Florida
Power
CORPORATION
Crystal River Unit 3
Docket No. 50-302

August 11, 1995
3F0895-16

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

Subject: NRC Event #29062

Dear Sir:

During a plant walkdown, the NRC's follow-up to Florida Power Corporation's (FPC) Crystal River Unit 3 (CR-3) Service Water Self Assessment, an NRC inspector identified a condition suspected to be outside the design basis of the plant. A Problem Report (PR-95-0125) was initiated, and at 1835 on July 13, 1995 a 1 hour non-emergency report was made to the NRC as directed by 10 CFR 50.72(b)(1)(ii)(B). This report was assigned the NRC Event #29062 (see Attachment 1).

The condition reported to the NRC comprised the shell side of a decay heat exchanger not having a relief valve for overpressure protection, if the cooling water was isolated from the heat exchanger (see Figure 1). Subsequently, a Design Basis Evaluation (NED95-0399) was performed which stated, in part, "The DC [ed. Decay Heat Closed Cycle Cooling System] and DH [ed. Decay Heat] heat exchangers are designed in accordance with applicable design basis codes, standards, and regulatory requirements and are acceptable 'as designed'" (see Attachment 2).

IE22

Based on the conclusions of the Design Basis Evaluation, FPC hereby rescinds the 1 hour non-emergency report (NRC Event #29062). Should you have any questions concerning the engineering evaluation, please contact Brian Gutherman, Supervisor, Nuclear Engineering Design at (904) 795-6486 extension 3325.

Sincerely,

B. J. Hickle, Director
Nuclear Plant Operations

JAF:ff

Attachments

xc: Regional Administrator, Region II
Project Manager, NRR
Senior Resident Inspector

3F0895-16
EVENT NOTIFICATION WORKSHEET

Attachment 1
ENCLOSURE 8 (Page 1 of 2)

NRC COMMUNICATOR J. Sebrosky

NRC EVENT NOTIFICATION WORKSHEET

NRC EVENT # 29062

NOTIFICATION TIME	FACILITY	UNIT	CALLER'S NAME	CALL BACK ENS # 708-821-0027 Or # 1-904-795-6958
1835	CRYSTAL RIVER	3	R. Sweeney	
EVENT TIME	**EVENT DATE**		**POWER/MODE BEFORE**	**POWER/MODE AFTER**
1802	7/13/95		100/1	100/1

EVENT CLASSIFICATIONS - 50.72 (a)(1)

- ☐ GENERAL EMERGENCY
- ☐ SITE AREA EMERGENCY
- ☐ ALERT
- ☐ UNUSUAL EVENT

1-HOUR NON-EMERGENCY 50.72(b)(1)

- ☐ (i)(A) TS Required Shut Down
- ☐ (i)(B) TS Deviation
- ☐ (ii) Degraded Condition
- ☐ (ii)(A) Unanalyzed Condition
- ☒ (ii)(B) Outside Design Basis
- ☐ (ii)(C) Not Covered By OPs/EPs
- ☐ (iii) Earthquake
- ☐ (iii) Flood
- ☐ (iii) Hurricane
- ☐ (iii) Ice/Hail
- ☐ (iii) Lightning

1-HOUR NON-EMERGENCY 50.72 (b)(1) (Cont'd)

- ☐ (iii) Tornado
- ☐ (iii) Other Natural Phenomena
- ☐ (iv) ECCS Discharge to RCS
- ☐ (v) Lost ENS
- ☐ (v) Lost Emergency Assessment
- ☐ (v) Lost Offsite Communications
- ☐ (v) Emergency Sirens Inoperable
- ☐ (vi) Fire
- ☐ (vi) Toxic Gas
- ☐ (vi) Rad Release
- ☐ (vi) Other Hampering Safe Operation

4-HOUR NON-EMERGENCY 50.72 (b)(2)

- ☐ (i) Degrade While Shut Down
- ☐ (ii) RPS Actuation (scram)
- ☐ (ii) ESF Actuation
- ☐ (iii)(A) Safe Shut/Down Capability

