U.S. NUCLEAR REGULATORY COMMISSION
REGION I

DOCKET/REPORT NO: 50-289/95-16

LICENSEE: GPU Nuclear Corporation

FACILITY: Three Mile Island Station, Unit No. 1

INSPECTOR: Alfred Lohmeier, Sr. Reactor Engineer 12-27-95 Date
Civil, Mechanical, and Materials
Engineering Branch
Division of Reactor Safety

APPROVED BY: Michael C. Modes, Chief 12/27/95 Date
Civil, Mechanical, and Materials
Engineering Branch
Division of Reactor Safety

MEETING SUMMARY: A predecisional enforcement conference was held at the Region I office on December 18, 1995, with GPU Nuclear, to discuss the two apparent violations identified in inspection report 50-289/95-16. During the meeting, GPUN acknowledged one of the apparent violations and disagreed with the other. At the conclusion of the meeting, the staff identified additional information which GPUN needs to provide in order for the staff to make a final determination of the extent and severity of the apparent violations.

MEETING SUMMARY
PREDECISIONAL ENFORCEMENT CONFERENCE WITH GPU NUCLEAR
INSPECTION REPORT 50-289/95-16

A predecisional enforcement conference was held with representatives from GPU Nuclear (GPUN) on December 18, 1995, to discuss the two apparent violations described in Inspection Report 50-289/95-16 (IR 95-16). As described in the report, the apparent violations involved GPUN's activities in response to problems identified with pipe supports on the reactor coolant system drain lines at Three Mile Island, Unit 1, during inservice inspections (ISI) performed in 1988 and 1990. The apparent violations are against 10 CFR 50.55a, Codes and Standards, and 10 CFR 50, Appendix B, Section III, Design Control.

During the meeting, GPUN presented its perspective on the issues, and the corrective actions that are being implemented. GPUN acknowledged that it had violated the requirements of 10 CFR 50, Appendix B, Section III, Design Controls, by failing to properly control a design modification that would have eliminated the problems with the pipe supports, and by failing to identify a significant analytical modeling error that caused them to underestimate the severity of the problem. As described in IR 95-16, the error involved modeling a 2" x 1.5" diameter reducing elbow as a 2" x 2" diameter elbow, resulting in underestimating the level of stress in the 1.5" diameter side of the elbow. GPUN stated that it considered this violation to be Severity Level IV, and described corrective actions that are being taken to prevent recurrence.

GPUN disagreed with the 10 CFR 50.55a apparent violation. The apparent violation involved a 1990 GPUN calculation that demonstrated that the piping was approximately 4% overstressed due to the pipe support configuration, and the basis for GPUN returning the system to service without properly reconciling the overstress. The overstress was calculated using the rules of ASA B31.1, "Power Piping," which is the code of record for the piping. In order to disposition the 4% overstress in 1990, GPUN utilized part of the ASME Section III alternative rules for fatigue analysis. During the meeting, GPUN acknowledged that the ASME Section III fatigue analysis that they performed in 1990 was flawed, but that the correct analysis would still have demonstrated that the 4% overstress was not significant.

GPUN also provided clarification of information contained in the inspection report. IR 95-16 stated that the level of overstress in the drain line piping was at least 30% rather than 4%, due to the analytical modeling error described above. The error was identified by GPUN in 1995 while reviewing the 1990 analysis. During the meeting, and during a subsequent telephone conversation on December 22, 1995, GPUN indicated that if the analyst had accounted for the modeling error in 1990, the level of overstress in the drain line would have been approximately 100% (70,000 psi vice an allowable of approximately 35,000 psi), rather than 30%.

At the end of the meeting, the staff requested that GPUN provide additional information. Regarding the apparent violation of 10 CFR 50, Appendix B, the staff requested that GPUN verify that similar design control issues do not exist by performing a review of past correspondences from GPUN/Parsippany to the TMI site. Regarding the apparent violation of 10 CFR 50.55a, the staff requested that GPUN provide a proper ASME Section III fatigue calculation, and an explanation of the basis for returning the drain line to service in 1990 with no provisions for augmented inspections when ISI examinations indicated that the pipe supports may be experiencing additional degradation due to normal operating conditions.

The staff will consider the information presented by GPUN during the meeting, and the additional information described above, in making a determination of the extent and severity of the apparent violations. The material presented by GPUN, and the meeting attendance list, is included as attachments to this memorandum.

ATTACHMENT 2

ATTENDANCE LIST
DECEMBER 18, 1995 PREDECISIONAL ENFORCEMENT CONFERENCE

GPU Nuclear

R. Keaten	Vice President Technical Functions
R. Zak	Engineer/Regulatory Affairs
M. Laggart	Manager/Licensing
L. Hixon	Media Relations Representative
P. Walsh	TMI Plant Engineering Director
J. Abromovici	Manager/Mechanical Components
J. Colitz	Director/Engineering and Design
S. Tumminelli	Manager/Technical Functions/Engineering Mechanics

United States Nuclear Regulatory Commission

W. Kane	RI Deputy Regional Administrator
J. Wiggins	Director Division of Reactor Safety
M. Modes	Branch Chief, CMMEB
P. Eselgroth	DRP Branch 7 Chief
J. Beall	Senior Enforcement Specialist
J. Joustra	Senior Enforcement Specialist
K. Smith	RI Regional Counsel
A. Lohmeier	Senior Reactor Engineer
M. McBrearty	Reactor Engineer
M. Evans	Senior Resident Inspector - TMI, DRP
S. Hansell	Resident Inspector - TMI, DRP
R. Hernan	NRR/PM

ATTACHMENT

GPUN HANDOUTS PRESENTED AT PREDECISIONAL ENFORCEMENT CONFERENCE
DECEMBER 18, 1995

NRC REGION I - GPU NUCLEAR

PREDECISIONAL ENFORCEMENT

CONFERENCE

December 18, 1995

AGENDA

1. Introduction / Overview

2. Sequence of Events

3. Issues and Safety Significance

   A. Engineering Management Control of the Design Process (Apparent Violation 2 - Example A)

      Calculation Error/Design Verification Failure to Identify (Apparent Violation 2 - Example B)

   B. B31.1 Code Calculation Using ASME III (Apparent Violation 1)

4. Determination of Civil Penalty If Apparent Violations are Considered as Severity Level III

   A. Previous Escalated Enforcement in Last 2 Years
   B. Identification
   C. Prompt and Comprehensive Corrective Action
   D. Exercise of Discretion

5. GPU Nuclear's Assessment of Apparent Violations

6. Conclusions

SEQUENCE OF EVENTS

Pre-1990 Inspections

1986 - 6R Outage:

	Support	Disposition
A Line:	RC 32-1	Acceptable.
	RC 31-1	Acceptable.
C Line:	RC 26-1	U-bolt adjusted to loose fit.
	RC 26-2	U-bolt adjusted to loose fit.

