BGE

Calvert Cliffs Nuclear Power Plant

License Renewal Project

Aging Management Review Report

for the

Containment System

(059)

Revision 1

May, 1996

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CONTAINMENT SYSTEM AGING MANAGEMENT REVIEW REPORT
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CONTAINMENT SYSTEM AGING MANAGEMENT REVIEW REPORT SUMMARY OF CHANGES

REVISION	CHANGE DESCRIPTION
0	Initial issue
1	Added more specific evaluation of containment sump recirc penetrations which are different from the other mechanical penetrations per the resolution of TPR 96-005. Clarified scope of MN-3-100 and PEG-7 as aging management programs per the resolution of TPR 96-016. Corrected some terminology inconsistencies in the original revision.

1.0 INTRODUCTION

1.1 CONTAINMENT SYSTEM DESCRIPTION

This section describes the scope and boundaries of the Containment System (System 059) as it was evaluated. Section 1.1.1 provides a brief synopsis of the system as described in existing plant documentation. The boundaries of the system are described in Section 1.1.2. Section 1.1.3 is a detailed breakdown of the system intended functions and is provided as a basis for component scoping and the identification of component-specific functions.

1.1.1 Containment System Description

The containment is a Class I structure, housing the reactor and other NSSS components. The containment consists of a reinforced concrete cylinder and a shallow domed roof which rests on a reinforced concrete foundation slab. The concrete cylinder and dome have a post-tensioned contraction design. Attached to the inside of the containment structure is a carbon steel liner. There are three personnel and equipment access openings in the containment: a two-door personnel lock, a large diameter single door equipment hatch, and a two-door personnel escape hatch.

The containment has numerous penetrations for piping and electrical connections. These penetrations are leak tight, inert assemblies, welded to the containment liner. A fuel transfer tube penetration in the containment is provided to permit fuel movement between the refueling pool in the containment and the spent fuel pool in the auxiliary building.

Two sumps are provided in the containment floor: a normal sump and an emergency sump.

The structural components of the Containment System were evaluated using a separate LCM procedure for evaluating structures and the results of this procedure are presented in a separate Aging Management Review Report.

1.1.2 Containment System Boundary

The Containment System components include containment penetrations, instrumentation associated with penetrations, doors and access hatches and

limit switches associated with doors and hatches. Components within this system boundary include the following major device types:

Penetration **(PEN)**	Includes all containment penetrations for mechanical and electrical equipment. Some penetrations are qualified under the requirements of 10 CFR 50.49.
Door **(DOOR)**	Includes the equipment hatch and the normal and emergency personnel access hatches
Pressure Indicator **(PI)**	Indicate the pressure associated with the penetration seal.
Pressure Switch **(PS)**	Provide a signal for low pressure associated with the penetrations.
Position Switch **(ZS)**	Provides a signal to indicate the position of containment doors and hatches.

1.1.3 Containment System Intended Functions

A detailed review of the Containment System intended functions was completed during the screening process using Procedure LCM-11. The following intended functions for the Containment System components were identified in Table 1 of the scoping results.

- Provide Closure of Containment Airlock and Access/Egress hatches.
- Maintain functionality of Electrical Components as addressed by the EQ program.
- Maintain the pressure boundary of the system.
- Provides rated fire barrier.

1.2 EVALUATION METHODS

Containment System components within the scope of license renewal were identified through the use of BGE procedure for Component Level Scoping of Systems. The results of the scoping process are discussed in Section 2.0 of this report.

Containment System components subject to aging management review for license renewal were determined using the BGE procedure for Component Pre-Evaluation to identify

passive, long-lived components that must be evaluated for management of the effects of age-related degradation. The results of the Pre-evaluation process are discussed in Section 3.0 of this report.

All components subject to aging management review are evaluated for the effects of aging in accordance with the BGE procedure for Component Aging Management Review. This procedure is performed to determine plausible aging effects and the appropriate methods to manage those effects. The results of the Aging Management Review (AMR) process are discussed in Section 4.0 of this report.

1.3 CONTAINMENT SYSTEM SPECIFIC DEFINITIONS

This section provides the definitions for any specific terms unique to the Containment System component level evaluation.

Term	Definition
None	

1.4 CONTAINMENT SYSTEM SPECIFIC REFERENCES

References utilized in the completion of the Containment System component level evaluation are listed in Table 1-1. Drawings and procedures used as source documents in the evaluation were taken at the revision level of record at the start of this task which was May 1996.

Table 1-1

Containment System Specific References

Document ID	Document Title	Revision No.	Date
UFSAR	Calvert Cliffs Nuclear Power Plant Units 1 and 2, Updated Final Safety Analysis Report	18	1996
----	Component Level ITLR Screening Results for the Containment System	0	1993
----	Pre-evaluation Results for the Containment System	1	1996
EPRI TR-103835	PWR Containment License Renewal Industry Report	1	7/94
EPRI TR-103842	Class I Structures License Renewal Industry Report	1	7/94
EPRI TR-103838	Pressurized Water Reactor, Reactor Pressure Vessel Internals License Renewal Industry Report	1	7/94
DG-1009	Draft USNRC Regulatory Guide - Standard Format and Content of Technical Information for Applications to Renew Nuclear Power Plant Operating Licenses	—	12/90
EPRI NP-5461	Components Life Estimation: LWR Structural Materials Degradation Mechanisms	—	9/87
----	Examination of the Unit-1 Containment Structure	—	8/92
----	Component Evaluation and Program Evaluation Results for Containment System No. 59	1	1994
----	Civil and Structural Design Criteria for Calvert Cliffs Nuclear Power Plant Unit No. 1 and 2, by Bechtel Power Corp.	0	8/91
IAEA-TECDOC-670	"Pilot Studies on Management of Aging of Nuclear Power Plant Components," International Atomic Energy Agency	—	10/92
MN-3-100	Painting and Other Protective Coatings	2	4/96
TRD-A-1000	Coating Application Performance Standard	10	7/95
6750-A-24	Specification for Painting and Special Coatings	12	10/82
6750-C-16	Specification for Furnishing, Fabricating, Delivering and Erection of the Containment Structure Liner Plate and Accessory Steel	8	5/71
6750-C-16A	Specification for Furnishing, Fabricating, and Delivering the Containment Structure Liner Plate and Accessory Steel	0	12/68
6750-C-17	Specification for Containment Personnel Locks and Equipment Hatch	3	2/76
6750-E-31	Specification for Containment Structure Electrical Penetration Assemblies	6	8/73
6750-M-307	Specification forFurnshing and Delivering Metallic Expansion Joints	2	6/72

Table 1-1

Containment System Specific References

Document ID	Document Title	Revision No.	Date
6750-M-343	Specification for Containment Wall Penetration Coolers	2	7/71
SP-387	Specification for Containment Structure Electrical Penetration Assemblies - BG&E	9	—
—	"Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings," American Institute of Steel Construction	—	1963
6750-C-28	Specification for Stainless Steel Liner Plate and Spent Fuel Pool Bulkhead Gate	6	6/74
ASME Section III, Division 2	"Code for Concrete Reactor Vessels and Containments," American Society of Mechanical Engineers Boiler and Pressure Vessel Code	—	1986
60-420-E Sh,. 1	Miscellaneous Piping Details	6	7/74
60-731-E Sh,. 3	Safety Injection and Containment Spray Systems Operations Drawing	20	11/95
60-420-E Sh,. 1	Miscellaneous Piping Details	6	7/74
62-152-E	Appendix "R" Separation Requirements, Aux. Bldg. and Ctmt. Sruct., Elevations 45'-0"	7	5/94
62-153-E	Appendix "R" Separation Requirements, Aux. Bldg. and Ctmt. Sruct., Elevations 69'-0"	7	5/94
61-740, Sh. 1	Containment Liner Plan, Elevation, and Penetrations	19	9/76
61-740, Sh. 2	Containment Structure Penetrations	6	9/76
61-741	Containment Liner Penetration Details	17	1/75
61-743	Containment Liner Penetration Details	6	3/73
61-749	Containment Liner Access Openings	11	4/76
60-353 Sh. 1	Fuel Transfer Tube	20	4/95
61-409 Sh. 1	Electrical East Penetration Assembly Arrangement Inside U-1	14	9/95
61-409 Sh. 2	Electrical West Penetration Assembly Arrangement Inside U-1	13	8/91
12317-0013	Incapsulating Flange	0	6/71
12819-0001	Material Preparation - Flued Head	C	12/72
12819-0002	Flued Head - With Internal Process Pipe	C	1/73
12405A-0001	Electrical Penetration Canister Type 1	I	3/93
12405A-0026	Header Plate Sub-Assembly (external) Type 1	D	3/73
12405B-0001	Electrical Penetration Canister Type 3D	E	3/72

Table 1-1

Containment System Specific References

Document ID	Document Title	Revision No.	Date
12405B-0010	Header Plate, Welding Sub-Assembly, Ext. Type 3D	B	10/71
12405C-0001	Electrical Penetration Canister Type 2A	L	7/94
12405D-0001	Electrical Penetration Canister Type 2B	J	1/73
12405D-0004	Hear Plate (Internal) Type 2B	D	2/72
12405E-0001	Electrical Penetration Canister Type 2C	F	2/72
12405F-0001 Sh. 1	Electrical Penetration Canister Type 3A	H	3/72
12405G-0001	Electrical Penetration Canister Type 3B	F	2/72
13074-0011	Penetrations Group M3	3	8/70
13074-0012	Penetrations Groups M1 and M2	4	2/70
13074-0013	Penetrations Groups E1 and E2	2	1/70
13074-0014	Penetrations	3	1/70
13074-0019	19'-0" Diameter Equipment Door	7	3/87
13074-0020 Sh. 1	Equipment Door Details	5	3/87
13074-0038	General Arrangement 3'-6" x 6'-8" Personnel Airlock	3	6/70
13074-0039	Lock Structure Personnel Lock	0	2/70
13074-0040	Interior Bulkhead Assembly 3'-6" x 6'-8" Personnel Airlock	2	4/96
13074-0041	Exterior Bulkhead Assembly 3'-6" x 6'-8" Personnel Airlock	1	4/96
13074-0042	3'-6" x 6'-8" Personnel Lock Structural Details	1	3/70
13074-0043	3'-6" x 6'-8" Personnel Lock Interior Door Details	0	2/70
13074-0044	3'-6" x 6'-8" Personnel Lock Exterior Door Details	0	2/70
13074-0047	Valve & Latching Limit Switch Locations	0	2/70
13074-0048	General Arrangement Escape Lock	5	12/94
13074-0049	Lock Structural Assembly Escape Lock	0	2/70
13074-0050	Interior Bulkhead Assembly Escape Lock	1	6/70
13074-0051	Exterior Bulkhead Assembly Escape Lock	1	8/94

2.0 COMPONENTS WITHIN THE SCOPE OF LICENSE RENEWAL

2.1 COMPONENT LEVEL SCOPING METHODOLOGY OVERVIEW

The scoping of the Containment System components was performed in accordance with the process described in the Calvert Cliffs Nuclear Power Plant Integrated Plant Assessment Methodology as specified in the procedure for the component level scoping of systems. The purpose of component level scoping is to identify all system components that support the intended system functions identified in Section 1.1.3 for the Containment System. These are the components that are within the scope of license renewal.