4 HOUR NON-EMERGENCY 50.72 (b)(2) (Cont'd)

- ☐ (iii)(B) RHR Capability
- ☐ (iii)(C) Control of Rad Release
- ☐ (iii)(D) Accident Mitigation
- ☐ (iv)(A) Air Release >20X Appendix B
- ☐ (iv)(B) Liq Release >20X Appendix B
- ☐ (v) Offsite Medical
- ☐ (vi) Offsite Notification

OTHER EVENTS

- ☐ PHYSICAL SECURITY (73.71)
- ☐ TRANSPORTATION
- ☐ MATERIAL/EXPOSURE (20.2202)
- ☐ FITNESS FOR DUTY
- ☐ OTHER

DESCRIPTION

The shell side of the decay heat heat exchangers do not have over pressure protection if the cooling water supply is isolated. Not an operability issue for the heat exchanger since cooling water is required for operability. Placing administrative controls on heat exchanger cooling water isolation valves. Evaluating Pressure vessel code conformance.

Include: Systems affected, actuations & their initiating signals, causes, effect of event on plant, actions taken or planned, etc.

NOTIFICATIONS	YES	NO	WILL BE					
NRC RESIDENT			✓	ANYTHING UNUSUAL OR NOT UNDERSTOOD?		YES (explain above)	X	NO
STATE OF FLORIDA		✓		DID ALL SYSTEMS FUNCTION AS REQUIRED?	X	YES		NO (explain above)
CITRUS & LEVY COUNTIES		✓						
DHRS		✓		MODE OF OPERATION UNTIL CORRECTED: 1	ESTIMATE FOR RESTART DATE: N/A		NO	ADDITIONAL INFO ON BACK?
MEDIA/PRESS RELEASE		✓						

Radiological Release Condition	Check or Fill in Applicable Items (specific details/explanations should be covered in event description)		
☐ Offsite Release (State release path in description)	☐ Offsite Protective Actions Recommended	☐ Areas Evacuated	☐ Personnel Exposed or Contaminated

Release Description	Check or Fill in Applicable Items (specific details/explanations should be covered in event description)							
Liquid Release	☐ Monitored	☐ Unmonitored	☐ Planned	☐ Unplanned	☐ Ongoing	☐ Terminated	☐ ODCM Exceeded	☐ RM Alarms
Gaseous Release	☐ Monitored	☐ Unmonitored	☐ Planned	☐ Unplanned	☐ Ongoing	☐ Terminated	☐ ODCM Exceeded	☐ RM Alarms

