September 1, 1982

Docket No. 50-029
LS05-82-09-010

Mr. James A. Kay
Senior Engineer - Licensing
Yankee Atomic Electric Company
1671 Worcester Road
Framingham, Massachusetts 01701

Dear Mr. Kay:

SUBJECT: SEP TOPIC VI-4, CONTAINMENT ISOLATION SYSTEM
YANKEE NUCLEAR POWER STATION

Enclosed is a copy of our draft evaluation of SEP Topic VI-4, Containment Isolation System. This assessment compares your facility, as described in Docket No. 50-029, with the criteria currently used by the regulatory staff for licensing new facilities. Please inform us if the as-built conditions at the facility differ from the licensing basis assumed in our assessment.

In addition, I would like to draw your attention to three of the more significant issues contained in the conclusion; 1) the use of a simple check valve as an isolation valve outside containment; 2) the use of hand operated manual valves for containment isolation with no indication that these valves are either locked closed or otherwise under administrative control; and 3) a lack of redundancy in the isolation provisions by using a single isolation barrier in an open system governed by GDC 55 or 56.

These items appear to contradict the explicit wording of the regulations and no other acceptable defined basis could be determined from the information provided.

To enable us to perform our assessment of the differences identified in this report, we will need the defined basis upon which the specific isolation configurations at the Yankee plant were judged to be acceptable to you. Please provide this information as a part of your comments on this report.

SE04
DSU USE EA (11)
Add: Gary Staley

OFFICE ▶							
SURNAME ▶							
DATE ▶							

Comments are required within 30 days of receipt of this letter so that they may be included in our final report. This evaluation will be a basic input to the Integrated Safety Assessment for your facility unless you identify changes needed to reflect the as-built conditions at your facility. This assessment may be revised in the future if your facility design is changed or if NRC criteria relating to this subject are modified before the Integrated Assessment is completed.

Sincerely,

Original signed by:

Ralph Caruso, Project Manager
Operating Reactors Branch No. 5
Division of Licensing

Enclosure:
As stated

cc w/enclosure:
See next page

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Containment Systems Branch
Evaluation Report on SEP Topic VI-4
Containment Isolation System for the
Yankee Nuclear Power Station
Docket No. 50-029

I Introduction

The Yankee Nuclear Power Station (Yankee Rowe) began commercial operation in 1961. Since then safety review criteria have changed. As part of the Systematic Evaluation Program (SEP), the containment isolation system for the Yankee Rowe plant has been re-evaluated. The purpose of this evaluation is to document the deviations from current safety criteria as they relate to the containment isolation system. The significance of the identified deviations, and recommended corrective measures to improve safety, will be the subject of a subsequent, integrated assessment of the Yankee Rowe plant.

II Review Criteria

The safety criteria used in the current evaluation of the containment isolation system for the Yankee Rowe plant are contained in the following references:

1) 10 CFR Part 50, Appendix A, General Design Criteria for Nuclear Power Plants (GDC 54, 55, 56 and 57).
2) NUREG-0800, Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants (SRP Section 6.2.4, Containment Isolation System).
3) Regulatory Guide 1.11, Instrument Lines Penetrating Primary Reactor Containment; and
4) Regulatory Guide 1.141, Containment Isolation Provisions for Fluid Systems.

ENCLOSURE

III Related Safety Topics

The review areas identified below are not covered in this report, but are related and essential to the completion of the re-evaluation of the containment isolation system for the Yankee Rowe plant. These review areas are included in other SEP topics or ongoing Generic Reviews, as indicated below:

(1) III-1, Classification of Structures, Components and Systems (Seismic and Quality)

(2) III-4.C, Internally Generated Missiles

(3) III-5.A, Effects of Pipe Break on Structures, Systems and Components Inside Containment

(4) III-5.B, Pipe Break Outside Containment

(5) III-6, Seismic Design Considerations

(6) III-12, Environmental Qualification of Safety-Related Equipment

(7) VI-6, Containment Leak Testing

(8) VII-2, Engineered Safety Feature System Control Logic and Design

(9) VIII-2, Onsite Emergency Power Systems - Diesel Generator

(10) VIII-4, Electrical Penetrations of Reactor Containment

(11) NUREG-0737, Clarification of TMI Action Plan Requirements, Item II.E.4.2, Containment Isolation Dependability

(12) NUREG-0660, NRC Action Plan Developed as a Result of the TMI-2 Accident, Item II.E.4.4, Containment Purging and Venting Requirements

IV. Review Guidelines

The containment isolation system of a nuclear power plant is an engineered safety feature that functions to allow the normal or emergency passage of fluids through the containment boundary while preserving the ability of the boundary to prevent or limit the escape of fission products to the environs that may result from postulated accidents. GDC 54, 55, 56 and 57 of Appendix A to 10 CFR Part 50 pertain to the containment isolation system of a nuclear power plant.

GDC 54 establishes design and test requirements for the leak detection provisions, the isolation function and the containment capability of the isolation barriers in lines penetrating the primary reactor containment. From the standpoint of containment isolation, leak detection provisions should be capable of quickly detecting and responding to a spectrum of postulated pipe break accident conditions. To accomplish this diverse parameters should be monitored to initiate the containment isolation function. The parameters selected should assure a positive, rapid response to the developing accident condition. This aspect of the containment isolation system review will be addressed during the review of the post-TMI requirements approved for implementation, as stated in NUREG-0737 at Item II.E.4.2.

Leak detection capability should also be provided at the system level to alert the operator of the need to isolate a system train equipped with remote manual isolation valves. Standard Review Plan (SRP) 6.2.4, at Item II.11, provides guidance in this regard.

With respect to the design requirements for the isolation function, all non-essential systems should be automatically isolated (with manual valves sealed closed), and valve closure times should be selected to assure rapid isolation of the containment in the event of an accident. The review of the classification of systems as essential or non-essential, and the automatic isolation provisions for non-essential systems by appropriate signals, will be addresssed in conjunction with the review of the post-TMI requirements as stated in NUREG-0737 at Item II.E.4.2. The closure time of the containment ventilation system isolation valves will be evaluated in conjunction with the ongoing generic review of purging practices at operating plants (see NUREG-0660 at Item II.E.4.4).

The electrical power supply, instrumentation and controls systems should be designed to engineered safety features criteria to assure accomplishment of the containment isolation function. This aspect of the review is covered under SEP Topics VII-2 and VIII-2. Also, resetting the isolation signal should not result in the automatic reopening of containment isolation valves. This will be addressed in conjunction with the review of the post-TMI requirements approved for implementation, as stated in NUREG-0737, at Item II.E.4.2.

With respect to the capabilities of containment isolation barriers in lines penetrating primary containment, the isolation barriers should be designed to engineered safety feature criteria, and proteted against missiles, pipe whip and jet impingement. Typical isolation

barriers include valves, closed systems and blind flanges. Furthermore, provisions should be made to permit periodic leak testing of the isolation barriers.

The adequacy of the missile, pipe whip and jet impingement protection will be covered under SEP Topics III-4.C, III-5.A and III-5.B. The acceptability of the design criteria originally used in the design of the containment isolation system components will be covered in SEP Topics III-1, III-6 and III-12.

The adequacy of the leak testing program will be covered under SEP Topic VI-6. The acceptability of electrical penetrations will be covered in SEP Topic VIII-4.

GDC 55, 56 and 57 establish explicit requirements for isolation valving in lines penetrating the containment. Specifically, they address the number and location of isolation valves (e.g., redundant valving with one located inside containment and the other lcoated outside containment), valve actuation provisions (eg., automatic or remote manual isolation valves), valve position (e.g., locked closed, or the position of greater safety in the event of an accident or power failure) and valve type (e.g., a simple check valve is not a permissible automatic isolation valve outside containment). Figures 1 and 2 depict the explicit valve arrangements specified in GDC 55 and 56, and GDC 57, respectively.

GDC 55 and 56 also permit containment isolation provisions for lines penetrating the primary containment boundary that differ from the