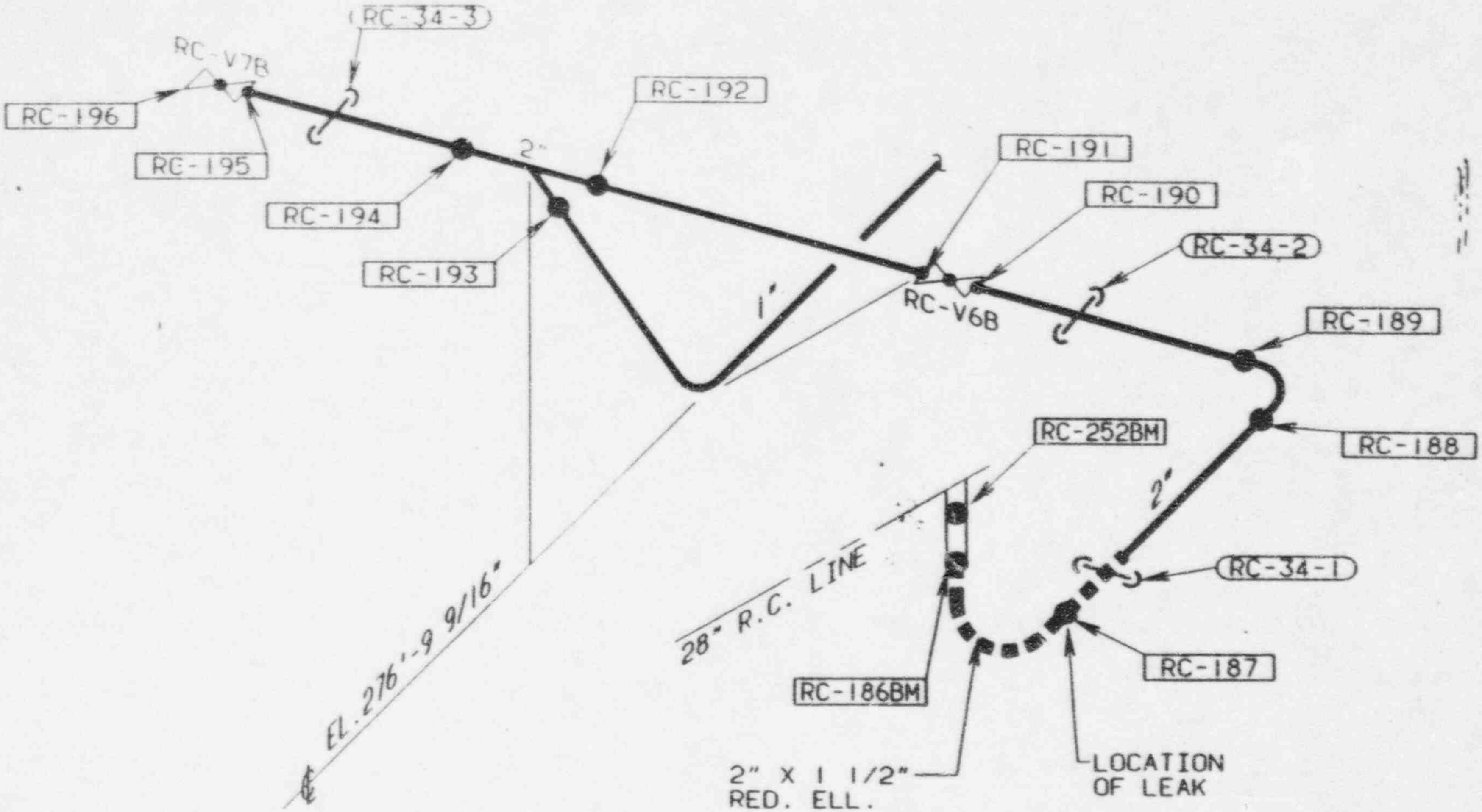
SEQUENCE OF EVENTS (Con't)

Pre-1990 Inspections (Con't)

1988 - 7R Outage:

	Support	Disposition
A Line:	RC 32-2	Acceptable.
	RC 32-3	Acceptable.
B Line:	RC 34-1	Acceptable.
	RC 34-2*	Bent U-bolt and missing nut replaced.
	RC 34-3*	Bent U-bolt found acceptable.

* Recommended to reinspect at next outage (8R)



LEGEND

■■■■■■ - REPLACED

"B" DRAIN LINE

SEQUENCE OF EVENTS (Con't)

1990 Inspections

1990 8R Outage:

	Support	Disposition
B Line:	RC 34-2	U-bolt adjusted to provide more gap.
	RC 34-3	U-bolt found more bent. Still acceptable.
D Line:	RC 35-1	Acceptable.
	RC 35-2	Bent U-bolt found acceptable.
	RC 35-3	U-bolt changed to loose fit.

SEQUENCE OF EVENTS (Con't)