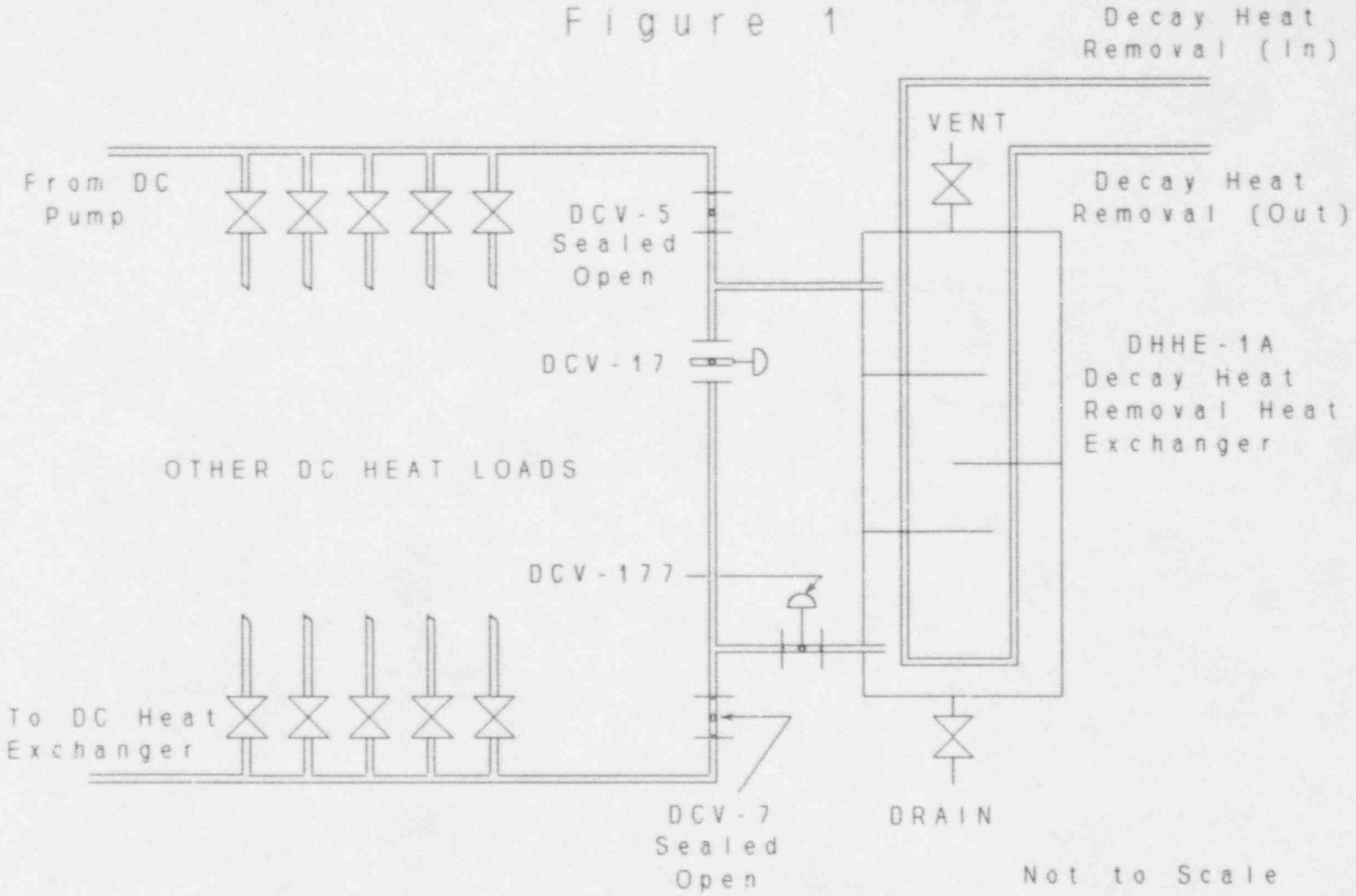
Release Rates/Limits (From Dose Assessment Team)	Release Rate (Ci/sec)	% ODCM Limit	Total Activity (Ci)	% ODCM Limit
Noble Gas				
Iodine				
Particulate				
Liquid (excluding tritium & dissolved noble gases)				
Liquid (tritium)				
Total Activity				

Rad Monitor Readings	Plant Stack (RMA-2)	Condenser/Air Ejector (RMA-12)	Main Steam Line (RMG-25,26,27,28)	Other (List)
RAD Monitor Readings:				
Alarm Setpoints:				
% ODCM Limit (if applicable)				

RCS or SG Tube Leaks	Check or Fill in Applicable Items: (specific details/explanations should be covered in event description)			
Location of the leak (e.g., SG#, valve, pipe, etc.)				
Leak Rate:	Units: gpm/gpd	I.T.S. Limits:		☐ Sudden or ☐ Long Term Development
Leak Start Date:	Time:	Coolant Activity	Primary μCi/ml	Secondary μCi/ml
List of Safety Related Equipment Not Operational:				

EVENT DESCRIPTION (Continued from front)
EC INITIALS

Figure 1



"A" Train Decay Heat Removal Detail

Attachment 2

Florida Power
CORPORATION

INTEROFFICE CORRESPONDENCE

Nuclear Engineering Design (OFFICE) NA1E (MAC) 240-3325 (TELEPHONE)

SUBJECT: **PR-95-0125, Corrective Item Step J - Design Basis Evaluation**

TO: **S. Chernenko**

DATE: **July 24, 1995**
NED95-0399

This correspondence is being transmitted to you to provide you with the results of the above subject evaluation. The results of the evaluation are summarized below for your information.