GENERAL DESIGN CRITERIA 55 AND 56
ISOLATION VALVE CRITERIA

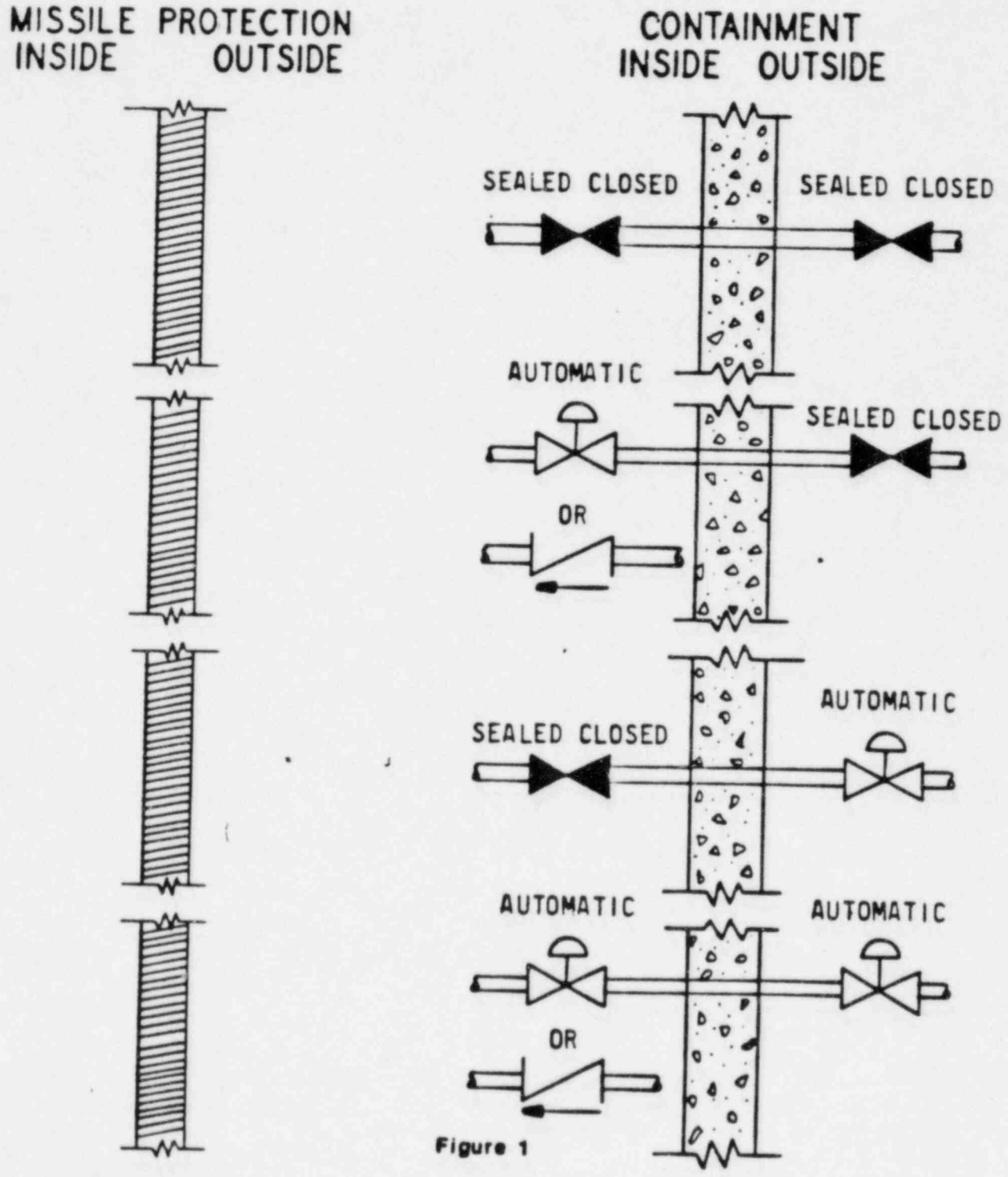

Figure 1

GENERAL DESIGN CRITERION 57
ISOLATION VALVE CRITERIA

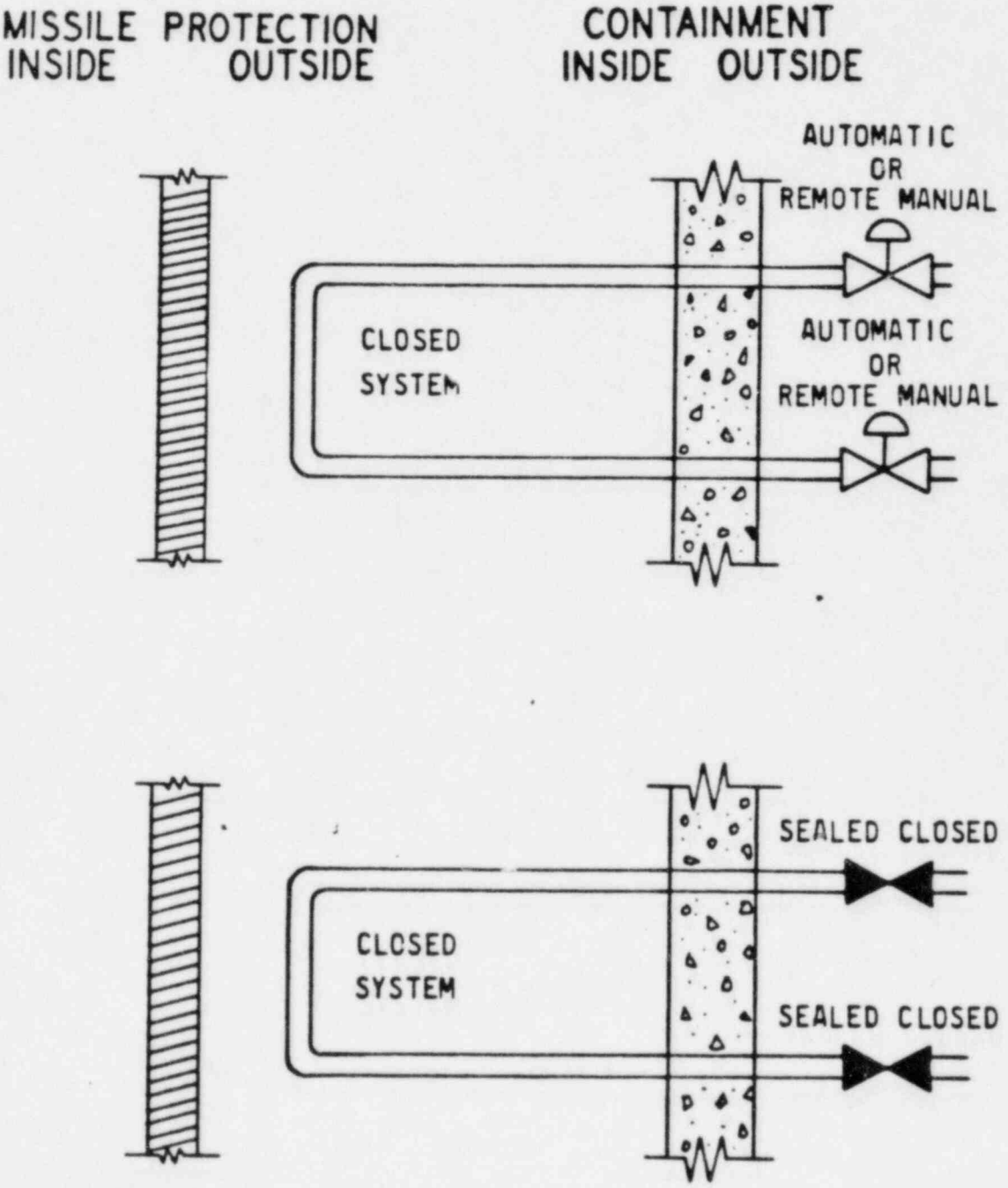

Figure 2

explicit requirements, provided the basis for acceptability is defined. This provision is typically invoked when establishing the containment isolation requirements for essential (i.e., safety related) systems, or when there is a clear improvement in safety.

SRP 6.2.4 at Item II.3 presents guidelines for acceptable alternate containment isolation provisions for certain classes of lines. Containment isolation provisions that are found acceptable on the "other defined basis" represent conformance with the GDC and do not constitute exceptions.

V. Evaluation

Containment for the Yankee Nuclear Power Station (Yankee Rowe) is provided by the vapor container and the Low Pressure Surge Tank (LPST). The vapor container is a free standing steel spherical shell that houses the reactor vessel, main coolant system, and steam generators. The LPST, located outside the vapor container, is part of the charging and volume control system and is considered by the licensee to be an extension of the containment boundary.

The containment isolation provisions for the lines penetrating the vapor container and LPST are tabulated in Table 1. This information was obtained from Attachment A to Reference 8, and other documents referenced in Section VII. The containment isolation provisions were evaluated against the requirements of GDC 54, 55, 56 and 57 (Appendix A to 10 CFR Part 50), and the supplementary guidance of SRP 6.2.4 (Containment Isolation System), where applicable. Deviations from the explicit requirements of GDC 54, 55, 56 and 57, and the acceptance criteria of

SRP 6.2.4, are tabulated in Table 2. The licensee should also provide comments on the accuracy and completeness of this evaluation.

As a result of our evaluation of the Yankee Rowe plant, the following is a summary of our findings of non-compliance with current safety criteria:

1. A lack of redundancy in the isolation provisions by using single isolation barriers in open systems governed by GDC 55 or 56;
2. The use of simple check valves outside containment as automatic isolation valves;
3. No isolation provisions for certain instrument lines;
4. The use of local manual valves for containment isolation with no indication that these valves are sealed closed or otherwise under administrative control; and
5. The location of both isolation valves inside containment for the shutdown cooling system.

The following paragraphs address the staff's evaluation of these identified deviations and recommended corrective measures to bring these systems into conformance with current safety criteria.

Redundancy Provisions

The need for redundant isolation provisions, as expressed by the GDC, is inherent in the double barrier concept to assure the isolation function after the occurence of a single active failure in the isolation provisions. This implies that, for non-essential lines having two automatic isolation valves in series, the valve operators should be powered from separate supplies, and diverse parameters should be sensed to initiate the automatic isolation signals. The following penetrations have only one isolation valve identified, which does not satisfy the explicit redundancy requirements of the regulations: 3 ,5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 38, 39, 40, 41,42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 63, 64, 65, 78, 87, 88, 89, 90, 91, 92, 93, 94, and 96.

For penetration 6 (main coolant feed), the containment isolation provisions are identified as a simple check valve inside containment. Whether or not a redundant (automatic) isolation valve should be provided outside containment depends on the post-accident safety function(s) the line may perform. If the system outside containment is a closed safety-grade system (which implies that all non-safety grade branch lines are provided with redundant isolation provisions), the system itself may serve as the redundant isolation barrier. The plant integrated assessment should address the short and long term post-accident safety functions of this line.

For penetrations 5, 7, 8, 9, 10, 11, 12, 16, 17, 18, 19, 20, 21, 22, 23,

24, 25, 26, 27, 28, 33, 38, 39, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 64, 65, 78, 87, 88, 89, 90, 91, 92, 93, and 96, redundant isolation valves should be provided. These valves may be automatic isolation valves or sealed closed valves, depending on the line function. For penetrations 42, 43, 44, and 45, these redundant valves should be located outside containment. For the remaining penetrations, the redundant valves should be located inside containment.

For penetrations 34 and 63, a blind flange in each line outside containment is identified as the isolation barrier. A blind flange is also shown in each line inside containment. A blind flange is an acceptable isolation barrier, in lieu of a valve, provided the blind flange is leak testable. Both blind flanges in each line should be identified as the isolation barriers to satisfy the redundancy requirement of the regulations.

Penetrations 40 and 41 are the vapor container (containment) pressure sensing lines which provide signals for engineered safety feature actuation under accident conditions. The terminations of these lines (i.e., outboardd of the pressure-sensing instruments) are provided with single, local manual valves. Redundant, sealed closed isolation valves should be provided at the terminations for greater assurance of containment integrity, and to assure that the safety function of the lines is not jeopardized.

