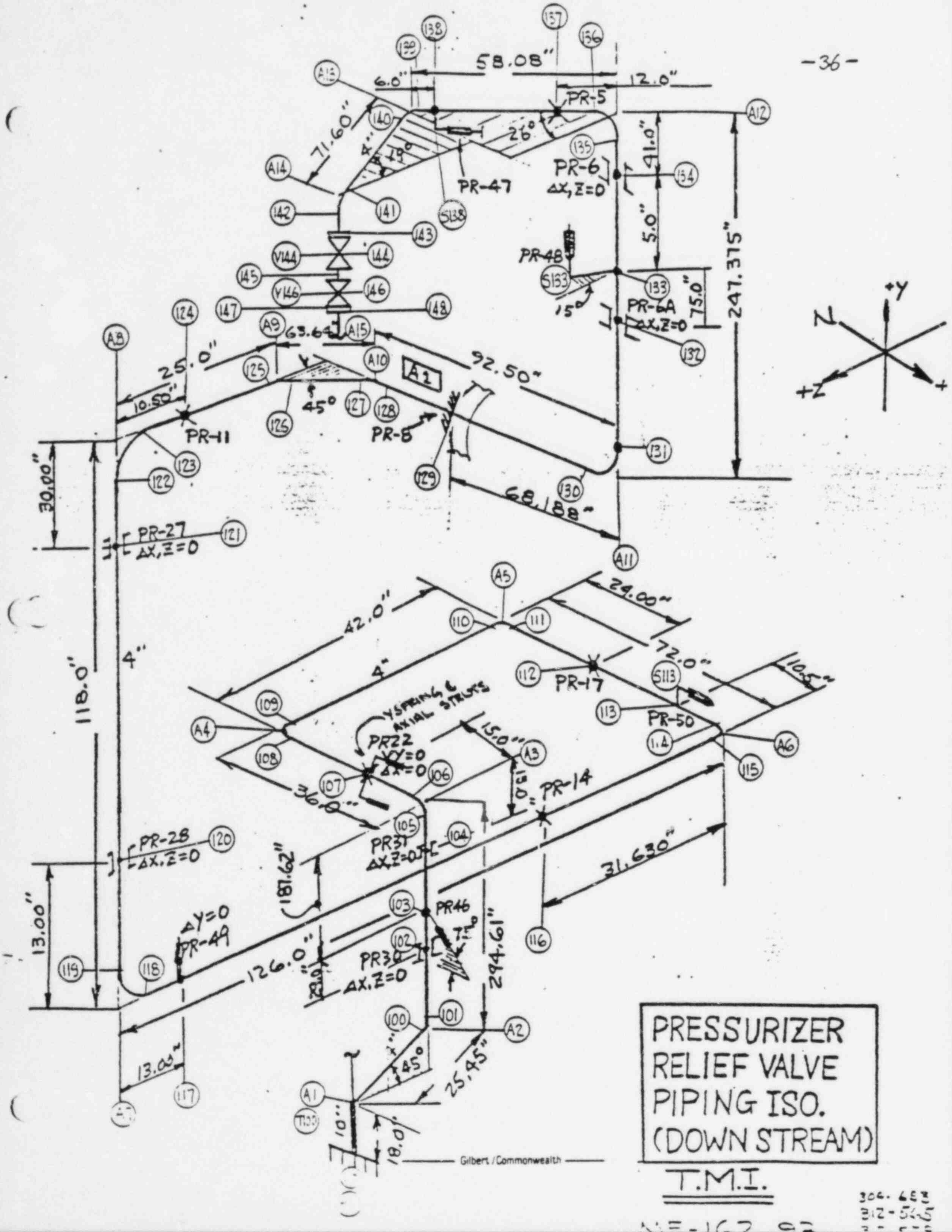
8. GEOMETRY PLOTS

SET 1. PORV - ME-162,93

SET 2. SRV1 - ME-88,89

SET 3. SRV2 - ME-91,92

SET 4. SRV REMOVED



PRESSURIZER
RELIEF VALVE
PIPING ISO.
(DOWN STREAM)

T.M.I.

Gilbert Associates, Inc. Reading, Pennsylvania ANALYSIS/CALCULATION	SUBJECT		CISID		PAGE
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	MICROFILMED				PAGES
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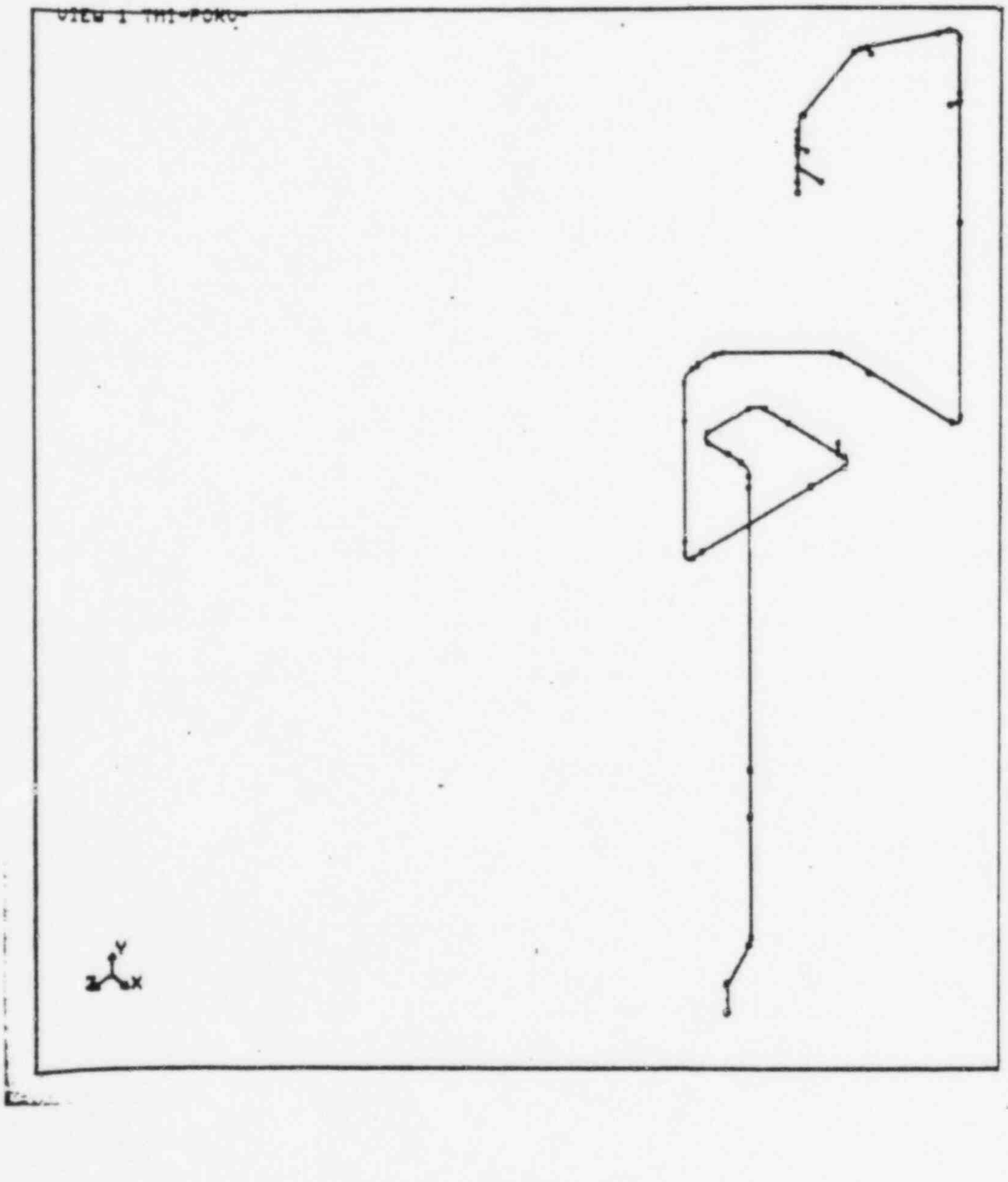
	DATE 7/20/82				



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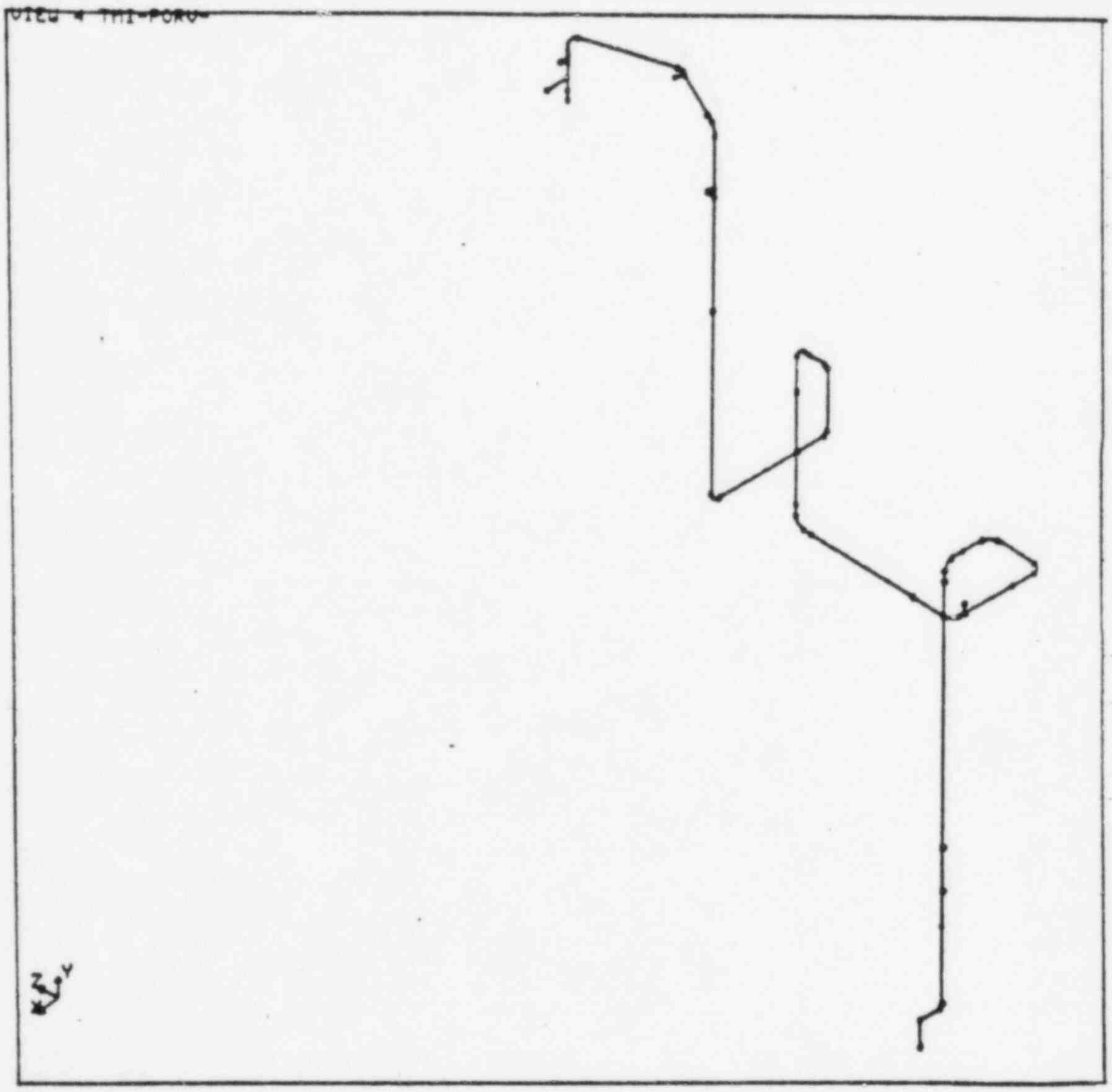

GAI 446 11-75

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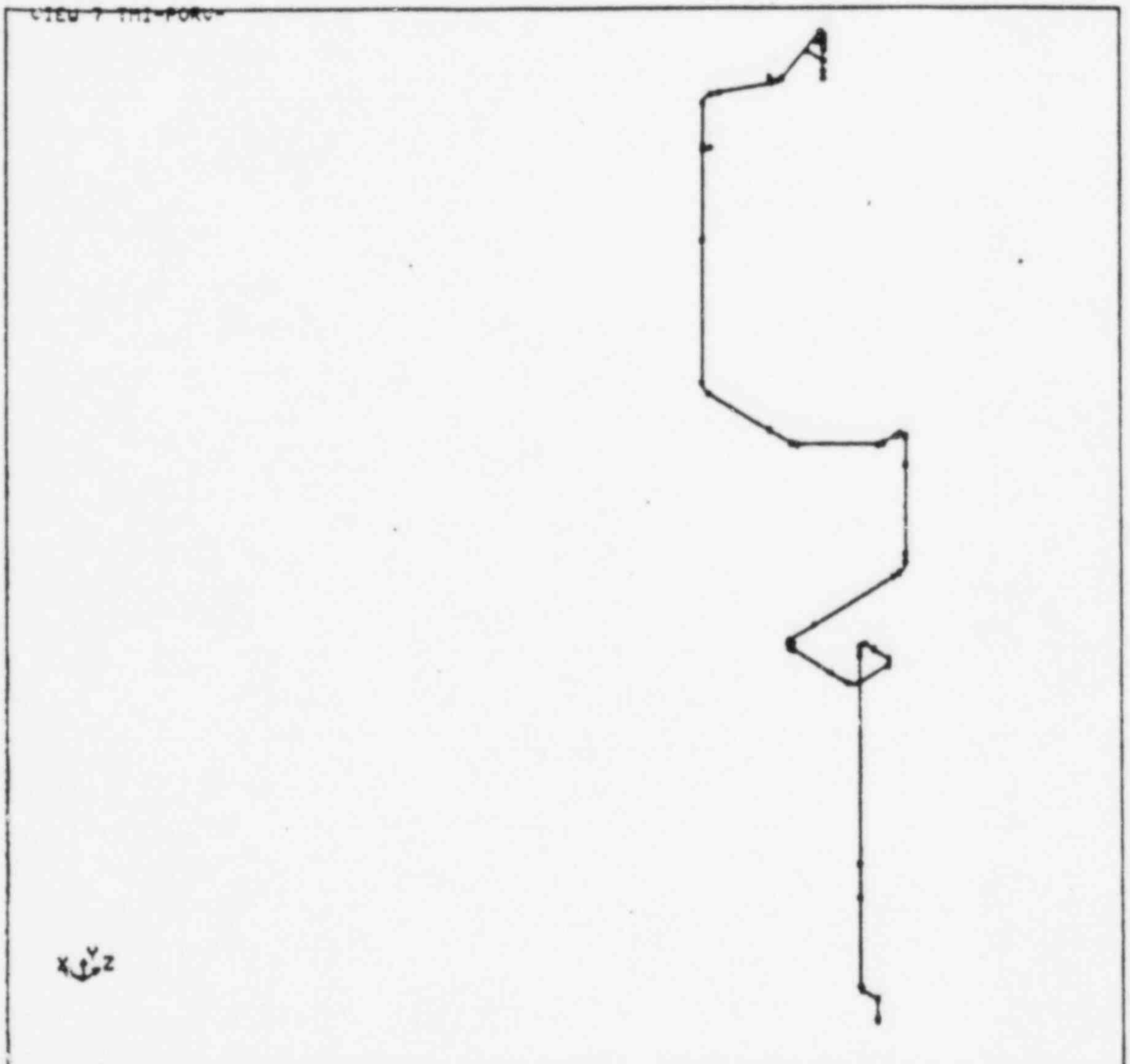

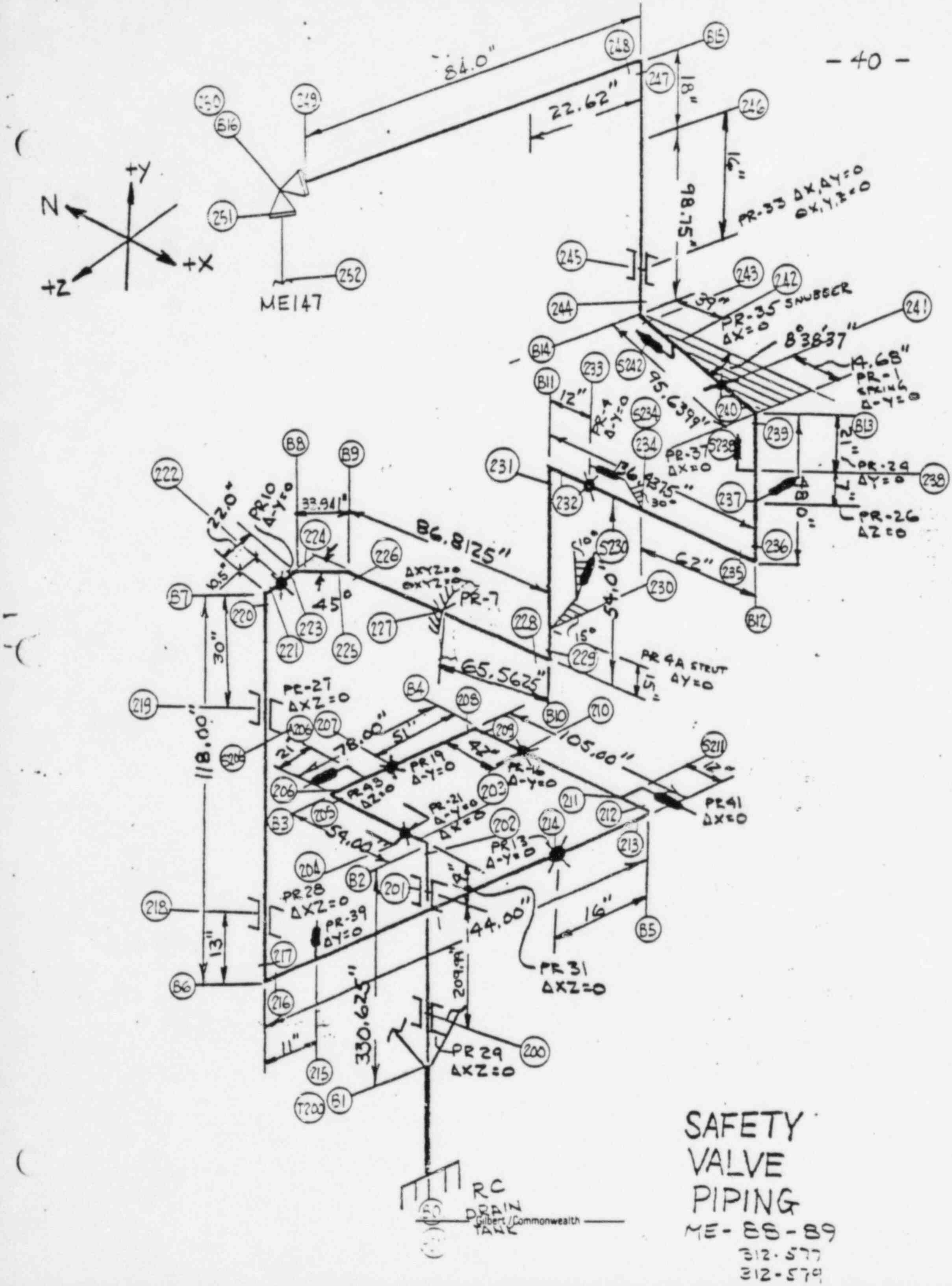

SAFETY
VALVE
PIPING
ME-88-89
312-577
312-579

Gilbert Associates, Inc. Reading, Pennsylvania CALCULATION	SUBJECT		CISID		PAGE
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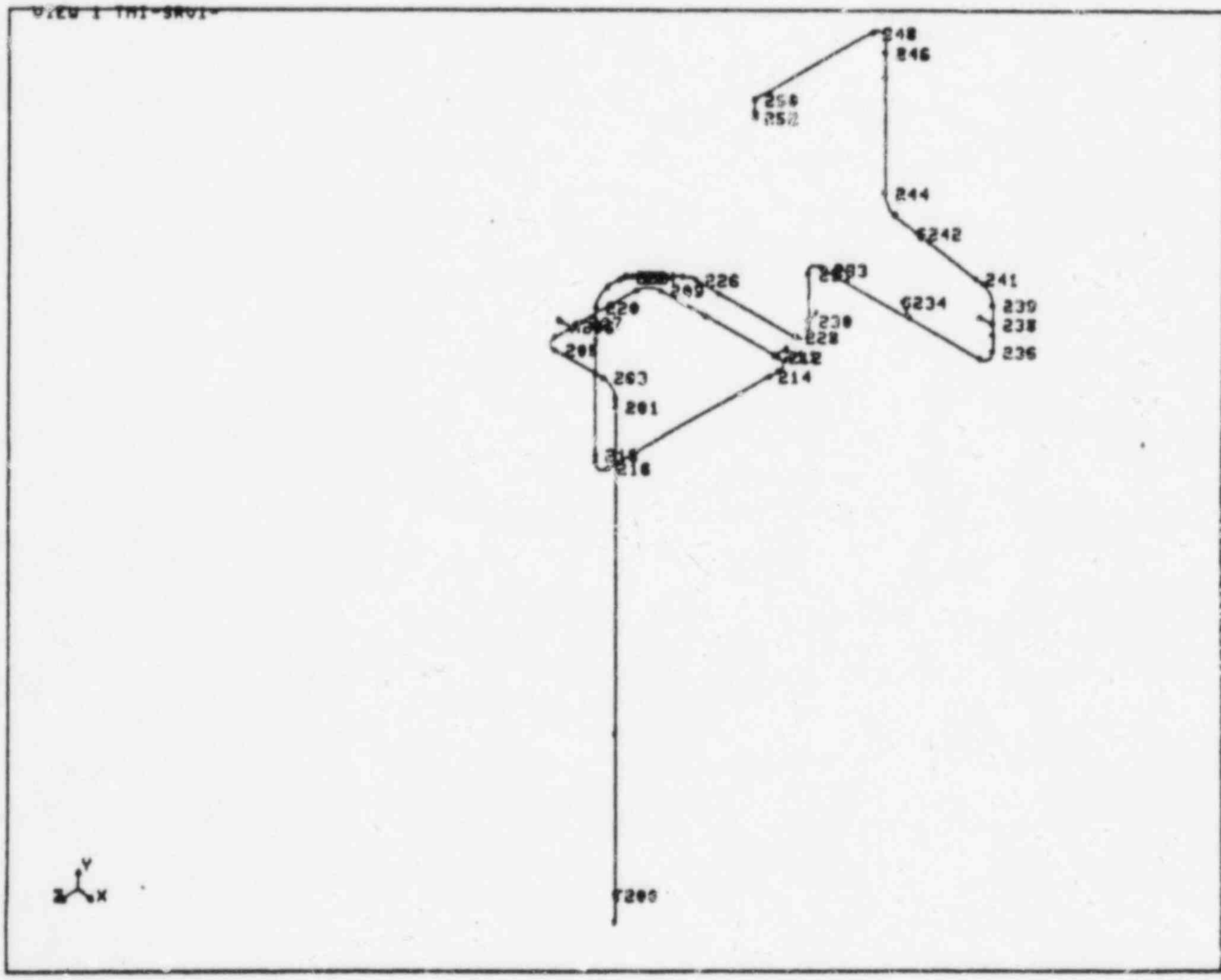