Per ASME Section VIII, Division 1, UG-125, 1968 edition, the heat exchangers for the Decay Heat Closed Cycle Cooling System (DC) are required by code to have pressure relief devices installed to protect the vessel, irrespective of the size or pressure of the vessel, in accordance with the requirements of UG-125 through UG-134. The installation of the relief capability need not be supplied by the vessel manufacturer. Relief capability may be installed within the inlet or outlet piping, between the inlet and outlet isolation valve(s) and the heat exchanger, in lieu of providing relief capabilities at the vessel itself. As a result, the vessel manufacturer was not required nor under any obligation by code to provide relief capabilities at the vessel.

Per flow diagram, FD-302-631, sheets 1 and 2 of 3, closure of DCV-5 and DCV-7 for DHHE-1A; and, closure of DCV-6 and DCV-8 for DHHE-1B would isolate these heat exchangers from the relief valves installed within the remainder of the DC piping system. During isolation of the heat exchangers, pressure relief would not be provided for these heat exchangers as required by the above referenced code requirements unless one of the two available vent valves were opened. Additionally, the existing pressure relief arrangement within the DC piping system, at first glance, does not appear to be in compliance with the above code requirements, as pressure relief capabilities located within the existing piping for DHHE-1A and DHHE-1B do not appear to be located between the existing isolation valves used for maintenance purposes for these heat exchangers, DCV-5 and DCV-7 for DHHE-1A; and, DCV-6 and DCV-8 for DHHE-1B.

The existing DC System piping arrangements provide relief capabilities for the remaining components within the DC System in accordance with the requirements of the ASME Codes (ie: relief valves are currently installed between the inlet isolation valves for all heat exchangers and pumps). The arrangement for DHHE-1A and DHHE-1B was designed to provide a minimum and maximun cooling water flow to the heat exchangers by automatic valve positioning of DCV-17 and DCV-177 for DHHE-1A or DCV-18 and DCV-178 for DHHE-1B, the outlet control valves nearest each heat exchanger and the bypass control valves for these heat exchangers. This arrangement prevents "dead

heading" and "pump in out" of the DC System flow within the DH heat exchangers, eliminating the need for closure of the inlet and outlet isolation valves, DCV-5 and DCV-7 for DHHE-1A and DCV-6 and DCV-8 for DHHE-1B, when placing one or both of these heat exchangers "out-of service" or in "stand-by service"during normal plant operation. This design arrangement eliminates the need for closure of the inlet and outlet isolation valves, DCV-5 and DCV-7 for DHHE-1A; and, DCV-6 and DCV-8 for DHHE-1B, except during maintenance activities. This arrangement assures there is adequate cooling water flow through the heat exchangers when the heat exchangers are out of service or in stand-by service (ie: Decay Heat Removal System is isolated), preventing tube fouling on the cooling water side of these heat exchangers.

During maintenance periods, when inlet and outlet isolation valves, DCV-5 and DCV-7 for DHHE-1A; and, DCV-6 and DCV-8 for DHHE-1B, for these heat exchangers may be closed for performing maintenance on the DC or DH side of these heat exchangers, one of the two available heat exchanger vents must be opened, as a minimum, to prevent any potential for inadvertent over pressurization of the isolated heat exchanger due to thermal transfer from the remainder of the DC System piping or the heat within the tube bundles from the DH System. This should occur whether the tube side has been isolated or not. Vents and drains are provided at the heat exchangers and must be used for this purpose.

The design pressure for the shell side is 100 psig (cold) and 487 psig (hot) for the tube side of these Decay Heat heat exchangers. The design temperature for both is 300 degrees F.