The structural components of the containment were scoped using a different, structural process. The results of this scoping are recorded in a separate section of the Containment Scoping Results. The aging management review of these structural components is documented in a separate AMR report.

2.2 COMPONENT LEVEL SCOPING RESULTS

A total of three device types in the Containment System were designated as within the scope of license renewal. These device types are listed in Table 2-1. All containment penetrations and doors were determined to contribute to one or more intended functions as well as the position switches associated with the doors. Refer to the results of the Component Level Scoping for the list of components within the scope of license renewal, and other scoping-related details.

Table 2-1

Containment System Components Within the Scope of License Renewal

Component	DEVICE TYPE
Containment Personnel Lock	DOOR
Containment Emergency Lock	DOOR
Containment Equipment Hatch	DOOR
Containment Penetrations (Electrical EQ)	PEN
Containment Penetrations (Electrical Non-EQ)	PEN
Containment Penetrations (Mechanical)	PEN
Fuel Transfer Tube and Penetration Bellows	PEN
Containment Sump Recirc Penetrations	PEN
Containment/Emergency Airlock Limit Switches	ZS

3.0 COMPONENT PRE-EVALUATION

3.1 PRE-EVALUATION METHODOLOGY OVERVIEW

The component pre-evaluation procedure is used to determine which components are subject to an aging management review. This procedure is used to categorize intended functions as active or passive, determine if the components supporting passive intended functions are long-lived, and identify the set of components subject to aging management review.

The pre-evaluation also determines whether the components should be included in a commodity group AMR or the system AMR.

3.2 PRE-EVALUATION RESULTS

Table 3-1 summarizes the disposition of intended functions for the Containment System as either active or passive. These functions are derived from the functions identified and documented during the component level scoping process, which are listed in subsection 1.1.3.

Components supporting only active intended functions (i.e., not passive components) and those that are subject to replacement based on qualified life (i.e., not long-lived components) do not require an aging management review.

Components that are evaluated as part of commodity evaluations are addressed in separate AMRs. The Containment System components dispositioned as part of commodity evaluations include all cables associated with Containment System components in the scope of license renewal.

Table 3-2 summarizes the disposition of the device types identified in Table 2-1 as within the scope of license renewal for the Containment System.

Refer to the results of the Containment System Component Pre-evaluation for the list of components subject to AMR and other details.

Table 3-1

Containment System Intended System Function Disposition

Function Description	Function Passive?
Provide Closure of Containment Airlock and Access/Egress hatches.	No
Maintain functionality of electrical components as addressed by the EQ Program.	Yes
Maintain the pressure boundary of the system.	Yes
Provides rated fire barrier.	Yes

Table 3-2

Summary of Containment System Components Requiring Aging Management Review

Device Type	Device Description	Components Support Passive Function(s)?	Components Subject to Replacement Program?	Components Evaluated in Commodity Evaluation?	Components Included in Containment AMR?
DOOR	Containment Personnel Airlock	Yes	No	No	Yes
DOOR	Containment Emergency Airlock	Yes	No	No	Yes
DOOR	Containment Equipment Hatch	Yes	No	No	Yes
PEN	Containment Electrical EQ Penetrations	Yes	No	No	Yes
PEN	Containment Electrical Non-EQ Penetrations	Yes	No	No	Yes
PEN	Containment Mechanical Penetrations	Yes	No	No	Yes
PEN	Containment Fuel Transfer Tube/Bellows	Yes	No	No	Yes
PEN	Containment Sump Recirc Penetrations	Yes	No	No	Yes
ZS	Containment/Emergency Airlock Limit Switches	No	NA	No	No

4.0 COMPONENT AGING MANAGEMENT REVIEW

4.1 AGING MANAGEMENT REVIEW METHODOLOGY OVERVIEW

The aging management review of Containment System components was performed in accordance with the process described in the Calvert Cliffs Nuclear Power Plant Integrated Plant Assessment Methodology as specified in the procedure for the component aging management review. This procedure requires the identification of plausible age related degradation mechanisms (ARDMs) for each component subject to aging management review, unless it can be demonstrated that the effects of aging can be managed without specifying ARDMs.

For one component type in the Containment System, the aging management review was completed without addressing specific ARDMs. Certain electrical penetrations are qualified for a 40 year life under the CCNPP 50.49 Program. This program has been identified as being a time-limited aging analysis which needs to be addressed under a separate section of the license renewal rule. Therefore, this AMR report does not address these penetrations beyond identifying which ones are qualified for 40 years under the 50.49 program.

For the remaining component groups, the effects of the ARDMs on the ability of the components to support intended functions are identified and the ability of existing plant programs to adequately manage the effects of these ARDMs is evaluated.

The review accomplished the following:

- Determination of plausible component-ARDMs combinations:

  (1) Identified potential age-related degradation mechanisms (ARDMs) for Containment System components.

  (2) Grouped Containment System components based on device type and design/operating environment attributes.

  (3) Identified plausible age-related degradation mechanisms ARDMs for each component based on:

  - Industry and plant information

- Material of construction
- Environmental service factors
- Intended functions

- Identified methods to manage aging effects for plausible ARDMs and assessed current plant programs to determine whether these aging effects are adequately managed.

4.2 AGE-RELATED DEGRADATION MECHANISMS

Containment System components were evaluated to identify plausible ARDMs for which activities are required to ensure that age related degradation does not affect the component intended function(s). The identification of plausible ARDMs was completed in accordance with the process discussed below.

4.2.1 Potential ARDMs

This step of the aging evaluation identifies ARDMs that are potentially detrimental to Containment System components. These potential ARDMs are determined on an equipment type basis. An ARDM is considered potential if the evaluation concludes that the ARDM could occur in generic applications of the equipment throughout the plant. The equipment types for which ARDMs were evaluated are listed below.

Penetration
Door

A list of potential component ARDMs was developed for each of the equipment types. The list was developed through review of industry documents. The following are examples of sources of ARDM information:

Draft NRC Regulatory Guide DG-1009
NEI(NUMARC) Industry Reports
NRC NPAR Reports
EPRI Reports

For each ARDM on the list, a determination was made whether it was applicable (i.e., potential) to the equipment type. The applicability of the ARDM was determined on the basis of a generic component of the equipment type in service in any system in the plant.

A summary of the potential ARDMs for each of the Containment System equipment types is provided in Table 4-1. The specific description of each potential ARDM is included on the Attachment 7s in Appendix A.

4.2.2 Component Grouping

Similar components are grouped together for evaluation efficiency. The age-related degradation evaluation results completed for a group are applicable to each of the individual components within the group. Selection of grouping attributes was accomplished through consideration of the component characteristics that would most influence the age-related degradation that could occur. Grouping attributes utilized for the Containment System included material of construction, process environment and applicability of the 50.49 program. Component grouping is shown on Attachment 3s in Appendix A.

4.2.3 Plausible ARDMs

The list of potential ARDMs is utilized for a Containment System component-specific identification of plausible ARDMs. The plausibility determination is made through consideration of factors that influence component susceptibility to the ARDM. The ARDMs are assessed for plausibility on the basis of:

Material of construction
Internal (process) environment
External environment
Operational conditions/effects
Affect on the passive intended function
Physical conditions of the component may be used as additional evidence to support a not plausible determination

The results of the component-specific ARDM plausibility evaluation are included in Attachment 5s and 6s in Appendix A. The results are consistent with both the results obtained in generic evaluations performed in industry reports and with the results previously obtained during the Containment and Auxiliary Building structures evaluations. These results are summarized by component Device Type, in matrix form, in Table 4-2.

4.3 METHODS TO MANAGE THE EFFECTS OF AGING

The methods of managing the effects of plausible age related degradation mechanisms are determined in the final step of the aging management review process. These methods are compared to current plant programs and practices to determine whether aging effects are adequately managed for the period of extended operation, or whether program revisions or new programs are required. Additionally, plant modifications may be considered as a method to manage aging effects.

Applicable aging effects management methods are determined through consideration of the specific plausible ARDM, component configuration (material of construction, geometry, service conditions, etc.), and relative significance of the aging effects for the period of extended operation.

Site programs and processes associated with the Containment system were reviewed to identify those that implemented the aging effects management methods determined to be necessary for the period of extended operation. These activities were reviewed with appropriate site program managers, system engineers, and others to gain concurrence on the site programs and processes that will become commitments for plant license renewal. Similarly, modifications to current programs, and requirements for new programs, were identified and reviewed with the site to gain concurrence as these will also become commitments for plant license renewal.

Site programs are related to specific containment system components and plausible ARDMs on Attachments 1, 2 and 8 in Appendix A.

Attachment 1 in Appendix A provides a summary of Containment System components (by device type) subject to aging management review, applicable passive intended function(s), plausible ARDMs, and aging effects management programs.