GAI 446 12/81

Gilbert Associates, Inc. Reading, Pennsylvania CALCULATION	SUBJECT		CISID		PAGE — OF — PAGES
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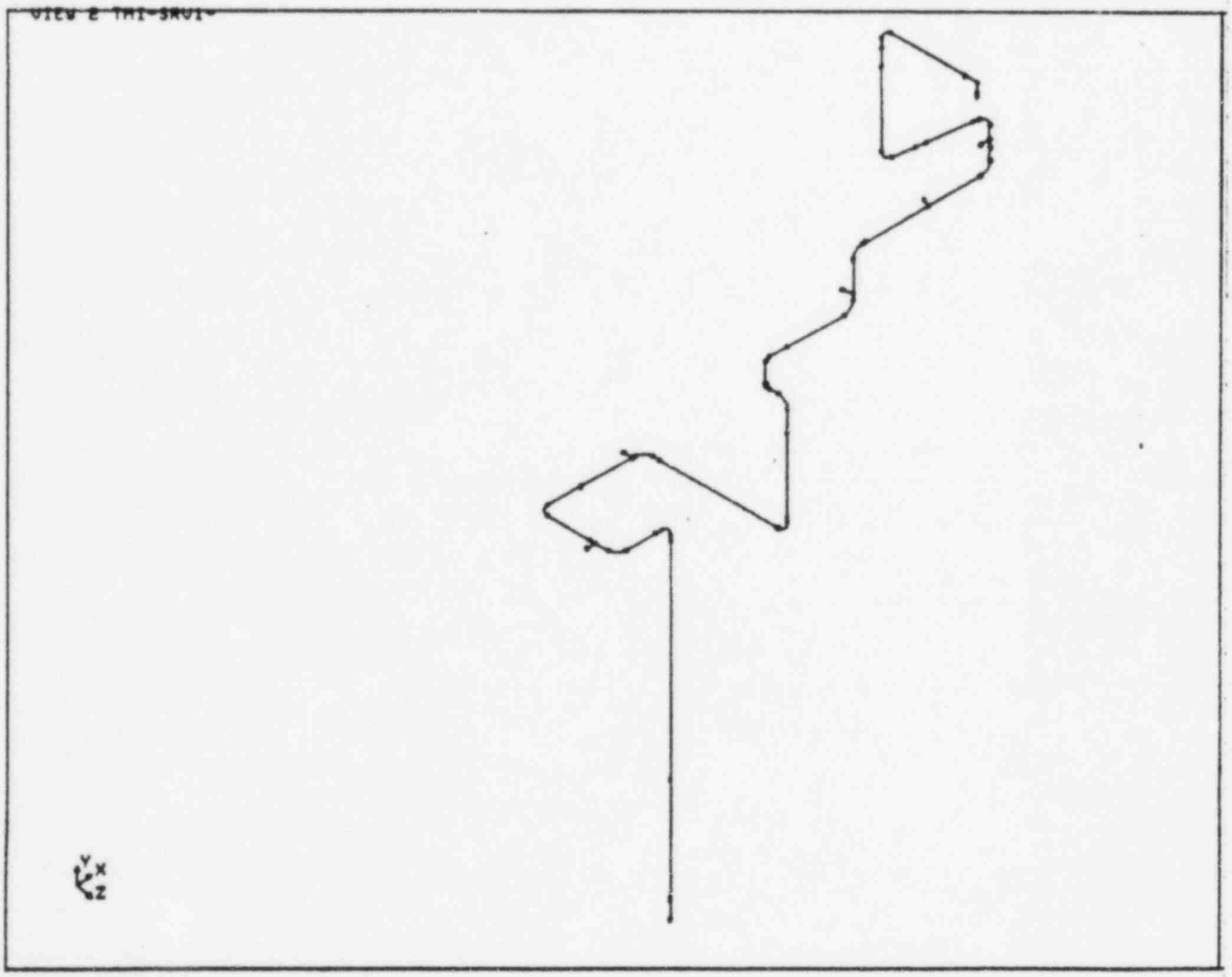

GAI 446 12/81

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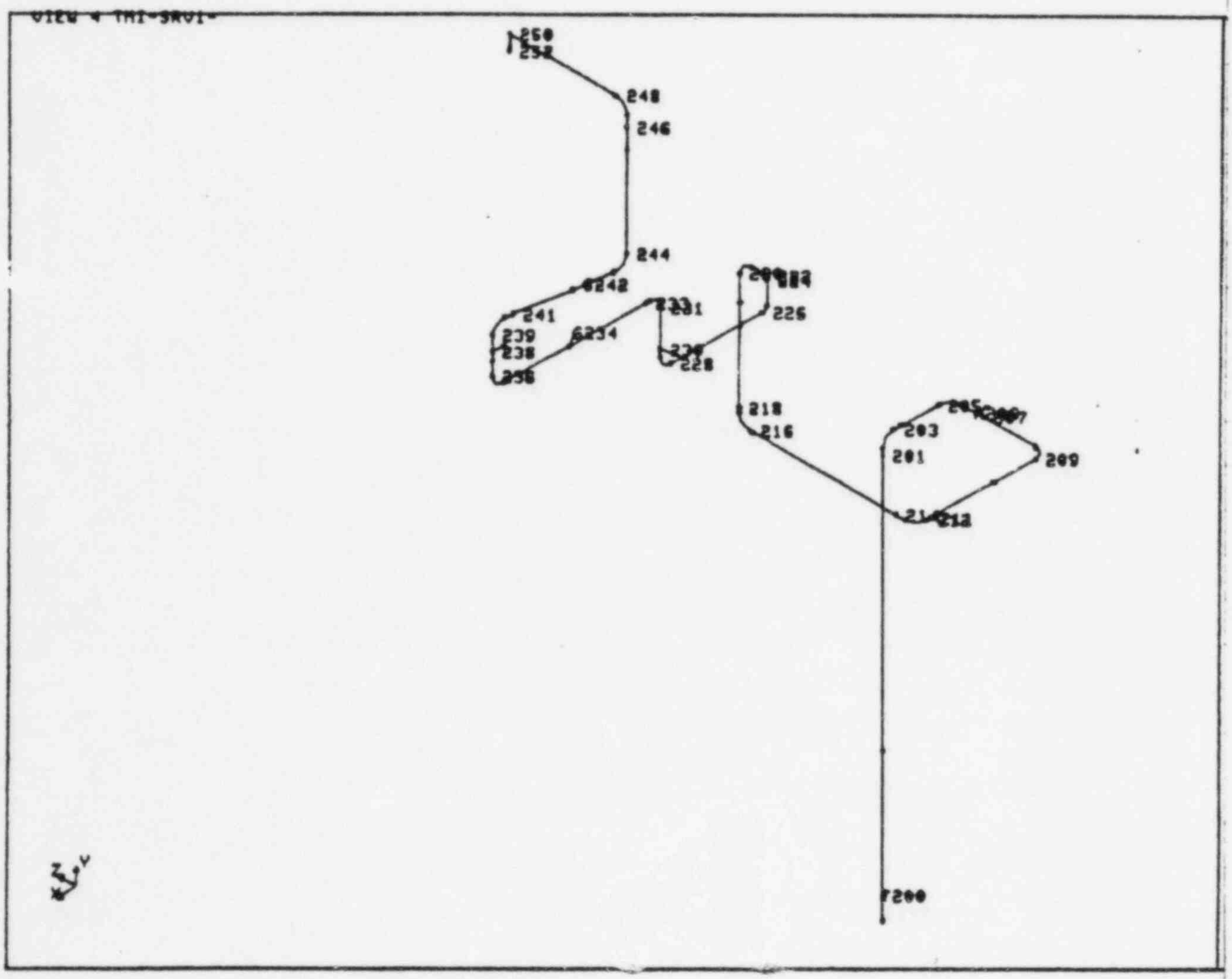
	DATE 7/20/82				



GAI 446 12/81

Gilbert Associates, Inc. Reading, Pennsylvania CALCULATION	SUBJECT		CISID		PAGE
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	MICROFILMED				PAGES
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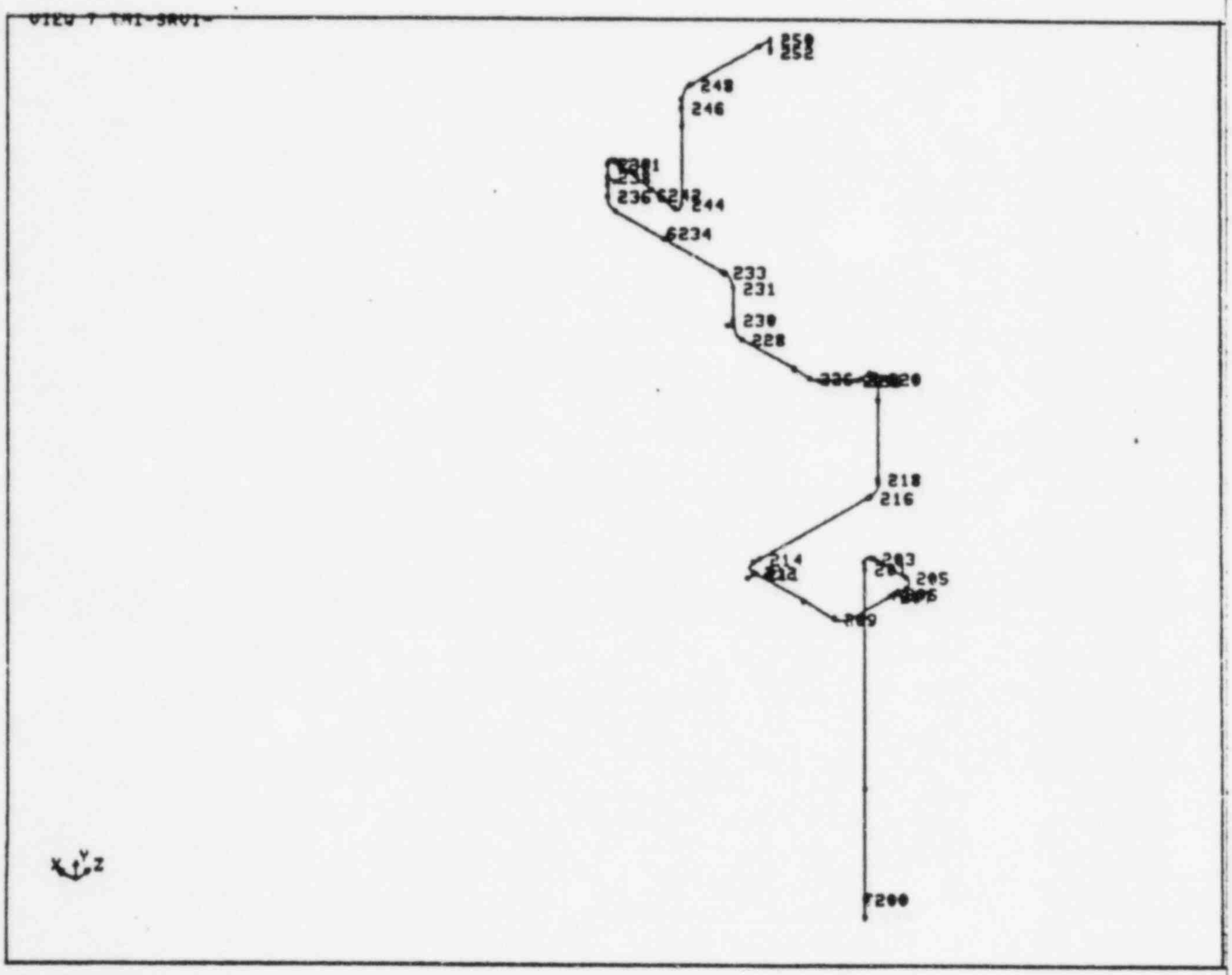
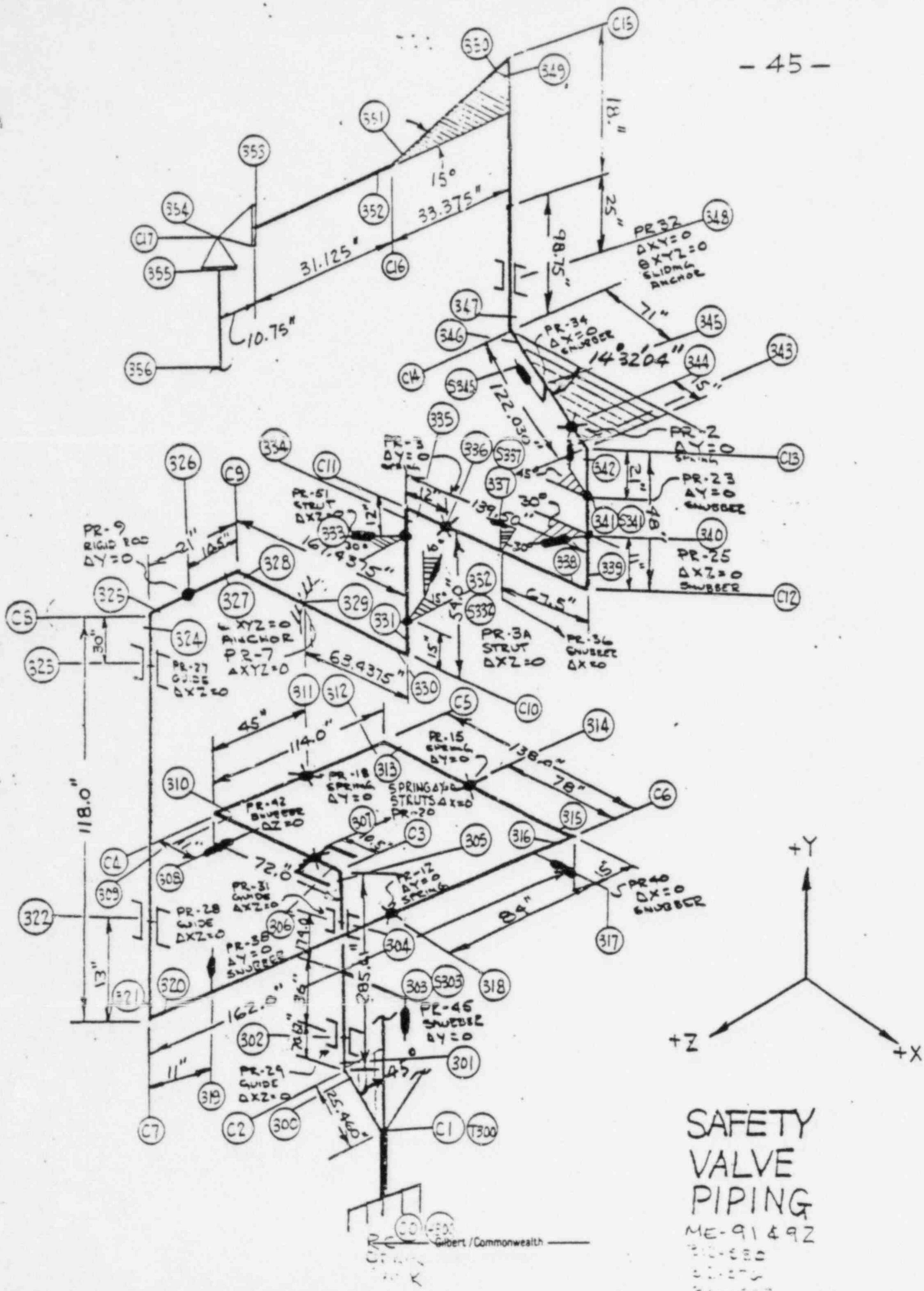
	DATE				



GAI 446 12/81



SAFETY
VALVE
PIPING
ME-91 & 92

Gilbert Associates, Inc. Reading, Pennsylvania CALCULATION	SUBJECT		CISID		PAGE ___ OF ___ PAGES
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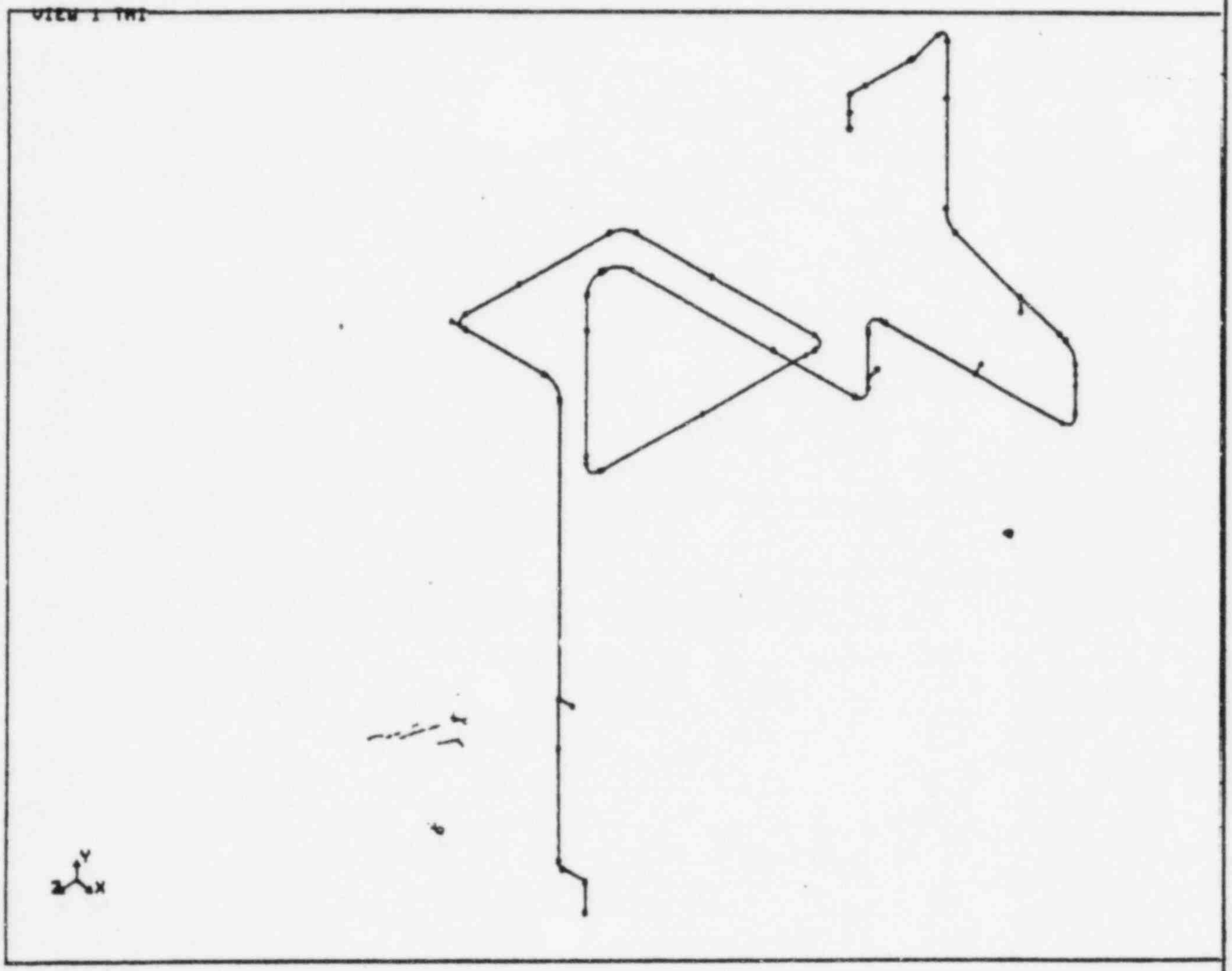