As part of this evaluation, plant procedure OP-404, "Operating Procedure For The Decay Heat Removal System (and DC System)", was reviewed. Per the requirements of this procedure, inlet and outlet isolation valves DCV-5 and DCV-7 for DHHE-1A and DCV-6 and DCV-8 for DHHE-1B, are not closed during normal plant operation of these systems, to include "initial filling and venting operations of the DHCCC System" contained within section 4.2 of this procedure; and, "isolation and restoration of individual decay heat pumps and heat exchangers", contained within section 4.14 of this procedure. Placing either of the heat exchangers, DHHE-1A or DHHE-1B, in "stand-by" service is accomplished using the flow controller for either DHHE-1A or DHHE-1B, DCV-177-MS for DHHE-1A and DCV-178-MS for DHHE-1B. This is accomplished by placing either of the controllers in the "0" position (ie: "minimum cooling), which opens the bypass valves DCV-177 for DHHE-1A or DCV-178 for DHHE-1B, while placing the outlet control valve nearest the heat exchanger (ie: DCV-17 for DHHE-1A or DCV-18 for DHHE-1B) to the minimum cooling position, assuring that relief capability is provided during normal plant operation of these heat exchangers (ie: heat exchangers are not isolated during normal plant operation). Additional information is contained within this procedure for temperature step changes, setting the flow requirements, etc. for these

heat exchangers using the above referenced controllers. See OP-404 for additional information. Per OP-404, when these heat exchangers are removed from service or are in stand-by service, the Decay Heat Removal System (tube side) is isolated. This prevents the internal temperature on the cooling water side (DC System) from exceeding the temperature limitations contained within this procedure for operation of these heat exchangers when the flow control controllers, DCV-177-MS for DHHE-1A and DCV-178-MS for DHHE-1B, are set in the "0" position (ie: minimum cooling, and not isolated on the cooling water side of the heat exchangers).

Per NED review of OP-404, this procedure does not provide specific guidance as to what steps should be accomplished when one of these heat exchangers is taken out of service for maintenance. During maintenance activities, such as removal of internal fouling (ie: cleaning) of these heat exchangers, isolation of the Decay Heat Removal System for the affected heat exchanger would be required. Isolation of DCV-5 and DCV-7 for DHHE-1A and DCV-6 and DCV-8 for DHHE-1B would require sealed closure. The vents and drains for the removed heat exchanger would require opening for venting and draining of the shell side of the heat exchanger. These steps are implied throughout the procedure but are not specifically addressed, similar to what is provided for DCHE-1A and DCHE-1B, the other heat exchangers contained within the DC System. Additional guidance may be required regarding the isolation of DHHE-1A or DHHE-1B during the performance of maintenance activities to assure the there is no potential for over pressurization of the heat exchangers when the inlet and outlet isolation valves are closed in the event these heat exchangers are not immediately vented and drained.

Per the review of the above design of the system, the current arrangement provides for pressure relief capabilities in accordance with the requirements of ASME Section VIII, UG-125, 1968 edition, to include Appendix M requirements, for these heat exchangers during normal plant operation. Placing a heat exchanger in "stand-by" service during normal plant operation is accomplished by opening the DC System bypass control valve for the non-operational heat exchanger, DCV-17 for DHHE-1A and DCV-18 for DHHE-1B; and, placing the outlet control valve closest to the heat exchanger outlet in the minimum flow position, DCV-177 for DHHE-1A and DCV-178 for DHHE-1B (ie: "0" position for controllers DCV-177-MS for DHHE-1A and DCV-178-MS for DHHE-1B). During maintenance of the heat exchangers, when the DC System is isolated from the heat exchangers using DCV-5 and DCV-7 for DHHE-1A and DCV-6 and DCV-8 for DHHE-1B, a vent valve (and/or drain valve) must be opened to assure there is no potential for over pressurization of the isolated heat exchanger due to thermal transfer from the isolated Decay Heat Removal System. Since the Decay Heat Removal System is isolated, transfer of residual heat to the isolated heat exchanger may occur over a period of time and would not be instantaneous. During these periods of isolation for maintenance purposes, the requirements for relief capabilities for these heat exchangers are satisfied by opening one of the two available vent valves, eliminating the need for

specific relief capabilities in the form of a relief valve or rupture disc while the equipment is isolated for maintenance purposes.