Containment isolation provisions which differ from the explicit requirements of the regulations are allowed if the basis for their acceptance is defined. In this regard, the isolation provisions for the following penetrations have been found to satisfy the redundancy requirement for the reasons given in the accompanying discussions:

a) For penetrations 3 (low pressure safety injection) and 15 (high pressure safety injection), the isolation provisions for each line are identifed as a simple check valve outside containment. The use of a single isolation valve is judged to be appropriate because the closed, safety grade system outside containment provides the redundant isolation barrier.

b) For penetration 94 (vapor container recirculation), parallel, remote manual valves are provided outside containment for switching from the injection mode of emergency core cooling to the recirculation mode. Since system reliability is greater without series isolation values and since the closed, safety grade system outside containment provides the redundant isolation barrier, the isolation provisions for the line are acceptable. However, a branch line, leading to the purification pumps, is neither closed outside containment nor safety grade. It has two parallel, local manual valves. These valves should be sealed closed and redundant valves, either automatic or sealed closed, provided in series with the existing valves (PU-V-543 and -544).

The use of check valves outside containment

The following penetrations have simple check valves located outside containment; such provisions are prohibited by the GDC: 3, 15, 16, 17, 18, 19, 24, 26, 28, 50, 51, 52, and 53. Since a simple check valve outside containment is not an appropriate automatic isolation valve, either a power-operated automatic isolation valve or a sealed closed valve should be provided outside containment to satisfy the requirements of the GDC. However, a judgement regarding the acceptability of simple check valves outside containment as bonafide containment isolation valves should be made in conjunction with the integrated assessment of the plant.

Penetrations with no isolation provisions

Penetrations 4 (pressurizer safety valve discharge), 37 (low pressure surge tank safety valve discharge) and 96 (main coolant bleed line) have no isolation provisions in the lines running to the Low Pressure Surge Tank (LPST).. However, as discussed below in the section concerning the LPST, this is acceptable because these lines are considered extensions of containment.

Penetration 14, main coolant Heise pressure gauge, is a 1/4" instrumentation line which is connected to the main coolant system and measures its pressure. Regulatory Guide 1.11 states that instrument lines connected to the reactor coolant boundary and part of the reactor protection system are to be equipped with a restricting orifice inside containment excess flow check valve, automatic valve; or remote manual valve outside containment. Instrument lines which are not part of the reactor protection system may

instead be equipped with one automatic isolation valve inside and one automatic valve outside containment. This line should satisfy the provisions of Regulatory Guide 1.11.

The use of local manual valves

GDC 55, 56 and 57 do not prohibit the use of local manual valves, but such valves are acceptable only if sealed closed. The following penetrations are provided with local manual valves: 33, 38, 39, 79, 80, 81, 82, 83, 84, 85, 86, 89, 90, 91, 92, 93, and 94. These manual valves should be sealed closed or replaced with automatic or sealed closed valves depending on line function.

As an isolation provision for branch lines from penetration 29, 30, 31, and 32, the licensee designated valve SI-V-701 as an isolation valve However, this valve is located in non-nuclear safety piping and as such is not acceptable as an isolation valve. Appropriate isolation valves should be installed in the safety-grade piping of these four branch lines. One possibility is to designte local manual valves VD-V-1093 through 1096 as isolation valves and seal them closed.

The use of blind flanges

The following penetrations have used blind flanges in lieu of isolation valves: 33, 34, 63 and 77. A blind (or blank) flange is an acceptable isolation barrier in lieu of an isolation valve, if it is leak-testable (see SRP 6.2.4, Section II.f). Penetrations 33, 34, and 63 are discussed above under "Redundancy Provisions." For penetration 77 (the fuel chute),

the blind flange may be considered to be a miniature equipment hatch if it has dual, testable seals. This would satisfy the requirements of the regulations under the "other defined basis" provision of GDC 55.

Location of isolation valves

Penetrations 1 and 2, shutdown cooling - In and - Out, differ in two ways from the explicit requirements of GDC 55. First, each line has two motor-operated valves inside containment; one valve in each line should be outside containment. The need for doing this should be considered in conjunction with the plant integrated assessment. Second, the valves do not automatically close upon receipt of an isolation signal. Instead, each is kept closed during normal operational by key-locked operating switches in the control room. Although we lack sufficient information to review in detail the electrical and administrative measures taken to maintain these valves closed, we conclude that these are effectively locked or sealed closed and therefore satisfy the requirements of GDC 55.

The Low Pressure Surge Tank

The Low Pressure Surge Tank (LPST), located outside the vapor container, is part of the charging and volume control system, which acts as a blowdown and quenching tank for take discharged steam or water from the pressurizer relief valve. The licensee has provided information on containment isolation provisions for all piping systems connected to the LPST, as shown in Table 1. The licensee considers the LPST to be an extension of containment. For the purpose of this review, we have assumed that

the LPST is qualified to be an extension of containment, along with several piping systems (detailed below) which connect the LPST to the vapor container. This assumption is based on the licensee's assertion and on the prescribed safety classification (Safety Class 2) of the LPST and connected piping systems. If it should be determined in the course of the plant integrated assessment that the LSPT and connected piping systems are not qualified to be extensions of containment, then the associated isolation provisions will have to be re-evaluated.

The following lines, which connect the vapor container to the LPST, are considered extensions of containment and thus need no isolation provisions: (a) between penetration 4 and penetrations LPST-20, -21, and -22; (b) between penetration 37 and penetrations LPST-11 through LPST-16; and (c) between penetrations 96 and penetration LPST-1. However, branch lines connected to these lines must have appropriate isolation provisions, since they effectively penetrate containment. Generally speaking, two automatic (not including check valves) or sealed closed isolation valves in series would be appropriate isolation provisions for these branch lines.

For line (a), there are several branch lines. Each contains only one isolation valve, which is either a local manual valve or check valve. Each line should be supplied with two isolation valves in series, which are either sealed closed or automatic (check valves are not allowed).

For line (b), there is one branch line with one local manual isolation valve. This should be sealed closed, and a second isolation valve, either automatic or sealed closed, put in series with it.

For line (c), the branch line (a sample line) contains only one isolation valve, an automatic valve; an additional valve, either automatic or sealed closed, should be provided in series with the first.

The following penetrations have only one isolation valve: LPST -2, -3, -4, -5, -6, -7, -8. -10. The valve for penetration LPST-7 is automatic and is an acceptable isolation valve.

The valves for penetrations LPST-2, -6, and -8 are check valves and should be replaced by automatic or sealed closed isolation valves. Penetrations LPST-3, -4, -5, and -10 have manual or remote manual valves; these should be sealed closed or replaced with automatic valves. All of these penetrations should be equipped with a second isolation valve of an appropriate type to satisfy GDC-55 or GDC-56.

Penetrations LPST-9, -17, -18, and -19 are instrument penetrations that have no isolation provisions. These lines should satisfy the provisions of Regulatory Guide 1.11.

Penetration LPST-23 is a manhole. This is equivalent to a small equipment hatch, and so it would be acceptable if equipped with dual, testable seals.

Containment Leg Expansion Joints

The licensee has defined penetrations 69 through 76 as containment leg expansion joints and has listed them in the containment isolation table. However, these penetrations are not fluid-carrying penetrations, but rather are expansion bellows on joints around the legs that support the vapor container. As such, they do not fall under the review of this evaluation report. The design acceptability of these penetrations should be addressed in SEP-Topic III-1.

Main Steam and Feedwater System Piping

Penetrations 79, 80, 81 and 82 are used for the main steam system. The main steam lines are provided with automatic check valves outside containment. The main steam bypass, emergency feed pump steam supply, steam drain, and new steam dump lines are branch lines from the main steam system which are provided with local manual valves. The main steam drain to condensate line and atmospheric steam dump line have automatic isolation valves and, therefore, satisfy the requirements of GDC 57. The automatic check valves in the main steam line close automatically on low steam line pressure,or may be remote manually closed, and so are not considered to be simple check valves. Therefore, their isolation provisions satisfy the requirements of GDC 57. However, the local manual valves noted above should be sealed closed or be replaced with automatic isolation valves or remote manual valves, depending on whether the line function is non-essential or essential, respectively.

Penetrations 83, 84, 85 and 86 are used for the main feedwater system. The main feedwater lines are provided with remote manual, air operated valves outside containment. The main feedwater chemical addition lines and drain lines are branched from the main feedwater lines and are provided with local manual valves. Since the secondary system (steam and feedwater piping and steam generators) constitutes a closed system inside containment, GDC 57 applies and the main feedwater valves are acceptable isolation valves. However, the local manual valves in the chemical addition lines and drain lines should be sealed closed or replaced by automatic isolation valves. This should include the lines containing valves BF-V-764, -766, -768, and -770, which were not identified by the licensee as requiring isolation .

Spare penetrations, manholes, and hatches

Penetrations 13, 35, 36, 58, 59, 60, 61, and 62 are spares. The isolation provisions for these penetrations are acceptable if the spares are welded closed with full, leak-tight welds, or if they are closed with dual, testable seals.

Penetrations 66 (manhole), 67 (personnel hatch), and 68 (equipment hatch) are acceptable if equipped with dual barriers which are leak testable.

Test, vent, and drain lines

Many of the lines penetrating containment are equipped with test, vent and drain (TVD) lines which attach to the main line between the containment wall and the isolation valve in the main line. Each TVD line

should also be equipped with appropriate isolation provisions. Sealed closed isolation avles are generally used and are acceptable; threaded pipe caps are not acceptable isolation barriers.

VI. Conclusion

The following summarizes the deviations from guidelines that have been identified and described in section V of this report.