GAI 446 12/81

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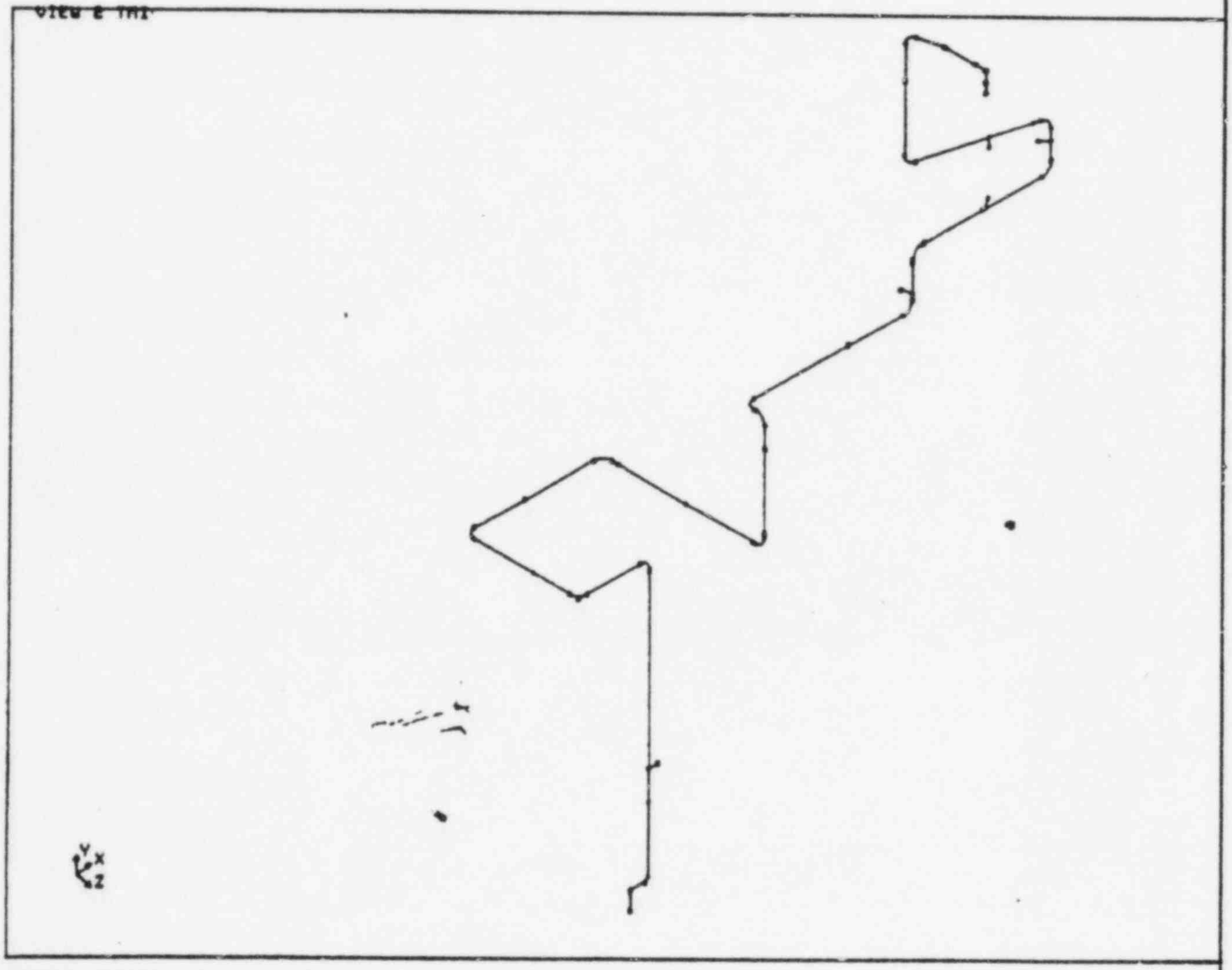
VIEW 2 TRI



GAI 446 12/81

Gilbert Associates, Inc. Reading, Pennsylvania CALCULATION	SUBJECT		CISID		PAGE OF PAGES
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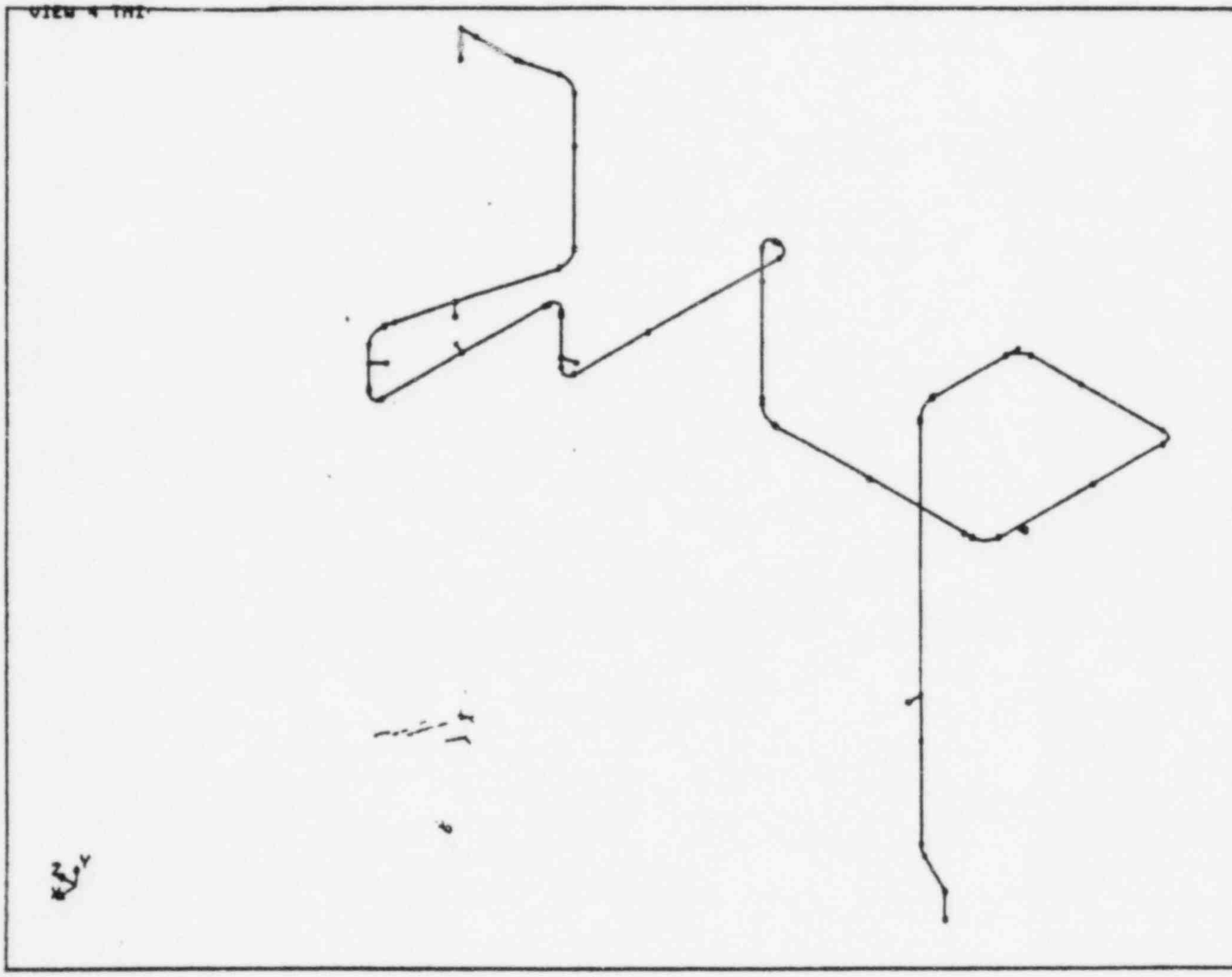

GAI 446 12/81

Gilbert Associates, Inc. Reading, Pennsylvania CALCULATION	SUBJECT		CISID		PAGE
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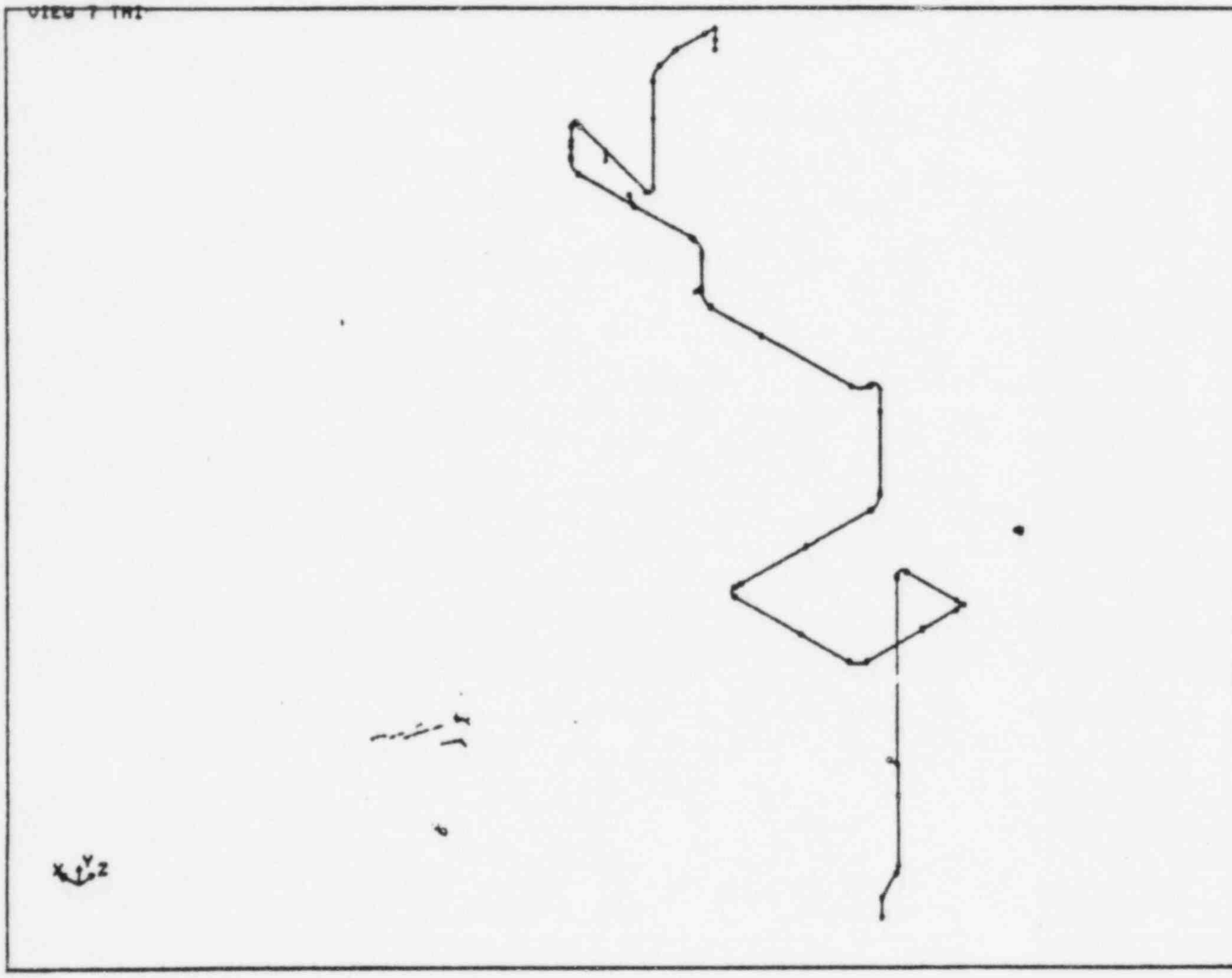
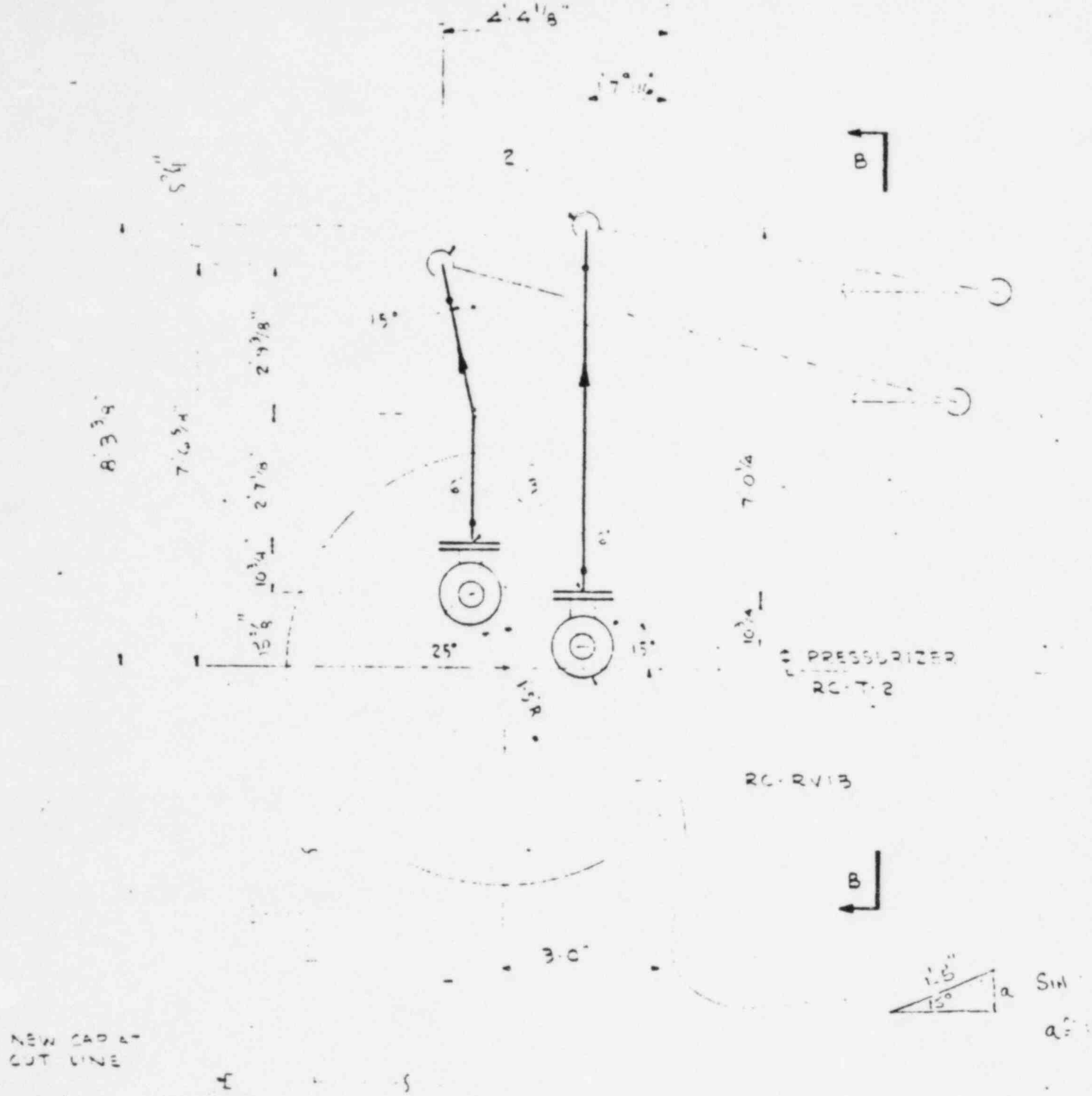
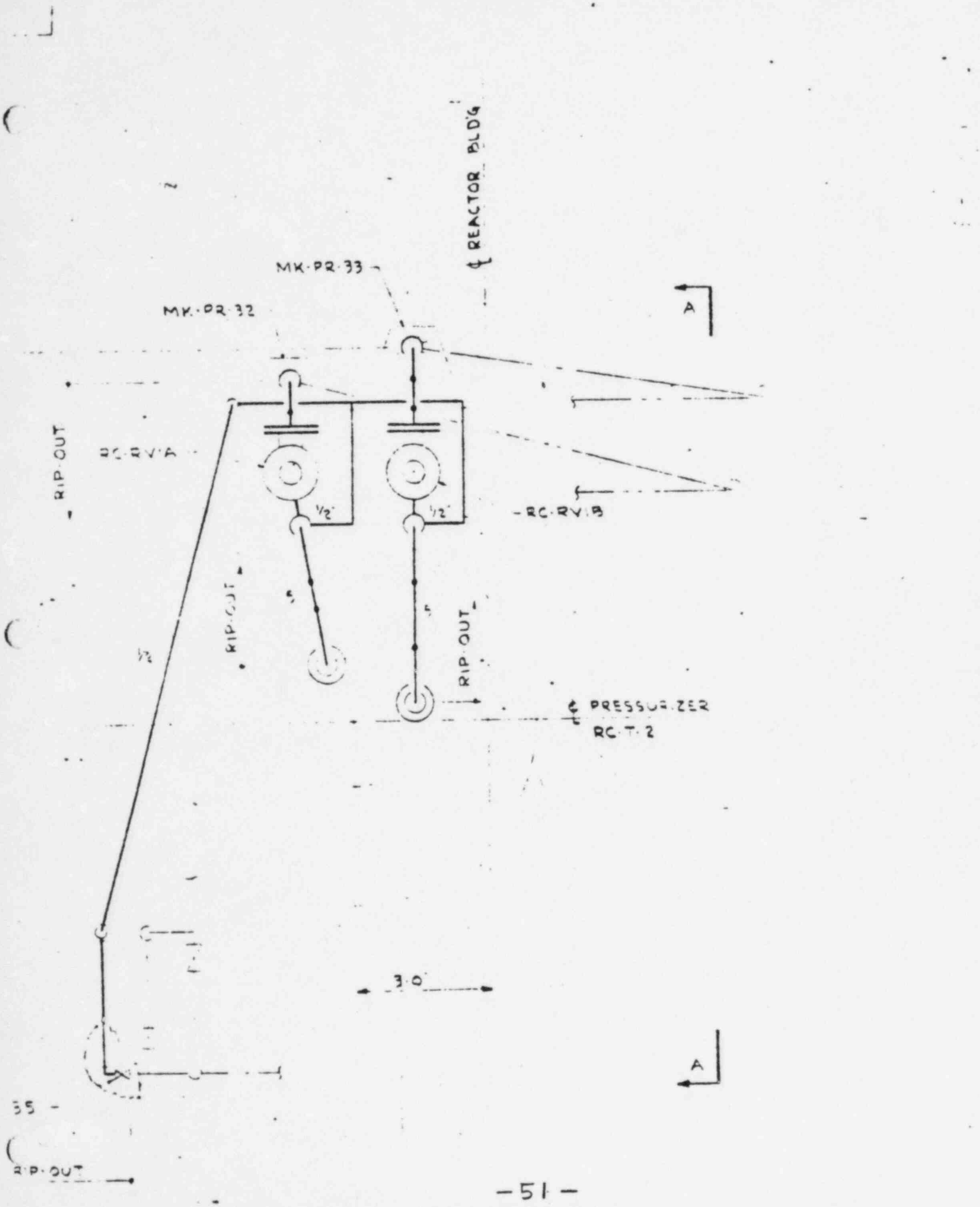
	ORIGINATOR LY Choy				
	DATE 7/30/82				