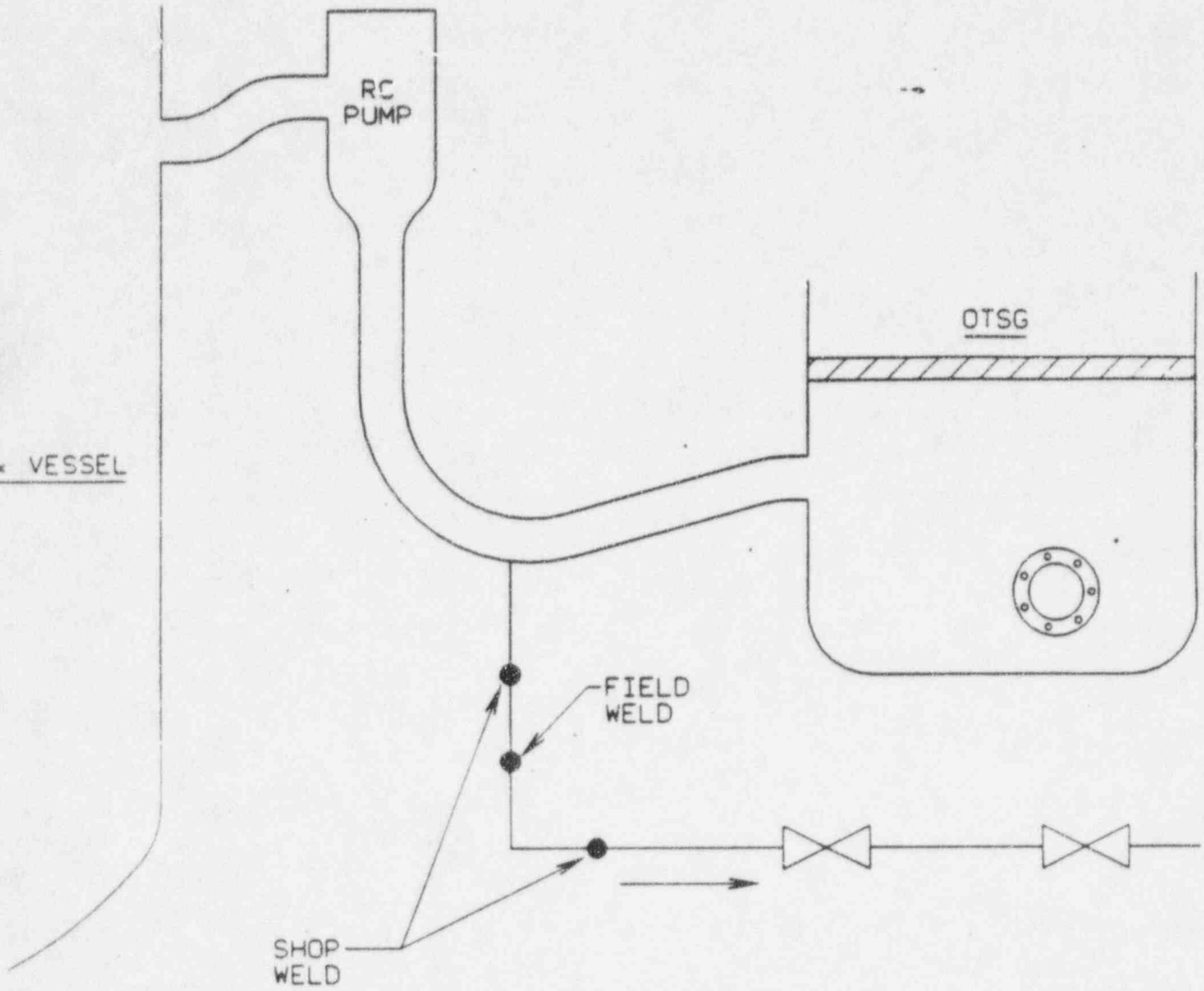
1990 Activities

- Technical Functions Engineering requested to evaluate the bent U-bolt concern.
- Calculations prepared and design verified for the "B" and "D" drain lines.
- The conclusion was that both lines were within acceptable limits.
- However, stress levels were not desirable.
- Modification designs were recommended to reduce stresses.
- Documented in memo of August 27,1990.

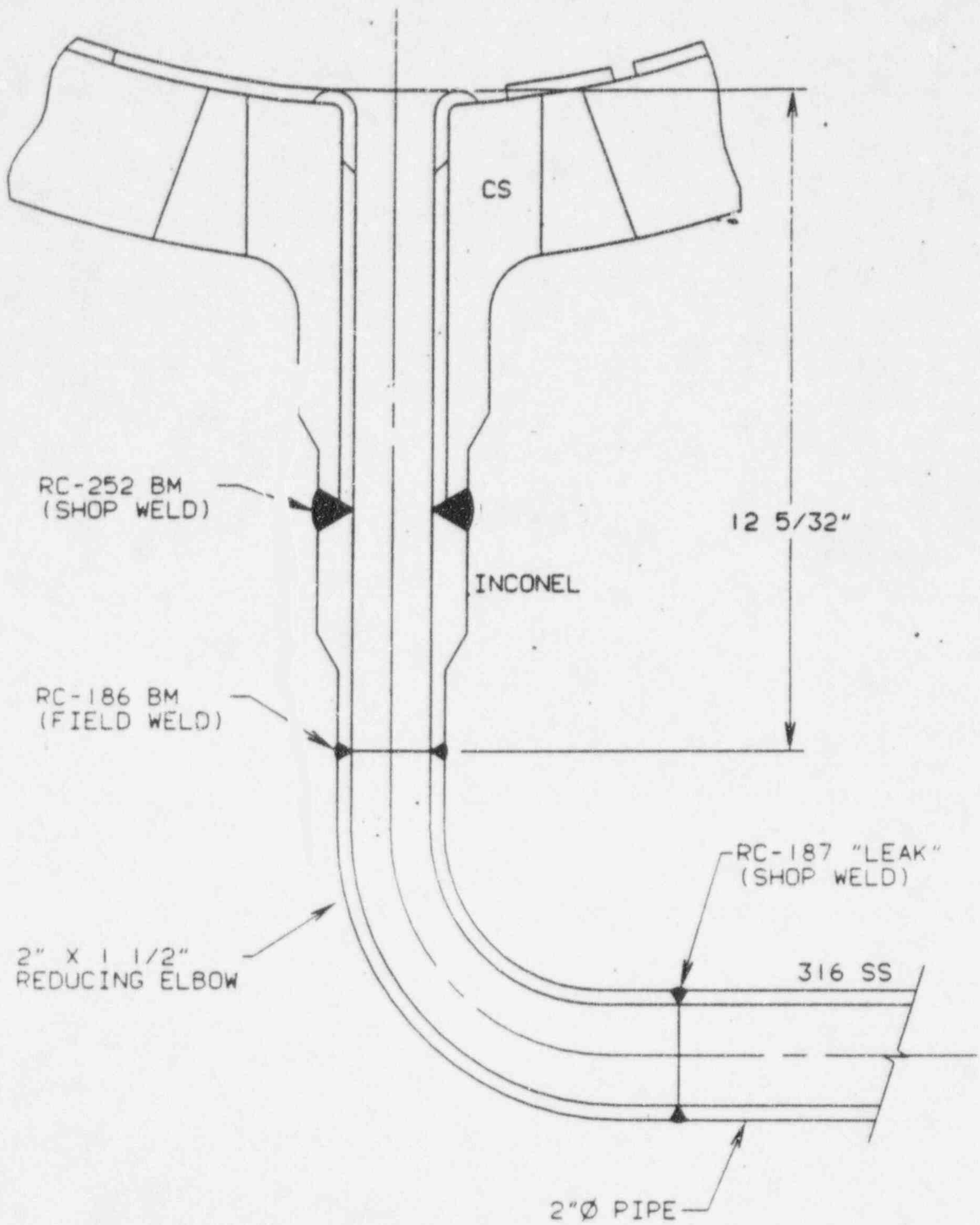
SEQUENCE OF EVENTS (Con't)

1995 Events (11R Outage)

- "B" Line weld RC-187 developed a leak during shutdown for refueling.
- GPUN reviewed the 1990 calculation and identified modeling error.
- Analyzed all 4 drain lines.
- Decided to implement modifications proposed in 1990.
- Calculations of B and D drain line stresses revised to correct modeling error.
- Modification proposed in 1990 not affected.
- Additional calculations prepared for modification of A and C lines.
- NRC Inspection began.
- All calculations verified and modification package for 4 drain lines issued for construction.