1. The isolation valving arrangement of the following penetrations differ from the explicit requirements of GDC 55 and 56 from the standpoint of valve number: 3, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 38, 39, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 63, 64, 65, 78, 87, 88, 89, 90, 91, 92, 93, 94,, and 96, and LPST-2, -3, -4, -5, -6, -7, -8, and 10. Most of these lines should have two isolation valves in each liner, one inside and one outside containment; however, there are certain exceptions, as detailed in the body of this report. The valves should be either automatic or sealed closed, depending on line function.

2. The isolation valves of the following penetrations differ from the explicit requirements of GDC 55, 56, and 57 from the standpoint of valve type by using simple check valves outside containment: 3, 15, 16, 17, 18, 19, 24, 26, 28, 50, 51, 52, 53, and LPST-2, -6, -8.

   A simple check valve outside containment is not an appropriate automatic isolation valve. However, a judgement regarding its acceptability should be made in conjunction with the integrated assessment of the plant.

3. The isolation barriers in the penetrations listed below differ from the explicit requirements of GDC 55, 56, and 57 from the standpoint of isolation barrier type by using blind flanges: 33, 34, 63, and 77. A blind (blank) flange, either inside or outside containment, is an acceptable isolation barrier in lieu of an isolation valve. However, a blind flange without leak testing provisions is not a suitable isolation barrier.

4. The containment isolation provisions for the following penetrations differ from the explicit requirements of GDC 56 from the standpoint of valve actuation, due to using local manual valves: 33, 38, 39, 79, 80, 81, 82, 83, 84, 85, 86, 89, 90, 91, 92, 93, 94, and LPST-3, -4, -5, and 10. These valves should be sealed closed or replaced with automatic or sealed closed valves. Penetrations 29, 30, 31, and 32 use a local manual valve, SI-V-701, as an isolation valve, but it is non-safety grade and should be replaced with an appropriate safety grade isolation valve or valves.

5. Both penetrations 1 and 2, the shutdown cooling system, have two, remote manual, motor operated valves inside containment which differs from the explicit requirements of GDC 55 from the standpoint of valve actuation and location. The acceptability of locating both valves inside containtainment should be addressed in the plant integrated assessment. However, the valve actuation provisions are acceptable since the valves are considered to be sealed closed.

6. The following penetrations have no isolation provisions: 4, 14, 37, 96, LPST-1, LPST-9, and LPST-11 through -22, LPST-9, -17, -18, and -19 are instrument penetrations that should satisfy the provisions of Regulatory Guide 1.11. The remainder are acceptable because the associated lines are extensions of containment.

7. Penetrations 79, 80, 81, and 82 are used for the main steam system. The automatic check valves in the main steam lines outside containment are acceptable. The automatic valves in the main steam drain to condensate line and atmospheric steam dump lines are also acceptable. However, the local manual valves in the main steam bypass, emergency feed pump steam supply, steam drain, and new steam dump lines should be sealed closed or replaced with automatic or remote manual isolation valves, depending on whether the line function is non-essential or essential, respectively.

8. Penetrations 83, 84, 85 and 86 are used for the main feedwater lines. The air-operated, remote manual valves control features in the main feedwater lines are acceptable since they satisfy the requirements of GDC-57. The main feedwater drain lines and chemical addition lines are branched from the main feedwater lines and are isolated with local manual valves. These valves should be sealed closed or replaced by automatic isolation valves. This should include the lines containing valves BF-V-764, -766, -768, and -770.

9. The contaiment leg expansion joins are not fluid-carrying penetrations of containment and therefore, have no been reviewed for acceptability. The design acceptability of these penetrations should be addressed in SEP Topic III-1.

10. The Low Pressure Surge Tank (LPST) is considered to be an extension of containment, along with certain lines connecting it to the vapor container. Lines branching from these connecting lines should meet applicable isolation requirements, since they effectively penetrate containment.

11. Penetrations 13, 35, 36, 58, 59, 60, 61, and 62 are spares. Acceptable isolation provisions would be full, leak-tight welds or dual, testable seals. Penetrations 66, 67, 68, and LPST-23 are manholes or hatches. Acceptable isolation provisions would be dual barriers (such as seals) which are leak testable.

12. Test, vent, and drain lines should meet appropriate isolation provisions, such as one sealed closed valve per line.

VII. References

1. Yankee Nuclear Power Station (Yankee Rowe) Final Safety Analysis Report, Volume 1, 2 and 3.
2. Yankee Rowe plant system design drawings: 9699-FM-1C, 9699-FM-3A, 9699-FM-4A, 9699-FM-5A, 9699-FM-6A, 9699-FB-7B, 9699-FM-8A, 9699-FM-8B, 9699-FM-9A, 9699-FM-26A, 9699-FM-27B, 9699-FM-83A, 9699-FV-1X, 9699-FV-1Y, 9699-HV-72A, YM-H-8-6.
3. YAECO (D. E. Moody) letter to NRC (B. H. Grenier), dated April 26, 1979, regarding responses to I&E Bulletin Nos. 79-06 and 79-06a and 79-06a, Revision 1.
4. YAECO (D. W. Edwards) letter to NRC (ONRR), dated June 26, 1979 regarding the submittal to Inservice Inspeciton Program, Revision 1.
5. YAECO (J. A. Kay) letter to NRC (D. M. Crutchfield) dated May 5, 1981, regarding additional information for SEP Topic IV-7.B.
6. YAECO (J. A. Kay letter to NRC (D. M. Crutchfield) dated November 18, 1981, regarding licensee provided assessments of the SEP topics.
7. YAECO (J. A. Kay) letter to NRC (D. M. Crutchfield dated June 30, 1981, regarding SEP Topic Assessments.
8. YAECO (J. A. Kay) letter to NRC (D. M. Crutchfield) dated January 29, 1982, regarding the submittal of additional information for SEP Topic VI-4, Containment Isolation System.

TABLE 1

CONTAINMENT ISOLATION SYSTEM SEP REVIEW ITEMS
PLANT: YANKEE ROWE PLANT

PENE-TRATION NO.	SYSTEM NAME AND SERVICE LINE SIZE	PENE CLASS NO.	VALVE IDENT. NUMBER	VALVE TYPE OR DESCRIPTION	LOCATION OC	LOCATION IC	POSITION NOR-MAL	POSITION SHUT DN	POSITION POST. LOCA	POSITION PWR FAIL.	ESS-EN-TIAL	ACTUA-TION	REMARKS
1	SHUTDOWN COOLING - IN (6"Φ)		SC-MOV-551 SC-MOV-553	MOV GATE VLV MOV GATE VLV		✓ ✓	NC NC	O O	C C	C C	N N	ELECT. KEY OP MAN.	POWER - MCC-1. Bus 1 closed loop outside CTMT - water seal - line pressurized by over pressure in Low Pressure surge TANK (LPST). SAFETY CLASS 1 Line
2	SHUTDOWN COOLING - OUT (6"Φ)		SC-MOV-552 SC-MOV-554	MOV GATE VLV MOV GATE VLV		✓ ✓	NC NC	O O	C C	C C		ELECT. KEY OP MAN.	〃 〃
3	LOW PRESSURE SAFETY INJECTION (8"Φ)		CS-V-621 PU-V-649	SWING CHECK VLV SWING CHECK VLV	✓ ✓		C C	C C	O C	- -	Y	REV ΔP REV. ΔP	SAFETY CLASS 2. Water supply with multiple water sources for EMER. Core cooling.
4	PRESSURIZER SAFETY VALVE DISCHARGE (6"Φ)		NONE	(Rupture disk)									By pass around diaphram discharge to low pressure surge tank - Containment extension, discharge to L.P. surge tank.
5	MAIN COOLANT DRAIN (2"Φ)		TV-202	A.O. GATE VLV	✓		NO	O	C	C	N	ELECT. SOV/AUTO	POWER - #1 & #3 BATTERIES SI/CI Signals for liquid collection
6	MAIN COOLANT FEED (2"Φ)		CH-V-611	SWING CHECK VLV		✓	O	O	C	-	Y	REV. ΔP	Water seal - Positive displacement pumps - closed loop safety class 2 line.
7	NEUTRON SHIELD TANK SAMPLE (HI) (1"Φ)		TV-207	A.O. GATE VLV	✓		NO	O	C	C	N	ELECT. SOV/AUTO	POWER - #1 & #3 Batteries Signals - SI/CI Liquid collection - water hd.

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CONTAINMENT ISOLATION SYSTEM SEP REVIEW ITEMS
PLANT: YANKEE ROWE PLANT

PENE-TRATION NO.	SYSTEM NAME AND SERVICE LINE SIZE	PENE CLASS NO.	VALVE IDENT. NUMBER	VALVE TYPE OR DESCRIPTION	LOCATION OC	LOCATION IC	POSITION NOR-MAL	POSITION SHUT DN	POSITION POST LOCA	POSITION PWR FAIL.	ESS-EN-TIAL	ACTUA-TION	REMARKS
8	NEUTRON SHIELD SAMPLE (LO) (1"ϕ)		TV-207	A.O. GATE VLV	✓		NO	O	C	C	N	ELECT. SOV/AUTO	POWER-#1&#3 Batteries Signal-S1/C1 liquid collection-water head
9	MAIN COOLANT VENT (1"ϕ)		TV-203	A.O. GATE VLV	✓		NO	O	C	C	N	ELECT. SOV/AUTO	POWER-#1&#3 Batteries Signal-S1/C1 AIR Test, Proper direction.
10	VALVE STEM LEAK-OFF (1"ϕ)		TV-204	A.O. GATE VLV	✓		NO	O	C	C	N	ELECT. SOV/AUTO	POWER-#1&#3 Batteries Signal-S1/C1 AIR Test, Proper direction.
11	MAIN COOLANT SAMPLE (1"ϕ)		TV-206	A.O. GATE VLV	✓		NO	O	C	C	N	ELECT. SOV/AUTO	POWER-#1&#3 Batteries Signal-S1/C1 liquid collection-water head
12	MAIN COOLANT FEED TO LOOP FILL HEADER (2"ϕ)		CH-MOV-522	MOV GATE VLV	✓		NC	C	C	C	N	ELECT. SWITCH CONTROL (R.M.)	POWER-ENEL6 MCC 1 Signal-NONE water seal-Positive displacement pump-closed loop. Safety class 2. backflow is not possible.
13	SPARE (3"ϕ)												Welded cap-Leakage detected in Type A test
14	MAIN COOLANT HEISE PRESSURE GAUGE (1/4"ϕ)		NONE										1/4" instrumentation line holds against MC system pressure