Table 4-1
Potential Age-Related Degradation Mechanisms (ARDMs) Summary

Potential ARDMs	Containment System Equipment Types	
	Penetration	Door
General Corrosion/Oxidation	x	x
Pitting/Crevice Corrosion	x	
Irradiation-Assisted Stress Corrosion Cracking	x	
Stress Corrosion Cracking, Intergranular Stress Corrosion Cracking and Intergranular Attack	x	
Microbiologically Influenced Corrosion	x	
Saline Water Attack		
Erosion		
Erosion/Corrosion		
Neutron Embrittlement		
Thermal Aging	x	
Hydrogen Damage	x	
Low Cycle Fatigue	x	
High Cycle Fatigue		
Wear		
Creep		
Electrical Stress		
Stress Relaxation	x	x
Elevated Temperature	x	x

x - indicates that the ARDM is potentially detrimental to the equipment type

Table 4-2
Plausible Age-Related Degradation Mechanisms Summary

Plausible ARDMs	Containment System Component Types				
	Electrical Pen (non-EQ)	Mechanical Pen (CS)	Fuel Transfer Tube/ Bellows	Cont Sump Recirc Pen (SS)	Equip/ Personnel Hatch
General Corrosion/Oxidation	X	X			X
Pitting/Crevice Corrosion					
Irradiation-Assisted Stress Corrosion Cracking					
Stress Corrosion Cracking, Intergranular Stress Corrosion Cracking and Intergranular Attack					
Microbiologically Influenced Corrosion					
Thermal Aging					
Hydrogen Damage					
Low Cycle Fatigue					
Elevated Temperature					

x - indicates that the ARDM is plausible for component(s) within the Device Type

Appendix A
Results of Aging Management Review Procedure for the Containment System (059)

	Total Pages
Attachment 1, Aging Management Review Summary	1
Attachment 2, Description of Programs Which Manage the Effects of Aging	1
Equipment Type: Penetration (PEN)	
Attachment 7, Potential ARDM List	7
Device Type: PEN	
Attachment 3, Component Grouping Summary Sheet (059-PEN-01)	2
Attachment 3, Component Grouping Summary Sheet (059-PEN-02)	2
Attachment 3, Component Grouping Summary Sheet (059-PEN-03)	5
Attachment 3, Component Grouping Summary Sheet (059-PEN-04)	1
Attachment 3, Component Grouping Summary Sheet (059-PEN-05)	1
Attachment 5, ARDM Matrix (PEN)	1
Attachment 6, Matrix Code List (PEN)	8
Equipment Type: Door (DOOR)	
Attachment 7, Potential ARDM List	7
Device Type: DOOR	
Attachment 3, Component Grouping Summary Sheet (059-DOOR-01)	1
Attachment 5, ARDM Matrix (DOOR)	1
Attachment 6, Matrix Code List (DOOR)	3
Attachment 8, Development of Aging Management Alternatives	1

Aging Management Review Summary (Revision 1)

System Name & No.: Containment System (059)

Date: May 1996

Device Type	Group I D	Passive Intended Functions	Grouping Attributes	Subcomponents/ Subgroups Not Subject to Aging Mgmt Review	Plausible Aging Mechanisms	Managed by Existing Programs I D	Modifications Needed	New Program Needed
Containment Electrical Penetrations (Long-Lived EQ)	059-PEN-01	1) Maintain Containment Pressure Boundary 2) Maintain Electrical Functionality per EQ Program	Long-Lived EQ	NA	NA	EQ Qualification Numbers EPA 004 and EPA 010	NA	NA
Containment Electrical Penetrations	059-PEN-02	1) Maintain Containment Pressure Boundary	Same materials	NA	General Corrosion/ Oxidation	PEG-7 MN-3-100 QL-2-100	No	NA
Containment Mechanical and Spare Penetrations (NOTE 1)	059-PEN-03	1) Maintain Containment Pressure Boundary	Same materials	NA	General Corrosion/ Oxidation	PEG-7 MN-3-100 QL-2-100	No	NA
Fuel Transfer Tube	059-PEN-04	1) Maintain Containment Pressure Boundary	Same materials Same environment	NA	None	NA	NA	NA
Containment Sump Recirc Penetrations	059-PEN-05	1) Maintain Containment Pressure Boundary	Same materials Same environment	NA	None	NA	NA	NA
Containment Personnel & Emergency Airlocks and Equipment Hatch	059-DOOR-01	1) Maintain Containment Pressure Boundary 2) Provide Containment Closure 3) Provide rated Fire Barriers	Same Materials	NA	General Corrosion/ Oxidation	PEG-7 MN-3-100 QL-2-100	No	NA

Note 1: The containment normal sump drain header penetrations (1/2PEN8) are not included in this group. These penetrations have no carbon steel sleeve which contributes to maintaining the pressure boundary function. For this penetration, the pressure retaining components are the welds for the containment sump liner (addressed in the Containment Structure Report) and the sump drain pipe itself (addressed in the Containment Isolation Only Systems AMR Report).

Attachment 2: Description of Programs Which Manage the Effects of Aging (Revision 1) **Date: May 1995**

System Name and Number: Containment System (059)

Program ID	Portions of System Managed By This Program & Passive Intended Function	Aging Mechanisms Managed by This Program	Description of Program
MN-3-100, Protective Coating Program QL-2-100, Issue Reporting PEG-7, System Walkdowns	Scope: All carbon steel Containment penetrations, equipment hatches and airlocks. Passive Intended Functions: 1) To Maintain the Pressure Boundary of the System 2) To Provide Rated Fire Barriers	General Corrosion/ Oxidation	MN-3-100 - This program provides for discovery of degraded coatings in containment and assessment, prioritization and corrective action for any degraded coatings discovered outside containment. QL-2-100 - This procedure provides requirements for initiating, reviewing, and processing of Issue Reports (IRs) and for resolution of issues. IRs are generated to document and resolve hardware and equipment deficiencies and nonconformances. Corrective actions are implemented as required to resolve the issues. PEG-7 - This guideline provides direction for performance of system walkdowns, the reporting of walkdown results and initiation of corrective action. Inspection items typically related to aging management include housekeeping (e.g. paint) and stress or abuse (e.g. vibration, cavitation, corrosion, leakage). Conditions adverse to quality are documented on a IR in accordance with QL-2-100.

Potential ARDM List (Revision 1)

SYSTEM: Containment System 059

EQUIPMENT TYPE: PEN

Date: May 1996

ARDM	POTENTIAL (YES/NO)	DESCRIPTION/JUSTIFICATION	SOURCE
General Corrosion/Oxidation	Yes	General Corrosion/Oxidation is the thinning of metal by chemical attack at the surface of the metal by an aggressive environment of moisture and oxygen. General Corrosion/Oxidation is a potential for low alloy and high alloy ferritic steels. Austenitic stainless steel and nickel-base alloys are quite resistant to general corrosion, especially in a properly chemically controlled PWR environment. General Corrosion/Oxidation is a potential ARDM for Containment Penetrations fabricated from carbon steel.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Pitting/Crevice Corrosion	Yes	Pitting is a potential ARDM if proper water chemistry is not maintained. Pitting occurs in the presence of copper ions and chloride ions. Oxygen is required for initiation of pitting. A stagnant condition will promote the growth of pitting corrosion. Crevice Corrosion occurs when surfaces of materials are wetted by the corrosion medium and are covered in localized areas with debris; or when a crack or crevice is permitted to exist in a component exposed to such media. Pitting/Crevice Corrosion is a potential ARDM for containment penetrations exposed to water (i.e. Fuel Transfer Tube).	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5

Potential ARDM List (Revision 1)

SYSTEM: Containment System 059

EQUIPMENT TYPE: PEN **Date**: May 1996

ARDM	POTENTIAL (YES/NO)	DESCRIPTION/JUSTIFICATION	SOURCE
Irradiation and Irradiation-Assisted Stress Corrosion Cracking (IASCC)	Yes	Steel degradation due to neutron irradiation results from the displacement of atoms from their normal lattice positions to form both interstitials and vacancies. The effect of this ARDM is to increase the yield strength, decrease the ultimate tensile ductility, and increase the ductile to brittle transition temperature. IASCC is an ARDM that can occur in stainless steels that are subjected to an environment conducive to corrosion cracking. IASCC can further accelerate the potential corrosion process. Since the containment penetrations are exposed to irradiation, Irradiation and IASCC are potential ARDMs.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Stress Corrosion Cracking (SCC)/Intergranular Stress Corrosion Cracking (IGSCC)/Intergranular Attack (IGA)	Yes	IGSCC is SCC where the grain boundaries of a susceptible materials are cracked due to stress and an aggressive environment. IGA is similar to IGSCC except stress is not required for IGA. Initiation and propagation of SCC. requires three factors to be present: (1) susceptible material, (2) a corrosive environment and (3) the presence of tensile stresses. The magnitude of the tensile stresses must exceed a threshold value before the ARDM can occur. A generally accepted value for the threshold stress is the yield stress of the material of construction. For austenitic stainless steels, SCC is potential if the PWR operating water chemistry shows the oxygen limit > 5ppb, the halogen limit > 150ppb and the stress levels are at or above the material yield strength. SCC/IGSCC/IGA are potential ARDMs for stainless steel penetrations and penetrations with stainless steel components.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5

Potential ARDM List (Revision 1)

SYSTEM: Containment System 059

EQUIPMENT TYPE: PEN

Date: May 1996

ARDM	POTENTIAL (YES/NO)	DESCRIPTION/JUSTIFICATION	SOURCE
Microbiologically Influenced Corrosion (MIC)	Yes	MIC occurs in stagnant or low flow areas in systems that use untreated water in an operating temperature range of 50F to 120F. MIC effects on carbon steel may result in random pitting, general corrosion, or severe hydraulic effects caused by formation of tubercles and massive corrosion product deposits. MIC attack on stainless steel is characterized by pitting, most commonly at weldments. Containment penetrations submerged in water (i.e., during refueling), are potentially susceptible to MIC.	REF. 2 REF. 3 REF. 4 REF. 5
Saline Water Attack	No	NOT Applicable to Equipment Type. The Containment penetrations are not susceptible to saline water attack. Saline water attack is only potential for re-inforced concrete structures. Since the containment penetrations are not fabricated from concrete, Saline Water Attack is not a potential ARDM for containment penetrations.	REF. 2 REF. 3 REF. 4 REF. 5
Erosion	No	NOT Applicable to Equipment Type. Erosion is attributed to the removal of protective surface films on a metal by mechanical action of a fluid or particulate matter. Erosion occurs under high-velocity conditions, turbulence and impingement. Since the water in the Refueling Canal and the Spent Fuel Pool is not in motion, Erosion is not a potential ARDM for the containment penetrations exposed to water (Fuel Transfer Tube).	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5

Potential ARDM List (Revision 1)

SYSTEM: Containment System 059

EQUIPMENT TYPE: PEN

Date: May 1996

ARDM	POTENTIAL (YES/NO)	DESCRIPTION/JUSTIFICATION	SOURCE
Erosion/Corrosion	No	NOT Applicable to Equipment Type. Erosion/Corrosion occurs under high-velocity conditions when the fluid flowing over the metal is corrosive to the metal. Erosion is attributed to the removal of protective surface films on a metal by mechanical action of a fluid or particulate matter. Since the water in the Refueling Canal and in the Spent Fuel Pool is neither high-velocity or corrosive, Erosion/Corrosion is not a potential ARDM for the containment penetrations exposed to water.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Neutron Embrittlement	No	NOT Applicable to Equipment Type. Neutron Embrittlement is not a potential ARDM for the containment penetrations since they are located outside the primary shield and are exposed to neutron fluences considerably less than 1E18 n/cm^2.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Thermal Aging	Yes	Thermal aging is a potential ARDM for steels subjected to elevated temperatures for long periods of time. Since some containment penetrations are exposed to elevated temperatures for extended periods, Thermal Aging is a potential ARDM.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Hydrogen Damage	Yes	Hydrogen damage can occur with only a few parts per million hydrogen, which can occur from the fabricating process or inservice corrosion reactions. For hydrogen damage to occur, stainless steels must be exposed to many times the levels that could damage carbon steels. Hydrogen damage is a potential ARDM for containment penetrations exposed to water.	REF. 2 REF. 3 REF. 4 REF. 5