Rx COOLANT DRAIN LINE
(TYPICAL)



DRAIN LINE CONFIGURATION

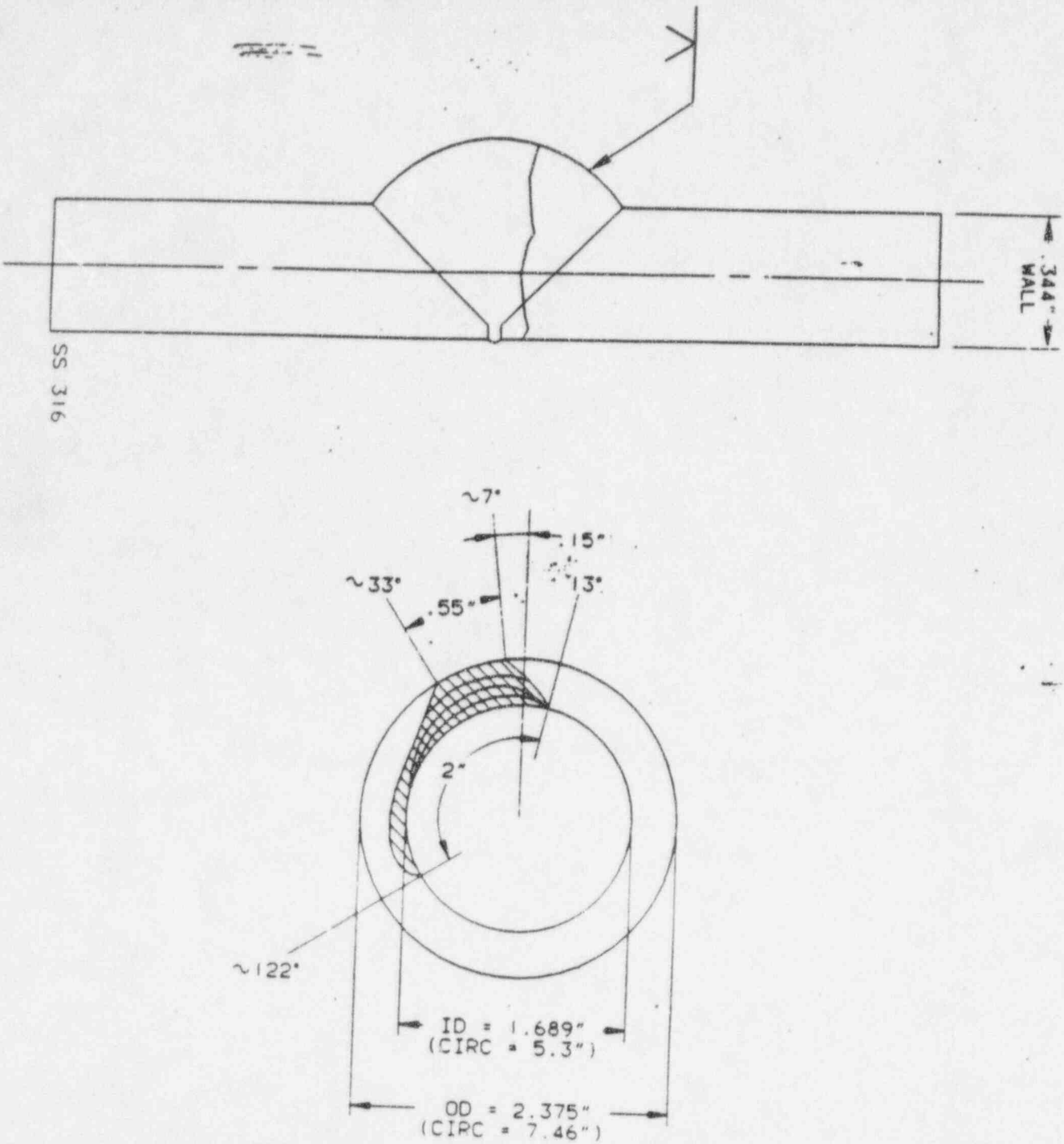
(TYPICAL) "B" SHOWN

SEQUENCE OF EVENTS (Con't)

Reactor Coolant Drain Line (RCDL) Cracked Weld/Leak

- GPU Nuclear submitted LER 95-003 to the NRC on October 9, 1995.
- Leak occurred on RCDL "B" reducing elbow weld.
- Crack located at 2" diameter end (large end) of the reducing elbow - not at highest stress location.
- Crack initiated from the inside of weld.
- B31.1 overstress did not cause the leak event.
- Evidence indicates leak would not have been prevented by the 1990 proposed modifications.

Therefore the apparent violations did not contribute to the leak event.



CRACKING CONFIGURATION FROM UT REPORT

ENGINEERING MANAGEMENT CONTROL OF THE DESIGN PROCESS
(Apparent Violation 2 - Example A)

Facts

- GPUN developed a modification of the drain line support configurations to eliminate undesirable stress condition.
- Documented in a letter dated August 27, 1990 and transmitted to the TMI site.
- Modification not implemented - no documentation to demonstrate how the modification was dispositioned.

ENGINEERING MANAGEMENT CONTROL OF THE DESIGN PROCESS (Con't)

Root Cause

- GPU Nuclear Engineering Management forwarded (by memo to the site) the proposed modification with the understanding it would be performed as a mini-mod.
- Recommendation was not captured in any formal system.
- No follow-up.

ENGINEERING MANAGEMENT CONTROL OF THE DESIGN PROCESS (Con't)

Corrective Action

- Individuals involved were counseled.
- Reengineered Project Approval and Management Plan.
  - System Engineer involved with all proposed system modifications.
  - System Performance Team reviews proposed modifications.
  - Plant Project Integration Team determines which projects will be funded and when they will be done.
- Continue management emphasis on follow-up and close-out of recommendations.