TABLE 1

CONTAINMENT ISOLATION SYSTEM SEP REVIEW ITEMS
PLANT: YANKEE ROWE PLANT

PEN.-TRATION NO.	SYSTEM NAME AND SERVICE LINE SIZE	PENE CLASS NO.	VALVE IDENT. NUMBER	VALVE TYPE OR DESCRIPTION	LOCATION OC	LOCATION IC	POSITION NOR-MAL	POSITION SHUT DN	POSITION POST LOCA	POSITION PWR FAIL.	ESS-EN-TIAL	ACTUA-TION	REMARKS
15	HIGH PRESSURE SAFETY INJECT. (3"Φ)		SI-V-14	SWING CHECK VLV	✓		C	C	O	–	Y	REV. ΔP	Water supply with multiple water sources for emer. core cooling. Safety class 2.
16	COMPONENT COOLING TO MC PUMP #1 (3"Φ)		CC-V-667	SWING CHECK VLV	✓		O	C	O	–	Y	REV. ΔP	Water seal - Closed loop outside CTMT.
17	COMPONENT COOLING TO MC PUMP #2 (3"Φ)		CC-V-663	SWING CHECK VLV	✓		O	C	O	–	Y	REV. ΔP	" "
18	COMPONENT COOLING TO MC PUMP #3 (3"Φ)		CC-V-671	SWING CHECK VLV	✓		O	C	O	–	Y	REV. ΔP	" "
19	COMPONENT COOLING TO MC PUMP #4 (3"Φ)		CC-V-675	SWING CHECK VLV	✓		O	C	O	–	Y	REV ΔP	" "
20	CC RETURN FROM MC PUMP #1 (3"Φ)		TV-205								Y		All SVs discharge to the CC surge tank. During post-accident conditions, the isolation signal to TV-205 would be bypass to provide flow to MC pumps
21	CC RETURN FROM MC PUMP #2 (3"Φ)		TV-205	A.O. GATE VLV	✓		O	O	O	C	Y	ELECT. SOV/AUTO	POWER #1 & #3 Batteries Signal – C1

TABLE 1

CONTAINMENT ISOLATION SYSTEM SEP REVIEW ITEMS
PLANT: YANKEE ROWE PLANT

PENE-TRATION NO.	SYSTEM NAME AND SERVICE LINE SIZE	PENE CLASS NO.	VALVE IDENT. NUMBER	VALVE TYPE OR DESCRIPTION	LOCATION		POSITION				ESS-EN-TIAL	ACTUA-TION	REMARKS
					OC	IC	NOR-MAL	SHUT DN	POST LOCA	PWR FAIL.			
22	CC RETURN FROM MC PUMP #3 (3"ϕ)		TV-205								Y		
23	CC RETURN FROM MC PUMP #4 (3"ϕ)		TV-205								Y		
24	CC TO SAMPLE COOLER (1½"ϕ)		CC-V-649	Swing Check VLV	✓		O	O	O	C	N	REV. ΔP	Water seal - closed loop outside containment
25	CC RETURN FROM SAMPLE COOLER (1½"ϕ)		TV-205	A.O. GATE VLV	✓		NO	O	O	C	Y	ELECT. SOV/AUTO	POWER - 1 & 3 Batteries Signal - C2 SV discharges to CC Surge Tank, outside CTMT
26	CC TO NEUTRON SHIELD TANK COOLERS (3"ϕ)		CC-V653	Swing Check VLV	✓		O	O	O	C	N	REV. ΔP	Water seal - closed loop outside CTMT.
27	CC RETURN FROM NEUTRON SHIELD TK COOLERS (3"ϕ)		TV-205	A.O. GATE VLV	✓		NO	O	O	C	Y	ELECT. SOV/AUTO	POWER - 1 & 3 Batteries Signal - C2 AIR TEST TO liquid filled line.
28	NEUTRON SHIELD TANK FILL (2"ϕ)		CC-V-660	Swing Check VLV	✓		O	C	C	C	N	REV. ΔP	Water Seal - closed loop Outside Containment

TABLE 1

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PLANT: YANKEE ROWE PLANT

PENE-TRATION NO.	SYSTEM NAME AND SERVICE LINE SIZE	PENE CLASS NO.	VALVE IDENT. NUMBER	VALVE TYPE OR DESCRIPTION	LOCATION OC	LOCATION IC	POSITION NOR-MAL	POSITION SHUT DN	POSITION POST LOCA	POSITION PWR FAIL.	ESS-EN-TIAL	ACTUA-TION	REMARKS
29	#1 S/G BLOWDOWN (2"φ)		TV-401A	A.O. GATE VLV	✓		NO	C	C	C	N	ELECT. SOV/AUTO	POWER - 1 & 3 Batteries Signal - S1/C1 Liquid collection when in cold lay up
30	#2 S/G BLOWDOWN (2"φ)		TV-401B	A.O. GATE VLV	✓		NO	C	C	C	N	ELECT. SOV/AUTO	POWER - 1 & 3 Batteries Signal - S1/C1 " "
31	#3 S/G BLOWDOWN (2"φ)		TV-401C	A.O. GATE VLV	✓		NO	C	C	C	N	ELECT SOV/AUTO	POWER - 1 & 3 Batteries Signal - S1/C1 "
32	#4 S/G BLOWDOWN (2"φ)		TV-401D	A.O. GATE VLV	✓		NO	C	C	C	N	ELECT SOV/AUTO	#1, #3 Batteries S1/C1 Signals
			SI-V-701	H.O. GATE VLV	✓		NC	C	C	C		MAN.	—
			EBF-MOV-557	MOV GATE VLV	✓		NC	C	O	A1		ELECT SW GEAR	MCC-1, Bus-2 Signal-none
33	CAVITY FILL (6"φ) CAVITY PURIFICATION (4"φ)		CS-V-601	H.O. GATE VLV	✓		NC	O	C	—		MAN.	
			—	BLANK FLANGE	✓		C	O	C	—		—	
34	DEMINERALIZED WATER SUPPLY (2"φ)		—	BLANK FLANGE	✓		C	O	C	—		—	
35	SPARE (2"φ)												Welded Caps - leak tape detected in Type A test

TABLE 1

CONTAINMENT ISOLATION SYSTEM SEP REVIEW ITEMS
PLANT: YANKEE ROWE PLANT

PENE-TRATION NO.	SYSTEM NAME AND SERVICE LINE SIZE	PENE CLASS NO.	VALVE IDENT. NUMBER	VALVE TYPE OR DESCRIPTION	LOCATION OC	LOCATION IC	POSITION NOR-MAL	POSITION SHUT DN	POSITION POST LOCA	POSITION PWR FAIL.	ESS-EN-TIAL	ACTUA-TION	REMARKS
36	SPARE (3"ϕ)												WELDED CAP - leakage detected in Type A Test
37	LO PRESSURE SURGE TANK SAFETY VALVE DISCHARGE (12"ϕ)		NONE										Rupture disk normally isolated LPST Safety valves discharge from Containment but is not claimed as Containment boundary
38	HYDROGEN CONTROL SERVICE AIR SUPPLY (2"ϕ)		HV-V-5 HV-V-6 HV-V-34 CA-V-688 CA-V-834	H.O. GATE VLV " " H.O. GATE VLV "	✓ ✓ ✓ ✓ ✓		NC NC NC NC NC	O O O O O	C C C C C	— — — — —	Y Y N 	MAN. " " " "	AIR PRESSURE DECAY TEST
39	CONTAINMENT AIR CHARGE (1"ϕ)		CA-V-746	H.O. GATE VLV	✓		NC	C	C	—		MAN.	
40	CONTAINMENT PRESSURE SENSING (3/4"ϕ)		TV-211	A.O. GATE VLV	✓		NO	O	C	C	Y	ELECT. SOV/AUTO	POWER - 1 & 3 Batteries SIGNAL - C I VC trip & SI initiation signal
41	CONTAINMENT PRESSURE SENSING (1"ϕ)		TV-212	A.O. GATE VLV	✓		NO	O	C	C	Y	ELECT. SOV/AUTO	POWER - 1 & 3 Batteries SIGNAL - C I AIR PRESSURE DECAY TEST.
42	SERVICE WATER TO CONTAINMENT COOLER #1 (2½"ϕ)		SW-V-820	Swing CHECK VLV		✓	O	O	C	—	N	REV. ΔP	Water Seal

TABLE 1

CONTAINMENT ISOLATION SYSTEM SEP REVIEW ITEMS
PLANT: YANKEE ROWE PLANT

PENE-TRATION NO.	SYSTEM NAME AND SERVICE LINE SIZE	PENE CLASS NO.	VALVE IDENT. NUMBER	VALVE TYPE OR DESCRIPTION	LOCATION OC	LOCATION IC	POSITION NORMAL	POSITION SHUT DN	POSITION POST LOCA	POSITION PWR FAIL.	ESS-EN-TIAL	ACTUA-TION	REMARKS
43	SERVICE WATER TO CONTAINMENT COOLER # 2 (2½")		SW-V-821	Swing Check VLV		✓	O	O	C	—	N	REV. ΔP	Water Seal
44	SERVICE WATER TO CONTAINMENT COOLER #3 (2½")		SW-V-822	Swing check VLV		✓	O	O	C	—	N	REV. ΔP	Water Seal
45	SERVICE WATER TO CONTAINMENT COOLER #4 (2½")		SW-V-823	Swing Check VLV		✓	O	O	C	—	N	REV. ΔP	Water Seal
46	SERVICE WATER RETURN FROM CONTAINMENT COOLER #1 (2½")												AIR TEST ON LIQUID LINE
47	SERVICE WATER RETURN FROM CONTAINMENT COOLER #2 (2½")		TV-408	A.O. GATE VLV	✓		NO	O	C	C	N	ELECT. SOV/AUTO	POWER - 1 & 3 Batteries Signal - S1/C1 AIR TEST ON LIQUID LINE
48	SERVICE WATER RETURN FROM CONTAINMENT COOLER #3 (2½")												
49	SERVICE WATER RETURN FROM CONTAINMENT COOLER #4 (2½")												