Potential ARDM List (Revision 1)

SYSTEM: Containment System 059

EQUIPMENT TYPE: PEN

Date: May 1996

ARDM	POTENTIAL (YES/NO)	DESCRIPTION/JUSTIFICATION	SOURCE
Low Cycle Fatigue	Yes	Structural deterioration can occur as the result of repeated stress/strain cycles caused by fluctuating loads and temperatures. When cyclic loads are such that significant plastic strain occurs in the highly-stressed regions, the material damage is said to have been caused by low cycle fatigue. Since the containment penetrations are subjected to both stress and thermal cycles, Low Cycle Fatigue is a potential ARDM.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
High Cycle Fatigue	No	NOT Applicable to Equipment Type. Since the containment penetrations will not be subjected to either high stress or high thermal cycles (>10E5 cycles), High Cycle Fatigue is not a potential ARDM.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Wear	No	NOT Applicable to Equipment Type. Since there is no relative motion between the penetrations and the Containment or Auxiliary Building, wear is not a potential ARDM.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Creep	No	NOT Applicable to Equipment Type. Creep is not a potential ARDM for containment penetrations. The containment penetrations are not exposed to the required temperature range (>1000°F) that would perpetuate this ARDM.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5

Potential ARDM List (Revision 1)

SYSTEM: Containment System 059

EQUIPMENT TYPE: PEN

Date: May 1996

ARDM	POTENTIAL (YES/NO)	DESCRIPTION/JUSTIFICATION	SOURCE
Electrical Stresses	No	NOT Applicable to Equipment Type. Electrical stresses are induced in the insulating material used in the fabrication of electrical and electromechanical parts and components. Since the containment penetrations have no electrical parts involved with maintaining a pressure boundary or rated fire barrier, Electrical stresses are not a potential ARDM.	REF. 2 REF. 3 REF. 4 REF. 5
Stress Relaxation	Yes	Stress Relaxation is unloading of preloaded components caused by long term exposure of materials to elevated temperature and/or neutron irradiation. Stress relaxation is a potential ARDM for components with substantial preload. Since some containment penetrations (Fuel Transfer Tube) have bolted flange connections, Stress Relaxation is a potential ARDM.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Elevated Temperature	Yes	Elevated temperatures can cause a reduction in yield strength and a reduction of the modulus of elasticity in steels. Therefore, since some containment penetrations are exposed to elevated temperatures, Elevated Temperature is a potential ARDM.	REF. 1

Potential ARDM List (Revision 1)

SYSTEM: Containment System 059

EQUIPMENT TYPE: PEN

Date: May 1996

ARDM	POTENTIAL (YES/NO)	DESCRIPTION/JUSTIFICATION	SOURCE

REF. 1: EPRI TR-103835, Pressurized Water Reactor Containment Structures, License Renewal Industry Report, Rev. 1, 7/94.

REF. 2: DG-1009, USNRC Draft Regulatory Guide - Standard Format and Content of Technical Information for Applications to Renew Nuclear Power Plant Operating Licenses, 12/90.

REF. 3: EPRI TR-103842, Class I Structures License Renewal Industry Report, Rev. 1, 7/94.

REF. 4: Component Life Estimation:LWR Structural Materials Degradation Mechanisms - EPRI NP-5461, Project Report 2643-5, 9/87.

REF. 5: EPRI TR-103838, Pressurized Water Reactor Pressure Vessel Internals License Renewal Industry Report, Rev. 1, 7/94.

Attachment 3 **Component Grouping Summary Sheet (Revision 1)** Date: **May 1996**

SYSTEM: **Containment 059**

GROUP ID NUMBER: 059-PEN-01

GROUP ATTRIBUTES:

1. Device Type: Containment Electrical Penetrations (Long-Lived EQ)
2. Vendor: Bunker-Ramo Corp. (Amphenol Space and Missile Systems Division) or Conax Corp.
3. Model Number: NA
4. Material: ASME SA516 Gr. 70 (Carbon Steel)

   ASME SA106B (Carbon Steel)

   ASME SA240,TPYE 304 (Stainless Steel)

   ASME SA312,TYPE 304 (Stainless Steel)

   Non-Metallic Materials:

   Epoxy

   Sealants (i.e., Polysulfone)

   Adhesives
5. Internal Environment: General Containment Environment
6. External Environment: General Auxilairy Building Environment
7. Function: 1) Maintain Containment Pressure Boundary

   2) Maintain Electrical Functionality per EQ Program
8. Name Plate Data:

PARAMETER	VALUE

LIST OF GROUPED COMPONENTS (EQUIPMENT ID):

See page 2 for listing

Equipment ID	Qual Number
1PEN1ZEA4	EPA004
1PEN1ZEA5	EPA004
1PEN1ZEA7	EPA004
1PEN1ZEB1	EPA010
1PEN1ZEB2	EPA004
1PEN1ZEB3	EPA004
1PEN1ZEC1	EPA004
1PEN1ZEC4	EPA004
1PEN1ZEC6	EPA004
1PEN1ZEC9	EPA004
1PEN1ZED1	EPA010
1PEN1ZED2	EPA010
1PEN1ZED6	EPA010
1PEN1ZED7	EPA010
1PEN1ZED8	EPA004
1PEN1ZEE1	EPA004
1PEN1ZEE3	EPA004
1PEN1ZEE4	EPA004
1PEN1ZEE9	EPA004
1PEN1ZWA3	EPA010
1PEN1ZWA6	EPA010
1PEN1ZWB2	EPA004
1PEN1ZWC1	EPA004
1PEN1ZWC4	EPA004
1PEN1ZWC6	EPA004
1PEN1ZWD3	EPA004
1PEN1ZWD4	EPA004
1PEN1ZWD6	EPA010
1PEN1ZWD8	EPA004
1PEN1ZWE1	EPA004
1PEN1ZWE2	EPA004
1PEN1ZWE3	EPA010
1PEN1ZWE4	EPA010
1PEN1ZWE6	EPA010
1PEN1ZWE9	EPA010
2PEN2ZEA4	EPA004
2PEN2ZEA7	EPA004
2PEN2ZEB1	EPA004
2PEN2ZEB3	EPA004
2PEN2ZEC1	EPA004
2PEN2ZEC4	EPA004
2PEN2ZEC6	EPA004
2PEN2ZEC9	EPA004
2PEN2ZED1	EPA010
2PEN2ZED2	EPA010
2PEN2ZED6	EPA010
2PEN2ZED7	EPA010
2PEN2ZED8	EPA004
2PEN2ZEE1	EPA004
2PEN2ZEE3	EPA004
2PEN2ZEE4	EPA004
2PEN2ZEE9	EPA004
2PEN2ZWA3	EPA004
2PEN2ZWA6	EPA004
2PEN2ZWB1	EPA004
2PEN2ZWB2	EPA004
2PEN2ZWC1	EPA004
2PEN2ZWC4	EPA004
2PEN2ZWC6	EPA004
2PEN2ZWD3	EPA004
2PEN2ZWD4	EPA004
2PEN2ZWD6	EPA010
2PEN2ZWD8	EPA004
2PEN2ZWE1	EPA004
2PEN2ZWE2	EPA004
2PEN2ZWE3	EPA010
2PEN2ZWE5	EPA010
2PEN2ZWE6	EPA010
2PEN2ZWE9	EPA010

Attachment 3 **Component Grouping Summary Sheet (Revision 1)** Date: **May 1996**

SYSTEM: **Containment 059**

GROUP ID NUMBER: 059-PEN-02

GROUP ATTRIBUTES:

1. Device Type: Containment Electrical Penetrations (Non-EQ)
2. Vendor: Bunker-Ramo Corp. (Amphenol Space and Missile Systems Division).
3. Model Number: NA
4. Material: ASME SA516 Gr. 70 (Carbon Steel)

   ASME SA106B (Carbon Steel)

   ASME SA240,TPYE 304 (Stainless Steel)

   ASME SA312,TYPE 304 (Stainless Steel)

   Non-Metallic Materials:

   Epoxy

   Sealants (i.e., Polysulfone)

   Adhesives
5. Internal Environment: General Containment Environment
6. External Environment: General Auxilairy Building Environment
7. Function: Maintain Containment Pressure Boundary
8. Name Plate Data:

PARAMETER	VALUE

LIST OF GROUPED COMPONENTS (EQUIPMENT ID):

See page 2 for listing

Equipment ID	Equipment ID	Equipment ID
1PEN1ZEA1	1PEN1ZWD1	2PEN2ZEE7
1PEN1ZEA2	1PEN1ZWD2	2PEN2ZEE8
1PEN1ZEA9	1PEN1ZWD5	2PEN2ZWA1
1PEN1ZEB4	1PEN1ZWD7	2PEN2ZWA8
1PEN1ZEB5	1PEN1ZWD9	2PEN2ZWA9
1PEN1ZEB6	1PEN1ZWE5	2PEN2ZWB7
1PEN1ZEC2	1PEN1ZWE7	2PEN2ZWB8
1PEN1ZEC7	1PEN1ZWE8	2PEN2ZWC3
1PEN1ZED3	2PEN2ZEA1	2PEN2ZWC9
1PEN1ZED4	2PEN2ZEA2	2PEN2ZWD1
1PEN1ZED5	2PEN2ZEA5	2PEN2ZWD2
1PEN1ZEE2	2PEN2ZEA9	2PEN2ZWD3
1PEN1ZEE5	2PEN2ZEB2	2PEN2ZWD4
1PEN1ZEE6	2PEN2ZEB4	2PEN2ZWD5
1PEN1ZEE7	2PEN2ZEB5	2PEN2ZWD6
1PEN1ZEE8	2PEN2ZEB6	2PEN2ZWD7
1PEN1ZWA1	2PEN2ZEC2	2PEN2ZWD8
1PEN1ZWA8	2PEN2ZEC7	2PEN2ZWD9
1PEN1ZWA9	2PEN2ZED3	2PEN2ZWE4
1PEN1ZWB1	2PEN2ZED4	2PEN2ZWE5
1PEN1ZWB7	2PEN2ZED5	2PEN2ZWE6
1PEN1ZWB8	2PEN2ZEE2	2PEN2ZWE7
1PEN1ZWC3	2PEN2ZEE5	2PEN2ZWE8
1PEN1ZWC9	2PEN2ZEE6	2PEN2ZWE9

Attachment 3 **Component Grouping Summary Sheet (Revision 1)** Date: **May 1996**

SYSTEM: **Containment 059**

GROUP ID NUMBER: 059-PEN-03

GROUP ATTRIBUTES:

1. Device Type: Containment Mechanical Penetrations and Spare Penetrations
2. Vendor: Chicago Bridge & Iron
3. Model Number: NA
4. Material: ASME SA516 Gr. 70 (Carbon Steel)
   ASME SA106B (Carbon Steel)
   ASME SA36 (Carbon Steel)
   ASTM A108 (Carbon Steel)
5. Internal Environment: General Containment Environment
6. External Environment: General Auxiliary Building Environment
7. Function: Maintain Containment Pressure Boundary
8. Name Plate Data:

PARAMETER	VALUE

LIST OF GROUPED COMPONENTS (EQUIPMENT ID):

See pages 2 through 5 for listing

Equipment ID	Equipment Description
1PEN10	CTMT SPRAY WATER
1PEN13	PURGE AIR INLET
1PEN14	PURGE AIR OUTLET
1PEN15	CTMT ATMOSPHERE AND PURGE
1PEN16	COMPONENT COOLING WATER
1PEN17A	STEAM GEN. NO. 12 BLOWDOWN
1PEN17B	STEAM GEN. NO. 12 BLOWDOWN
1PEN18	COMPONENT COOLING WATER
1PEN19A	INSTRUMENT AIR
1PEN19B	PLANT AIR
1PEN 1A	REACTOR COOLANT & PRESS SAMPLING
1PEN1B	RC DRAIN TANK 11 VENT HEAD
1PEN1C	REACTOR COOLANT PUMP SEAL
1PEN1D	POST-ACCIDENT SAMPLING
1PEN1ZEA3	CTMT SPARE PENETRATION
1PEN1ZEA6	CTMT SPARE PENETRATION
1PEN1ZEA8	CTMT SPARE PENETRATION
1PEN1ZEB7	CTMT SPARE PENETRATION
1PEN1ZEB8	CTMT SPARE PENETRATION
1PEN1ZEB9	CTMT SPARE PENETRATION
1PEN1ZEC3	CTMT SPARE PENETRATION
1PEN1ZEC5	CTMT SPARE PENETRATION
1PEN1ZEC8	CTMT SPARE PENETRATION
1PEN1ZED1	CTMT SPARE PENETRATION
1PEN1ZED9	CTMT SPARE PENETRATION
1PEN1ZWA2	CTMT SPARE PENETRATION
1PEN1ZWA4	CTMT SPARE PENETRATION
1PEN1ZWA5	CTMT SPARE PENETRATION
1PEN1ZWA7	CTMT SPARE PENETRATION
1PEN1ZWB3	CTMT SPARE PENETRATION
1PEN1ZWB4	CTMT SPARE PENETRATION
1PEN1ZWB5	CTMT SPARE PENETRATION
1PEN1ZWB6	CTMT SPARE PENETRATION
1PEN1ZWB9	CTMT SPARE PENETRATION
1PEN1ZWC2	CTMT SPARE PENETRATION
1PEN1ZWC5	CTMT SPARE PENETRATION
1PEN1ZWC7	CTMT SPARE PENETRATION
1PEN1ZWC8	CTMT SPARE PENETRATION
1PEN20A	N2 SUPPLY TO SAFETY INJECTION
1PEN20B	NITROGEN SUPPLY TO RC DRAIN
1PEN20C	N2 SUPPLY TO STEAM GEN
1PEN21	AUX FEEDWATER TO STEAM GEN
1PEN22	AUX FEEDWATER TO STEAM GEN
1PEN23	DRAINS FROM REACTOR COOLANT
1PEN24	OXYGEN SAMPLE LINE
1PEN25	SERVICE WATER PENETRATION PPG
1PEN26	SERVICE WATER PENETRATION PPG
1PEN27	SERVICE WATER PENETRATION PPG
1PEN28	SERVICE WATER PENETRATION PPG
1PEN29	SERVICE WATER PENETRATION PPG
1PEN2A	LETDOWN LINE

Equipment ID	Equipment Description
1PEN2B	REACTOR COOLANT CHARGING
1PEN3	SAFETY INJECTION
1PEN30	SERVICE WATER PENETRATION PPG
1PEN31	SERVICE WATER PENETRATION PPG
1PEN32	SERVICE WATER PENETRATION PPG
1PEN33	MAIN FEEDWATER
1PEN34	MAIN FEEDWATER
1PEN35	MAIN STEAM
1PEN36	MAIN STEAM
1PEN37	PLANT SERVICE WATER
1PEN38	DEMINERALIZED WATER
1PEN39	SAFETY INJECTION
1PEN4	SAFETY INJECTION
1PEN40	SPARE
1PEN41	REACTOR COOLANT SHUTDOWN
1PEN42	FUEL TRANSFER TUBE
1PEN43A	STEAM GENERATOR BLOWDOWN
1PEN43B	STEAM GENERATOR BLOWDOWN
1PEN44	FIRE PROTECTION
1PEN45	SPARE
1PEN46	SPARE
1PEN47A	HYDROGEN SAMPLING
1PEN47B	HYDROGEN SAMPLING
1PEN47C	HYDROGEN SAMPLING
1PEN47D	HYDROGEN SAMPLING
1PEN48A	CTMT HYDROGEN PURGE
1PEN48B	CTMT HYDROGEN PURGE
1PEN49A	HYDROGEN SAMPLE
1PEN49C	HYDROGEN SAMPLE
1PEN49D	SPARE
1PEN5	SAFETY INJECTION
1PEN50	ILRT PENETRATION
1PEN51	SPARE
1PEN52	SPARE
1PEN57	SPARE
1PEN58	SPARE
1PEN59	REFUELING POOL RECYCLE
1PEN6	SAFETY INJECTION
1PEN60	STEAM TO REACTOR HEAD
1PEN61	REFUELING POOL OUTLET
1PEN62	CTMT PLANT HEATING
1PEN63	SPARE
1PEN64	CTMT PLANT HEATING
1PEN70	LINER PLATE GROUND PENETRATION
1PEN71	LINER PLATE GROUND PENETRATION
1PEN72	CTMT PRESSURE MONITOR
1PEN73	SPARE
1PEN74	SPARE
1PEN75	SPARE
1PEN76	SPARE
1PEN77	CTMT PRESSURE MONITOR
1PEN78	CTMT PRESSURE MONITOR
1PEN79	SPARE
1PEN7A	ILRT PENETRATION
1PEN7B	ILRT PENETRATION
1PEN80	SPARE
1PEN81	SPARE
1PEN82	SPARE
1PEN83	CTMT PRESSURE MONITOR
1PEN9	CTMT SPRAY WATER
2PEN10	CTMT SPRAY WATER
2PEN13	PURGE AIR INLET
2PEN14	PURGE AIR OUTLET
2PEN15	CTMT ATMOSHPERE AND PURGE
2PEN16	COMPNENT COOLING WATER
2PEN17A	STEAM GEN. NO. 12 BLOWDOWN
2PEN17B	STEAM GEN. NO. 12 BLOWDOWN
2PEN18	COMPONENT COOLING WATER
2PEN19A	INSTRUMENT AIR
2PEN19B	PLANT AIR
2PEN 1A	REACTOR COOLANT & PRESS SAMPLING

Equipment ID	Equipment Description
2PEN1B	RC DRAIN TANK 11 VENT HEAD
2PEN1C	REACTOR COOLANT PUMP SEAL
2PEN1D	POST-ACCIDENT SAMPLING
2PEN20A	N2 SUPPLY TO SAFETY INJECTION
2PEN20B	NITROGEN SUPPLY TO RC DRAIN
2PEN20C	N2 SUPPLY TO STEAM GEN
2PEN21	AUX FEEDWATER TO STEAM GEN
2PEN22	AUX FEEDWATER TO STEAM GEN
2PEN23	DRAINS FROM REACTOR COOLANT
2PEN24	OXYGEN SAMPLE LINE
2PEN25	SERVICE WATER PENETRATION PPG
2PEN26	SERVICE WATER PENETRATION PPG
2PEN27	SERVICE WATER PENETRATION PPG
2PEN28	SERVICE WATER PENETRATION PPG
2PEN29	SERVICE WATER PENETRATION PPG
2PEN2A	LETDOWN LINE
2PEN2B	REACTOR COOLANT CHARGING
2PEN2ZEA3	CTMT SPARE PENETRATION
2PEN2ZEA6	CTMT SPARE PENETRATION
2PEN2ZEA8	CTMT SPARE PENETRATION
2PEN2ZEB7	CTMT SPARE PENETRATION
2PEN2ZEB8	CTMT SPARE PENETRATION
2PEN2ZEB9	CTMT SPARE PENETRATION
2PEN2ZEC3	CTMT SPARE PENETRATION
2PEN2ZEC5	CTMT SPARE PENETRATION
2PEN2ZEC8	CTMT SPARE PENETRATION
2PEN2ZED1	CTMT SPARE PENETRATION
2PEN2ZED9	CTMT SPARE PENETRATION
2PEN2ZWA2	CTMT SPARE PENETRATION
2PEN2ZWA4	CTMT SPARE PENETRATION
2PEN2ZWA5	CTMT SPARE PENETRATION
2PEN2ZWA7	CTMT SPARE PENETRATION
2PEN2ZWB3	CTMT SPARE PENETRATION
2PEN2ZWB4	CTMT SPARE PENETRATION
2PEN2ZWB5	CTMT SPARE PENETRATION
2PEN2ZWB6	CTMT SPARE PENETRATION
2PEN2ZWB9	CTMT SPARE PENETRATION
2PEN2ZWC2	CTMT SPARE PENETRATION
2PEN2ZWC5	CTMT SPARE PENETRATION
2PEN2ZWC7	CTMT SPARE PENETRATION
2PEN2ZWC8	CTMT SPARE PENETRATION
2PEN3	SAFETY INJECTION
2PEN30	SERVICE WATER PENETRATION PPG
2PEN31	SERVICE WATER PENETRATION PPG
2PEN32	SERVICE WATER PENETRATION PPG
2PEN33	MAIN FEEDWATER
2PEN34	MAIN FEEDWATER
2PEN35	MAIN STEAM
2PEN36	MAIN STEAM
2PEN37	PLANT SERVICE WATER
2PEN38	DEMINERALIZED WATER
2PEN39	SAFETY INJECTION
2PEN4	SAFETY INJECTION
2PEN40	SPARE