CALCULATION ERROR/ DESIGN VERIFICATION FAILURE TO IDENTIFY (Apparent Violation 2 - Example B)

Formal Procedures Exist

- EP-006 Calculations:
  - Establishes general guidelines for the documentation of technical calculations.
  - Defines procedure requirements.
  - Defines individual responsibilities.

- EP-009 Design Verification:
  - Establishes the method for GPU Nuclear Technical Functions Division to use for conducting design verifications.
  - Provides Calculation Verification Checklist as a guide to be used when reviewing calculations in support of the design verification.
  - Defines individual responsibilities.
  - Meets ANSI 45.2.11 requirements.

CALCULATION ERROR / DESIGN VERIFICATION FAILURE TO IDENTIFY (Con't)

Root Cause

- Personnel error.
- Continuing to evaluate for programmatic causes.

CALCULATION ERROR / DESIGN VERIFICATION FAILURE TO IDENTIFY (Con't)

Corrective Action

Immediate Corrective Actions Taken:

- Individuals involved were counseled.
- Specific individual restricted for now from performing design verifications.
- Completed review of previous design verifications performed by the individual.
- Reviewed finding with all E&D Directors/Managers on November 13, 1995 at Plan-of-the-Week Meeting.
- Plan-of-the-Week Meeting Minutes to all engineers discussed concern and need for technically correct work and design verification.

CALCULATION ERROR / DESIGN VERIFICATION FAILURE TO IDENTIFY (Con't)

Ongoing Corrective Actions:

- Further evaluation of root cause of calculation and design verification errors.
- Contacted INPO for recommendations on utilities with strong Design Verification Programs.
- Identified two A/Es to discuss with them their Design Verification Program/Practices.
- Have held initial discussion with each of the above.
- Evaluating information obtained.
- Will modify procedure/practices to enhance program, as appropriate.
- Will retrain all appropriate engineers during 1st Quarter of 1996 on Design Verification Process.

B31.1 CODE CALCULATION USING ASME III (Apparent Violation #1)

During performance of ASME Section XI inservice inspections in 1988 and 1990, TMI site engineering personnel identified distorted pipe supports on the 'B' and 'D' RCS drain lines. In 1990, GPUN performed a structural analysis of the drain lines that demonstrated that the piping exceeded allowable stress values specified in the design code of record. GPUN performed a calculation using part of the criteria in ASME Section III, Section NB-3653.6, "Simplified Elastic-Plastic Discontinuity Analysis," The inspectors concluded that this was not an appropriate method to disposition the overstresses, because: (1) there are no provisions in B31.1 that justify this approach, and (2) the rules of ASME Section III should be applied in a consistent manner in its entirety, not in a fragmented manner in conjunction with parts of other design codes (i.e., B31.1).

B31.1 CODE CALCULATION USING ASME III (Con't)

Basis for GPU Nuclear Position

- USAS B31.1 1967 states that advanced alternative techniques can be used.
  - Paragraph 100 (b) - specifically incorporates the ASME Boiler and Pressure Vessel Code.
  - Foreward (Page iii)
  - Introduction (Page xi)
- An independent ASME Code expert, Mr. Don Landers of Teledyne Brown, has reviewed and concurred with this position.
- The GPU Nuclear calculation, however, did not adequately implement ASME III rules.

USA STANDARD

CODE FOR PRESSURE PIPING

Power Piping

USAS B31.1.0 - 1967

UDC 621.64.002.1 '.2 621.565

Sponsor

The American Society of Mechanical Engineers

Published by

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

United Engineering Center 345 East 47th Street New York, N. Y. 10017

Foreword

THE general philosophy underlying this Power Piping Code is to parallel those provisions of Section No. I, Power Boilers, of the ASME Boiler and Pressure Vessel Code, as they can be applied to power piping systems. The Allowable Stress Values for power piping are generally consistent with those assigned for power boilers. This Code is more conservative than some other piping codes, reflecting the need for long service life and maximum reliability in power plant installations.

The Power Piping Code as currently written does not differentiate between the design, fabrication, and erection requirements for critical and noncritical piping systems, except for certain stress calculations and mandatory nondestructive tests of welds for heavy wall, high temperature applications. The problem involved is to try to reach agreement on how to evaluate criticality, and to avoid the inference that noncritical systems do not require competence in design, fabrication, and erection. Some day such levels of quality may be definable, so that the need for the many different piping codes will be overcome.

There are many instances where the Code serves to warn a designer, fabricator, or erector against possible pitfalls; but the Code is not a handbook, and cannot substitute for education, experience, and sound engineering judgment.

The Code never intentionally puts a ceiling limit on conservatism. A designer is free to specify more rigid requirements as he feels they may be justified. Conversely, a designer who is capable of a more rigorous analysis than is specified in the Code may justify a less conservative design, and still satisfy the basic intent of the Code.

The Power Piping Committee strives to keep abreast of the current technological improvements in new materials, fabrication practices and testing techniques; and endeavors to keep the Code updated to permit the use of acceptable new developments.

Following approval by the USA Standards Committee B31, and by the sponsor, this Section of the Code was approved by the USA Standards Institute on July 26, 1967. It was designated B31.1.0 in the title only, on a temporary basis, until revision of B31.1-1955 has been completed.

Introduction

The Code for Pressure Piping (USAS B31) consists of a number of Sections, which collectively constitute the Code. Hereinafter in this Introduction and in the text of this Code Section B31.1, when the word "Code" is used without identification to another specific Code Section, it means this Code Section.

The Code for Pressure Piping sets forth engineering requirements deemed necessary for safe design and construction of piping systems. While safety is the basic consideration of this Code, this factor alone will not necessarily govern the final specifications for any pressure piping system. The designer is cautioned that the Code is not a design handbook. The Code does not do away with the need for the engineer or competent engineering judgment.

The Code contains basic reference data and formulas necessary for design. It is intended to state these requirements in terms of basic design principles to the fullest possible extent, supplemented with specific requirements where necessary to obtain uniform interpretation of principle. It contains prohibitions in areas where practices or designs are known to be unsafe. In other areas the Code contains warnings or "flags" where caution is known to be necessary, but where it is felt that a direct prohibition would be unwise.

The Code includes:

(1) material specifications and component standards which have been accepted for Code usage.

(2) the designation of proper dimensional standards for the elements comprising piping systems.

(3) requirements for the design of component parts and assembled units, including necessary pipe supporting elements.

(4) requirements for the evaluation and limitation of stresses, reactions, and movements associated with pressure, temperature, and external forces.