TABLE 1

CONTAINMENT ISOLATION SYSTEM SEP REVIEW ITEMS
PLANT: YANKEE ROWE PLANT

PENE-TRATION NO.	SYSTEM NAME AND SERVICE LINE SIZE	PENE CLASS NO.	VALVE IDENT. NUMBER	VALVE TYPE OR DESCRIPTION	LOCATION OC	LOCATION IC	POSITION NOR-MAL	POSITION SHUT DN	POSITION POST LOCA	POSITION PWR FAIL.	ESS-EN-TIAL	ACTUA-TION	REMARKS
50	STEAM SUPPLY TO CONTAINMENT HEATER #1 (3"Φ)												closed loop
51	STEAM SUPPLY TO CONTAINMENT HEATER #2 (3"Φ)		HC-V-1199	Swing check VLV	✓		O	O	C	–	N	REV. DF	closed loop
52	STEAM SUPPLY TO CONTAINMENT HEATER #3 (3"Φ)												closed loop
53	STEAM SUPPLY TO CONTAINMENT HEATER #4 (3"Φ)												closed loop
54	CONDENSATE RETURN FROM HEATER #1 (4"Φ)												AIR TEST IN PROPER DIRECTION
55	CONDENSATE RETURN FROM HEATER #2 (4"Φ)		TV-409	A.O. GATE VLV	✓		NO	O	C	C	N	ELECT. SOV/AUTO	POWER - 1&3 Batteries 5,5491 - 52/C2
56	CONDENSATE RETURN FROM HEATER #3 (4"Φ)												

TABLE 1

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PLANT: YANKEE ROWE PLANT

PENE-TRATION NO.	SYSTEM NAME AND SERVICE LINE SIZE	PENE CLASS NO.	VALVE IDENT. NUMBER	VALVE TYPE OR DESCRIPTION	LOCATION OC	LOCATION IC	POSITION NOR-MAL	POSITION SHUT DN	POSITION POST LOCA	POSITION PWR FAIL.	ESS-EN-TIAL	ACTUA-TION	REMARKS
57	CONDENSATE RETURN FROM HEATER #4 (4"ϕ)										N		
58	SPARE (8"ϕ)												welded cap - leakage detected in type A test
59	SPARE (8"ϕ)												" "
60	SPARE (8"ϕ)												" "
61	SPARE (8"ϕ).												" "
62	SPARE (8"ϕ)												" "
63	LO PRESSURE VENT HEADER (2"ϕ)		—	BLANK FLANGE	✓		C	O	C	—			

TABLE 1

CONTAINMENT ISOLATION SYSTEM SEP REVIEW ITEMS
PLANT: YANKEE ROWE PLANT

PENE-TRATION NO.	SYSTEM NAME AND SERVICE LINE SIZE	PENE CLASS NO.	VALVE IDENT. NUMBER	VALVE TYPE OR DESCRIPTION	LOCATION OC	LOCATION IC	POSITION NOR-MAL	POSITION SHUT DN	POSITION POST LOCA	POSITION PWR FAIL.	ESS-EN-TIAL	ACTUA-TION	REMARKS
64	AIR PARTICULATE MONITOR - IN (2"ϕ)		VD-SOV-301	SOV GATE VLV	V		NO	O	C	C	Y	ELECT. SOV	Power - #1 Battery Signal - C2 AIR PRESSURE DECAY
65	AIR PARTICULATE MONITOR - OUT (2"ϕ)		VD-SOV-302	SOV GATE VLV	V		NO	O	C	C	Y	ELECT. SOV	Power - #1 Battery Signal - C2 " "
66	MANHOLE M-1 (20'ϕ)			TYPE B	V		C	C	C	—			GASKETED JOINT PRESSURIZED AND SOAP BUBBLE TESTED
67	PERSONNEL HATCH		— —	DOOR ELECT. PENETR.	V V		C C	O C	C C	- -			TESTED AT 6 MO. INTERVAL
68	EQUIPMENT HATCH (14'ϕ)						C	C	C	—			SINGLE GASKET SEAL - NOT INDIVIDUALLY TESTABLE
69 S 76	CONTAINMENT LEG EXPANSION JOINTS (8)												EXAMINED DURING A TEST. NOT INDIVIDUALLY TESTABLE.
77	FUEL CHUTE (12"ϕ)		— CS-MOV-500	BLANK FLANGE man. VLV	V		C	O	C	—	N		TEST - THREADED PLUG Not individually testable - examined during type A test

TABLE 1

CONTAINMENT ISOLATION SYSTEM SEP REVIEW ITEMS
PLANT: YANKEE ROWE PLANT

PENE-TRATION NO.	SYSTEM NAME AND SERVICE LINE SIZE	PENE CLASS NO.	VALVE IDENT. NUMBER	VALVE TYPE OR DESCRIPTION	LOCATION OC	LOCATION IC	POSITION NORMAL	POSITION SHUT DN	POSITION POST LOCA	POSITION PWR FAIL.	ESSENTIAL	ACTUATION	REMARKS
78	FUEL CHUTE DEWATERING PUMP DISCHARGE (4"φ)		CS-CV-216	A.O. GATE VLV	✓		NC	O	C	C		PNEUMAT.	
79	MAINSTEAM LINE #1 (14"φ)		NRV-405A	AUTO CHECK VLV	✓		O	C	O	O		Hyd OP PNEUM. CL	Power-stored energy
	MAINSTEAM BYPASS		MS-V-627	H.O. GATE VLV	✓		C	C	C	-		MAN.	Signal - Low stm pressure
	NEW STEAM DUMP		MS-V-658	" "	✓		C	C	C	-		MAN.	No postulated accident requires isolation
80	MAINSTEAM LINE #2 (14"φ)		NRV-405B	AUTO CHECK VLV	✓		O	C	O	O		Hyd OP PNEUM. CL	Power-stored energy
	MAINSTEAM BYPASS (4"φ)		MS-V-628	H.O. GATE VLV	✓		C	C	C	C		MAN.	Signal - Low stm Line Press.
	NEW STEAM DUMP (2"φ)		MS-V-669	" "	✓		C	C	C	C		MAN.	
81	MAINSTEAM LINE #3 (14"φ)		NRV-405C	AUTO CHECK VLV	✓		O	C	O	O		Hyd OP PNEUM. CL	Power-stored energy
	MAINSTEAM BYPASS		MS-V-629	H.O. GATE VLV	✓		C	C	C	-		MAN.	Signal - low stm line press.
	NEW STEAM DUMP		MS-V-680		✓		C	C	C	-		MAN.	
82	MAIN STEAM LINE #4 (14"φ)		NRV-405D	AUTO CHECK VLV	✓		NO	C	O	O		Hyd OP/PNEU CL	Power-stored energy
	MAN STEAM BYPASS		MS-V-630	HAND OP GATE VLV	✓		C	C	C	C		MAN	Signal - low stm line pressure
	EMERG FD PUMP STEAM		AS-V-719	H.O. GATE VLV	✓		C	C	C	C		"	
	SUPPLY, STEAM DRAIN		AS-V-720	" "	✓		C	O	C	C		"	
	NEW STEAM PUMP (2"φ)		TV-406	A.O. GATE VLV	✓		NO	C	C	O	N	SOV/AUTO	Power - #1 & #3 Batteries
			TV-411	" "	✓		C	O	C	C	N	SOV/AUTO	Signal - S2/C2.
			MS-V-621	H.O. GATE VLV	✓		C	C	C	C		MAN	
83	MAIN FEEDWATER LINE #1 (8"φ)		BF-CV-1000	A.O. GLOBE VLV	✓		NO	C	C	AZ	Y	R.M.	No postulated accident requires isolation
	MFW CHEMICAL		BF-V-861	H.O. GATE VLV	✓		C	O	C	-		MAN.	
	ADDITION (¾"φ)		CF-V-609	" "	✓		C	O	C	-		"	
84	MAIN FEEDWATER LINE #2 (8"φ)		BF-CV-1100	A.O. GLOBE VLV	✓		NO	C	C	AZ	Y	R.M.	The Bailey Feedwater Regulator valve does not receive an auto isolation signal does not contain provisions for monitoring leakage from container into feedlines.
	MFW CHEMICAL		BF-V-862	H.O. GATE VLV	✓		C	O	C	—		MAN.	
	ADDITION (¾"φ)		CF-V-608	" "	✓		C	O	C	—		"	

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85	MAIN FEEDWATER LINE #3, (8"φ) MFW CHEMICAL ADDITION (3/4"φ)		BF-CV-1200 BF-V-865 CF-V-607	A.O. GLOBE VLV H.O. Gate VLV H.O. Gate VLV	✓ ✓ ✓		NO C C	C O O	C C C	AZ – –	Y	R.M. MAN. MAN.	
86	MAIN FEEDWATER LINE #4 (8"φ) MFW CHEMICAL ADDITION (3/4"φ)		BF-CV-1300 BF-V-866 CF-V-606	A.O. GLOBE VLV H.O. GATE VLV " "	✓ ✓ ✓		NO C C	C O O	C C C	AZ – –	Y	R.M. MAN. MAN.	
87	BOTTOM DRAIN DR-1 (3"φ)		TV-209	A.O. GATE VLV	✓		NO	O	C	C	Y	SOV/AUTO	Power-1&3 Batteries 3.5 KW/-52/C2 PRESSURE DECAY TEST
88	BOTTOM DRAIN DR-2 (3"φ)		TV-209 VD-V-756	A.O. Gate VLV Swing Check VLV	✓ ✓		NO	C	C	–	Y	SOV/AUTO REV. ΔP	
89	NEUTRON SHIELD TANK INNER TEST. (1"φ)		VD-V-754	H.O. GATE VLV	✓		NC	O	C	–		MAN.	CAN ONLY BE TESTED IN REVERSE DIRECTION
90	NEUTRON SHIELD TANK OUTER TEST. (1"φ)		VD-V-752	H.O. Gate VLV	✓		NC	O	C	–		MAN.	" "
91	AIR PURGE INLET (30"φ)		BF-V-4-1	H.O. BUTTFLY VLV	✓		NC	O	C	–		MAN	AIR PRESSURE DECAY TEST