GAI 446 12/81

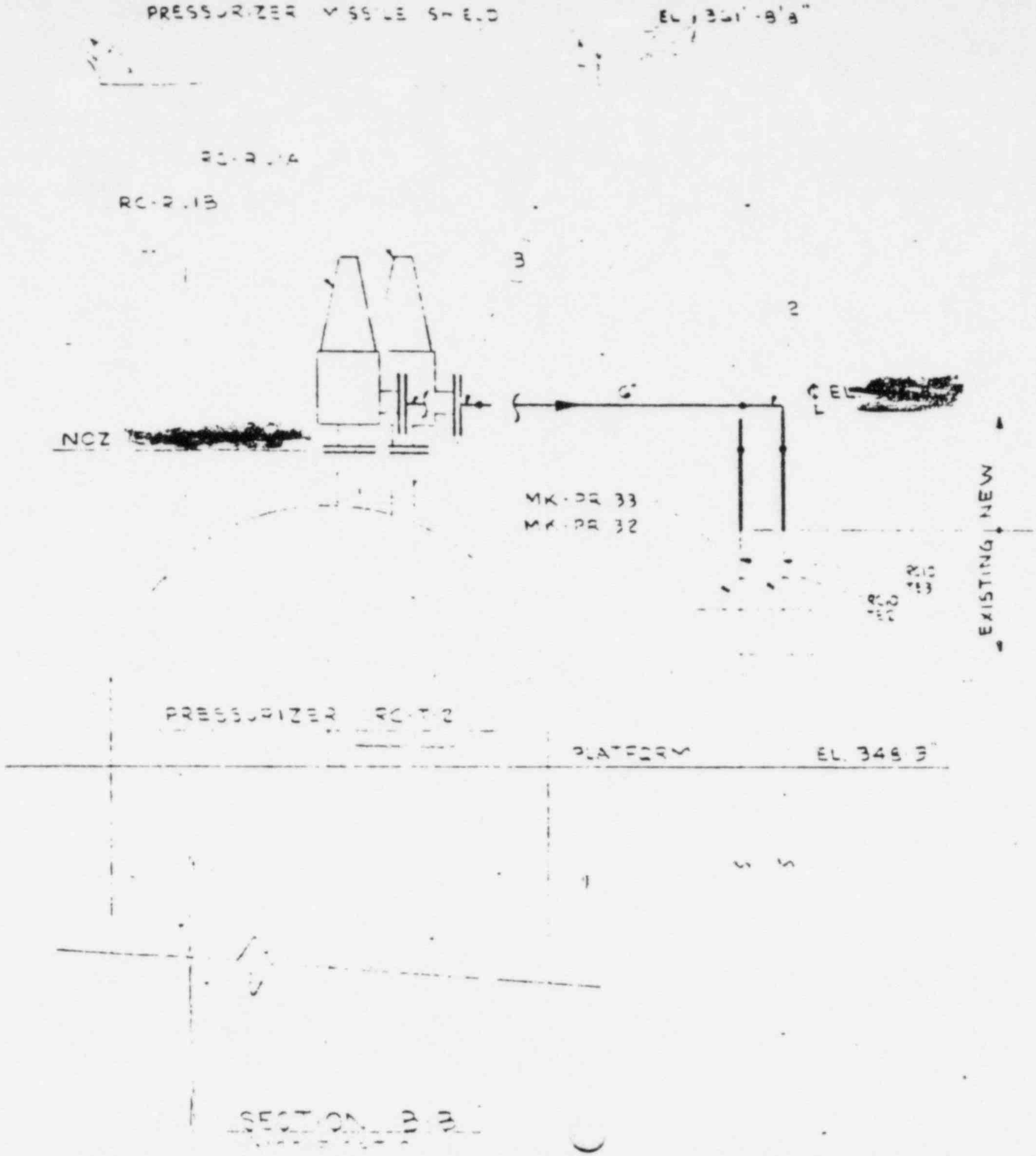


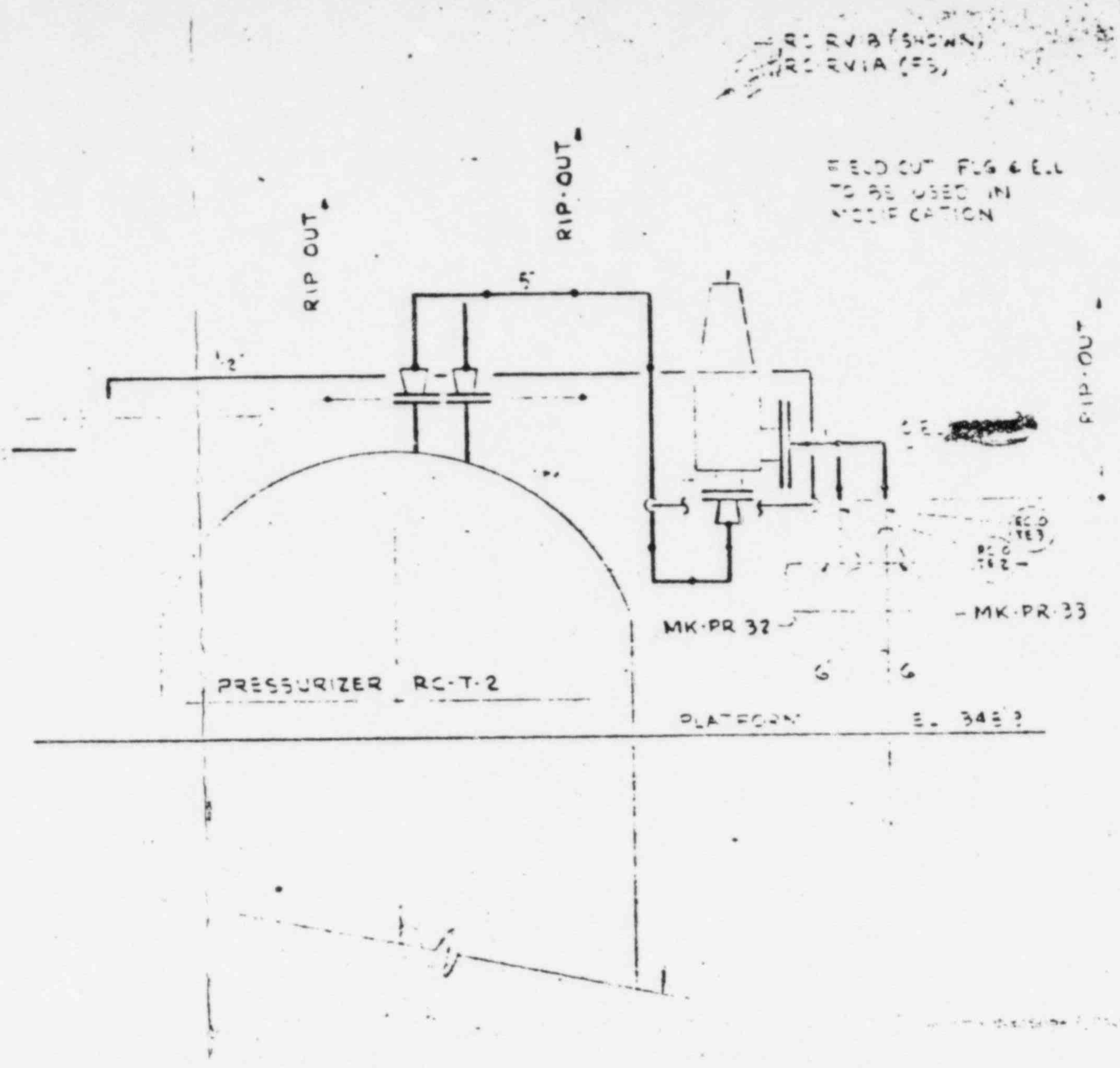
PLAN
(MODIFICATION)



℄ REACTOR BLD'G
MK·PR·33
MK·PR·32
A
RIP·OUT
RC·RV·A
1/2"
1/2"
RC·RV·B
RIP·OUT
RIP·OUT
℄ PRESSURIZER
RC·T·2
3·0"
A
RIP·OUT

PLAN
(RIP·OUT)


PRESSURIZER MISSILE SHIELD
RC-R-1B
3
2
6"
MK-PR 33
MK-PR 32
EXISTING NEW
PRESSURIZER RC-T-2
PLATFORM
EL. 348' 3"
SECTION B-B



SECTION A-A
(RIP OUT)

9. IDENTIFICATION OF COMPUTER OUTPUT FILES

FILE NO.	JOB I.D.	JOB DATE	FILE NAME	DESCRIPTION
1	AYXBBDI	6/17/82	PORVP	PORV POST PROCESS
2	AYXBANH	6/17/82	PORV	PORV DW,THERMAL,OBE
3	AYXBBAK	6/17/82	PORVTH	PORV TIME HISTORY
4	AYXBMBK	6/16/82	SRV1P	SRV1 POST PROCESS
5	AYXBLTD	6/16/82	SRV1	SRV1 DW,THERMAL,OBE
6	AYXBLYV	6/16/82	SRV1A	SRV1 TIME HISTORY (SUBCOOLED)
7	AYXBAWS	6/16/82	SRV1B	SRV1 TIME HISTORY (STEAM)
8	AYXBADC	6/16/82	SRV2P	SRV2 POST PROCESS
9	AYXBLVO	6/16/82	SRV2	SRV2 DW,THERMAL,OBE
10	AYXBAJZ	6/16/82	SRV2A	SRV2 TIME HISTORY (SUBCOOLED)
11	AYXBAMQ	6/16/82	SRV2B	SRV2 TIME HISTORY (STEAM)
12	AYXBCAU	6/23/82	PORVDW	PORV DEADWEIGHT (STEAM)
13	AYXBCBD	6/23/82	SRV1DW	SRV1 DEADWEIGHT (STEAM)
14	AYXBCAV	6/23/82	SRV2DW	SRV2 DEADWEIGHT (STEAM)
15	T452(A1202)	6/7/82	SRV40.DATA	SRV SUBCOOLED DISCHARGE FORCES
16	T452(A1202)	6/7/82	STEAM.DATA	SRV STEAM DISCHARGE FORCES
17	T452(A1202)	6/7/82	TMI.PORV.FORCE.PSIA70.DATA	

NOTE : SRV1(ME-147,ME-88,89) AND SRV2(ME-148,ME-91,92)

9. IDENTIFICATION OF COMPUTER OUTPUT FILES (Continued)

FILE NO.	JOB I.D.	JOB DATE	FILE NAME	DESCRIPTION
18	AYXBBCO	7/30/82	SRV2P	SRV2 POST PROCESS (ADD ONE SNUBBER)
19	AYXBCHE	7/29/82	SRV2	SRV2 DW, THERMAL, OBE (ADD ONE SNUBBER)
20	AYXBDKQ	7/30/82	SRV2A	SR2 TIME HISTORY (SUB) (ADD ONE SNUBBER)
21	AYXBPB	7/30/82	SRV2B	SRV2 TIME HISTORY (STEAM)
22	AYXBDZM	8/3/82	SRV2TH	SRV2 THERMAL (COLD PIPING)
23	AYXBDZI	8/3/82	SRV1TH	SRV1 (COLD PIPING)

10. EVALUATION OF PIPE SUPPORT AND EQUIPMENT NOZZLE

10.1. EQUIPMENT NOZZLE LOAD SUMMARY

GILBERT ASSOCIATES, INC. READING, PA.	TMI UNIT-1 NUCLEAR STATION	W.O. NUMBER 04-5064-000	FILING CODE (ME- 88,89)
PIPING ENGINEERING DEPT. NUMBER 0432	ORINGINATOR: ________ DATE: ______	VERIFIER: ________ ________	PAGE 001 OF 001

2.10 NOZZLE LOAD SUMMARY

EQUIPMENT : SRV TAG NO. : RC-RV1B
NOZZLE SIZE : 6" SERVICE : RC JOINT NO. : 249(MEMBER-2520)
REFERENCE : PRESSURIZER SAFETY RELIEF VALVE OUTLET FLANGE
ORIENTATION : LOCAL (X - AXIAL, Y,Z-SHEAR)

LOAD CASE (RUN I.D.)	FORCES (LBS)			MOMENTS (IN-LBS)		
	FX	FY	FZ	MX	MY	MZ
DEADWEIGHT (AYXBLTD)	0.	-249.	0.	0.	0.	1344.
THERMAL (AYXBLTD)	31.	103.	236.	-1800.	12636.	-5976.
SEISMIC-OBE (AYXBLTD)	*2393.	*198.	0.	0.	0.	*1368.
BLOWDOWN (AYXBLYU)	*2035.	*84.	0.	0.	0.	*5126.
DW(NORMAL)# (AYXBCBD)	0.	-87.	0.	0.	0.	120.
THERMAL # (AYXBDZI)	-2.	-216.	23[illegible].	-1800.	12636.	12780.
( )						

NOTE :
1. * — POSITIVE AND NEGATIVE VALUES
2. # — PLANT NORMAL OPERATING LOAD

page 55 (CONT.)

GILBERT ASSOCIATES, INC. READING, PA.	TMI UNIT-1 NUCLEAR STATION	W.O. NUMBER 04-5064-000	FILING CODE (ME- 91,92)
PIPING ENGINEERING DEPT. NUMBER 0432	ORINGINATOR: ______ DATE: ______	VERIFIER: ______ ______	PAGE 001 OF 001

2.10 NOZZLE LOAD SUMMARY

EQUIPMENT : SRV TAG NO. : RC-RV1A
NOZZLE SIZE : 6" SERVICE : RC JOINT NO. : 353(MEMBER-3560)
REFERENCE : PRESSURIZER SAFETY RELIEF VALVE OUTLET FLANGE
ORIENTATION : LOCAL (X - AXIAL, Y,Z-SHEAR)

LOAD CASE (RUN I.D.)	FORCES (LBS)			MOMENTS (IN-LBS)		
	FX	FY	FZ	MX	MY	MZ
DEADWEIGHT (AYXBCHE)	1.	-174.	-4.	-420.	-132.	-36.
THERMAL (AYXBCHE)	134.	199.	-312.	1872.	-11712.	-8124.
SEISMIC-OBE (AYXBCHE)	*560.	*60.	*60.	*98.	*60.	*1056.
BLOWDOWN (AYXBDKQ)	*991.	*167.	*178.	*1503.	*2685.	*5238.
DW(NORMAL)# (AYXBCAV)	0.	-56.	-2.	-192.	-60.	-492.
THERMAL # (AYXDZMI)	0.	-324.	-122.	2892.	-4716.	14502.
( )						

NOTE :
1. * — POSITIVE AND NEGATIVE VALUES
2. # — PLANT NORMAL OPERATING LOAD

page 55 (Cont.)

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE \	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

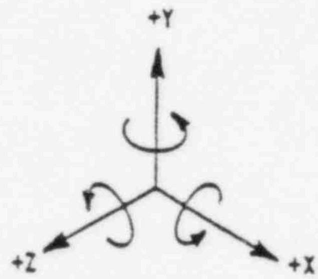
ORIGINATOR: [illegible signature]
DATE 8/5/82
VERIFIER: [illegible]
DATE [illegible]

MARK NO. PRXX

ANALYSIS CODE ________

ANALYSIS JOINT NO. 346

SEISMIC CATEGORY ________



RIGHT HAND CARTESIAN COORDINATE SYSTEM

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN	1.0476
N (S)	0.0317
(E) W	0.3081

(ANALYST TO DEFINE)
NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ -	+ -	+ -	+ -	+ -	+ -
THERMAL	+ -	+ -	+ -	+ -	+ -	+ -
SEISMIC-OBE	+ -	+ -	+ 349 - 349	+ -	+ -	+ -
SRVZ	+ -	+ -	+ 469 - 469	+ -	+ -	+ -
DESIGN LOAD	+ -	+ -	+ 818 - 818	+ -	+ -	+ -
HYPOTHETICAL LOAD	+ -	+ -	+ 1167 - 1167	+ -	+ -	+ -

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal + OBE	(Occasional) Design
	c) Deadweight + Thermal $\mp$(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

page 55 (CONT.)

GILBERT ASSOCIATES, INC. READING, PA.	TMI UNIT-1 NUCLEAR STATION	W.O. NUMBER 04-5064-000	FILING CODE (ME-162,93)
PIPING ENGINEERING DEPT. NUMBER 0432	ORINGINATOR: [signature] DATE: 7/20/82	VERIFIER:	PAGE 001 OF 001

2.10 NOZZLE LOAD SUMMARY

EQUIPMENT : PORV TAG NO. : RC-RV2
NOZZLE SIZE : 4" SERVICE : RC JOINT NO. : 143(MEMBER-1450)
REFERENCE : PRESSURIZER PORV OUTLET FLANGE
ORIENTATION : LOCAL (X - AXIAL, Y,Z - SHEAR)

LOAD CASE (RUN I.D.)	FORCES (LBS)			MOMENTS (IN-LBS)		
	FX	FY	FZ	MX	MY	MZ
DEADWEIGHT (AYXBANH)	-72.	2.	11.	132.	432.	-864.
THERMAL (AYXBANH)	-33.	64.	-1133.	8124.	300.	276.
SEISMIC-OBE (AYXBANH)	*83.	*164.	*238.	*1452.	*2124.	*3456.
BLOWDOWN (AYXBBAK)	*229.	*304.	*591.	*2138.	*1558.	*2910.

NOTE :
1. RUN AYXBANH DATED 6/16/82
2. RUN AYXBBAK DATED 6/17/82
3. * — POSITIVE AND NEGATIVE VALUES

GILBERT ASSOCIATES, INC. READING, PA.	TMI UNIT-1 NUCLEAR STATION	W.O. NUMBER 04-5064-000	FILING CODE (ME-102,83)
PIPING ENGINEERING DEPT. NUMBER 0432	ORIGINATOR: [signature] DATE: 7/20/82	VERIFIER:	PAGE 001 OF 001

2.10 NOZZLE LOAD SUMMARY

EQUIPMENT : PENETRATION TAG NO. : PR8
NOZZLE SIZE : 4" SERVICE : RC JOINT NO. : 129
REFERENCE : PENETRATION
ORIENTATION : LOCAL (X - AXIAL, Y,Z - SHEAR)

LOAD CASE (RUN I.D.)	FORCES (LBS)			MOMENTS (IN-LBS)		
	FX	FY	FZ	MX	MY	MZ
DEADWEIGHT (AYXBANH)	-9.	-143.	17.	156.	636.	-636.
THERMAL (AYXBANH)	1734.	411.	-2639.	-5016.	-57888.	-1920.
SEISMIC-OBE (AYXBANH)	±26.	±36.	±294.	±1800.	±17820.	±1680.
BLOWDOWN (AYXBBAK)	±591.	±93.	±242.	±782.	±5086.	±2760.
NORMAL ( )						
UPSET ( )						
EMERGENCY ( )						
FAULTED ( )						

NOTE :

1. RUN AYXBANH DATED 6/16/82
2. RUN AYXBBAK DATED 6/17/82

GILBERT ASSOCIATES, INC. READING, PA.	TMI UNIT-1 NUCLEAR STATION	W.O. NUMBER 04-5064-000	FILING CODE (ME-162.43)
PIPING ENGINEERING DEPT. NUMBER 0432	ORINGINATOR: [signature] DATE: [illegible]	VERIFIER:	PAGE 001 OF 001

2.10 NOZZLE LOAD SUMMARY

EQUIPMENT : DRAIN TANK TAG NO. : WDL-T-3
NOZZLE SIZE : 10" SERVICE : RC JOINT NO. : H100 (MEMBER-1000)
REFERENCE : PRESSURIZER RELIEF DRAIN TANK
ORIENTATION : LOCAL (X - AXIAL, Y,Z - SHEAR)

LOAD CASE (RUN I.D.)	FORCES (LBS)			MOMENTS (IN-LBS)		
	FX	FY	FZ	MX	MY	MZ
DEADWEIGHT (AYXBANH)	-389.	-1.	-15.	12.	-3132.	-36.
THERMAL (AYXBANH)	-378.	91.	-84.	-12.	684.	4080.
SEISMIC-OBE (AYXBANH)	±52.	±20.	±43.	±624.	±2328.	±840.
BLOWDOWN (AYXBBAK)	±262.	±31.	±68.	±770.	±3618.	±1265.
NORMAL (——)						
UPSET (——)						
EMERGENCY (——)						
FAULTED (——)						

NOTE :

1. RUN AYXBANH DATED 6/16/82
2. RUN AYXBBAK DATED 6/17/82

GILBERT ASSOCIATES, INC. READING, PA.	TMI UNIT-1 NUCLEAR STATION	W.O. NUMBER 04-5064-000	FILING CODE (ME- 88,89)
PIPING ENGINEERING DEPT. NUMBER 0432	ORINGINATOR: [signature] DATE: 7/24/82	VERIFIER:	PAGE 001 OF 001

2.10 NOZZLE LOAD SUMMARY

EQUIPMENT : SRV TAG NO. : RC-RV1B
NOZZLE SIZE : 6" SERVICE : RC JOINT NO. : 249(MEMBER-2520)
REFERENCE : PRESSURIZER SRV OUTLET FLANGE
ORIENTATION : LOCAL (X - AXIAL, Y,Z - SHEAR)

LOAD CASE (RUN I.D.)	FORCES (LBS)			MOMENTS (IN-LBS)		
	FX	FY	FZ	MX	MY	MZ
DEADWEIGHT (AYXBLTD)	0.	-249.	0.	0.	0.	1344.
THERMAL (AYXBLTD)	31.	103.	236.	-1800.	12636.	-5976.
SEISMIC-OBE (AYXBLTD)	*2393.	*198.	0.	0.	0.	*1368.
BLOWDOWN (AYXBLYU)	*2035.	*84.	0.	00.	0.	*5126.