(5) requirements for the fabrication, assembly, and erection of piping systems.

(6) requirements for testing and inspecting of elements before assembly or erection and of the completed systems after erection.

The components of piping systems should, as far as practicable, comply with the Specifications and Standards listed in the Code. Compliance with this Code requires that fundamental principles be followed and that materials or practices not specifically approved under this Code, but which are not prohibited by the Code, be qualified for use as set forth in the applicable chapters of the Code.

The specific design requirements of the Code usually revolve around a simplified engineering approach to a subject. It is intended that a designer capable of applying more complete and rigorous analysis to special or unusual problems shall have latitude in the development of such designs and the evaluation of complex or combined stresses. In such cases the designer is responsible for demonstrating the validity of his approach.

This Code shall not be retroactive, or construed as applying to piping systems erected before, or under construction at the time of its approval by the United States of America Standards Institute.

Attention of users of the Code is directed to the fact that the numbering of the Divisions and the material thereunder may not be consecutive. Such discontinuity is recognized. It is not the result of editorial or printing errors. An attempt has been made, insofar as possible, to follow a uniform outline in the various Sections. Due to the fact that the complete outline may cover phases not applicable to a particular Section, the Code has been prepared with gaps in the numbering. It is believed that in this way, cross referencing between Sections is made easier and use of the Code is facilitated since the same subject, in general, appears under the same number and sub-number in all Sections.

The Code is under the direction of USA Standards Committee B31 organized under the procedures of the United States of America Standards Institute and is under the administrative sponsorship of The American Society of Mechanical Engineers.

The Committee is a continuing one and is organized to keep the Code up to date in context and in step with the developments in materials, constructions and usage. Revisions are issued periodically. New editions are published at three to four year intervals depending on conditions.

USA Standards Committee USAS B31 has established an orderly procedure to consider requests

Chapter I

SCOPE AND DEFINITIONS

100 GENERAL

(a) This Power Piping Code is one of several Sections of the USA Standard Code for Pressure Piping (USAS B31). This Section is published as a separate document for convenience.

(b) Standards and specifications specifically incorporated by reference into this Code are shown in Table 126.1. It is not considered practical to refer to a dated edition of each of the standards and specifications in this Code. Instead, the dated edition references are included in an Addendum which will be revised yearly.

100.1 Scope.

100.1.1. This Code prescribes minimum requirements for the design, materials, fabrication, erection, test and inspection of power piping systems for steam electric generating stations; industrial plants; central and district heating plants; district heating systems, including those portions of the system both on the property of and within the buildings of industrial establishments.

Piping as used in this Code includes pipe, flanges, bolting, gaskets, valves, relief devices, fittings and the pressure containing parts of other piping components. It also includes hangers and supports and other equipment items necessary to prevent overstressing the pressure containing parts. It does not include structures and equipment such as towers, building frames, pressure vessels, mechanical equipment and foundations.

The users of this Code are advised that in some areas legislation may establish governmental jurisdiction over the subject matter covered by this Code. However, any such legal requirement shall not relieve the owner of his inspection responsibilities specified in Par. 136.1.

100.1.2. Power piping systems as covered by this Code apply to all piping and their component parts within or forming a part of the above-mentioned plants, except as excluded in Par. 100.1.3. They include but are not limited to steam, water, oil, gas and air services.

(1) Piping for power boilers is within the scope of this Code, but, where such piping is included in the scope of Section I of the ASME Boiler and Pressure Vessel Code, the provisions of that Code shall govern.

(2) This Code also covers central and district heating systems for the distribution of steam and hot water away from the plant, whether underground or elsewhere.

(3) Where gas or oil piping is brought to the plant site from a distribution system, this Code shall apply to the gas and oil piping downstream from the outlet of the plant meter set assembly, unless the meter set assembly is located outside of the plant property, in which case this Code shall apply inside of the plant property line.

(4) This Code applies to piping for steam jet cooling systems which are part of the power plant cycle.

(5) Air and hydraulic distribution systems are within the scope of this Code.

100.1.3. This Code does *not* apply to the following:

(a) Piping specifically covered by other Sections of the Code for Pressure Piping.

(b) Economizers, heaters, tanks, nuclear reactor vessels and other pressure vessels covered by Sections of the ASME Boiler and Pressure Vessel Code.

(c) Building heating and distribution steam piping designed for 15 psi gage or less, or hot water heating systems designed for 30 psi gage or less.

(d) Roof and floor drains, plumbing, sewers and sprinkler and other fire protection systems.

(e) Piping for hydraulic or pneumatic components of tools and equipment.

(f) Piping for marine installations under statutory jurisdiction of regulatory agencies.

100.2 Definitions.

Some commonly used terms relating to piping are defined below. Terms related to welding which agree with AWS Standard A3.0 are marked with an asterisk (*) and are shown here for convenience. Other welding terms are defined with specific reference to piping. For welding terms used in this Code, but not shown here, definitions of AWS A3.0 apply.

Electrodes – Arc Weld

B225 Copper & Copper Alloy
B285 Aluminum & Aluminum Alloy
B297 Tungsten

Rods – Gas Weld

B285 Aluminum & Aluminum Alloy

Plates

B168 Nickel-Chromium-Iron Alloy
B209 Aluminum Alloy

Solder

B32 Tin-Lead and Silver-Lead Alloys

Brazing

B260 Filler Metals

Procedure

Publication 25 Copper Development Association

USA STANDARDS

A21.1 Computation – Strength & Thickness – C.I. Pipe
A21.2 Pit Cast Pipe
A21.6 Centrifugally Cast Pipe In Metal Molds
A21.8 Centrifugally Cast Pipe – Sand Lined Molds
A21.10 Short-Body, C.I. Fittings
A21.11 Mech. Joint for C.I. Pipe