TABLE 1

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92	AIR PURGE OUTLET (30"ϕ)		BF-V-1-2	H.O. BUTTFLY VLV	✓		NC	O	C	—		MAN.	AIR PRESSURE DECAY TEST
93	AIR PURGE BYPASS (8"ϕ)		HC-V-602	H.O. GLOBE VLV	✓		NC	C	C	—		MAN.	
94	CONTAINMENT SUMP SUCTION ECCS RECIRC. (2½"ϕ & 6"ϕ)		PU-V-543	H.O. GATE VLV	✓		NC	C	C	—		MAN.	Manhole seal welded to pipe
			PU-V-544	" "	✓		NC	C	C	—		MAN.	
			SI-MOV-516	MOV GATE VLV	✓		NC	C	O	C	Y	ELECT. SWITCH REMOTE M. OPEN	Power - MCC 4, Buss 1 & 2
			SI-MOV-517	MOV GATE VLV	✓		NC	C	O	C	Y		Signal - none
95	TOP MANHOLE (20'ϕ)												SEAL WELDED - Leakage detected in Type A test
96	MAIN COOLANT BLEED LINE LO PRESSURE SAMPLE (3"ϕ)		TV-213	A.O. GATE VLV	✓		NO	O/C	C	C	N	SOV/AUTO	Power - 1 & 3 Batteries Signal - S2/C 2 goes to low pressure surge tank - VC extension

TABLE 1

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LPST 1	BLEED LINE SAMPLE (½"ϕ)		TV-213	A.O. GATE VLV	✓		NO	O	C	C	N	SOV/AUTO	Power-1 & 2 Batteries Signal-S2/C2
LPST 2	PURIFICATION RECIRCULATION (2½"ϕ)		PU-V-622	SWING CHECK VLV	✓		O	O	C	–		REV. ΔP	
LPST 3	PRESSURE CONTROL (1"ϕ)		PU-PCV-201	A.O. GLOBE VLV	✓		C	C	C	C		ELECT. SOV.	
LPST 4	PRESSURE CONTROL (½"ϕ)		VD-V-914	H.O. GLOBE VLV	✓		C	C	C	–		MAN.	
LPST 5	LPST COOLING PUMP DISCHARGE (6"ϕ)		CH-V-651	H.O GLOBE VLV	✓		C	O	C	–		MAN	
LPST 6	LPST MAKE UP (2"ϕ)		DW-V-757	SWING CHECK VLV	✓		C	C	C	–		REV. ΔP	
LPST 7	PURIFICATION (3"ϕ)		PU-MOV-541	MOV GATE VLV	✓		O	O	C	AI		ELECT/AUTO	Power-MCC-4. Bus 2 Signal-S2/C2

TABLE 1

CONTAINMENT ISOLATION SYSTEM SEP REVIEW ITEMS
PLANT: YANKEE ROWE PLANT

PENE-TRATION NO.	SYSTEM NAME AND SERVICE LINE SIZE	PENE CLASS NO.	VALVE IDENT. NUMBER	VALVE TYPE OR DESCRIPTION	LOCATION OC	LOCATION IC	POSITION NOR-MAL	POSITION SHUT DN	POSITION POST LOCA	POSITION PWR FAIL.	ESS-EN-TIAL	ACTUA-TION	REMARKS
LPST 8	HYDROGEN COVER GAS (1/2"ϕ)		CO-CV-601	SWING CHECK VLV	✓		C	C	C	—		REV ΔP	
LPST 9	LEVEL CONNECTIONS (2"ϕ)		NONE										CH-V-695 is allowed to be open while attended by a chemist.
LPST 10	LPST PUMP SUCTION CHARGING PUMP SUCTION (8'ϕ)		CH-V-654 CH-MOV-521	H.O. GATE VLV MOV GATE VLV	✓ ✓		C O	O O	C C	— A-Z		MAN R.M.	Power-MCC4, Bus 2 Signal - N/A No provisions for monitoring leakage past this valve.
LPST 11~16	LPST SAFETY VALVE DISCHARGE LINE (3/4"ϕ)		VD-V-917	H.O. GLOBE VLV	✓		C	C	C	—		MAN.	VD-V-917 may be opened long enough to drain the condensate on high pressure alarm.
LPST 17	LPST PRESSURE SENSING (1/2"ϕ)		NONE										closed system
LPST 18	TEMPERATURE DETECTOR (2"ϕ)		NONE										" "
LPST 19	TEMPERATURE CONTROLLER (1"ϕ)		NONE										" "

TABLE 1

CONTAINMENT ISOLATION SYSTEM SEP REVIEW ITEMS
PLANT: YANKEE ROWE PLANT

PENE-TRATION NO.	SYSTEM NAME AND SERVICE LINE SIZE	PENE CLASS NO.	VALVE IDENT. NUMBER	VALVE TYPE OR DESCRIPTION	LOCATION OC	LOCATION IC	POSITION NOR-MAL	POSITION SHUT DN	POSITION POST LOCA	POSITION PWR FAIL.	ESS-EN-TIAL	ACTUA-TION	REMARKS
LPST 20-22	PRESSURIZER SV DISCHARGE HEADER (6"ϕ)		VD-V-1012	SWING CHECK VLV	✓		C	C	C	–		REV. ΔP	
			VD-V-747	H.O. GATE VLV	✓		C	C	C	–		MAN.	
			VD-V-747B	" "	✓		C	O	C	–		"	
			VD-V-756	SWING CHECK VLV	✓		C	C	C	–		REV. ΔP.	
			VD-V-749	HAND OP GATE VLV	✓		C	O	C	–		MAN.	
			VD-V-750	" "	✓		C	O	C	–		"	
			VD-V-1057	SWING CHECK VLV	✓		C	C	C	–		REV. ΔP	
			VD-V-921	THREE WAY VLV	✓		C	C	C	–		MAN.	
LPST 23	MANHOLE COVER						C	C	C	–			

TABLE 2

CONTAINMENT ISOLATION SYSTEM SEP REVIEW FINDINGS

PLANT: YANKEE ROWE PLANT

PENETRATION NUMBER	LINE SERVICE	APPLICABLE GDC	EXCEPTIONS						REVIEWER'S COMMENTS
			LOCATION	NUMBER	TYPE	POSITION	ACTUATION		
1	SHUT DOWN COOLING-IN	55	X				X		NORMAL CLOSED MOV'S WITH KEY-SWITCH POWER LOCKOUT IN CONTROL RM
2	SHUTDOWN COOLING-OUT	55	X				X		ADEQUACY OF ELECTRICAL INTERLOCKS / ADMINISTRATIVE CONTROLS NOT REVIEWED.
3	L.P. SAFETY INJECTION	55		X	X				
4	PZR SAFETY VALVE DISCH (HEADER TO LPST)	56		X					NO ISOLATION VALVES
5	MAIN COOLANT DRAIN	55		X					A POWER OPERATED AUTOMATIC ISOLATION VALVE REQUIRED INSIDE CONTAINMENT
6	MAIN COOLANT FEED	55		X					HAS POST-ACCIDENT FUNCTION, i.e, REQUIRED FOR EMERGENCY CORE COOLINGS
7	NEUTRON SHIELD TK SAMPLE (HI)	56		X					AUTOMATIC ISOLATION VALVE REQUIRED INSIDE CONTAINMENT
8	NEUTRON SHIELD TK SAMPLE (LO)	56		X					" "
9	MAIN COOLANT VENT	55		X					" "
10	VALVE STEM LEAK-OFF	55		X					" "
11	MAIN COOLANT SAMPLE	55		X					" "
12	MAIN COOLANT FEED TO LOOP FILL HEADER	55		X			X		SHOULD BE AUTOMATIC ISOLATION VALVE OUTSIDE CONTAINMENT
13	SPARE								

TABLE 2

CONTAINMENT ISOLATION SYSTEM SEP REVIEW FINDINGS

PLANT: YANKEE ROWE PLANT

PENETRATION NUMBER	LINE SERVICE	APPLICABLE GDC	EXCEPTIONS: LOCATION	NUMBER	TYPE	POSITION	ACTUATION	REVIEWER'S COMMENTS
14	MAIN COOLANT HEISE PRESSURE GAUGE	55		X				NO ISOLATION PROVISIONS; JUSTIFICATION NEED&D.
15	H.P. SAFETY INJECTION	55		X	X			SIMPLE CHECK VALVE OUTSIDE CONTAINMENT
16	COMPONENT COOLING TO MC PUMP #1	57		X	X			" "
17	COMPONENT COOLING TO MC PUMP #2	57		X	X			" "
18	COMPONENT COOLING TO MC PUMP #3	57		X	X			" "
19	COMPONENT COOLING TO MC PUMP #4	57		X	X			" "
20	C.C. RETURN FROM MC PUMP #1	57		X			X	
21	C.C. RETURN FROM MC PUMP #2	57		X			X	
22	C.C. RETURN FROM MC PUMP #3	57		X			X	
23	C.C. RETURN FROM MC PUMP #4	57		X			X	
24	C.C. TO SAMPLE COOLER	57		X	X			SIMPLE CHECK VALVE OUTSIDE CONTAINMENT
25	C.C. RETURN FROM SAMPLE COOLER	57		X			X	
26	C.C. TO NEUTRON SHIELD TANK COOLERS	57		X	X			SIMPLE CHECK VALVE OUTSIDE CONTAINMENT