NOTE :
1. RUN AYXBLTD DATED 6/16/82
2. RUN AYXBLYU DATED 6/17/82
3. * — POSITIVE AND NEGATIVE VALUES

GILBERT ASSOCIATES, INC. READING, PA.	TMI UNIT-1 NUCLEAR STATION	W.O. NUMBER 04-5004-000	FILING CODE (ME-88.89)
PIPING ENGINEERING DEPT. NUMBER 0432	ORINGINATOR: [illegible signature] DATE: 7-20-82	VERIFIER:	PAGE 001 OF 001

2.10 NOZZLE LOAD SUMMARY

EQUIPMENT : PENETRATION TAG NO. : PR7
NOZZLE SIZE : 6" SERVICE : RC JOINT NO. : 227
REFERENCE : PENETRATION
ORIENTATION : LOCAL (X - AXIAL, Y,Z - SHEAR)

LOAD CASE (RUN I.D.)	FORCES (LBS)			MOMENTS (IN-LBS)		
	FX	FY	FZ	MX	MY	MZ
DEADWEIGHT (AYXBLTD)	-157.	-276.	377.	6204.	9864.	7368.
THERMAL (AYXBLTD)	2669.	-879.	-5032.	-4464.	-92184.	-55980.
SEISMIC-OBE (AYXBLTD)	±167.	±567.	±1307.	±29748.	±66564	±27516
BLOWDOWN (AYXBLYU)	±2162.	±1147.	±1053.	±15327.	±41872.	±22341.
NORMAL ( )						
UPSET ( )						
EMERGENCY ( )						
FAULTED ( )						

NOTE :
1. RUN AYXBLTD DATED 6/16/82
2. RUN AYXBLYU DATED 6/17/82

GILBERT ASSOCIATES, INC. READING, PA.	TMI UNIT-1 NUCLEAR STATION	W.O. NUMBER 04-5064-000	FILING CODE (ME-[illegible]7)
PIPING ENGINEERING DEPT. NUMBER 0432	ORINGINATOR: [illegible] DATE: [illegible]	VERIFIER:	PAGE 001 OF 001

2.10 NOZZLE LOAD SUMMARY

EQUIPMENT : REACTOR COOLANT TANK TAG NO. : WDL-T-3
NOZZLE SIZE : 10" SERVICE : RC JOINT NO. : H200 (MEMBER-2000)
REFERENCE : REATOR COOLANT DRAIN TANK
ORIENTATION : LOCAL (X - AXIAL, Y,Z - SHEAR)

LOAD CASE (RUN I.D.)	FORCES (LBS)			MOMENTS (IN-LBS)		
	FX	FY	FZ	MX	MY	MZ
DEADWEIGHT (AYXBLTD)	-1730.	-2.	1	-36	-48	-108.
THERMAL (AYXBLTD)	-534.	+208.	56.	6132.	-2832.	10464.
SEISMIC-OBE (AYXBLTD)	±272.	±7.	±44.	±912.	±2232.	±360.
BLOWDOWN (AYXBLWB)	±2937.	±46.	±35.	±344.	±1305.	±194.
NORMAL ( )						
UPSET ( )						
EMERGENCY ( )						
FAULTED ( )						

NOTE :

1. RUN AYXBLTD DATED 6/16/82
2. RUN AYXBLWB DATED 6/17/82

GILBERT ASSOCIATES, INC. READING, PA.	TMI UNIT-1 NUCLEAR STATION	W.O. NUMBER 04-5064-000	FILING CODE (ME- 91,92)
PIPING ENGINEERING DEPT. NUMBER 0432	ORINGINATOR: [signature] DATE: 7/26/82	VERIFIER:	PAGE 001 OF 001

2.10 NOZZLE LOAD SUMMARY

EQUIPMENT : SRV TAG NO. : RC-RV1A
NOZZLE SIZE : 6" SERVICE : RC JOINT NO. : 353(MEMBER-3560)
REFERENCE : PRESSURIZER SRV OUTLET FLANGE
ORIENTATION : LOCAL (X - AXIAL, Y,Z - SHEAR)

LOAD CASE (RUN I.D.)	FORCES (LBS)			MOMENTS (IN-LBS)		
	FX	FY	FZ	MX	MY	MZ
DEADWEIGHT (AYXBLVO)	1.	-174.	-4.	-420.	-132.	-36.
THERMAL (AYXBLVO)	134.	199.	-312.	1872.	-11712.	-8124.
SEISMIC-OBE (AYXBLVO)	*4401.	*473.	*477.	*456.	*192.	*8112.
BLOWDOWN (AYXBLJZ)	*991.	*161.	*176.	*127.	*229.	*5206.

NOTE :

1. RUN AYXBLTD DATED 6/16/82
2. RUN AYXBLYU DATED 6/17/82
3. * — POSITIVE AND NEGATIVE VALUES

GILBERT ASSOCIATES, INC. READING, PA.	TMI UNIT-1 NUCLEAR STATION	W.O. NUMBER 04-5064-000	FILING CODE (ME-511.72)
PIPING ENGINEERING DEPT. NUMBER 0432	ORINGINATOR: [illegible] DATE: 7/20/82	VERIFIER:	PAGE 001 OF 001

2.10 NOZZLE LOAD SUMMARY

EQUIPMENT : PENETRATION TAG NO. : PR7
NOZZLE SIZE : " SERVICE : RC JOINT NO. : 321
REFERENCE : PENETRATION
ORIENTATION : LOCAL (X - AXIAL, Y,Z - SHEAR)

LOAD CASE (RUN I.D.)	FORCES (LBS)			MOMENTS (IN-LBS)		
	FX	FY	FZ	MX	MY	MZ
DEADWEIGHT (AYXBLVO)	-5.	-541.	-15.	4548.	36.	144.
THERMAL (AYXBLVO)	5204.	-1210.	-881.	3204.	-94788.	-109860.
SEISMIC-OBE (AYXBLVO)	±346.	±367.	±1138.	±17724.	±74578.	±16362.
BLOWDOWN (AYXBLJZ)	±3008.	±180.	±192.	±6160.	±8256.	±9607.
NORMAL ( )						
UPSET ( )						
EMERGENCY ( )						
FAULTED ( )						

NOTE :
1. RUN AYXBLVO DATED 6/16/82
2. RUN AYXBLJZ DATED 6/17/82

GILBERT ASSOCIATES, INC. READING, PA.	TMI UNIT-1 NUCLEAR STATION	W.O. NUMBER 04-5004-000	FILING CODE (ME-71,72)
PIPING ENGINEERING DEPT. NUMBER 0432	ORINGINATOR: [signature] DATE: 7/26/82	VERIFIER:	PAGE 001 OF 001

2.10 NOZZLE LOAD SUMMARY

EQUIPMENT : TANK TAG NO. : WDL-T-3
NOZZLE SIZE : 10" SERVICE : RC JOINT NO. : H300(MEMBER-3000)
REFERENCE : REACTOR COOLANT DRAIN TANK
ORIENTATION : LOCAL (X - AXIAL, Y,Z - SHEAR)

LOAD CASE (RUN I.D.)	FORCES (LBS)			MOMENTS (IN-LBS)		
	FX	FY	FZ	MX	MY	MZ
DEADWEIGHT (AYXBLVO)	-541.	-3	15.	36.	4548.	-144.
THERMAL (AYXBLVO)	-243.	167.	299.	15864.	-15396.	4944.
SEISMIC-OBE (AYXBLVO)	±740.	±208.	±194.	±3624.	±11184.	±7644.
BLOWDOWN (AYXBLJZ)	±4019.	±530.	±1155.	±7857.	±32211.	±17187.
NORMAL ( )						
UPSET ( )						
EMERGENCY ( )						
FAULTED ( )						

NOTE :
1. RUN AYXBLVO DATED 6/16/82
2. RUN AYXBLJZ DATED 6/17/82

10.3 SUPPORT LOAD DETAILS

STATUS: ☐ PRELIMINARY ☑ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME: Three Mile Island Unit #1	W.O. NUMBER: 04-5064-000	PAGE

SUBJECT: Support Load Summary Sheet

ORIGINATOR: [illegible]
DATE: [illegible]
VERIFIER: [illegible]
DATE: [illegible]

MARK NO. [illegible]

TYPE OF SUPPORT

ANALYSIS CODE

ANALYSIS JOINT NO. [illegible]

LOAD TYPE	BRANCH JOINT NO.	SUPPORT LOAD (LBS.) (IN.-LBS.)					
		F_X	F_Y	F_Z	M_X	M_Y	M_Z
DEADWEIGHT	1( ) 2( ) 3( )	-1.	-3[illegible]1.	+15.	-3132.	+12.	+56.
THERMAL	1( ) 2( ) 3( )	+91.	-[illegible].	+[illegible].	+6[illegible]4.	-12.	-4080.
SEISMIC - OBE	1( ) 2( ) 3( )	±20.	±52.	±43.	±2528.	±624.	±[illegible].
PORV	1( ) 2( ) 3( )	+18. -31.	+262. -108.	+64. -68.	+3618. -1354.	+526. -770.	+1265. -710.
DESIGN LOAD		+129. -52.	+514. -927.	+206 -111	+6650 -[illegible]	+1162. -1406	+2141. -5650.
HYPOTHETICAL LOAD		+149. -72.	+566. -979.	+[illegible]. -154.	+[illegible]8 -9142.	+1786. -2030.	+2981 -6470.

Design loading combinations for seismic category 1, 2, 3, and non-nuclear supports

Seismic Category	Loading Case	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ± (2) OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT: SUPPORT LOAD SUMMARY SHEET

ORIGINATOR: [illegible]
DATE: [illegible]
VERIFIER: C. [illegible]
DATE: 6-17-82

MARK NO. PR30

ANALYSIS CODE ____

ANALYSIS JOINT NO. 102

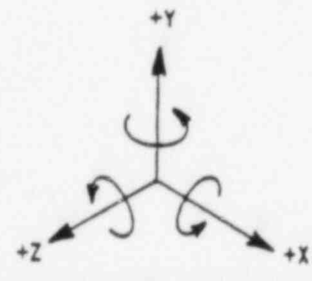
SEISMIC CATEGORY ____

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN .5346

N S ____

E W ____



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ 2. −	+ −	+ − 15.	+ −	+ −	+ −
THERMAL	+ − 208.	+ −	+ − 83.	+ −	+ −	+ −
SEISMIC-OBE	+ 83. − 83.	+ −	+ 165. − 165.	+ −	+ −	+ −
PORV	+ 125. − 67.	+ −	+ 91. − 74.	+ −	+ −	+ −
DESIGN LOAD	+ 210. − 358.	+ −	+ 256. − 337.	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 293. − 441.	+ −	+ 421. − 502.	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ±(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE

SUBJECT: SUPPORT LOAD SUMMARY SHEET

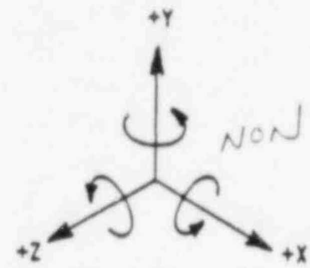
ORIGINATOR: [illegible]
DATE: [illegible]
VERIFIER: C. [illegible]
DATE: [illegible]

MARK NO. PR46

ANALYSIS CODE ______

ANALYSIS JOINT NO. 103

SEISMIC CATEGORY ______



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

UP DN 0.1412 (Y)
N S 0.6562 (X)
E W 0.0271 (Z)

NON-GLOBAL

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	± 120.	+ −	+ −	+ −	+ −	+ −
PORV	+ 77. − 213.	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ 197 − 333.	+ −	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 317. − 453.	+ −	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE
SUBJECT SUPPORT LOAD SUMMARY SHEET			ORIGINATOR [illegible] DATE [illegible]	
			VERIFIER [illegible] DATE [illegible]	

MARK NO. PR31

ANALYSIS CODE ____________

ANALYSIS JOINT NO. 101

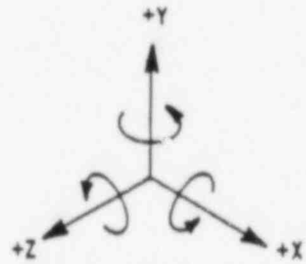
SEISMIC CATEGORY ____________

PREDICTED PIPE MOVEMENT (INCHES)

UP (circled) DN 1.4877

N S ____________

E W ____________



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ − 136.	+ −	+ 2. −	+ −	+ −	+ −
THERMAL	+ 1331. −	+ −	+ − 281.	+ −	+ −	+ −
SEISMIC-OBE	± 416.	+ −	± 119.	+ −	+ −	+ −
PORV	+168. −142.	+ −	+50. −172.	+ −	+ −	+ −
DESIGN LOAD	+ 1915. − 694.	+ −	+ 171. − 572.	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 2331. − 1110.	+ −	+ 290. − 691.	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☑ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT: SUPPORT LOAD SUMMARY SHEET

ORIGINATOR: [illegible]
DATE: [illegible]
VERIFIER: C. [illegible]
DATE: [illegible]

MARK NO. PR22

ANALYSIS CODE ________

ANALYSIS JOINT NO. 107

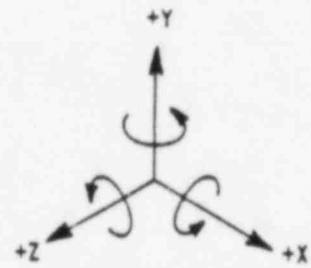
SEISMIC CATEGORY ________

PREDICTED PIPE MOVEMENT (INCHES)

UP/DN (UP circled) 1.6436

N S ________

E W (W circled) 0.0376



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ 135. -	+ - 251.	+ -	+ -	+ -	+ -
THERMAL	+ - 1436.	+ -	+ -	+ -	+ -	+ -
SEISMIC-OBE	± 455.	+ -	+ -	+ -	+ -	+ -
PORV	+ 106. - 344.	+ -	+ -	+ -	+ -	+ -
DESIGN LOAD	+ 696. - 2235.	+ - 251.	+ -	+ -	+ -	+ -
HYPOTHETICAL LOAD	+ 1151. - 2690.	+ - 251.	+ -	+ -	+ -	+ -

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ±(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000	PAGE

SUBJECT: SUPPORT LOAD SUMMARY SHEET

ORIGINATOR: R. [illegible]
DATE: [illegible]
VERIFIER: [illegible]
DATE: [illegible]

MARK NO. PR17

ANALYSIS CODE ________

ANALYSIS JOINT NO. 112

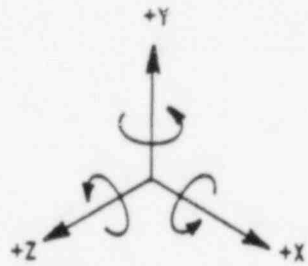
SEISMIC CATEGORY ________

PREDICTED PIPE MOVEMENT (INCHES)

UP DN 1.5085

(N) S 0.2968

(E) W 0.2704



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ / −	+ / − 113.	+ / −	+ / −	+ / −	+ / −
THERMAL	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
SEISMIC-OBE	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
PORV	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
DESIGN LOAD	+ / −	+ / − 113.	+ / −	+ / −	+ / −	+ / −
HYPOTHETICAL LOAD	+ / −	+ / − 113.	+ / −	+ / −	+ / −	+ / −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ±(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

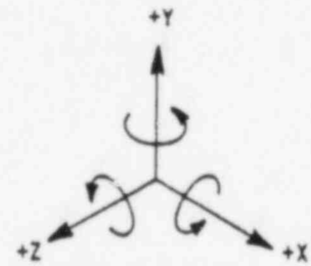
GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE
SUBJECT	SUPPORT LOAD SUMMARY SHEET		ORIGINATOR [illegible] DATE [illegible]	
			VERIFIER [illegible] DATE [illegible]	

MARK NO. PR50

ANALYSIS CODE ______

ANALYSIS JOINT NO. S113

SEISMIC CATEGORY ______



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

UP / DN 0.9812
N / S 0.0348
E / W 0.5001

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ − 123.	+ −	+ −	+ −	+ −	+ −
PCRV	+316. −39.	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+439. −162	+ −	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+562. −285.	+ −	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☑ FINAL

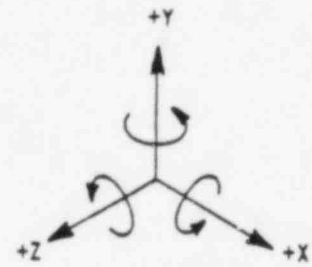
GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE
SUBJECT	SUPPORT LOAD SUMMARY SHEET		ORIGINATOR	
			DATE	
			VERIFIER	
			DATE	

MARK NO. *PR14*

ANALYSIS CODE ____________

ANALYSIS JOINT NO. *116*

SEISMIC CATEGORY ____________



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN *0.1250*
(N) S *0.0171*
(E) W *0.2663*

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ / −	+ / − *150.*	+ / −	+ / −	+ / −	+ / −
THERMAL	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
SEISMIC-OBE	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
PORV	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
DESIGN LOAD	+ / −	+ / − *150.*	+ / −	+ / −	+ / −	+ / −
HYPOTHETICAL LOAD	+ / −	+ / − *150.*	+ / −	+ / −	+ / −	+ / −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

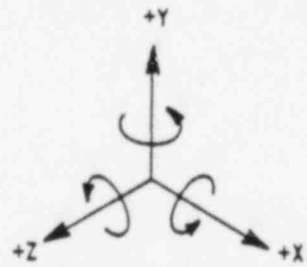
GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME: Three Mile Island Unit #1	W.O. NUMBER: 04-5064-000	PAGE
SUBJECT: SUPPORT LOAD SUMMARY SHEET			ORIGINATOR: [illegible] DATE: [illegible]
			VERIFIER: C. [illegible] DATE: 6-17-82

MARK NO. FR+?

ANALYSIS CODE ____

ANALYSIS JOINT NO. 117

SEISMIC CATEGORY ____



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

UP (DN) 0.5502

(N) S 0.0535

(E) W 0.0853

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	+ − 84.	+ −	+ −	+ −	+ −
PCRV	+ −	+ 499. − 103.	+ −	+ −	+ −	+ −
DESIGN LOAD	+ −	+ 583. − 187.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ 667. − 271.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible]

DATE [illegible]

VERIFIER C.LICCO

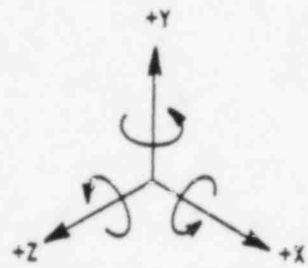
DATE 6-17-82

MARK NO. PR-7

ANALYSIS CODE ___________

ANALYSIS JOINT NO. 120

SEISMIC CATEGORY ___________



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

UP (DN) 0.5817

N S ___________

E W ___________

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ - 6.	+ -	+ - 2.	+ -	+ -	+ -
THERMAL	+ 597. -	+ -	+ - 802.	+ -	+ -	+ -
SEISMIC-OBE	± 42.	+ -	± 100.	+ -	+ -	+ -
PORV	+ 75. - 77	+ -	+ 539. - 127.	+ -	+ -	+ -
DESIGN LOAD	+ 714. - 125.	+ -	+ 639. - 1031.	+ -	+ -	+ -
HYPOTHETICAL LOAD	+ 756. - 167.	+ -	+ 739. - 1131.	+ -	+ -	+ -

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ±(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000	PAGE
SUBJECT	SUPPORT LOAD SUMMARY SHEET		ORIGINATOR DATE
			VERIFIER DATE

MARK NO. PR27

ANALYSIS CODE ____

ANALYSIS JOINT NO. 121

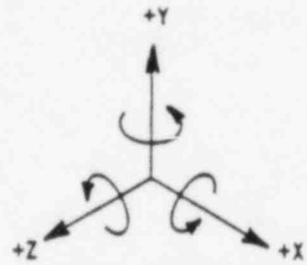
SEISMIC CATEGORY ____

PREDICTED PIPE MOVEMENT (INCHES)

UP (DN) 0.2356

N S ____

E W ____



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ 15. −	+ −	+ − 16.	+ −	+ −	+ −
THERMAL	+ − 2211.	+ −	+ 3650. −	+ −	+ −	+ −
SEISMIC-OBE	± 79.	+ −	± 86.	+ −	+ −	+ −
PCRV	+ 115. − 107.	+ −	+ 118. − 275.	+ −	+ −	+ −
DESIGN LOAD	+ 209. − 2397.	+ −	+ 3854. − 377.	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 288. − 2476.	+ −	+ 3940. − 463.	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ±(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT: SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible]
DATE [illegible]
VERIFIER [illegible]
DATE [illegible]

MARK NO. PR11

ANALYSIS CODE

ANALYSIS JOINT NO. 124

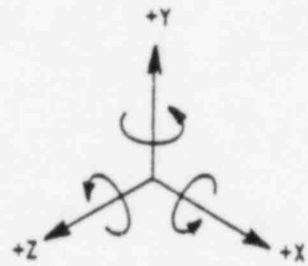
SEISMIC CATEGORY

PREDICTED PIPE MOVEMENT (INCHES)

UP (DN) 0.0403

(N) S 0.2771

E (W) 0.1643



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ − 303.	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	+ −	+ −	+ −	+ −	+ −
	+ −	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ −	+ − 303.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ − 303.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE

SUBJECT: Support Load Summary Sheet

ORIGINATOR [illegible]
DATE [illegible]
VERIFIER [illegible]
DATE [illegible]

MARK NO. PCP

TYPE OF SUPPORT ________

ANALYSIS CODE ________

ANALYSIS JOINT NO. 129

LOAD TYPE	BRANCH JOINT NO.	SUPPORT LOAD (LBS.) (IN.-LBS.)					
		F_X	F_Y	F_Z	M_X	M_Y	M_Z
DEADWEIGHT	1( ) 2( ) 3( )	-9.	-143.	+17.	+156.	+656.	-636.
THERMAL	1( ) 2( ) 3( )	+1734.	+411.	-2639.	-5016.	-57888.	-1920.
SEISMIC - OBE	1( ) 2( ) 3( )	±26.	±36.	±294.	±1800.	±17820.	±1680.
PCRV	1( ) 2( ) 3( )	+591. -30.	-93. -62.	+57. -342.	+315. -782.	+1403. -5186.	+2760. -1547.
DESIGN LOAD		+2351. -65.	+540. -241.	+368. -3175.	+2271. -7598.	+19859. -80794.	+4440. -5763.
HYPOTHETICAL LOAD		+2377. -91.	+576. -277.	+662. -3469	+4071. -9398.	+37679. -98614.	+6120. -7463.