Equipment ID	Equipment Description
2PEN41	REACTOR COOLANT SHUTDOWN
2PEN42	FUEL TRANSFER TUBE
2PEN43A	STEAM GENERATOR BLOWDOWN
2PEN43B	STEAM GENERATOR BLOWDOWN
2PEN44	FIRE PROTECTION
2PEN45	SPARE
2PEN46	SPARE
2PEN47A	HYDROGEN SAMPLING
2PEN47B	HYDROGEN SAMPLING
2PEN47C	HYDROGEN SAMPLING
2PEN47D	HYDROGEN SAMPLING
2PEN48A	CTMT HYDROGEN PURGE
2PEN48B	CTMT HYDROGEN PURGE
2PEN49A	HYDROGEN SAMPLE
2PEN49C	HYDROGEN SAMPLE
2PEN49D	SPARE
2PEN5	SAFETY INJECTION
2PEN50	ILRT PENETRATION
2PEN51	SPARE
2PEN52	SPARE
2PEN57	SPARE
2PEN58	SPARE
2PEN59	REFUELING POOL RECYCLE
2PEN6	SAFETY INJECTION
2PEN60	STEAM TO REACTOR HEAD
2PEN61	REFUELING POOL OUTLET
2PEN62	CTMT PLANT HEATING
2PEN63	SPARE
2PEN64	CTMT PLANT HEATING
2PEN70	LINER PLATE GROUND PENETRATION
2PEN71	LINER PLATE GROUND PENETRATION
2PEN72	CTMT PRESSURE MONITOR
2PEN73	SPARE
2PEN74	SPARE
2PEN75	SPARE
2PEN76	SPARE
2PEN77	CTMT PRESSURE MONITOR
2PEN78	CTMT PRESSURE MONITOR
2PEN79	SPARE
2PEN7A	ILRT PENETRATION
2PEN7B	ILRT PENETRATION
2PE80	SPARE
2PEN81	SPARE
2PEN82	SPARE
2PEN83	CTMT PRESSURE MONITOR
2PEN9	CTMT SPRAY WATER

Note: The containment normal sump drain header penetrations (1/2PEN8) are not included in this group. These penetrations have no carbon steel sleeve which contributes to maintaining the pressure boundary function. For this penetration, the pressure retaining components are the welds for the containment sump liner (addressed in the Containment Structure Report) and the sump drain pipe itself (addressed in the Containment Isolation Only Systems AMR Report).

Attachment 3 **Component Grouping Summary Sheet (Revision 1)** Date: **May 1996**

SYSTEM: **Containment 059**

GROUP ID NUMBER: 059-PEN-04

GROUP ATTRIBUTES:

1. Device Type: Fuel Transfer Tube
2. Vendor: KELLOGG
3. Model Number: NA
4. Material: ASME SA240,TYPE 304 (Stainless Steel)
   ASME SA312,TYPE 304 (Stainless Steel)
5. Internal Environment: Containment Refueling Pool Environment
6. External Environment: Auxiliary Building Spent Fuel Pool Environment
7. Function: Maintain Containment Pressure Boundary
8. Name Plate Data:

PARAMETER	VALUE

LIST OF GROUPED COMPONENTS (EQUIPMENT ID):

Fuel Transfer Tube

Attachment 3 **Component Grouping Summary Sheet (Revision 1)** Date: **May 1996**

SYSTEM: **Containment 059**

GROUP ID NUMBER: 059-PEN-05

GROUP ATTRIBUTES:

1. Device Type: Containment Sump Recirc Penetrations
2. Vendor: VELAN
3. Model Number: NA
4. Material: ASME SA240,TYPE 316 (Stainless Steel)

   Inconel Bellows
5. Internal Environment: General Auxiliary Building Environment
6. External Environment: General Auxiliary Building Environment
7. Function: Maintain Containment Pressure Boundary This encapsulation serves to make the sump isolation valve inboard of the containment boundary. It would capture any leakage from the isolation valve or piping.
8. Name Plate Data:

PARAMETER	VALUE

LIST OF GROUPED COMPONENTS (EQUIPMENT ID):

1PEN11 (1XJ15)	1PEN12 (1XJ16)
2PEN11 (2XJ15)	2PEN12 (2XJ16)

Note:

1. In NUCLEIS the components identified as 1XJ15, 1XJ16, 2XJ15 and 2XJ16 (expansion joints) are actually part of the containment penetrations identified above. These XJs are included in the Safety Injection System in NUCLEIS but are evaluated in this AMR. Valves 1HVSI-1090, 1HVSI-1090A, 2HVSI-1090 and 2HVSI-1090A, which isolate the drains from these encapsulation devices, are evaluated in the Safety Injection System AMR.

ARDM Matrix (Revision 1)

SYSTEM NUMBER: 059 SYSTEM NAME: Containment System

EQUIPMENT TYPE: PEN

DEVICE TYPE: Containment Penetrations

GROUP ID : As Noted Date: May 1996

	GROUP OR SUB GROUP ID			
ARDMs	059-PEN-02	059-PEN-03	059-PEN-04	059-PEN-05
General Corrosion/Oxidation	A	A	8	8
Pitting/Crevice Corrosion	1	1	1	1
Irradiation and Irradiation-Assisted Stress Corrosion Cracking (IASCC)	2	2	2	2
SCC/IGSCC/IGA	3	3	3	3
MIC	4	4	4	4
Thermal Aging	5	5	5	5
Hydrogen Damage	6	6	6	6
Low Cycle Fatigue	7	7	7	7
Stress Relaxation	9	9	9	9
Elevated Temperature	10	10	10	10

Matrix Code List (Revision 1)

SYSTEM NUMBER: 059 SYSTEM NAME: Containment System

DEVICE TYPE: Containment Penetrations

GROUP ID: 059-PEN-02, 03, 04, 05 Date: May 1996

CODE	DESCRIPTION	SOURCE
A	General Corrosion/Oxidation is a PLAUSIBLE ARDM for Containment Penetrations due to the following: 1) The containment carbon steel penetrations are exposed to the environment of the containment and auxiliary building and corrosion could occur in the presence of moisture and oxygen if their coated surfaces are not maintained by an effective coating management program. 2) Some penetrations have fluids passing through at temperatures that could cause condensation, which, in the presence of oxygen, could lead to oxidation. 3) Some penetrations could have elevated temperatures, which do not affect the penetration but may cause the coatings to fail, allowing oxidation to occur. 4) A walkdown of selected Containment Penetrations, in April 1995, noted that some penetrations in Unit-2 have indications of rust/scale/corrosion inside the containment. Issue Report IR1-005-351 was written to address this situation. The effects of general corrosion/oxidation would be eventual loss of carbon steel sleeve material and inability of the penetration to form the required pressure boundary. This ARDM can be detected visually well before loss of material occurs to the extent that intended function would be affected. Therefore, General Corrosion/Oxidation can be managed by visual examination of Containment Penetration coated surfaces both in containment and outside containment.	REF. 1 REF. 2 REF. 3 REF. 4

Matrix Code List (Revision 1)

SYSTEM NUMBER: 059 SYSTEM NAME: Containment System

DEVICE TYPE: Containment Penetrations

GROUP ID: 059-PEN-02, 03, 04, 05 Date: May 1996

CODE	DESCRIPTION	SOURCE
1	Pitting/Crevice Corrosion is not a PLAUSIBLE ARDM for containment penetrations, due to the following: 1) Only the Fuel Transfer Tube penetration is a wetted surface. Therefore, Pitting/Crevice Corrosion is not PLAUSIBLE for all other containment penetrations. 2) The amount of oxygen, chlorides and copper ions in the surrounding fluid (Spent Fuel Pool and Refueling Canal water) is not sufficient to perpetuate Pitting/Crevice corrosion in the Fuel Transfer Tube. 3) Due to strict water control, the Fuel Transfer Tube could not experience localized build up of debris (e.g. crud), which is required for this type of corrosion, 4) A visual examination of the Refueling Canal Liner, which experiences the same water environment as the Fuel Transfer Canal, was performed in June 1992 and noted that "the stainless steel liner appeared to be in good condition 5) A visual examination of the Fuel Transfer Tube from the Refueling Canal in April 1995, verified that there were no indications of corrosion.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
2	Irradiation and Irradiation-Assisted Stress Corrosion Cracking are not PLAUSIBLE ARDMs for containment penetrations, due to the following: 1) The cumulative radiation exposure experienced by the containment penetrations throughout the license renewal term is far below the level of 2E17 neutrons/cm^2 (> 1MeV) which could cause a change in mechanical or physical properties	REF. 1

Matrix Code List (Revision 1)

SYSTEM NUMBER: 059 SYSTEM NAME: Containment System

DEVICE TYPE: Containment Penetrations

GROUP ID: 059-PEN-02, 03, 04, 05 Date: May 1996

CODE	DESCRIPTION	SOURCE
3	SCC, IGSCC and IGA are not plausible ARDMs for the Fuel transfer Tube, containment sump recirc penetrations and other containment penetrations with stainless steel components (electrical penetrations), due to the following: 1) Specification 6750-M-254, Shop Fabricated Nuclear Carbon and Austenitic Steel Piping and Pipe Supports, which governs the fabrication of the Fuel Transfer Tube, specifically limits the weld interpass temperatures to 350°F to "limit distortion and sensitized areas". 2) The containment electrical penetrations are not exposed to water or moisture. 3) Insignificant tensile stresses occur in the Fuel Transfer Tube and electrical penetration stainless steel materials. 4) A lack of an aggressive environment. The normal water in the Refueling Canal and Spent Fuel Pool water is quite benign to stainless steel. 5) Very little field welding was performed on the Fuel Transfer Tube. Welders and welding was strictly controlled per ASME Section IX requirements. 6) Per Ref. 4, "for temperatures below 200°F, IGSCC is not a great concern for austenitic stainless steels in oxidizing water environments in the absence of chlorides and sulfates". The maximum normal temperature of the Spent Fuel Pool is less than 130°F (UFSAR Section 9.4.1). 7) There is no history of excessive leakage of the Fuel Transfer Tubes at CCNPP. SCC, IGSCC and IGA are not plausible ARDMs for the carbon steel containment penetrations because they are not wetted surfaces and they are subjected to very low stress levels.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5

Matrix Code List (Revision 1)

SYSTEM NUMBER: 059 SYSTEM NAME: Containment System

DEVICE TYPE: Containment Penetrations

GROUP ID: 059-PEN-02, 03, 04, 05 Date: May 1996

CODE	DESCRIPTION	SOURCE
4	MIC is not a plausible ARDM for the Fuel transfer Tube, due to the following: 1) Insignificant tensile stresses occur in the Fuel Transfer Tube stainless steel materials. 2) A lack of an aggressive environment. The Refueling Canal and Spent Fuel Pool water chemistry is very tightly controlled and is benign to stainless steel. 3) CCNPP has no history of damage to stainless steel material from MIC. 4) The Refueling Canal is only filled with water during outages. The majority of the time, the Fuel Transfer Tube is dry and MIC would not be possible in the internals and in the areas located in the Refueling Canal. 5) A visual examination of the Refueling Canal Liner, which experiences the same water environment as the Fuel Transfer Tube, was performed in June 1992 and noted that "the stainless steel liner appeared to be in good condition". 6) A visual examination of the Fuel Transfer Tube was performed in April 1995 and noted that "All areas visible looked free from damage/corrosion. Blind flange removed and installed in rack. No damage/corrosion to blind flange/studs securing flange in rack". MIC is not a plausible ARDM for the carbon steel containment penetrations, electrical penetrations and stainless steel containment sump recirc penetrations because they are not wetted surfaces and are subject to low stress levels.	REF. 2 REF. 3 REF. 4 REF. 5
5	Thermal Aging is not a PLAUSIBLE ARDM for containment penetrations, due to the following: 1) Normal operating temperatures within PWR containment structures are between 120° F and 150° F which are well below the 700° F level at which the structural integrity of steel begins to be significantly affected. Additionally, even if local areas of containment penetrations should experience elevated temperatures, the highest fluid temperature in any process pipe is still well below 700° F.	REF. 1