From the above, the existing arrangement complies with the requirements of the initial design for the DH heat exchangers, DHHE-1A and DHHE-1B, as described within ASME Section VIII, Division 1, UG-125, 1968 edition, for normal plant operation, provided the heat exchangers are isolated in accordance with the design of the system as stated previously as currently established by procedure (ie: OP-404). During maintenance activities, when the DC System is to be isolated by closing the inlet and outlet isolation valves for these heat exchangers, a vent valve or drain valve should be immediately opened to assure that any potential for over pressurization of the isolated heat exchanger is eliminated in the event the heat exchanger removed from service is not immediately vented or drained for maintenance purposes.

Per ASME Section VIII, UG-125, 1968 edition, Appendix M, Paragraphs UA-354 and UA-355, as referenced within UG-125(e) and UG-134, states that an isolation stop valve may be installed between the vessel and the pressure relieving device provided in the event the isolation of the relief device from the vessel is so accomplished to isolate the pressure source to the vessel. The existing arrangement for the DHHE-1A and DHHE-1B meets the restrictions. During normal operation, the DC System outlet control valves and the bypass valves are repositioned to the "0" position (ie: minimum cooling) when the heat exchanger is not in service or is in stand-by service. During the performance of maintenance activities, when the DC System inlet and outlet isolation valves for these heat exchangers are closed and the Decay heat removal System is isolated, the pressure source for these heat exchangers is isolated. Since both the shell side and the tube side are designed for a temperature of 300 degrees F, and the normal function of the heat exchangers is to cool the RCS within the DH System from 280 degrees to 140 degrees F within 14 hours, thermal transfer (ie: thermal over pressurization of the heat exchanger) during the short period when one of the two heat exchangers is taken out of service for maintenance is unlikely (pressure and temperature sources isolated). Established maintenance clearances provide an adequate means to meet the requirements of Appendix M, Section UA-354, which states that (isolation valves installed between the pressure vessel and relief device) "it shall not be closed except by authorized personnel who shall remain stationed there during that period of the vessel's operation within which the valve remains closed, and who shall again lock or seal the stop valve (ie: isolation valve - added for clarity) in the open position before leaving the station". Per Enclosure 2, Checklist II of OP-404, Page 3 for DCV-5 and DCV-7; and, Page 4 for DCV-6 and DCV-8, these isolation valves are "sealed open" during normal plant operation as required by ASME Section VIII, Division 1, UG-125, Appendix M.

As a result of the above, the previously identified potential Design Basis Issue of not having relief valves installed on the shell side of the DH heat exchangers or between

the isolation valves DCV-5 and DCV-7 for DHHE-1A and DCV-6 and DCV-8 for DHHE-1B, is not a design basis issue. The DC System and the DH heat exchangers are designed in accordance with applicable design basis codes, standards, and regulatory requirements and are acceptable "as designed".

No further action is required for this issue. The Corrective Action Plan for this problem report is not needed nor required and will not be developed per this correspondence. We recommend voiding PR95-0125 and retraction of the NRC report generated for PR 95-1025.

A copy of this correspondence will be transmitted to the System Engineer for any follow up action with operations which may be deemed necessary concerning additional guidance for isolating either DHHE-1A or DHHE-1B while performing maintenance activities.

NED will initiate a design basis document change to incorporate this correspondence into the design basis document for the DH System, documenting the evaluation within a design reference.

REFERENCES:

FSAR Sections: (Revision 21)	6.1.2.3, 6.2.2.1, 9.4.2, 9.5.1.b, 9.5.2.2 and Table 9-9.
Design Basis Documents:	EDBD 6/3, Enhanced Design Basis Document For The Decay Heat Removal System", Revision 5.
	EDBD 6/6 Enhanced Design Basis Document For The Decay Heat Closed Cycle Cooling System", Revision 3.
Procedures, Drawings, etc.:	OP-404, "Operation of the Decay Removal System", Revision 92.
	FD-302-631, Sheets 1 and 2 of 3
Codes, Standards, Regulations:	ASME Section VIII, Division 1, 1968 edition, Paragraphs UG-125 through 134, and Appendix M.