Design loading combinations for seismic category 1, 2, 3, and non-nuclear supports

Seismic Category	Loading Case	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ± (2) OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000	PAGE
SUBJECT SUPPORT LOAD SUMMARY SHEET			ORIGINATOR [illegible] DATE [illegible]
			VERIFIER [illegible] DATE [illegible]

MARK NO. PR-6A

ANALYSIS CODE ______

ANALYSIS JOINT NO. 132

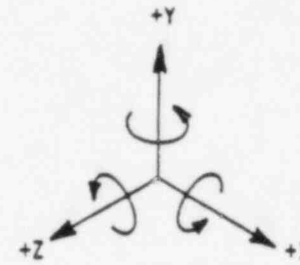
SEISMIC CATEGORY ______

PREDICTED PIPE MOVEMENT (INCHES)

(UP) /DN 0.6593

N S ______

E W ______



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ - 15.	+ -	+ 7. -	+ -	+ -	+ -
THERMAL	+ 185. -	+ -	+ 641. -	+ -	+ -	+ -
SEISMIC-OBE	± 113.	+ -	± 189.	+ -	+ -	+ -
PORV	+ 114. - 114.	+ -	+ 71. - 109.	+ -	+ -	+ -
DESIGN LOAD	+ 412. - 242.	+ -	+ 908. - 298.	+ -	+ -	+ -
HYPOTHETICAL LOAD	+ 525. - 355.	+ -	+ 1097. - 487.	+ -	+ -	+ -

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ±(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

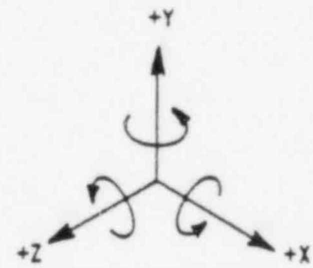
GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE
SUBJECT	SUPPORT LOAD SUMMARY SHEET		ORIGINATOR	
			DATE	
			VERIFIER	
			DATE	

MARK NO. *PR48*

ANALYSIS CODE ________

ANALYSIS JOINT NO. *5133*

SEISMIC CATEGORY ________



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

- (UP) DN *1.0326*
- (N) S *0.0346*
- E (W) *0.0410*

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	± *205.*	+ −	+ −	+ −	+ −
PORV	+ −	+ *1118.* − *140.*	+ −	+ −	+ −	+ −
DESIGN LOAD	+ −	+ *1323.* − *345.*	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ *1528.* − *550.*	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
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SUBJECT SUPPORT LOAD SUMMARY SHEET			ORIGINATOR [illegible] DATE [illegible]	
			VERIFIER C. [illegible] DATE 6-17-82	

MARK NO. PR6

ANALYSIS CODE ______

ANALYSIS JOINT NO. 134

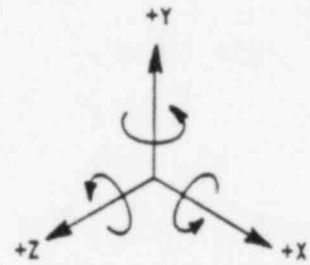
SEISMIC CATEGORY ______

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN 1.0342

N S ______

E W ______



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+16. −	+ −	+4. −	+ −	+ −	+ −
THERMAL	+ −21.	+ −	+ −1703.	+ −	+ −	+ −
SEISMIC-OBE	±195.	+ −	±338.	+ −	+ −	+ −
PORV	+222. −184.	+ −	+265. −289.	+ −	+ −	+ −
DESIGN LOAD	+433. −400.	+ −	+607. −2330.	+ −	+ −	+ −
HYPOTHETICAL LOAD	+628. −595.	+ −	+945. −2668.	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE
SUBJECT	SUPPORT LOAD SUMMARY SHEET	ORIGINATOR DATE	VERIFIER DATE

MARK NO. PR5

ANALYSIS CODE ______

ANALYSIS JOINT NO. 137

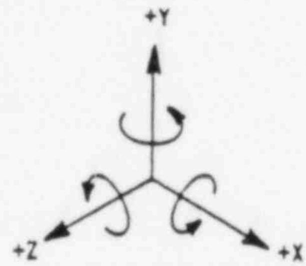
SEISMIC CATEGORY ______

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN 1.2998

(N) S 0.0432

(E) W 0.2537



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ − 517.	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	+ −	+ −	+ −	+ −	+ −
	+ −	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ −	+ − 517.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ − 517.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☑ FINAL

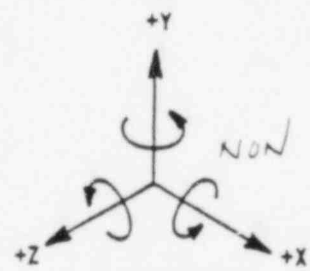
GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE
SUBJECT	SUPPORT LOAD SUMMARY SHEET		ORIGINATOR [illegible] DATE [illegible] VERIFIER [illegible] DATE [illegible]

MARK NO. PR47

ANALYSIS CODE ________

ANALYSIS JOINT NO. 152

SEISMIC CATEGORY ________



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

PREDICTED PIPE MOVEMENT (INCHES)

UP DN 1.4903 (Y)
N S 0.0219 (X)
E W 0.3159 (Z)

NON-SEISMIC

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
THERMAL	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
SEISMIC-OBE	± 300.	+ / −	+ / −	+ / −	+ / −	+ / −
PORV	+ 445. / − 281.	+ / −	+ / −	+ / −	+ / −	+ / −
DESIGN LOAD	+ 745. / − 581.	+ / −	+ / −	+ / −	+ / −	+ / −
HYPOTHETICAL LOAD	+ 1045. / − 881.	+ / −	+ / −	+ / −	+ / −	+ / −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME: Three Mile Island Unit #1	W.O. NUMBER: 04-5064-000	PAGE

SUBJECT: Support Load Summary Sheet A

ORIGINATOR: [illegible] DATE: [illegible]
VERIFIER: [illegible] DATE: [illegible]

MARK NO. Press. Nozzle

TYPE OF SUPPORT ____

ANALYSIS CODE ____

ANALYSIS JOINT NO. 148

LOAD TYPE	BRANCH JOINT NO.	SUPPORT LOAD (LBS.) (IN.-LBS.) Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	1( ) 2( ) 3( )	-2.	-924.	-11.	-804.	+132.	-10728.
THERMAL	1( ) 2( ) 3( )	-64.	-35.	+1135.	+37080.	+8124.	+1824.
SEISMIC - OBE	1( ) 2( ) 3( )	±620.	±624.	±985.	±19704.	±10788.	±25452
PORV	1( ) 2( ) 3( )	+529. -579.	+433. -425.	+628 -926.	+16160. -24876.	+6728. -7207.	+22727. -21541.
DESIGN LOAD		+1149. -1265.	+1057. -2006.	+2746. -1922.	+72914. -44884.	+25772. -17995.	+50008. -57721.
HYPOTHETICAL LOAD		+1769. -1885.	+1681. -2600.	+3731. -2907.	+92648. -64588.	+36560. -28783.	+[illegible]455. -83173.

Design loading combinations for seismic category 1, 2, 3, and non-nuclear supports

Seismic Category	Loading Case	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ± (2) OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT: Support Load Summary Sheet

ORIGINATOR [illegible]
DATE 6-17-82
VERIFIER [illegible]
DATE 6-17-82

MARK NO. RC [illegible]

TYPE OF SUPPORT

ANALYSIS CODE

ANALYSIS JOINT NO. H200

LOAD TYPE	BRANCH JOINT NO.	SUPPORT LOAD (LBS.) (IN.-LBS.)					
		Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	1( ) 2( ) 3( )	-2.	-1730.	-1.	-48.	-36.	+105.
THERMAL	1( ) 2( ) 3( )	+208.	-584.	-56.	-2882.	+6[illegible]	[illegible]
SEISMIC - OBE	1( ) 2( ) 3( )	± 7.	±272.	±44.	±2252.	±712.	±36[illegible].
SRV1	1( ) 2( ) 3( )	+3. -5.	+2957. -846.	+28. -85.	+1173. -1305.	+344. -258.	+174. -15[illegible].
DESIGN LOAD		+218. -14.	+3209. -5582.	+72. -136.	+3405. -6417.	+7358. -1[illegible].	+662. -10957.
HYPOTHETICAL LOAD		+225. -21.	+3481. -3654.	+116. -180.	+5637. -2649.	+8300. -2118.	+1022. -11517.

Design loading combinations for seismic category 1, 2, 3, and non-nuclear supports

Seismic Category	Loading Case	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ± (2) OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible]

DATE [illegible]

VERIFIER [illegible]

DATE [illegible]

MARK NO. PR29

ANALYSIS CODE ________

ANALYSIS JOINT NO. 200

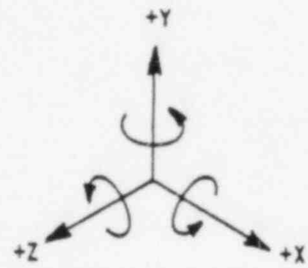
SEISMIC CATEGORY ________

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN 0.4566

N S ________

E W ________



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ 5. −	+ −	+ 2. −	+ −	+ −	+ −
THERMAL	+ − 499.	+ −	+ 132. −	+ −	+ −	+ −
SEISMIC-OBE	± 16.	+ −	± 104.	+ −	+ −	+ −
SRVI	+ 8. − 5.	+ −	+ 54. − 50.	+ −	+ −	+ −
DESIGN LOAD	+ 29. − 510	+ −	+ 292. − 154.	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 45. − 526.	+ −	+ 396. − 258.	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

GAI 350 REV. 3-77

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE

SUBJECT: SUPPORT LOAD SUMMARY SHEET

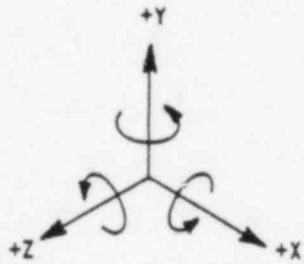
ORIGINATOR: [illegible]
DATE: [illegible]
VERIFIER: C. [illegible]
DATE: [illegible]

MARK NO. PR21

ANALYSIS CODE ____________

ANALYSIS JOINT NO. 201

SEISMIC CATEGORY ____________



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN 1.2260

N S ____________

E W ____________

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ - 259.	+ -	+ -	+ -	+ -	+ -
THERMAL	+ 3488. -	+ -	+ - 199.	+ -	+ -	+ -
SEISMIC-OBE	± 782.	+ -	± 20.	+ -	+ -	+ -
SRVI	+ 282. - 398.	+ -	+ 455. - 404.	+ -	+ -	+ -
DESIGN LOAD	+ 4552. - 1439.	+ -	+ 475. - 623.	+ -	+ -	+ -
HYPOTHETICAL LOAD	+ 5334. - 2221.	+ -	+ 495. - 643.	+ -	+ -	+ -

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible]
DATE [illegible]
VERIFIER [illegible]
DATE [illegible]

MARK NO. PA-21

ANALYSIS CODE ________

ANALYSIS JOINT NO. 204

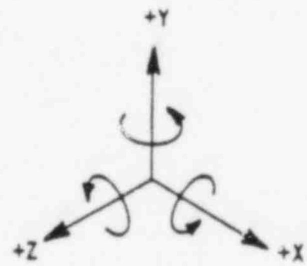
SEISMIC CATEGORY ________

PREDICTED PIPE MOVEMENT (INCHES)

UP (circled) DN 1.3455

N S ________

E W (circled) 0.0342



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ 252. −	+ − 567.	+ −	+ −	+ −	+ −
THERMAL	+ − 3446.	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	± 762.	+ −	+ −	+ −	+ −	+ −
SRV1	+ 627. − 1733.	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ 1647. − 5941.	+ 0 − 567.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 2409. − 6703.	+ 0 − 567.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

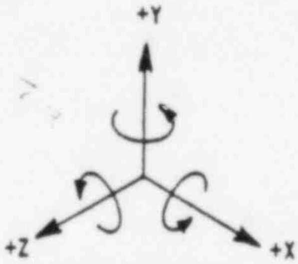
GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE
SUBJECT	SUPPORT LOAD SUMMARY SHEET	ORIGINATOR [illegible] DATE [illegible]	VERIFIER [illegible] DATE [illegible]

MARK NO. PR43

ANALYSIS CODE ____________

ANALYSIS JOINT NO. 5206

SEISMIC CATEGORY ____________



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN 1.5734
(N) S 0.2818
E (W) 0.1584

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	+ −	± 186.	+ −	+ −	+ −
SRV1	+ −	+ −	+ 892. − 1525.	+ −	+ −	+ −
DESIGN LOAD	+ −	+ −	+ 1078. − 1711.	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ −	+ 1264. − 1897.	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

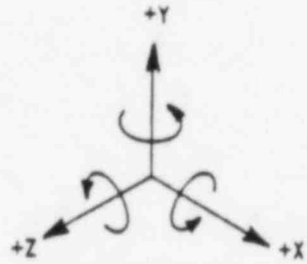
GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE
SUBJECT SUPPORT LOAD SUMMARY SHEET			ORIGINATOR [illegible] DATE 5-17-[illegible]	
			VERIFIER [illegible] DATE [illegible]	

MARK NO. PR19

ANALYSIS CODE ____

ANALYSIS JOINT NO. 207

SEISMIC CATEGORY ____



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN 1.4964

(N) S 0.2810

E (W) 0.0834

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ –	+ –520.	+ –	+ –	+ –	+ –
THERMAL	+ –	+ –	+ –	+ –	+ –	+ –
SEISMIC-OBE	+ –	+ –	+ –	+ –	+ –	+ –
	+ –	+ –	+ –	+ –	+ –	+ –
DESIGN LOAD	+ –	+ –520.	+ –	+ –	+ –	+ –
HYPOTHETICAL LOAD	+ –	+ –520.	+ –	+ –	+ –	+ –

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME: Three Mile Island Unit #1	W.O. NUMBER: 04-5064-000		PAGE
SUBJECT: SUPPORT LOAD SUMMARY SHEET			ORIGINATOR: K. [illegible] DATE 3/17/82	
			VERIFIER: C. [illegible] DATE 6-17-82	

MARK NO. PR16

ANALYSIS CODE ____________

ANALYSIS JOINT NO. 210

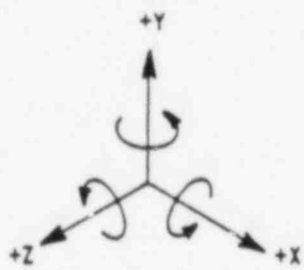
SEISMIC CATEGORY ________

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN 0.9880

(N) S 0.4042

(E) W 0.3025



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ / −	+ / −523.	+ / −	+ / −	+ / −	+ / −
THERMAL	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
SEISMIC-OBE	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
DESIGN LOAD	+ / −	+ / −523.	+ / −	+ / −	+ / −	+ / −
HYPOTHETICAL LOAD	+ / −	+ / −523.	+ / −	+ / −	+ / −	+ / −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME Three Mile Island Unit #1	W.C. NUMBER 04-5064-000	PAGE

SUBJECT: SUPPORT LOAD SUMMARY SHEET

ORIGINATOR: R. [illegible] DATE 6/7/82
VERIFIER: [illegible] DATE [illegible]

MARK NO. PK41

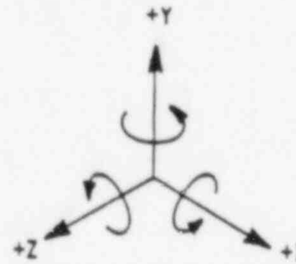
ANALYSIS CODE

ANALYSIS JOINT NO. 211

SEISMIC CATEGORY

PREDICTED PIPE MOVEMENT (INCHES)

UP DN 0.4377
(N) S 0.2173
(E) W 0.5073



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	± 119.	+ −	+ −	+ −	+ −	+ −
SRV1	+2640. −855.	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+2759. −974.	+ −	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+2878. −1093.	+ −	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ±(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000	PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible]

DATE [illegible]

VERIFIER [illegible]

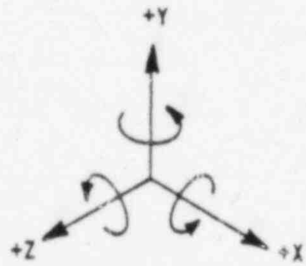
DATE [illegible]

MARK NO. PR13

ANALYSIS CODE ____________

ANALYSIS JOINT NO. 214

SEISMIC CATEGORY ____________



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

(UP)/DN 0.2296

(N) S 0.1449

(E) W 0.4835

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ − 612.	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	+ −	+ −	+ −	+ −	+ −
	+ −	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ −	+ − 612.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ − 612.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

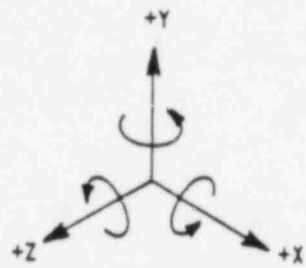
GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE
SUBJECT	SUPPORT LOAD SUMMARY SHEET	ORIGINATOR [illegible] DATE [illegible]	VERIFIER [illegible] DATE [illegible]

MARK NO. PK51

ANALYSIS CODE

ANALYSIS JOINT NO. 215

SEISMIC CATEGORY



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

UP (DN) 0.5150

(N) S 0.0473

(E) W 0.0545

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	± 556.	+ −	+ −	+ −	+ −
SRV1	+ −	+ 3805. − 2932.	+ −	+ −	+ −	+ −
DESIGN LOAD	+ −	+ 4361. − 3488.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ 4917. − 4044.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000	PAGE
SUBJECT	SUPPORT LOAD SUMMARY SHEET		ORIGINATOR
			DATE
			VERIFIER
			DATE

MARK NO. PR28

ANALYSIS CODE

ANALYSIS JOINT NO. 218

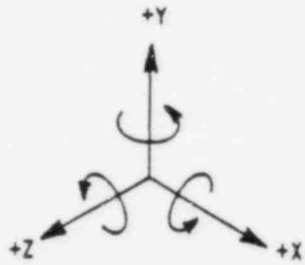
SEISMIC CATEGORY

PREDICTED PIPE MOVEMENT (INCHES)

UP DN) 0.5052

N S

E W



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ - 61.	+ -	+ 4. -	+ -	+ -	+ -
THERMAL	+ 817. -	+ -	+ - 2021.	+ -	+ -	+ -
SEISMIC-OBE	± 85.	+ -	± 918.	+ -	+ -	+ -
SRVI	+ 1480. - 1392.	+ -	+ 6213. - 3746.	+ -	+ -	+ -
DESIGN LOAD	+ 2382. - 1538.	+ -	+ 7135. - 6685.	+ -	+ -	+ -
HYPOTHETICAL LOAD	+ 2467. - 1623.	+ -	+ 8053. - 7603.	+ -	+ -	+ -

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000	PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible]

DATE [illegible]

VERIFIER [illegible]

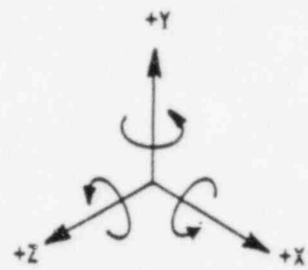
DATE [illegible]