Matrix Code List (Revision 1)

SYSTEM NUMBER: 059 SYSTEM NAME: Containment System

DEVICE TYPE: Containment Penetrations

GROUP ID: 059-PEN-02, 03, 04, 05 Date: May 1996

CODE	DESCRIPTION	SOURCE
6	Hydrogen Damage is not a PLAUSIBLE ARDM for Fuel Transfer Tube, due to the following: 1)) Insignificant tensile stresses occur in the Fuel Transfer Tube stainless steel material. 2) A lack of an aggressive environment. The normal Refueling Canal water chemistry is very tightly controlled and is quite benign to stainless steels. The amount of hydrogen in the surrounding fluid is not sufficient to perpetuate Hydrogen Damage. 3) CCNPP has no history of damage to stainless steel material from Hydrogen Damage. 4) The Refueling Canal is only filled with water during outages. The majority of the time, the Fuel Transfer Tube is dry and Hydrogen Damage would not be possible and if any damage did begin it could not perpetuate . 5) A visual examination of the Refueling Canal Liner, which experiences the same water environment as the Fuel Transfer Tube, was performed in June 1992 and noted that "the stainless steel liner appeared to be in good condition". 6) A visual examination of the Fuel Transfer Tube was performed in April 1995 and noted that "All areas visible looked free from damage/corrosion. Blind flange removed and installed in rack. No damage/corrosion to blind flange/studs securing flange in rack". Hydrogen Damage is not a plausible ARDM for the carbon steel containment penetrations, electrical penetrations and stainless steel containment sump recirc penetrations because they are not wetted surfaces and are subject to low stress levels.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5

Matrix Code List (Revision 1)

SYSTEM NUMBER: 059 SYSTEM NAME: Containment System

DEVICE TYPE: Containment Penetrations

GROUP ID: 059-PEN-02, 03, 04, 05 Date: May 1996

CODE	DESCRIPTION	SOURCE
7	Low Cycle Fatigue is not a PLAUSIBLE ARDM for containment penetrations, due to the following: 1) Containment penetrations are designed to have good fatigue strength properties (1E5 cycles) of below yield load in accordance with ASME Section III. 2) Containment penetrations are not exposed to any cyclic thermal or pressure loading since they are only exposed to normal containment temperature variations and are not pressurized. Potential low-cycle fatigue due to localized elevated temperatures are not anticipated to be significant. 3) Containment penetrations with high temperature process piping (i.e. Main Steam and Feedwater) are keep below 120°F by penetration coolers. 4) Containment penetrations are designed such that their stresses are well below the plastic range.	REF. 1 REF. 5
8	General Corrosion/Oxidation is not a PLAUSIBLE ARDM for the Fuel Transfer Tube and the containment sump recirc penetrations because these penetrations are fabricated from stainless steel and Inconel.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5

Matrix Code List (Revision 1)

SYSTEM NUMBER: 059 SYSTEM NAME: Containment System

DEVICE TYPE: Containment Penetrations

GROUP ID: 059-PEN-02, 03, 04, 05 Date: May 1996

CODE	DESCRIPTION	SOURCE
9	Stress Relaxation is not a PLAUSIBLE ARDM for containment penetrations, due to the following: 1) The Fuel Transfer Tube flange bolts are not exposed to high temperature or high radiation. 2) The Fuel Transfer Tube flange bolts are removed and reinstalled during each outage. 3) The Fuel Transfer Tube bolting flange is oriented such that the water pressure in the Refueling Canal would always put the flange seals in compression. Therefore any slight relaxation of bolting pre-load would probably not cause any leakage. 4) The only external loading on the Fuel Transfer Tube flange bolts is the water head in the Refueling Canal, which is insignificant. 5) The containment sump recirc penetration bolted joints are not exposed to the high temperatures and radiation levels required for stress relaxation to occur for stainless steel and carbon steel. Additionally, these joints are not subject to any cyclic thermal or pressure loads and are subject to low stress levels under normal operations because the joints are not pressurized. 6) The carbon steel containment penetrations and electrical penetrations have no bolted components.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
10	Elevated Temperature is not a PLAUSIBLE ARDM for the containment penetrations, due to the following: 1) Normal operating temperatures within PWR containment structures are between 120° F and 150° F which are well below the 700° F level at which the structural integrity of steel begins to be significantly affected. Additionally, even if local areas of containment penetrations should experience elevated temperatures, the highest fluid temperature in any process pipe is still well below 700° F.	REF. 1

Matrix Code List (Revision 1)

SYSTEM NUMBER: 059 SYSTEM NAME: Containment System

DEVICE TYPE: Containment Penetrations

GROUP ID: 059-PEN-02, 03, 04, 05 Date: May 1996

CODE	DESCRIPTION	SOURCE
	REF. 1: EPRI TR-103835, Pressurized Water Reactor Containment Structures, License Renewal Industry Report, Rev. 1, 7/94. REF. 2: DG-1009, USNRC Draft Regulatory Guide - Standard Format and Content of Technical Information for Applications to Renew Nuclear Power Plant Operating Licenses, 12/90 REF. 3: EPRI TR-103842, Class I Structures License Renewal Industry Report, Rev. 1, 7/94. REF. 4: Component Life Estimation: LWR Structural Materials Degradation Mechanisms - EPRI NP-5461, 9/87 REF. 5: EPRI TR-103838, Pressurized Water Reactor Pressure Vessel Internals License Renewal Industry Report, Rev. 1, 7/94.	

Potential ARDM List (Revision 1)

SYSTEM: Containment System 059

EQUIPMENT TYPE: 059-DOOR-01 Date: May 1996

ARDM	POTENTIAL (YES/NO)	DESCRIPTION/JUSTIFICATION	SOURCE
General Corrosion/ Oxidation	Yes	General Corrosion/Oxidation is the thinning of metal by chemical attack at the surface of the metal by an aggressive environment of moisture and oxygen. General Corrosion/Oxidation is a potential for low alloy and high alloy ferritic steels. General Corrosion/Oxidation is a potential ARDM for the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch, since they are fabricated from carbon steel.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Pitting/Crevice Corrosion	No	NOT Applicable to Equipment Type. Pitting/Crevice Corrosion occurs when surfaces of materials are wetted by the corrosive medium and are covered in localized areas with debris. Since the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch are not wetted surfaces, Pitting/Crevice Corrosion is not a potential ARDM.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Irradiation-Assisted Stress Corrosion Cracking (IASCC)	Yes	Steel degradation due to neutron irradiation results from the displacement of atoms from their normal lattice positions to form both interstitials and vacancies. The effect of this ARDM is to increase the yield strength, decrease the ultimate tensile ductility, and increase the ductile to brittle transition temperature. IASCC is an ARDM that can occur in stainless steels that are subjected to an environment conducive to corrosion cracking. IASCC can further accelerate the potential corrosion process. Since the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch are exposed to radiation, Irradiation and IASCC are potential ARDMs.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5

Potential ARDM List (Revision 1)

SYSTEM: Containment System 059

EQUIPMENT TYPE: 059-DOOR-01 Date: May 1996

ARDM	POTENTIAL (YES/NO)	DESCRIPTION/JUSTIFICATION	SOURCE
Stress Corrosion Cracking (SCC)/Intergranular Stress Corrosion Cracking (IGSCC)/Intergranular Attack (IGA)	No	NOT Applicable to Equipment Type. SCC/IGSCC/IGA are potential ARDMs for stainless steel components. IGSCC is SCC where the grain boundaries of a susceptible materials are cracked due to stress and an aggressive environment. IGA is similar to IGSCC except stress is not required for IGA. Initiation and propagation of SCC requires three factors to be present: (1) susceptible material, (2) a corrosive environment and (3) the presence of tensile stresses. The magnitude of the tensile stresses must exceed a threshold value before the ARDM can occur. A generally accepted value for the threshold stress is the yield stress of the material of construction. For austenitic stainless steels, SCC is potential if the PWR operating water chemistry shows the oxygen limit > 5ppb, the halogen limit > 150ppb and the stress levels are at or above the material yield strength. Since the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch are fabricated from carbon steel and are subjected to low tensile stresses, SSC, IGSCC, and IGA are not potential ARDMs.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Microbiologically Influenced Corrosion (MIC)	No	NOT Applicable to Equipment Type. MIC occurs in stagnant or low flow areas in systems that use untreated water in an operating temperature range of 50F to 120F. Since the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch are not submerged in water, MIC is not a potential ARDM.	REF. 2 REF. 3 REF. 4 REF. 5

Potential ARDM List (Revision 1)

SYSTEM: Containment System 059

EQUIPMENT TYPE: 059-DOOR-01

Date: May 1996

ARDM	POTENTIAL (YES/NO)	DESCRIPTION/JUSTIFICATION	SOURCE
Saline Water Attack	No	NOT Applicable to Equipment Type. The Containment Personnel Airlock, Emergency Airlock and Equipment Hatch are not susceptible to saline water attack. Saline water attack is only potential for re-inforced concrete structures. Since the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch are not fabricated from concrete, saline water attack is not a potential ARDM.	REF. 2 REF. 3 REF. 4 REF. 5
Erosion	No	NOT Applicable to Equipment Type. Erosion is not a potential ARDM for the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch. Erosion is attributed to the removal of protective surface films on a metal by mechanical action of a fluid or particulate matter. Erosion occurs under high-velocity conditions, turbulence and impingement. Since the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch are not exposed to water, Erosion is not a potential ARDM.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Erosion/Corrosion	No	NOT Applicable to Equipment Type. Erosion/Corrosion is not a potential ARDM for the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch. Erosion/Corrosion occurs under high-velocity conditions when the fluid flowing over the metal is corrosive to the metal. Erosion is attributed to the removal of protective surface films on a metal by mechanical action of a fluid or particulate matter. Since the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch are not exposed to water, Erosion is not a potential ARDM.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5

Potential ARDM List (Revision 1)