B1.1 Unified Screw Threads
B2.1 Pipe Threads
B2.2 Dryseal Pipe Threads
B16.1 C.I. Flanges & Fittings – 125 lb
B16.2 C.I. Flanges & Fittings – 250 lb
B16b1 C.I. Flanges & Fittings – 800 lb
B16b2 Flanges & Fittings – 25 lb
B16.3 M.I. Scd. Fittings – 150 & 300 lb
B16.4 C.I. Scd. Fittings – 125 & 250 lb
B16.5 Steel Pipe Flanges and Flanged Fittings
B16.9 Steel-Butt-Welding Fittings
B16.10 Dimensions of Ferrous Valves
B16.11 Steel S.W. Fittings
B16.14 Ferrous-Threaded – Plugs, Bushings & Locknuts
B16.15 Cast Bronze Scd. Fittings – 125 & 250 lb
B16.18 Cast Brass Solder-Joints
B16.20 Ring Joint Gaskets – Steel Flanges
B16.21 Non-metallic Gaskets for Flanges
B16.22 Wrought Copper & Bronze Solder Joints Fittings
B16.24 Brass or Bronze Flanges & Fittings – 150 & 300 lb
B16.25 Butt Welding Ends – Pipe, Valves, Flanges, & Fittings
B16.28 Wrought Steel Buttwelding Short Radius Elbows and Returns
B18.2.1 Square and hex bolts and screws
B18.2.2 Square and hex nuts
B26 Fire Hose Couplings Thread
B31.3 Petroleum Refinery Piping
B31.4 Oil Transportation Piping
B31.8 Gas Transmission & Distribution Piping
B36.10 Wrought-Steel & Iron Pipe
B36.19 Stainless Steel Pipe

MSS STANDARD PRACTICES

SP-6 Finishes – On Flanges, Valves & Fittings
SP-9 Spot-Facing
SP-25 Marking for Valves, Fittings, Flanges & Unions
SP-37 Bronze Gate Valves – 125 lb
SP-42 Cast Flanged Valves – 150 lb
SP-43 Wrought S. S. Butt-Welding Fittings
SP-45 Bypass & Drain Connection
SP-46 Assembly of Steel Raised Face Flanges to C. I. Brass, Bronze & S. S. Flanges
SP-48 Steel Butt-Welding Fittings
SP-49 Forged Steel Scd. Fittings 2000, 3000 & 6000 lb
SP-50 Forged Steel Plugs & Bushings
SP-51 Cast Flanges & Fittings – 150 lb
SP-53 Magnetic Particle Inspection – Steel Castings
SP-54 Radiographic Inspection – Steel Castings
SP-55 Visual Inspection – Steel Castings
SP-58 Pipe Hangers & Supports
SP-61 Hydrostatic Testing Steel Valves
SP-63 Wrought Welding Fittings
SP-66 Pressure-Temperature Ratings for Steel Butt Welding End Valves

API SPECIFICATIONS

5L Line Pipe

ASME CODES

ASME Boiler and Pressure Vessel Code ◄——

AWWA STANDARDS

AWWA C100 Cast Iron Pressure Fittings
AWWA C111 Mechanical Joints for C. I. Pipe & Fitting
AWWA C207 Standards – Steel Flanges
AWWA C300 Concrete Water Pipe – Steel Cylinder-Not Prestressed
AWWA C301 Concrete Water Pipe – Steel Cylinder-Prestressed
AWWA C302 Concrete Water Pipe – Moneyfinder Type – Not Prestressed
AWWA C500 Gate Valves for Water Works Service
AWWA C600 Installation of C. I. Water Mains

FEDERAL SPECIFICATION

WW-P-421b Pipe, Cast Iron, for Water and other Liquids
SS-P-381 Pipe – Pressure, Reinforced Concrete Pretensioned Reinforcement (Steel Cylinder Type)

Specifications and Standards of the Following Organizations Appear in this List:

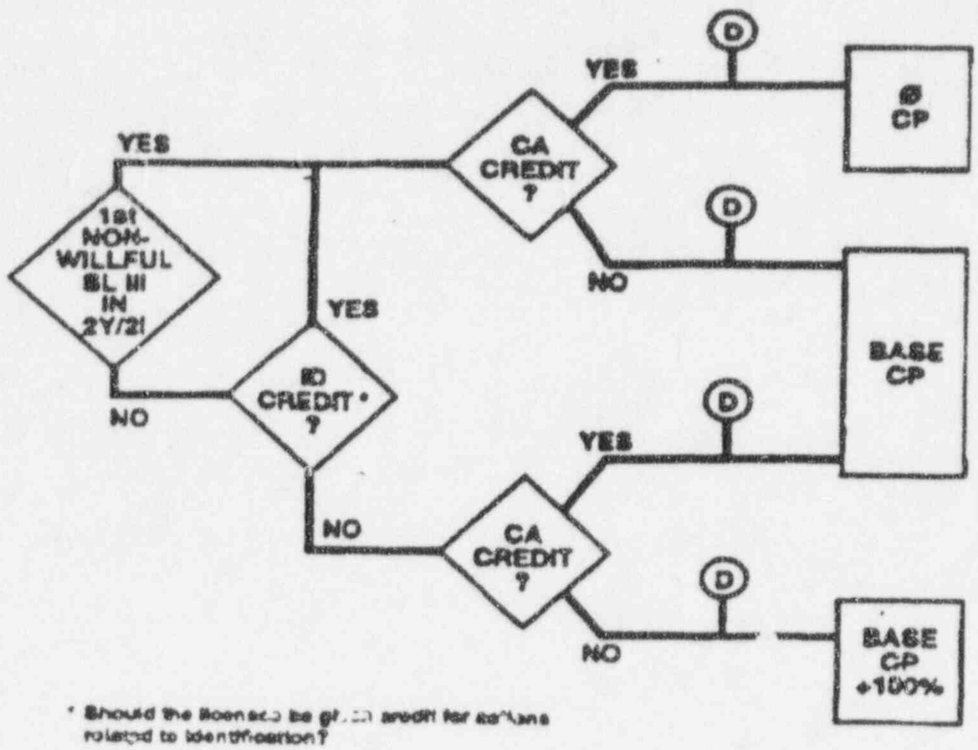
API American Petroleum Institute
1271 Avenue of the Americas
New York, New York 10020

B31.1 CODE CALCULATION USING ASME III (Con't)

GPU Nuclear Actions

- GPU Nuclear will document basis for disposition of analysis producing stresses beyond code specified allowables.

DETERMINATION OF CIVIL PENALTY IF APPARENT VIOLATIONS ARE SEVERITY LEVEL III



* Should the licensee be given credit for actions related to identification?

(D) Discretion, e.g., SL I and II violations should normally result in a civil penalty regardless of ID and CA.

Reference: NUREG-1600, "General Statement of Policy and Procedures for NRC Enforcement Actions-Enforcement Policy", July, 1995, Page 11.

ANY ESCALATED ENFORCEMENT ACTIONS WITHIN PREVIOUS 2 YEARS ?

- The last previous escalated enforcement action taken for TMI was over 2 years ago in the area of Emergency Preparedness (Severity Level III).

Therefore these apparent violations would be first escalated enforcement action (i.e., Severity Level III violation) to have occurred in the last 2 Years and/or Inspections.