MARK NO. PR27

ANALYSIS CODE ______

ANALYSIS JOINT NO. 219

SEISMIC CATEGORY ______



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

UP (DN) 0.2304

N S ______

E W ______

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ 218. −	+ −	+ − 382.	+ −	+ −	+ −
THERMAL	+ − 3699.	+ −	+ 7146. −	+ −	+ −	+ −
SEISMIC-OBE	± 186.	+ −	± 166.	+ −	+ −	+ −
SRVI	+ 848. − 1205.	+ −	+ 1164. − 1543.	+ −	+ −	+ −
DESIGN LOAD	+ 1[illegible]6. − 5084.	+ −	+ 8176. − 2091.	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 1426. − 5264.	+ −	+ 8642. − 2257.	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE
SUBJECT SUPPORT LOAD SUMMARY SHEET			ORIGINATOR [illegible] DATE [illegible] VERIFIER [illegible] DATE [illegible]

MARK NO. PR10

ANALYSIS CODE ________

ANALYSIS JOINT NO. 222

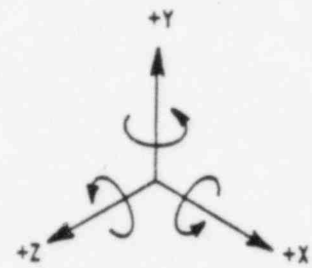
SEISMIC CATEGORY ________

PREDICTED PIPE MOVEMENT (INCHES)

UP (DN) 0.0471

(N) S 0.1806

E (W) 0.0527



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ / −	+ / − 1467.	+ / −	+ / −	+ / −	+ / −
THERMAL	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
SEISMIC-OBE	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
DESIGN LOAD	+ / −	+ / − 1467.	+ / −	+ / −	+ / −	+ / −
HYPOTHETICAL LOAD	+ / −	+ / − 1467.	+ / −	+ / −	+ / −	+ / −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT: Support Load Summary Sheet A

ORIGINATOR: R. C[illegible]

DATE: [illegible]

VERIFIER: [illegible]

DATE: [illegible]

MARK NO. [illegible] 7

TYPE OF SUPPORT

ANALYSIS CODE

ANALYSIS JOINT NO. [illegible]7

LOAD TYPE	BRANCH JOINT NO.	SUPPORT LOAD (LBS.) (IN.-LBS.)					
		F_X	F_Y	F_Z	M_X	M_Y	M_Z
DEADWEIGHT	1( ) 2( ) 3( )	-157.	-276.	+377.	+6204.	+9864.	-7368.
THERMAL	1( ) 2( ) 3( )	+2669.	-879.	-5032.	-4464.	-92184.	-55980.
SEISMIC - OBE	1( ) 2( ) 3( )	±167.	±567.	±1307.	±29748.	±66564.	±27516.
SKV1	1( ) 2( ) 3( )	+2162. -613.	+1147. -941.	+1053. -1068.	+15327. -16941.	+41872. -[illegible]576.	+22341. -[illegible]1025.
DESIGN LOAD		+4996. -937.	+1714 -2663.	+2737. -7407.	+51279. -51153.	+11[illegible]. -192124.	+49857. -121869.
HYPOTHETICAL LOAD		+5165. -1104.	+2281. -3230.	+4044. -8714.	+81027. -80901.	+184864. -258688.	+77373. -149405.

Design loading combinations for seismic category 1, 2, 3, and non-nuclear supports

Seismic Category	Loading Case	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ± (2) OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

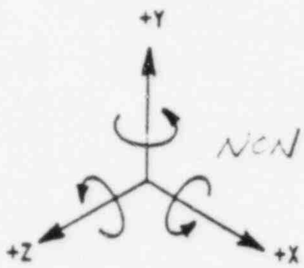
GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE
SUBJECT	SUPPORT LOAD SUMMARY SHEET	ORIGINATOR [illegible]	DATE [illegible] 17 [illegible]	
		VERIFIER [illegible]	DATE [illegible]	

MARK NO. PR4A STRUT

ANALYSIS CODE ________

ANALYSIS JOINT NO. S250

SEISMIC CATEGORY ________



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

PREDICTED PIPE MOVEMENT (INCHES)

UP DN 0.2023 ($\bar{Y}$)

N S ________

E W 0.0753. ($\bar{Z}$)

NON-GLOBAL

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ 56. −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ 1667. −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	± 351.	+ −	+ −	+ −	+ −	+ −
SRVI	+ 1658. − 1438.	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ 3732. − 1789.	+ −	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 4083. − 2140.	+ −	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

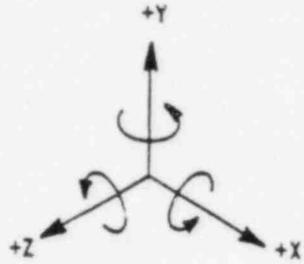
GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE
SUBJECT	SUPPORT LOAD SUMMARY SHEET	ORIGINATOR [illegible] DATE [illegible]	VERIFIER [illegible] DATE [illegible]

MARK NO. PR4

ANALYSIS CODE ____

ANALYSIS JOINT NO. 233

SEISMIC CATEGORY ____



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN 0.1942
N (S) 0.1344
(E) W 0.1468

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ − 1008.	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	+ −	+ −	+ −	+ −	+ −
	+ −	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ −	+ − 1008.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ − 1008.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ±(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE

SUBJECT: SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible] DATE [illegible]

VERIFIER [illegible] DATE [illegible]

MARK NO. FK37

ANALYSIS CODE

ANALYSIS JOINT NO. 8234

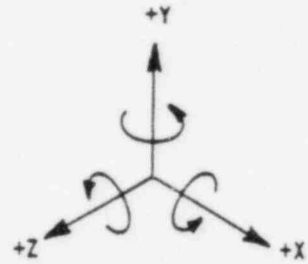
SEISMIC CATEGORY

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN 0.5720

N (S) 0.2978

(E) W 0.2307



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ 260. −	+ −	+ −	+ −	+ −	+ −
SRV1	+4318. −1990.	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+4578. −2250.	+ −	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+4838. −2510.	+ −	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE
SUBJECT SUPPORT LOAD SUMMARY SHEET			ORIGINATOR [illegible] DATE 6/17/[illegible]	
			VERIFIER [illegible] DATE [illegible]	

MARK NO. PK26

ANALYSIS CODE ______

ANALYSIS JOINT NO. 237

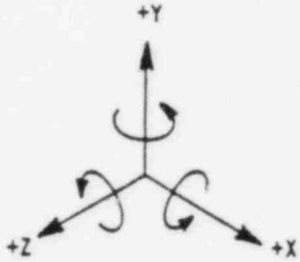
SEISMIC CATEGORY ______

PREDICTED PIPE MOVEMENT (INCHES)

UP / DN 1.0241

N / S 0.4957

E / W 0.3180



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	+ −	± 871.	+ −	+ −	+ −
SRV1	+ −	+ −	+ 1458. − 2039.	+ −	+ −	+ −
DESIGN LOAD	+ −	+ −	+ 2329. − 2910.	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ −	+ [illegible] − 3781.	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2*	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000	PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [signature]

DATE [illegible]

VERIFIER C. [illegible]

DATE 6-17-82

MARK NO. PR24

ANALYSIS CODE

ANALYSIS JOINT NO. 238

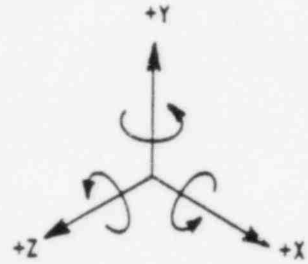
SEISMIC CATEGORY

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN 1.0478

N (S) 0.4659

(E) W 0.3255



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	± 118.	+ −	+ −	+ −	+ −
SRVI	+ −	+ 1424. − 473.	+ −	+ −	+ −	+ −
DESIGN LOAD	+ −	+ 1542. − 591.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ 1660. − 709.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ±(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☑ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible]

DATE [illegible] 17 [illegible]

VERIFIER C [illegible]

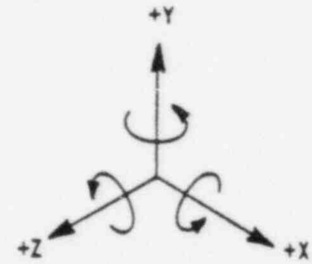
DATE 6 17 [illegible]

MARK NO. PR1 SPRING

ANALYSIS CODE ________

ANALYSIS JOINT NO. 241

SEISMIC CATEGORY ________



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

UP DN 1.0948

N (S) 0.3349

(E) W 0.3246

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ − 1046.	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	+ −	+ −	+ −	+ −	+ −
SRV1	+ −	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ −	+ − 1046.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ − 1046.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000	PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible]
DATE 6/17/82
VERIFIER C. Hsu
DATE 6/17/82

MARK NO. PR55

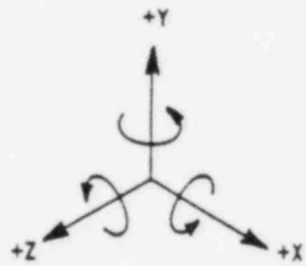
ANALYSIS CODE ____________

ANALYSIS JOINT NO. 212

SEISMIC CATEGORY ____________

PREDICTED PIPE MOVEMENT (INCHES)

UP DN 1.0455
N S 0.1796
E W 0.5469



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	± 92.	+ −	+ −	+ −	+ −	+ −
SRVI	+ 283. − 446.	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ 375 − 538.	+ −	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 467. − 630.	+ −	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ±(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible]
DATE [illegible] 17 [illegible]
VERIFIER C. [illegible]
DATE 6·17·82

MARK NO. PR33

ANALYSIS CODE

ANALYSIS JOINT NO. 245

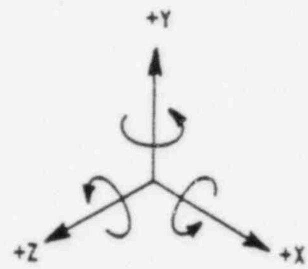
SEISMIC CATEGORY

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN 1.3200

N S

(E) W 0.3673



RIGHT HAND CARTESIAN
COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ − 11.	+ − 1072.	+ −	+1680. −	+ − 108.	+ − 1140.
THERMAL	+ 404. −	+ − 585.	+ −	+ − 2220.	+ 7216. −	+ 6672. −
SEISMIC-OBE	± 115.	± 96.	±	± 205680.	± 9108.	± 7592.
SRVI	+ 64. − 68.	+ 2278. − 239.	+ −	+ 41405. − [illegible]	+ 12312. − [illegible]	+ 5764. − 3987.
DESIGN LOAD	+ 583. − 194.	+ 2574. − 1710.	+ −	+ 248765. − [illegible]	+ 55656. − 23358.	+ 17528 − 12119.
HYPOTHETICAL LOAD	+ 698. − 309.	+ 2470. − 1836.	+ −	+ 454445. − 4369[illegible]	+ 37744. − 32466.	+ 24620. − 19211.

Design loading combinations for seismic category 1, 2, 3
and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT: Support Load Summary Sheet

ORIGINATOR: [illegible]
DATE: 6.17.82
VERIFIER: C. Hurs
DATE: 6.17.82

MARK NO. Pre... [illegible]

TYPE OF SUPPORT ____________

ANALYSIS CODE ____________

ANALYSIS JOINT NO. 252

LOAD TYPE	BRANCH JOINT NO.	SUPPORT LOAD (LBS.) (IN.-LBS.)					
		F_X	F_Y	F_Z	M_X	M_Y	M_Z
DEADWEIGHT	1( ) 2( ) 3( )		-927.		-6372.		
THERMAL	1( ) 2( ) 3( )	-236.	+103.	+31.	+7596.	+15468.	+1020.
SEISMIC - OBE	1( ) 2( ) 3( )		±214.	±2421.	±33024.		
SRV1	1( ) 2( ) 3( )		+372. -331.	+2563. -1048.	+28698. -14447.		
DESIGN LOAD		+ -236.	+689. -1482.	+5018. -3472.	+69318. -53843.	+15468. -	+1020. -
HYPOTHETICAL LOAD		+ -236.	+903. -1676	+7442. -5896.	+102342. -86867.	+15468. -	+1020. -

Design loading combinations for seismic category 1, 2, 3, and non-nuclear supports

Seismic Category	Loading Case	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ± (2) OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT Support Load Summary Sheet A

ORIGINATOR [illegible]
DATE [illegible]
VERIFIER [illegible]
DATE [illegible]

MARK NO. [illegible]

TYPE OF SUPPORT ____________________

ANALYSIS CODE ____________________

ANALYSIS JOINT NO. H500

LOAD TYPE	BRANCH JOINT NO.	SUPPORT LOAD (LBS.) (IN.-LBS.)					
		Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	1( ) 2( ) 3( )	-3.	-541.	-15.	+4548.	+36.	+124.
THERMAL	1( ) 2( ) 3( )	+167.	-245.	-297.	-1538.	[illegible]	[illegible]
SEISMIC - OBE	1( ) 2( ) 3( )	±208.	±740.	±194.	±11184.	[illegible]	[illegible]
SRV2	1( ) 2( ) 3( )	+436. -530.	+4019. -1104.	+657. -1155.	+19241. -53211.	+6453. [illegible]	+17187. -13978.
DESIGN LOAD		+811. -741.	+4759. -2628.	+851. -1663.	+34973. -58791.	+25977. -11481.	+24975. -26536.
HYPOTHETICAL LOAD		+1019. -949.	+5499. -3368.	+1045. -1857.	+46157. -69975.	+29601. -15105.	+32619. -34210.

Design loading combinations for seismic category 1, 2, 3, and non-nuclear supports

Seismic Category	Loading Case	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ± (2) OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE
SUBJECT SUPPORT LOAD SUMMARY SHEET			ORIGINATOR R. Chang DATE 5 7 82	
			VERIFIER [illegible] DATE [illegible]	

MARK NO. PR29

ANALYSIS CODE ____

ANALYSIS JOINT NO. 302

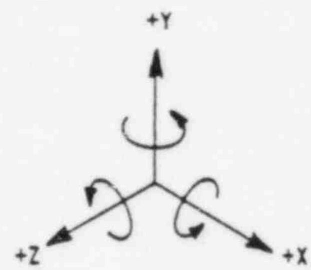
SEISMIC CATEGORY ____

PREDICTED PIPE MOVEMENT (INCHES)

UP/DN 0.3951

N S ____

E W ____



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ 6. −	+ −	+ 8. −	+ −	+ −	+ −
THERMAL	+ − 414.	+ −	+ 405. −	+ −	+ −	+ −
SEISMIC-OBE	± 717.	+ −	± 795.	+ −	+ −	+ −
SRV2	+ 928. − 907.	+ −	+ 781. − 621.	+ −	+ −	+ −
DESIGN LOAD	+ 1651. − 2038.	+ −	+ 1989. − 1416.	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 2368. − 2755.	+ −	+ 2784. − 2211.	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible]
DATE [illegible] 17 82
VERIFIER C. [illegible]
DATE 6-15-82

MARK NO. PR45

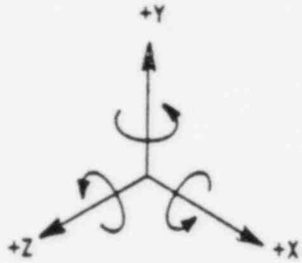
ANALYSIS CODE ________

ANALYSIS JOINT NO. S303

SEISMIC CATEGORY ________

PREDICTED PIPE MOVEMENT (INCHES)

UP/DN 0.5127
N (S) 0.0119
(E) W 0.0382



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	+ − 398.	+ −	+ −	+ −	+ −
SRVZ	+ −	+ 2308. − 594.	+ −	+ −	+ −	+ −
DESIGN LOAD	+ −	+ 2706. − 992.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ 3104. − 1390.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT: SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible]
DATE [illegible]
VERIFIER [illegible]
DATE [illegible]

MARK NO. PR31

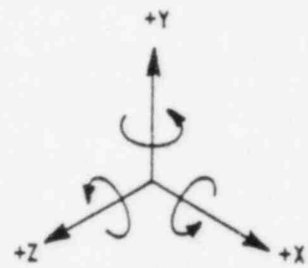
ANALYSIS CODE ________

ANALYSIS JOINT NO. 304

SEISMIC CATEGORY ________

PREDICTED PIPE MOVEMENT (INCHES)

UP DN .1427
N S ________
E W ________



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ - 569.	+ -	+ 8. -	+ -	+ -	+ -
THERMAL	+ 3884. -	+ -	+ - 32.	+ -	+ -	+ -
SEISMIC-OBE	± 3093.	±	± 63.	±	±	±
SRV2	+ 711. - 662.	+ -	+ 1032. - 963.	+ -	+ -	+ -
DESIGN LOAD	+ 7688. - 4324.	+ -	+ 1103. - 1058.	+ -	+ -	+ -
HYPOTHETICAL LOAD	+ 10781. - 7417.	+ -	+ 1166. - 1121.	+ -	+ -	+ -

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible]
DATE [illegible]
VERIFIER [illegible]
DATE [illegible]

MARK NO. PR20

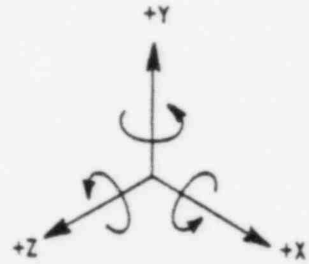
ANALYSIS CODE ________

ANALYSIS JOINT NO. 307

SEISMIC CATEGORY ________

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN 1.2238
N S ________
E (W) 0.0661



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ 565. −	+ − 1839.	+ −	+ −	+ −	+ −
THERMAL	+ − 3857.	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	± 3067	+ −	+ −	+ −	+ −	+ −
SRV2	+ 820. − 1719.	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ 4452. − 8643.	+ − 1839.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 7519. − 11710.	+ − 1839.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

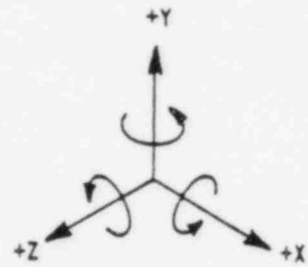
GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE
SUBJECT	SUPPORT LOAD SUMMARY SHEET		ORIGINATOR K C[illegible] DATE [illegible]	
			VERIFIER [illegible] DATE [illegible]	

MARK NO. PR42

ANALYSIS CODE ____________

ANALYSIS JOINT NO. 308

SEISMIC CATEGORY ____________



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

PREDICTED PIPE MOVEMENT (INCHES)

UP DN 1.4793
(N) S 0.2256
E (W) 0.5289

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	+ −	± 286.	+ −	+ −	+ −
SRV2	+ −	+ −	+ 1868. − 2286.	+ −	+ −	+ −
DESIGN LOAD	+ −	+ −	+ 2154. − 2572.	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ −	+ 2440. − 2858.	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR R. C[illegible]

DATE [illegible] 17 [illegible]

VERIFIER C [illegible]

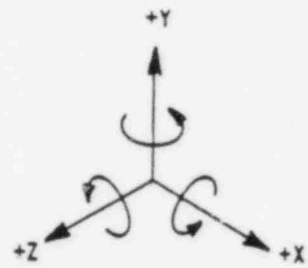
DATE 6-18-82

MARK NO. PR18

ANALYSIS CODE ____

ANALYSIS JOINT NO. 311

SEISMIC CATEGORY ____



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN 1.3883
(N) S 0.6214
E (W) 0.3673

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ − 672.	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	+ −	+ −	+ −	+ −	+ −
SRV2	+ −	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ −	+ − 672.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ − 672.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☑ FINAL

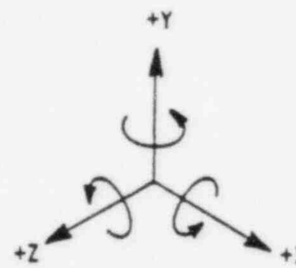
GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE
SUBJECT SUPPORT LOAD SUMMARY SHEET			ORIGINATOR [illegible] DATE [illegible]	
			VERIFIER [illegible] DATE [illegible]	

MARK NO. PR15

ANALYSIS CODE ______

ANALYSIS JOINT NO. 314

SEISMIC CATEGORY ______



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN	0.7492
(N) S	0.9857
(E) W	0.2405

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ − 900.	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	+ −	+ −	+ −	+ −	+ −
	+ −	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ −	+ − 900.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ − 900.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000	PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible]
DATE [illegible]
VERIFIER [illegible]
DATE [illegible]

MARK NO. PR40

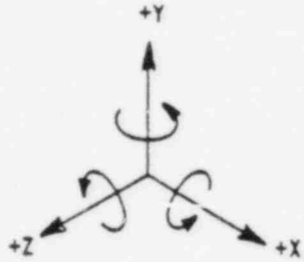
ANALYSIS CODE ______

ANALYSIS JOINT NO. 317

SEISMIC CATEGORY ______

PREDICTED PIPE MOVEMENT (INCHES)

UP/DN 0.0515
(N) S 0.6477
(E) W 0.5506



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	± 227.	+ −	+ −	+ −	+ −	+ −
SRV2	+ 3359. − 3263.	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ 3586. − 3490.	+ −	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 3813. − 3717.	+ −	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal + OBE	(Occasional) Design
	c) Deadweight + Thermal ±(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

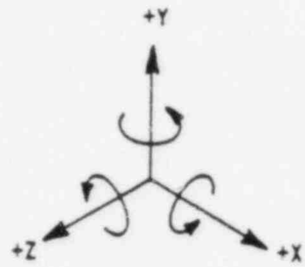
ORIGINATOR [illegible]
DATE [illegible]
VERIFIER [illegible]
DATE [illegible]

MARK NO. PR12

ANALYSIS CODE ____

ANALYSIS JOINT NO. 318

SEISMIC CATEGORY ____



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

PREDICTED PIPE MOVEMENT (INCHES)

UP (DN) 0.1983
(N) S 0.4015
(E) W 0.2975

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ / −	+ / − 946.	+ / −	+ / −	+ / −	+ / −
THERMAL	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
SEISMIC-OBE	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
DESIGN LOAD	+ / −	+ / − 946.	+ / −	+ / −	+ / −	+ / −
HYPOTHETICAL LOAD	+ / −	+ / − 946.	+ / −	+ / −	+ / −	+ / −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR R. C.