SYSTEM: Containment System 059

EQUIPMENT TYPE: 059-DOOR-01 Date: May 1996

ARDM	POTENTIAL (YES/NO)	DESCRIPTION/JUSTIFICATION	SOURCE
Neutron Embrittlement	No	NOT Applicable to Equipment Type. Neutron Embrittlement is not a potential ARDM for the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch, since all are located outside the primary shield and are exposed to neutron fluences considerably less than 1E18 n/cm^2.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Thermal Aging	No	NOT Applicable to Equipment Type. Thermal aging occurs in steels with high content of carbon and at temperature levels as low as 550°F. Since the temperature of the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch are ambient and well below the temperature threshold for damage, Thermal Aging is not a potential ARDM.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Hydrogen Damage	No	NOT Applicable to Equipment Type. Since the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch are not exposed to a hydrogen environment, Hydrogen Damage is not a potential ARDM.	REF. 2 REF. 3 REF. 4 REF. 5

Potential ARDM List (Revision 1)

SYSTEM: Containment System 059

EQUIPMENT TYPE: 059-DOOR-01

Date: May 1996

ARDM	POTENTIAL (YES/NO)	DESCRIPTION/JUSTIFICATION	SOURCE
Low Cycle Fatigue	No	NOT Applicable to Equipment Type. Structural deterioration can occur as the result of repeated stress/strain cycles caused by fluctuating loads and temperatures. When cyclic loads are such that significant plastic strain occurs in the highly-stressed regions, the material damage is said to have been caused by low cycle fatigue. Only the periodic Type A, integrated leak rate tests are a major source of load changes for the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch. Since the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch are typically not subjected to either stress or thermal cycles and are normally at ambient temperatures below 120°F and are under insignificant stresses (excluding periodic Type A testing), Low Cycle Fatigue is not a potential ARDM.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
High Cycle Fatigue	No	NOT Applicable to Equipment Type. Since the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch will not be subjected to either high stress (except for the periodic Type A integrated leak rate tests) or high thermal cycles (>10E5 cycles), High Cycle Fatigue is not a potential ARDM.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Wear	No	NOT Applicable to Equipment Type. Since there is no relative motion between the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch surfaces and the Containment structure itself, wear is not a potential ARDM.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5

Potential ARDM List (Revision 1)

SYSTEM: Containment System 059

EQUIPMENT TYPE: 059-DOOR-01 Date: May 1996

ARDM	POTENTIAL (YES/NO)	DESCRIPTION/JUSTIFICATION	SOURCE
Creep	No	NOT Applicable to Equipment Type. Since the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch are not exposed to the required temperature range that would perpetuate this ARDM, Creep is not a potential ARDM.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Electrical Stresses	No	NOT Applicable to Equipment Type. Electrical stresses are induced in the insulating material used in the fabrication of electrical and electromechanical parts and components. Since the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch have no insulation material involved in any intended functions, Electrical stresses are not a potential ARDM.	REF. 2 REF. 3 REF. 4 REF. 5
Stress Relaxation	Yes	Stress relaxation is a potential ARDM for components with substantial preload. Since the Containment Equipment Hatch has bolted connections, stress relaxation is a potential ARDM.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
Elevated Temperature	Yes	Elevated temperatures can cause a reduction in yield strength and a reduction of the modulus of elasticity in steels. Therefore, Elevated Temperature is a potential ARDM for the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch.	REF. 1

Potential ARDM List (Revision 1)

SYSTEM: Containment System 059

EQUIPMENT TYPE: 059-DOOR-01 Date: May 1996

ARDM	POTENTIAL (YES/NO)	DESCRIPTION/JUSTIFICATION	SOURCE
REF. 1: EPRI TR-103835, Pressurized Water Reactor Containment Structures, License Renewal Industry Report, Rev. 1, 7/94. REF. 2: DG-1009, USNRC Draft Regulatory Guide - Standard Format and Content of Technical Information for Applications to Renew Nuclear Power Plant Operating Licenses, 12/90. REF. 3: EPRI TR-103842, Class I Structures License Renewal Industry Report, Rev. 1, 7/94. REF. 4: Component Life Estimation:LWR Structural Materials Degradation Mechanisms - EPRI NP-5461, 9/87. REF. 5: EPRI TR-103838, Pressurized Water Reactor Pressure Vessel Internals License Renewal Industry Report, Rev. 1, 7/94.			

Attachment 3 **Component Grouping Summary Sheet (Revision 1)** Date: **May 1996**

SYSTEM: **Containment 059**

GROUP ID NUMBER: 059-DOOR-01

GROUP ATTRIBUTES:

1. Device Type: DOOR
2. Vendor: Chicago Bridge and Iron
3. Model Number: NA
4. Material: Carbon Steel
   Plate SA-516
   Forgings SA-350
   Castings SA-216
   Bolting SA-320
5. Internal Environment: NA
6. External Environment: NA
7. Function: Maintain Containment Pressure Boundary
8. Name Plate Data:

PARAMETER	VALUE

LIST OF GROUPED COMPONENTS (EQUIPMENT ID):

1DOOR67	2DOOR67
1DOOR68	2DOOR68
1DOOR69	2DOOR69

ARDM Matrix (Revision 1)

SYSTEM NUMBER: 059 SYSTEM NAME: Containment System

EQUIPMENT TYPE: DOOR

DEVICE TYPE: DOOR

GROUP ID 059-DOOR-01 Date: May 1996

	GROUP OR SUB GROUP ID				
ARDMs	059-DOOR-01				
General Corrosion/Oxidation	A				
Irradiation and Irradiation-Assisted Stress Corrosion Cracking (IASCC)	1				
Stress Relaxation	2				
Elevated Temperature	3				

Atachment 5

Matrix Code List (Revision 1)

SYSTEM NUMBER: 059 SYSTEM NAME: Containment System

DEVICE TYPE: DOOR

GROUP ID: 059-DOOR-01 Date: May 1996

CODE	DESCRIPTION	SOURCE
A	General Corrosion/Oxidation is a PLAUSIBLE ARDM for the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch due to the following: 1) The Containment Personnel Airlock, Emergency Airlock and Equipment Hatch are exposed to the internal environment of the containment and corrosion could occur in the presence of moisture and oxygen if their coated surfaces are not maintained by an effective coating management program. 2) The Containment Personnel Airlock, Emergency Airlock and Equipment Hatch can be exposed to conditions conducive to forming condensation (warmed air flowing through an open airlock/hatch) which could lead to oxidation.) The effects of general corrosion/oxidation would be eventual loss of carbon steel material and inability of the door to form the required pressure boundary. This ARDM can be detected visually well before loss of material occurs to the extent that intended function would be affected. Therefore, General Corrosion/Oxidation can be managed by visual examination of Containment equipment hatch and personnel airlocks coated surfaces both in containment and outside containment.	REF. 1 REF. 2 REF. 3 REF. 4
1	Irradiation and Irradiation-Assisted Stress Corrosion Cracking are not PLAUSIBLE ARDMs for the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch, due to the following: 1) The cumulative radiation exposure experienced by the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch throughout the license renewal term is far below the level of 2E17 neutrons/cm^2 (> 1MeV) which could cause a change in mechanical or physical properties	REF. 1

Matrix Code List (Revision 1)

SYSTEM NUMBER: 059 SYSTEM NAME: Containment System

DEVICE TYPE: DOOR

GROUP ID: 059-DOOR-01 Date: May 1996

CODE	DESCRIPTION	SOURCE
2	Stress Relaxation is not a plausible ARDM for the Containment Personnel Airlock, Emergency Airlock, and Equipment Hatch due to the following: 1) The Containment Equipment Hatch flange bolts are not exposed to the high temperature or high radiation levels required for stress relaxation to be a plausible ARDM.. 2) The bolts are typically removed and reinstalled during each outage. 3) The Containment Equipment Hatch is oriented such that the LOCA pressure during an accident would always put the hatch seals in compression. Therefore any slight relaxation of bolting pre-load would not cause leakage. 4) The only external loading on the Equipment Hatch bolts is the dead weight of the hatch itself, which is insignificant.	REF. 1 REF. 2 REF. 3 REF. 4 REF. 5
3	Elevated Temperature is not a PLAUSIBLE ARDM for the Containment Personnel Airlock, Emergency Airlock and Equipment Hatch, due to the following: 1) Normal operating temperatures within PWR containment structures are between 120° F and 150° F which are well below the 700° F level at which the structural integrity of steel begins to be significantly affected.	REF. 1

Matrix Code List (Revision 1)

SYSTEM NUMBER: 059 SYSTEM NAME: Containment System

DEVICE TYPE: DOOR

GROUP ID: 059-DOOR-01 Date: May 1996

CODE	DESCRIPTION	SOURCE
	REF. 1. EPRI TR-103842, Class I Structures License Renewal Industry Report, Rev. 1, 7/94. REF. 2: DG-1009, USNRC Draft Regulatory Guide - Standard Format and Content of Technical Information for Applications to Renew Nuclear Power Plant Operating Licenses, 12/90 REF. 3: EPRI TR-103835, Pressurized Water Reactor Containment Structures, License Renewal Industry Report, Rev. 1, 7/94. REF. 4: Component Life Estimation:LWR Structural Materials Degradation Mechanisms - EPRI NP-5461, 9/87 REF. 5: EPRI TR-103838, Pressurized Water Reactor Pressure Vessel Internals License Renewal Industry Report, Rev. 1, 7/94.	

SYSTEM NUMBER: **059**	SYSTEM NAME: **Containment System**
COMPONENT ID: NA	GROUP ID: **059-PEN-02, 059-PEN-03, 059-DOOR-01**

1 **PLAUSIBLE ARDM FROM ATTACHMENT 5**	2 **PLANT PROGRAM**	3 **REASON FOR THE FORM OF AGING MANAGEMENT ALTERNATIVE CHOSEN**
General Corrosion/ Oxidation	Periodically walkdown the Containment penetrations, equipment hatch and personnel airlocks to identify and correct areas where the external painted surfaces have degraded to the extent that ARDMs could challenge the pressure boundary function. MN-3-100, Protective Coating Program QL-2-100, Issue Reporting PEG-7, System Walkdowns	The plausibility of the ARDMs is due to possible degradation of the external protective paint coatings due to ambient conditions. MN-3-100 requires the monitoring of all coated surfaces in the Containment. For surfaces outside containment, System Engineer Walkdowns as directed by PEG-7 provide for an engineer with "ownership" of the system to closely examine components. These walkdowns will identify and document significant coating degradation and/or presence of corrosion. PEG-7 and MN-3-100 require initiation of an Issue Report in accordance with QL-2-100 for conditions adverse to quality, including housekeeping deficiencies (e.g. degraded paint). Issue Reports identify needed corrective action, and require completion of the work prior to closure. Procedure MN-3-100 also identifies when and how to to correct the degraded condition regardless of its location. This aging management approach provides reasonable assurance that significant degradation (i.e. degradation, which if not corrected, could eventually challenge system pressure boundary) will be identified and resolved.