TABLE 2

CONTAINMENT ISOLATION SYSTEM SEP REVIEW FINDINGS

PLANT: YANKEE ROWE PLANT

PENETRATION NUMBER	LINE SERVICE	APPLICABLE GDC	EXCEPTIONS					REVIEWER'S COMMENTS
			LOCATION	NUMBER	TYPE	POSITION	ACTUATION	
27	C.C. RETURN FROM NEUTRON SHIELD TK COOLERS	56		X			X	
28	NEUTRON SHIELD TANK FILL	56		X	X			SIMPLE CHECK VALVE OUTSIDE CONTAINMENT
29	#1 STM GENERATOR BLOWDOWN	57					X	Non-Nuclear (NNS) Safety isolation valves; VD-V-1093 thru 1096 should be designated as isolation valves and 3981 closed
30	#2 STM GENERATOR BLOWDOWN	57					X	" "
31	#3 STM GENERATOR BLOWDOWN	57					X	" "
32	#4 STM GENERATOR BLOWDOWN	57					X	" "
33	CAVITY FILL CAVITY PURIFICATION	56		X	X		X	
34	DEMINERALIZED WATER SUPPLY	56		X	X			BLIND FLANGE
35	SPARE	-						
36	SPARE	-						
37	LO PRESSURE SURGE TANK SAFETY VALVE DISCH.	56			X			
38	HYDROGEN CONTROL SERVICE AIR SUPPLY	56		X			X	Hydrogen Control line & Service air supply line should be automatically isolated.
39	CONTAINMENT AIR CHARGE	56		X			X	Automatic isolation valves required both inside and outside containment

TABLE 2

CONTAINMENT ISOLATION SYSTEM SEP REVIEW FINDINGS

PLANT: YANKEE ROWE PLANT

PENETRATION NUMBER	LINE SERVICE	APPLICABLE GDC	EXCEPTIONS: LOCATION	NUMBER	TYPE	POSITION	ACTUATION	REVIEWER'S COMMENTS
40	CONTAINMENT PRESSURE SENSING	56		X				
41	CONTAINMENT PRESSURE SENSING	56		X				
42	SERVICE WATER TO CONTAINMENT COOLER #1	56		X				AUTOMATIC ISOLATION VALVES REQUIRED OUTSIDE CONTAINMENT
43	SERVICE WATER TO CONTAINMENT COOLER #2	56		X				" "
44	SERVICE WATER TO CONTAINMENT COOLER #3	56		X				" "
45	SERVICE WATER TO CONTAINMENT COOLER #4	56		X				" "
46	SERVICE WTR RETURN FROM CONTAINMENT COOLER #1	56		X				AUTOMATIC ISOLATION VALVE REQUIRED INSIDE CONTAINMENT
47	SERVICE WTR RETURN FROM CONTAINMENT COOLER #2	56		X				" "
48	SERVICE WTR RETURN FROM CONTAINMENT COOLER #3	56		X				" "
49	SERVICE WTR RETURN FROM CONTAINMENT COOLER #4	56		X				" "
50	STEAM SUPPLY TO CONTAINMENT HEATER #1	56		X	X			SIMPLE CHECK VALVE OUTSIDE CONTAINMENT, ISOLATION PROVISIONS FOR BRANCH LINES ARE NOT IDENTIFIED
51	STEAM SUPPLY TO CONTAINMENT HEATER #2	56		X	X			" "
52	STEAM SUPPLY TO CONTAINMENT HEATER #3	56		X	X			" "

TABLE 2

CONTAINMENT ISOLATION SYSTEM SEP REVIEW FINDINGS

PLANT: YANKEE ROWE PLANT

PENETRATION NUMBER	LINE SERVICE	APPLICABLE GDC	EXCEPTIONS: LOCATION	NUMBER	TYPE	POSITION	ACTUATION	REVIEWER'S COMMENTS
53	STEAM SUPPLY TO CONTAINMENT HEATER #4	56		X	X			
54	CONDENSATE RETURN FROM HEATER #1	56		X				ISOLATION PROVISIONS FOR BRANCH LINES NOT IDENTIFIED
55	CONDENSATE RETURN FROM HEATER #2	56		X				" "
56	CONDENSATE RETURN FROM HEATER #3	56		X				" "
57	CONDENSATE RETURN FROM HEATER #4	56		X				" "
58	SPARE							
59	SPARE							
60	SPARE							
61	SPARE							
62	SPARE							
63	LO PRESSURE VENT HEADER	56		X	X			
64	AIR PARTICULATE MONITOR - IN	56		X			X	IDENTIFIED AS ESSENTIAL LINE, BUT NNS DESIGN OUTSIDE CONTAINMENT
65	AIR PARTICULATE MONITOR - OUT	56		X			X	" "

TABLE 2

CONTAINMENT ISOLATION SYSTEM SEP REVIEW FINDINGS

PLANT: YANKEE ROWE PLANT

PENETRATION NUMBER	LINE SERVICE	APPLICABLE GDC	EXCEPTIONS: LOCATION	NUMBER	TYPE	POSITION	ACTUATION		REVIEWER'S COMMENTS
66	MANHOLE M-1								LEAK TESTABLE SEAL ?
67	PERSONNEL HATCH								" "
68	EQUIPMENT HATCH								" "
69	CONTAINMENT LEG EXPANSION JOINTS								INFORMATION ON DESIGN is REQUIRED TO REVIEW ISOLATION CAPABILITY
5 76	" "								" "
77	FUEL CHUTE	56			X				LEAK TESTABLE BLANK FLANGE ?
78	FUEL CHUTE DEWATERING PUMP DISCHARGE	56		X			X		AUTOMATIC ISOLATION VALVES OR L C VALVES REQUIRED
79	MAIN STEAM LINE #1 MS BYPASS & DUMP	57					X		JUSTIFICATION FOR USE OF MANUAL VALVES NEEDED; JUSTIFICATION FOR IDENTIFICATION OF ISOLATION VALVES NEEDED
80	MAIN STEAM LINE #2 MS BYPASS & DUMP	57					X		" "
81	MAIN STEAM LINE #3 MS BYPASS & DUMP	57					X		" "
82	MAIN STEAM LINE #4 MS BYPASS & DUMP	57					X		" "
83	MAIN FEEDWATER LINE #1 MFW CHEMICAL ADDITION	57					X		" "
84	MAIN FEEDWATER LINE #2 MFW DRAIN	57					X		" "

TABLE 2

CONTAINMENT ISOLATION SYSTEM SEP REVIEW FINDINGS

PLANT: YANKEE ROWE PLANT

PENETRATION NUMBER	LINE SERVICE	APPLICABLE GDC	EXCEPTIONS: LOCATION	NUMBER	TYPE	POSITION	ACTUATION		REVIEWER'S COMMENTS
85	MAIN FEEDWATER LINE #3 MFW DRAIN	57					X		JUSTIFICATION FOR USE OF MANUAL VALVES NEEDED; JUSTIFICATION FOR IDENTIFICATION OF ISOLATION VALVES NEEDED
86	MAIN FEEDWATER LINE #4 MFW DRAIN	57					X		" "
87	BOTTOM DRAIN DR-1	56		X					NO IDENTIFIED ISOLATION FOR BRANCH LINES
88	BOTTOM DRAIN DR-2	56		X					" "
89	NEUTRON SHIELD TANK INNER TEST	56		X			X		
90	NEUTRON SHIELD TANK OUTER TEST	56		X			X		
91	AIR PURGE INLET	56		X			X		
92	AIR PURGE OUTLET	56		X			X		
93	AIR PURGE BYPASS	56		X			X		
94	CONTAINMENT SUMP SUCTION	56		X			X		
95	TOP MANHOLE								LEAK TESTABLE SEAL ?
96	MAIN COOLANT BLEED LINE	55		X					

TABLE 2

CONTAINMENT ISOLATION SYSTEM SEP REVIEW FINDINGS

PLANT: YANKEE ROWE PLANT

PENETRATION NUMBER	LINE SERVICE	APPLICABLE GDC	EXCEPTIONS: LOCATION	NUMBER	TYPE	POSITION	ACTUATION	REVIEWER'S COMMENTS
LPST 1	BLEED LINE SAMPLE	56		X				MAIN LINE IS EXTENSION OF CONTAINMENT.
LPST 2	PURIFICATION RECIRCULATION	56		X	X			
LPST 3	PRESSURE CONTROL	56		X			X	
LPST 4	PRESSURE CONTROL	56		X			X	
LPST 5	LPST COOLING PUMP DISCHARGE	56		X			X	
LPST 6	LPST MAKE UP	56		X	X			
LPST 7	PURIFICATION	56		X				
LPST 8	HYDROGEN COVER GAS	56		X	X			
LPST 9	LEVEL CONNECTIONS	56		X				SHOULD MEET RG 1.11
LPST 10	LPST PUMP & CHARGING PUMP SUCTION	56		X			X	
LPST 11	LPST SAFETY VALVE DISCHARGE LINE	56		X			X	MAIN LINES ARE EXTENSIONS OF CONTAINMENT
5 16								
LPST	LPST PRESSURE	56		X				SHOULD MEET RG 1.11

TABLE 2

CONTAINMENT ISOLATION SYSTEM SEP REVIEW FINDINGS

PLANT: YANKEE ROWE PLANT

PENETRATION NUMBER	LINE SERVICE	APPLICABLE GDC	EXCEPTIONS					REVIEWER'S COMMENTS
			LOCATION	NUMBER	TYPE	POSITION	ACTUATION	
LPST 18	TEMPERATURE DETECTOR	55		X				SHOULD MEET RG 1.11
LPST 19	TEMPERATURE CONTROLLER	55		X				" "
LPST 20	PRESSURIZER SV DISCHARGE	55		X	X		X	MAIN LINES ARE EXTENSIONS OF CONTAINMENT
5 22	HEADER							
LPST 23	MANHOLE COVER							SMALL EQUIPMENT HATCH, NEEDS DUAL, TESTABLE SEALS