CREDIT FOR ACTIONS RELATED TO IDENTIFICATION

The concept of identification presumes that the identifier recognizes the existence of a problem and understands that corrective action is needed.

- GPU Nuclear identified the B31.1 stress condition and a corrective modification was proposed (in 1990).
- GPU Nuclear identified the failure to implement the desired modification prior to the NRC Inspection.
- GPU Nuclear identified the original (1990) design verification error (reducing elbow) and addressed the error prior to the NRC Inspection.

Therefore credit could be given related to identification.

PROMPT AND COMPREHENSIVE CORRECTIVE ACTION

Apparent Violation #1 - B31.1 Code Calculation Using ASME III

- Prompt and comprehensive corrective actions already taken:
  - GPU Nuclear has implemented a modification which satisfies B31.1 Code requirements without using ASME III techniques.

- Lasting comprehensive corrective action to be taken:
  - GPU Nuclear will document basis for disposition of analysis producing stresses beyond code specified allowables (i.e., ASME III methods for B31.1 qualification).

PROMPT AND COMPREHENSIVE CORRECTIVE ACTION (Con't)

Apparent Violation 2 - Example A Modification Not Implemented

- Prompt and comprehensive corrective actions already taken:
  - Individual manager and engineers involved in the modification implementation/disposition concern have been counseled.
- Lasting comprehensive corrective actions which have occurred and are ongoing:
  - Reengineered Project Approval and Management Plan in place.

    System Engineer involved with all proposed system modifications.

    System Performance Team reviews proposed modifications.

    Plant Project Integration Team determines which projects will be funded and implementation schedule.
  - Continuing management emphasis on follow-up and close-out of recommendations.

PROMPT AND COMPREHENSIVE CORRECTIVE ACTION (Con't)

Apparent Violation 2 - Example B
Design Verification Failed to Identify Error in Calculation

- Prompt and comprehensive corrective actions already taken:
  - Individuals involved were counseled.
  - Specific individual restricted for now from performing design verifications.
  - Completed review of previous design verifications performed by the individual.
  - Reviewed finding with all Engr & Design Directors and Managers.
  - Notified all Engr & Design engineers of concern and need for technically correct work and design verification.

PROMPT AND COMPREHENSIVE CORRECTIVE ACTION (Con't)

- Lasting comprehensive corrective actions which have occurred and are ongoing:
  - Further evaluation of root cause of calculation and design verification errors.
  - Contacted INPO and had initial discussion on recommendations of utilities with strong design verification programs.
  - Identified two A/E's and had initial discussions on their Design Verification Programs/Practices.
  - Procedures/practices will be appropriately modified to enhance GPU Nuclear's program.
  - All appropriate engineers will be retrained on the Design Verification Process during first quarter of 1996.

Therefore the Licensee's corrective actions have been prompt and comprehensive.

EXERCISE OF DISCRETION

- The apparent violations are not Severity Level I or II.
- The apparent violations were not safety significant.
- The apparent violations did not occur with willful intent.

Therefore discretion can be exercised - no civil penalty.

GPU NUCLEAR'S SEVERITY LEVEL ASSESSMENT

Apparent Violation #1 - Exceeding Design Code of Record (10 CFR 50.55.a)

- GPU Nuclear does not agree with this apparent violation.
- Based upon guidance provided in the B31.1 Code, alternative ASME III calculations are allowed to be used to satisfy B31.1 requirements.
- This Code guidance/position as applied by GPU Nuclear has been confirmed as a legitimate Code option by an independent Code expert.

GPU Nuclear assessment is this apparent violation is <u>not</u> a violation.

GPU NUCLEAR'S SEVERITY LEVEL ASSESSMENT (Con't)

Apparent Violation #2 - Modification Not Implemented and Design Verification Failed to Identify Error in Calculation (10 CFR 50, Appendix B, Criterion III, Design Controls)

Apparent Violation 2 - Example A
Modification Not Implemented

- Not implementing or properly dispositioning the subject modification was an isolated occurrence and is not a repetitive violation.
- Not implementing or properly dispositioning the subject modification was/is not a programmatic problem.
- The action was not willful.
- Prompt and comprehensive corrective actions have already been taken:
  - Individual manager and engineers involved in the modification implementation/disposition concern have been counseled.

Apparent Violation #2 (Con't)

- Lasting comprehensive corrective actions have occurred and addition actions are ongoing:
  - Reengineered Project Approval and Management Plan:

    System Engineer involved with all proposed system modifications.

    System Performance Team reviews proposed modifications.

    Plant Project Integration Team determines which projects will be funded and implementation schedule.

  - Continuing management emphasis on follow-up and close-out of recommendations.

Apparent Violation #2 (Con't)

Apparent Violation 2 - Example B
Design Verification Failed to Identify Error in Calculation

- This action is not a repetitive violation.
- Initial findings indicate this action does not appear to be a programmatic problem - evaluation is still ongoing.
- Prompt and comprehensive corrective actions have already been taken.
  - Individuals involved were counseled.
  - Specific individual restricted for now from performing design verifications.
  - Completed review of previous design verifications performed by the individual.
  - Reviewed finding with all Engr & Design Directors and Managers.
  - Notified all Engr & Design engineers of concern and need for technically correct work and design verification.

Apparent Violation #2 (Con't)

- Lasting comprehensive corrective actions have occurred:
  - Further evaluation of root cause of calculation and design verification errors.
  - Contacted INPO and had initial discussion on recommendations of utilities with strong design verification programs.
  - Identified two A/E's and had initial discussions on their Design Verification Programs/Practices.
  - Procedures/practices will be appropriately modified to enhance GPU Nuclear's program.
  - All appropriate engineers will be retrained on the Design Verification Process during first quarter of 1996.

GPU NUCLEAR'S SEVERITY LEVEL ASSESSMENT (Con't)

Apparent Violation #2 (Con't)

GPU Nuclear agrees with this apparent violation and assesses it as being Severity Level IV.

CONCLUSIONS

- GPU Nuclear takes seriously the findings identified in the apparent violations.
- GPU Nuclear has already taken prompt and comprehensive corrective actions for each apparent violation and additional actions are ongoing.
- The apparent violations did not contribute to the leak event.
- The apparent violations did not result in a safety problem.
- GPU Nuclear disagrees with the B31.1 apparent violation and assesses it not to be a violation.
- GPU Nuclear assesses the Modification/Design Verification apparent violation as being Severity Level IV.
- NRC Guidance would not consider a civil penalty necessary if either apparent violation was considered to be Severity Level III.