DATE 7-…

VERIFIER C. Hess

DATE 6-11-82

MARK NO. PRS2

ANALYSIS CODE ________

ANALYSIS JOINT NO. 319

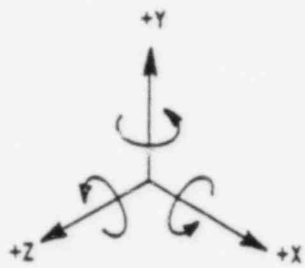
SEISMIC CATEGORY ________

PREDICTED PIPE MOVEMENT (INCHES)

UP (DN) 0.4249

(N) S 0.1026

(E) W 0.0518



RIGHT HAND CARTESIAN
COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
THERMAL	+ / −	+ / −	+ / −	+ / −	+ / −	+ / −
SEISMIC-OBE	+ / −	± 1493.	+ / −	+ / −	+ / −	+ / −
SRVZ	+ / −	+ 2608. / − 2627.	+ / −	+ / −	+ / −	+ / −
DESIGN LOAD	+ / −	+ 4101. / − 4120.	+ / −	+ / −	+ / −	+ / −
HYPOTHETICAL LOAD	+ / −	+ 5594. / − 5613.	+ / −	+ / −	+ / −	+ / −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☑ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000	PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible signature]

DATE [illegible]

VERIFIER [illegible signature]

DATE [illegible]

MARK NO. PK27

ANALYSIS CODE ______

ANALYSIS JOINT NO. 322

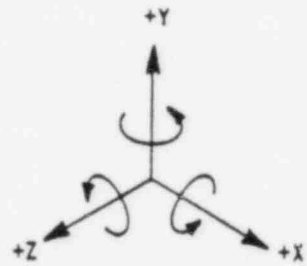
SEISMIC CATEGORY ______

PREDICTED PIPE MOVEMENT (INCHES)

UP DN 0.3997

N S ______

E W ______



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ − 39.	+ −	+ − 59.	+ −	+ −	+ −
THERMAL	+ 1765. −	+ −	+ − 900.	+ −	+ −	+ −
SEISMIC-OBE	± 216.	+ −	± 364.	+ −	+ −	+ −
SRV2	+ 762. − 786.	+ −	+ 5040. − 3811.	+ −	+ −	+ −
DESIGN LOAD	+ 2743. − 1041.	+ −	+ 5404 − 5134.	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 2959. − 1257.	+ −	+ 5768. − 5498.	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.C. NUMBER 04-5064-000		PAGE

SUBJECT: SUPPORT LOAD SUMMARY SHEET

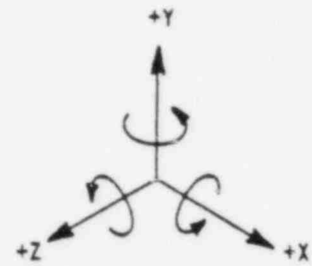
ORIGINATOR [illegible]
DATE [illegible]
VERIFIER C. [illegible]
DATE [illegible]

MARK NO. PR27

ANALYSIS CODE ______

ANALYSIS JOINT NO. 323

SEISMIC CATEGORY ______



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

UP (DN) 0.1248

N S ______

E W ______

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ 39. / −	+ / −	+ 45. / −	+ / −	+ / −	+ / −
THERMAL	+ / − 7707.	+ / −	+ 2409. / −	+ / −	+ / −	+ / −
SEISMIC-OBE	± 134.	+ / −	± 185.	+ / −	+ / −	+ / −
SRV2	+ 518. / − 527.	+ / −	+ 1235. / − 1384.	+ / −	+ / −	+ / −
DESIGN LOAD	+ 691. / − 8568.	+ / −	+ 3872. / − 1569.	+ / −	+ / −	+ / −
HYPOTHETICAL LOAD	+ 825. / − 8502.	+ / −	+ 4057. / − 1754.	+ / −	+ / −	+ / −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible]

DATE [illegible]

VERIFIER [illegible]

DATE [illegible]

MARK NO. PR9

ANALYSIS CODE ________

ANALYSIS JOINT NO. 326

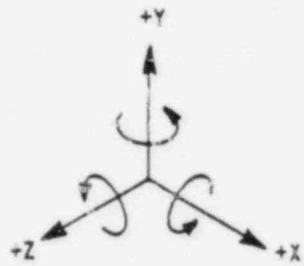
SEISMIC CATEGORY ________

PREDICTED PIPE MOVEMENT (INCHES)

UP DN ________

(N) S 0.2928

E (W) 0.0053



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −1009.	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −565.	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	+ −1347.	+ −	+ −	+ −	+ −
SRV2	+ −	+3218. −2425.	+ −	+ −	+ −	+ −
DESIGN LOAD	+ −	+4565. −5346.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+5912. −6692.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
	a) Deadweight + Thermal	(Normal) Operating
1&2	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000	PAGE

SUBJECT: Support Load Summary Sheet A

ORIGINATOR: [illegible]
DATE: [illegible]
VERIFIER: [illegible]
DATE: [illegible]

MARK NO. PR7

TYPE OF SUPPORT

ANALYSIS CODE

ANALYSIS JOINT NO. 3-9

LOAD TYPE	BRANCH JOINT NO.	SUPPORT LOAD (LBS.) (IN.-LBS.)					
		F_X	F_Y	F_Z	M_X	M_Y	M_Z
DEADWEIGHT	1( ) 2( ) 3( )	-5.	-588.	+21.	+624.	+828.	+44488.
THERMAL	1( ) 2( ) 3( )	+5204.	-1210.	-881.	+3204.	-94788.	[illegible]
SEISMIC - OBE	1( ) 2( ) 3( )	±346.	±567.	±1138.	±17724.	±74828.	±16568.
SRV2	1( ) 2( ) 3( )	+3008. -1209.	+180. -177.	+192. -290.	+6160. -6432.	+8251. -16232.	+9607. -7724.
DESIGN LOAD		+8558. -1560.	+547. -2342.	+1351. -2309.	+27712. -24156.	+83407. -185348.	+30463. -132952.
HYPOTHETICAL LOAD		+8904. -1906.	+914. -2709.	+2489. -3447.	+45436. -41880.	+157735. -259676.	+46851. -150320.

Design loading combinations for seismic category 1, 2, 3, and non-nuclear supports

Seismic Category	Loading Case	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ± (2) OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME: Three Mile Island Unit #1	W.O. NUMBER: 04-5064-000		PAGE

SUBJECT: SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible] DATE [illegible]
VERIFIER [illegible] DATE [illegible]

MARK NO. PR3A

ANALYSIS CODE ____

ANALYSIS JOINT NO. S332

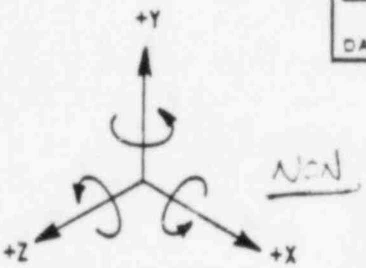
SEISMIC CATEGORY ____

PREDICTED PIPE MOVEMENT (INCHES)

UP DN 0.1990 (F)

N S ____

E W 0.0154 (E)



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

NON-GLOBAL

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ 88. −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ 2248. −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	± 378.	+ −	+ −	+ −	+ −	+ −
SRV2	+ 1814. − 1094.	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ 4528. − 1472.	+ −	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 4906. − 1850.	+ −	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT: SUPPORT LOAD SUMMARY SHEET

ORIGINATOR: [illegible]
DATE: [illegible]
VERIFIER: C [illegible]
DATE: 6-15-[illegible]

MARK NO. PR51

ANALYSIS CODE ____________

ANALYSIS JOINT NO. 333

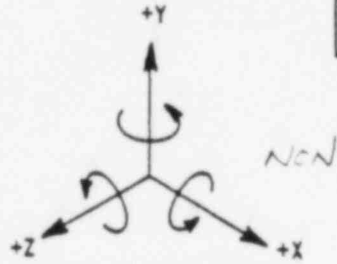
SEISMIC CATEGORY ____________

PREDICTED PIPE MOVEMENT (INCHES)

UP DN 0.0693 (Y)

N S ________

E W 0.1231 (Z)



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

NON-GLOBAL

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ - 9.	+ -	+ -	+ -	+ -	+ -
THERMAL	+ - 966.	+ -	+ -	+ -	+ -	+ -
SEISMIC-OBE	+ - 881.	+ -	+ -	+ -	+ -	+ -
SRVZ	+ 796. - 807.	+ -	+ -	+ -	+ -	+ -
DESIGN LOAD	+ 1677. - 2663.	+ -	+ -	+ -	+ -	+ -
HYPOTHETICAL LOAD	+ 2558. - 3544.	+ -	+ -	+ -	+ -	+ -

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000	PAGE

SUBJECT

SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible]
DATE [illegible]
VERIFIER [illegible]
DATE [illegible]

MARK NO. PR3

ANALYSIS CODE

ANALYSIS JOINT NO. 336

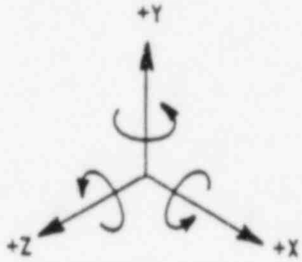
SEISMIC CATEGORY

PREDICTED PIPE MOVEMENT (INCHES)

UP DN 0.1735

N (S) 0.0984

E (W) 0.0553



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ − 1045.	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	+ −	+ −	+ −	+ −	+ −
	+ −	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ −	+ − 1045.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ − 1045.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
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SUBJECT SUPPORT LOAD SUMMARY SHEET			ORIGINATOR R 2l	
			DATE 7-2	
			VERIFIER CHW	
			DATE 6-18-82	

MARK NO. PK56

ANALYSIS CODE

ANALYSIS JOINT NO. 337

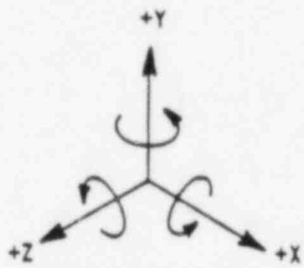
SEISMIC CATEGORY

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN 0.5125

N (S) 0.3183

(E) W 0.0265



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	± 3002.	+ −	+ −	+ −	+ −	+ −
SRV2	+ 5292. − 1151.	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ 6294. − 4153.	+ −	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 9296. − 7155.	+ −	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ±(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

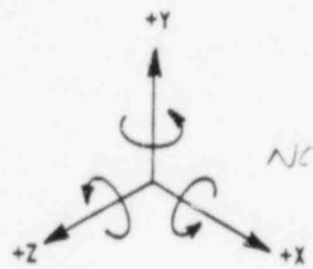
GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE
SUBJECT	SUPPORT LOAD SUMMARY SHEET		ORIGINATOR [illegible] DATE [illegible] VERIFIER [illegible] DATE [illegible]

MARK NO. PR25

ANALYSIS CODE

ANALYSIS JOINT NO. 340

SEISMIC CATEGORY



NON

RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

PREDICTED PIPE MOVEMENT (INCHES)

UP DN 0.7150 (Y)
N S 0.5125 (X)
E W 0.1557 (Z)

NON-GLOBAL

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	± 4767.	+ −	+ −	+ −	+ −	+ −
SRV2	+ 1331. − 977.	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ 6098. − 5744.	+ −	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 10865. − 10511.	+ −	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
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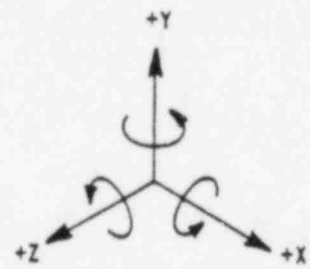
SUBJECT SUPPORT LOAD SUMMARY SHEET			ORIGINATOR [illegible] DATE [illegible]
			VERIFIER [illegible] DATE 6-[illegible]

MARK NO. PR23

ANALYSIS CODE

ANALYSIS JOINT NO. S341

SEISMIC CATEGORY



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

PREDICTED PIPE MOVEMENT (INCHES)

UP (circled) DN 0.9540

N (S circled) 0.1434

(E circled) W 0.1493

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	± 1156.	+ −	+ −	+ −	+ −
SRV2	+ −	+ 2422. − 491.	+ −	+ −	+ −	+ −
DESIGN LOAD	+ −	+ 3578. − 1647.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ 4734. − 2803.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company PROJECT NAME Three Mile Island Unit #1	DEPT. NO. 0432 W.O. NUMBER 04-5064-000	FILING CODE PAGE
SUBJECT	SUPPORT LOAD SUMMARY SHEET		ORIGINATOR [illegible] DATE [illegible] VERIFIER [illegible] DATE [illegible]

MARK NO. PK2

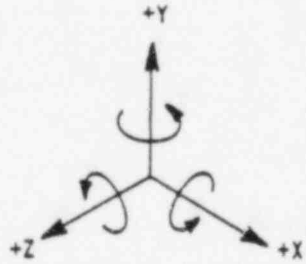
ANALYSIS CODE ______

ANALYSIS JOINT NO. 344

SEISMIC CATEGORY ______

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN 1.0372
N (S) 0.3633
(E) W 0.1545



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ − 1115.	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ −	+ −	+ −	+ −	+ −	+ −
	+ −	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ −	+ − 1115.	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ −	+ − 1115.	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000	PAGE

SUBJECT: SUPPORT LOAD SUMMARY SHEET

ORIGINATOR [illegible]
DATE [illegible]
VERIFIER [illegible]
DATE [illegible]

MARK NO. PRS4

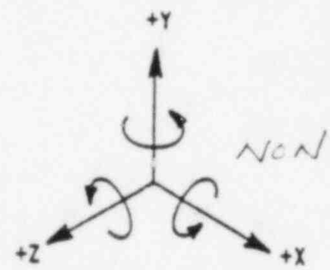
ANALYSIS CODE ______

ANALYSIS JOINT NO. 5345

SEISMIC CATEGORY ______

PREDICTED PIPE MOVEMENT (INCHES)

UP DN 0.9939
N (S) 0.1824
(E) W 0.2582



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE)
NORTH

NON-GLOBAL

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ −	+ −	+ −	+ −	+ −	+ −
THERMAL	+ −	+ −	+ −	+ −	+ −	+ −
SEISMIC-OBE	+ − 1097.	+ −	+ −	+ −	+ −	+ −
SRV2	+ 708. − 3316.	+ −	+ −	+ −	+ −	+ −
DESIGN LOAD	+ 1805. − 4413.	+ −	+ −	+ −	+ −	+ −
HYPOTHETICAL LOAD	+ 2902. − 5510.	+ −	+ −	+ −	+ −	+ −

Design loading combinations for seismic category 1, 2, 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ∓(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE
	PROJECT NAME: Three Mile Island Unit #1	W.O. NUMBER: 04-5064-000	PAGE
SUBJECT: SUPPORT LOAD SUMMARY SHEET		ORIGINATOR: [illegible] DATE: [illegible] 17 [illegible]	VERIFIER: [illegible] DATE: [illegible]

MARK NO. PRE2

ANALYSIS CODE ____________

ANALYSIS JOINT NO. 348

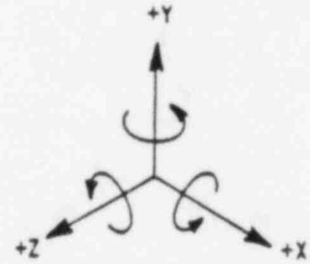
SEISMIC CATEGORY ____________

PREDICTED PIPE MOVEMENT (INCHES)

(UP) DN 1.32

N S ____________

(E) W 0.3360



RIGHT HAND CARTESIAN COORDINATE SYSTEM

(ANALYST TO DEFINE) NORTH

	DESIGN MECHANICAL LOADS					
	FORCE (LBS.)			MOMENT (IN.-LBS.)		
	Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	+ - 17.	+ - 1125.	+ -	+ 1440. -	+ - 444.	+ -2364.
THERMAL	+ - 221.	+ - 396.	+ -	+ -8868.	+ -11136.	+12360. -
SEISMIC-OBE	± 1542.	± 455.	+ -	± 341532.	± 36624.	± 41134.
CRV2	+ 322. - 305.	+2476. - 298.	+ -	+22632. -23520.	+ 4423. - 3697.	+10596. -11256.
DESIGN LOAD	+ 1864. - 2085.	+ 2931. - 2274.	+ -	+365604. -373920.	+ 41047. - 51901.	+61380. -54744.
HYPOTHETICAL LOAD	+ 3406. - 3627.	+ 3386. - 2729.	+ -	+ 707126. - 715452.	+ 77671. - 88525.	+ 105504. - 95868.

Design loading combinations for seismic category 1, 2. 3 and non-nuclear supports

Seismic Category	Loading Cases	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ±(2)OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

STATUS: ☐ PRELIMINARY ☒ FINAL

GILBERT ASSOCIATES, INC. ENGINEERS AND CONSULTANTS READING, PA.	Metropolitan Edison Company	DEPT. NO. 0432	FILING CODE	
	PROJECT NAME Three Mile Island Unit #1	W.O. NUMBER 04-5064-000		PAGE

SUBJECT: Support Load Summary Sheet

ORIGINATOR: [illegible]
DATE: [illegible]
VERIFIER: [illegible]
DATE: [illegible]

MARK NO. Press. Nozzle

TYPE OF SUPPORT ____________

ANALYSIS CODE ____________

ANALYSIS JOINT NO. 356

LOAD TYPE	BRANCH JOINT NO.	SUPPORT LOAD (LBS.) (IN.-LBS.)					
		Fx	Fy	Fz	Mx	My	Mz
DEADWEIGHT	1( ) 2( ) 3( )	+4.	-898.	+1.	-3648.	-166.	-504.
THERMAL	1( ) 2( ) 3( )	+312.	+199.	+134.	+12912.	-15072.	-4281.
SEISMIC - OBE	1( ) 2( ) 3( )	±500.	±506.	±4553.	±87228.	±5064.	±10352.
SRVZ	1( ) 2( ) 3( )	+696. -804.	+339. -374.	+1233. -1270.	+18960. -20844.	+3060. -2416	+15288. -13212.
DESIGN LOAD		+1512. -1304.	+1044. -1778.	+5921. -5823.	+119100. -111720.	+8124. -22720	+25620. -28332.
HYPOTHETICAL LOAD		+2012. -1804.	+1550. -2284.	+10474. -10376.	+206328. -198948.	+13188. -27764	+35952. -38664.

Design loading combinations for seismic category 1, 2, 3, and non-nuclear supports

Seismic Category	Loading Case	Condition Classification
1&2	a) Deadweight + Thermal	(Normal) Operating
	b) Deadweight + Thermal ± OBE	(Occasional) Design
	c) Deadweight + Thermal ± (2) OBE	(Occasional) Hypothetical
3 & Non-Nuclear	a) Deadweight + Thermal	(Normal) Operating

FILING CODE

Gilbert Associates, Inc. Reading, Pennsylvania CALCULATION	SUBJECT				CISID	PAGE
	REV.	0	1	2	3	OF
	MICROFILMED					PAGES
	ORIGINATOR	[illegible signature]				
	DATE	7/30/82				

10.2. SUPPORT LOAD SUMMARY

11. REFERENCE

1. Dresser Valve N-100 Cataloge, "Consolidated and Hancock Valves for Nuclear Service".

2. Safety and Relief Valve Test Report, EPRI, April 1, 1981.

3. TPIPE 4.2 User Manual, June 1982.

4. Seismic Design Criteria, October 9, 1969.

5. Valve Selection/Justification Report, April 1, 1982.

6. "Guide for Application of Valve Test Program Results to Plant Specific Evaluation", Rev. 1, April 5, 1982.