If you have any questions or require additional information, please contact R. E. Robbins at 240-3293.

R. E. Robbins, Project Engineer
Nuclear Engineering Design

B. Gutherman, Supervisor
Nuclear Engineering Design

cc: J. R. Maseda w/attach
B. J. Hickle w/attach
K. R. Wilson w/attach
M.W. Donovan w/attach
D. A. Shook w/attach
S. A. Stewart w/attach
K. R. Campbell w/attach
M. W. Donovan w/attach
Records Management (DXREF = EQUIP 4-15-1) w/attach

APPENDIX M
Installation and Operation

UA-350 Introduction

(a) The rules in this Appendix are for general information only, because they pertain to the installation and operation of pressure vessels, which are the prerogative and responsibility of the law enforcement authorities in those states and municipalities which have made provision for the enforcement of Section VIII of the Boiler and Pressure Vessel Code.

(b) It is permissive to use any departures suggested herein from provisions in the mandatory parts of this Division of Section VIII when granted by the authority having legal jurisdiction over the installation of unfired pressure vessels.

UA-351 Corrosion

(a) Vessels subject to external corrosion shall be so installed that there is sufficient access to all parts of the exterior to permit proper inspection of the exterior, unless adequate protection against corrosion is provided or unless the vessel is of such size and is so connected that it may readily be removed from its permanent location for inspection.

(b) Vessels having manholes, handholes, or cover plates to permit inspection of the interior shall be so installed that these openings are accessible.

(c) In vertical cylindrical vessels subject to corrosion, to insure complete drainage, the bottom head, if dished, should preferably be concave to pressure.

UA-352 Marking on the Vessel

The marking required by this Division shall be so located that it will be accessible after installation and when installed shall not be covered with insulation or other material that is not readily removable (see Par. UG-116(i)).

UA-353 Pressure-Relieving Safety Devices

The general provisions for the installation of pressure-relieving devices are fully covered in Par. UG-134. The following paragraphs contain details in arrangement of stop valves for shut-off control of safety pressure-relief devices which are sometimes necessary to the continuous operation of processing equipment of such a complex nature that the shut-down of any part of it is not feasible. There are also rules in regard to the design of discharge piping from safety and relief valves, which can only be general in nature because the design engineer must fit the arrangement and proportions of such a system to the particular requirements in the operation of the equipment involved.

UA-354 Stop Valves Between Pressure-Relieving Device and Vessel

(a) A vessel, in which pressure can be generated because of service conditions, may have a full-area stop valve between it and its pressure-relieving device for inspection and repair purposes only. When such a stop valve is provided, it shall be so arranged that it can be locked or sealed open, and it shall not be closed except by an authorized person who shall remain stationed there during that period of the vessel's operation within which the valve remains closed, and who shall again lock or seal the stop valve in the open position before leaving the station.

(b) A vessel or system (see Par. UG-132(c)) for which the pressure originates from an outside source exclusively may have individual pressure-relieving devices on each vessel, or connected to any point on the connecting piping, or on any one of the vessels to be protected. Under such an arrangement, there may be a stop valve between any vessel and the pressure-relieving devices, and this stop valve need not be locked open, provided it also closes off that vessel from the source of pressure.

UA-355 Stop Valves on the Discharge Side of a Pressure-Relieving Device (See Par. UG-134(e).)

A full-area stop valve may be placed on the discharge side of a pressure-relieving device when its discharge is connected to a common header with other discharge lines from other pressure-relieving devices on nearby vessels that are in operation, so that this stop valve when closed will prevent a discharge from any connected operating vessels from backing up beyond the valve so closed. Such a stop valve shall be so arranged that it can be locked or sealed in either the open or closed position, and it shall be locked or sealed in either position only by an authorized